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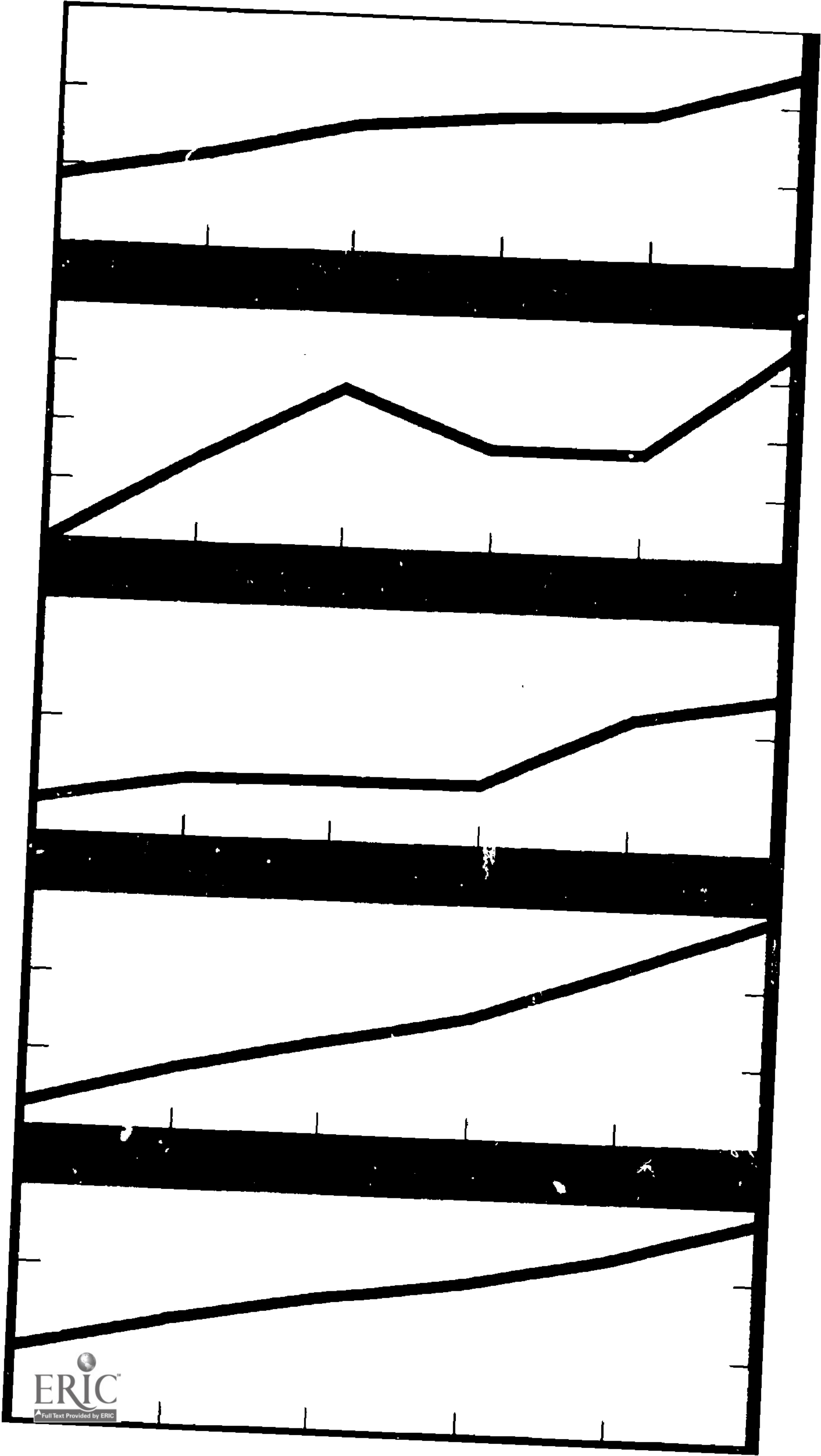
ABSTRACT

While concentrating on the impact of the economic expansion of 1972, U.S. Industrial Outlook 1973 also reviews developments since 1967 and projects activity levels in major manufacturing and nonmanufacturing industries for 1973 and 1980. More service-producing industries have been added in this edition. Coverage is extended to automobile services--repair, rental, leasing, parking, and car wash establishments--and property and liability insurance. Life insurance is again included. The still nebulous but nonetheless opportunity-laden growth field of pollution abatement equipment is explored. Ten of the volume's 47 chapters relate to nonmanufacturing industries that provide services as well as markets for manufactured products. Usual narrative and statistical industry-by-industry analyses are featured as well as the appendix ranking industries by projected rate of increase from 1972-73. The 200 manufacturing industries covered in this publication account for about 85 percent of the shipments value of all U.S. producers. Industry statements include discussions on changes in supply and demand, foreign trade, and technology; developments in employment and productivity; capital investment to improve efficiency and competitiveness and combat pollution; and financial conditions, where possible. (Author)



BCABP-452-08-73-001

U.S. INDUSTRIAL OUTLOOK 1973

with Projections to 1980

U.S. DEPARTMENT OF COMMERCE
Peter G. Peterson, Secretary
James T. Lynn, Under Secretary

Andrew E. Gibson, Assistant Secretary
for Domestic and International Business

Gary M. Cook, Deputy Assistant Secretary
and Acting Director, Bureau of Competitive Assessment
and Business Policy

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Contents

Page

Foreword

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Industry statements include discussions on changes in supply and demand, foreign trade, and technology; developments in employment and productivity; capital investment to improve efficiency and competitiveness and combat pollution; and financial conditions, where possible.

Individual statements together with estimates for 1972, 1973, and 1980 were prepared by industry analysts of the Office of Business Research and Analysis of the former Bureau of Domestic Commerce, now identified as the Bureau of Competitive Assessment and Business Policy.

Preparation of guidelines and technical and editorial work were coordinated by Toba S. Herzenberg, assisted by Renée L. Gallop. Statistical materials and support were provided by David N. Cohen and Ruth C. Knapé.

Your cooperation in returning the questionnaire in the back of this volume will be appreciated.

GARY M. COOK,
Deputy Assistant Secretary and Acting Director,
Bureau of Competitive Assessment and
Business Policy.

January 1973.

Introduction

Building upon 1972's solid economic advances, U.S. industry moves into 1973 with buoyancy. The quest for real economic growth was fulfilled in 1972, and the likelihood is for higher levels of activity for most industries in 1973.

The stage is set for widespread gains—employment is at record levels, inflation has slowed, earned incomes are higher, social security payments have been increased, and the rate of savings has receded but is still high enough to fuel a period of further economic expansion.

With profits higher, investment in new plant and equipment will rise. While thus far the expansion has been accomplished without significant increases in inventory and capacity utilization, continuing growth will require more spending for these purposes. Much more effort and money are being invested to protect the consumer and the environment—new markets are developing for makers of the special equipment needed to clear our air and water.

The construction industry helped boost the economy to higher levels and will continue its all-important role. Two years of record spending for all types of construction are about to be followed by a third, with a slightly different mix. After hitting all-time highs in 1971 and 1972, housing starts are poised for a third great year at a rate somewhere between the recordbreakers. Construction gains will be highest for public utilities, industrial buildings, and health care facilities, mainly reflecting response to the ever expanding needs of a growing population.

Aided by excise tax repeal and currency realignments, the auto industry had 2 successive outstanding years, at the same time keeping imports from capturing a larger share of the domestic market.

U.S. Industrial Outlook 1973 presents a compact review of 1972's developments in more than 250 industries or industry groups—both manufacturing and nonmanufacturing, including services and trade. Activity levels are estimated for 1973 as well as for 1980.

Short- and long-term projections are based on a number of assumptions including a continued decline in the rate of inflation; a leveling of housing starts to about 2.15 million a year; a continuing rise in auto production; defense spending to remain at about current levels; high levels of investment to increase productivity and competitiveness of U.S. industry as well as for pollution control; and a GNP reaching close to $2 trillion (current dollars) in 1980.

Of the manufacturing industries for which projections are included in this edition, 7 are expected to grow by more than 15 percent, 23 to increase sales between 10 and 15 percent, 109 are to rise from 5 through 9 percent, and 21 are estimated to show gains of less than 5 percent in 1973. For one industry no change is expected and sales of 5 are expected to be lower than in 1972. Among nonmanufacturing industries whose activity levels are estimated, 14 are to gain 10 percent or more, 24 are expected to increase between 5 and 9 percent, and advances of less than 5 percent are foreseen for 7 industries.

Appendix B is a list of the industries for which projections are included in this volume, ranked in descending order of projected growth. Manufacturing and nonmanufacturing industries are ranked separately. Summaries of chapters contain projections to 1980 for industries covered.

CHAPTER 1

Construction

For the third straight year the construction industry is providing strong underpinning to the economy. The estimated $150 billion that will be spent in 1973 for new work and for maintenance and repair will add thrust to the expansion underway.

Spending in 1973 for new construction is expected to rise by 7 percent to $130 billion. Three-fourths—$97 billion—will be for privately owned facilities and the remainder—$33 billion—for public works of all types. These dollar outlays will represent the highest annual physical volume of work ever put-in-place (expenditures adjusted for price changes), exceeding the high set in 1972. Thus, construction activity in the upcoming year will provide additional job opportunities and bring the industry's employment level to a new peak.

The record construction forecast for 1973 assumes that mortgage money will be as readily avialable in 1973 as in 1972, that wage and price stabilization will result in less inflated bids for future projects, capital markets will be favorable for financing business construction, and that State and local governments will be able to finance public works more easily than in the past few years.

In general, labor, materials, and machinery and equipment should be in adequate supply in 1973, especially with housing construction probably no longer surging upward. Many local shortage situations which developed during 1972 may be alleviated.

In 1972, about three-fourths of the almost $13 billion rise in the value of new construction put in place was accounted for by the housing sector. In 1973, the $8 billion gain is expected to be spread among almost all categories except for new housing units and educational buildings. While the commercial, public utilities, and hospital categories (public and private) will account for half of the dollar rise, expenditures for other major types of new construction will also advance.

Spending on private residential buildings, which jumped from $32 billion in 1970 to over $53 billion in 1972, will not be contributing to the overall uptrend in 1973. Spending for that sector will probably remain at the 1972 level as housing starts recede somewhat from the all-time high.

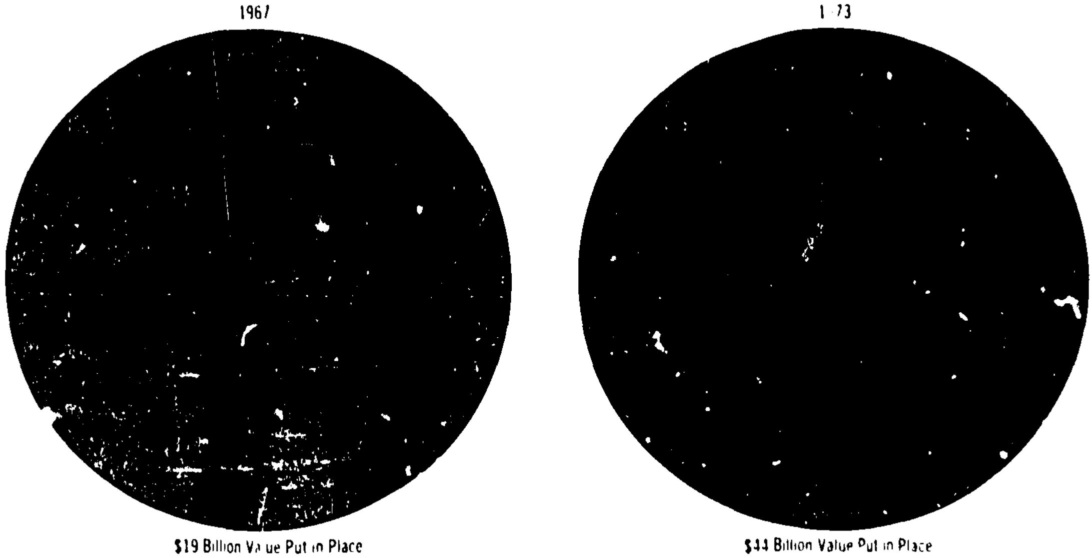
In contrast to 1972's private sector gain of $13 billion, the public sector merely maintained its 1971 level of new construction outlays. It is expected to rise by 10 percent in 1973, twice the rate of increase for privately owned facilities. Contributing to increased State and local spending will be a large rise in spending for new water supply and sewer systems. Other categories which will reflect increases are hospitals, highways, local transit, and airport construction. Public construction spending totaled an estimated $30 billion in 1972 and is expected to rise 10 percent in 1973.

Residential Construction Consolidates Gains

Reflecting basic strength of the housing market, private housing starts in 1973 are expected to total 2,150,000 units—midway between 1971 and the recordbreaking year 1972.

The 1971–73 boom in conventionally built housing and shipments of mobile homes will add 50

Multi-unit share of new housing grows



SOURCE: Bureau of the Census and Bureau of Domestic Commerce

percent more housing supply than the 1968–70 period, and 80 percent more than the 3-year period of 1965–67.

Contributing to expected lower levels of new starts in 1973 are some signs that national vacancy rates may be inching up. This slackening of demand is occurring especially in rentals, mainly of apartment units. The proportion of multiunit starts in 1973 will probably be slightly below their 44 percent share in 1972. Only a few years ago, only 1 out of 3 starts were in such structures.

An anticipated reduction in the number of subsidized housing units will have a considerable effect on housing starts since about 1 in 5 new homes built in 1972 was in this category. Mobile homes are increasingly meeting low-priced housing needs.

Expenditures for new housing units reached $44 billion in 1972 and should be maintained at that level in 1973. Historically, housing expenditures relate closely to the availability of mortgage funds. Inflows of savings, particularly to the savings and loan sector, reached record levels in 1971, only to be topped in the first half of 1972. Because of the lag between commitment of funds and actual construction, funds will be in adequate supply to sustain the projected housing starts level for 1973.

Real Gain in Nonresidential Buildings

The improved price-cost structure will be felt most in the private nonresidential buildings sector. As costs rose 8 percent on the average in both 1970 and 1971, many of these construction projects tended to be postponed and in some cases canceled. In 1972, phase II controls in the construction area have reduced inflation to about 5 percent. It is reasonable to assume that bids in 1973 will be based on more modest estimates of projected increases for labor costs and materials than in the past several years.

The Construction Industry Stabilization Committee (CISC) which preceded the establishment of the Pay Board, has aided in reducing the inflationary trends in construction wage rates. Starting in early 1971, the CISC achieved a reduction of average annual wage increases for the various construction trades to about 11.5 percent compared with 15 percent rises averaged in 1970. For 1972 approved increases are estimated to have averaged about 7.5 percent and prospects are that 1973 construction wage settlements will be brought into line with the Pay Board's phase II standard of 5.5 percent.

On the materials front, it is believed that average cost increases will be held down to between 3 and 4 percent.

Slowdown of construction inflation would result in a sizeable real increase in 1973's pace of new construction of nonresidential buildings perhaps as much as two-thirds of the projected 12 percent dollar gain. Almost $3 billion of the estimated $8 billion rise in value put in place of new construction will come from private nonresidential buildings. This represents a marked change from the 1972 performance when spending rose to $23.7 billion from 1971's $22.5 billion level with no real output growth registered if cost increases are taken into account.

While all nonresidential buildings categories will rise in 1973, religious and educational buildings will increase only slightly. Heaviest expenditures are in the commercial category which includes office buildings, shopping centers, warehouses, gas stations, etc. An estimated 14-percent rise in 1972 is expected to be followed by a 10-percent increase in 1973. Since these facilities typically lag behind new housing construction, many projects which started in late 1972 will contribute heavily to value put in place in 1973. Many new buildings will also be started during 1973 in the new suburban areas. Office buildings especially should benefit from a large carryover of activity from 1972 and its steady growth trend of recent years should be maintained throughout 1973.

Industrial construction, the second largest category among private nonresidential buildings, is expected to pick up considerably from the relatively low levels experienced in the last few years. Expenditures on industrial buildings dropped from $6.8 billion in 1969 to $4.7 billion in 1972, a decline of 30 percent. However, in 1973 a rebound to $5.5 billion is expected. Adequate industrial capacity in recent years was mainly responsible for slackening in demand for new industrial construction. A continuing rise in industrial output will generate a need for modernization and new plant capacity to meet both domestic demand and world competitive conditions. Older plant and equipment also need to be replaced by newer plants at an increasing rate to improve productivity.

Hospital construction should be a most important gainer among nonresidential buildings categories. New hospitals are being built in suburban areas and existing urban hospitals are being modernized. The strong hospital construction market should rise by almost a fifth in 1973, following a 10-percent gain in 1972. The Hill-Burton Act con-

Construction and Housing: Projections 1967–80

	1967	1969	1970	1971	1972 [1]
New construction put in place ($ billions)	77.5	93.4	94.0	109.4	122.0
Total housing starts and shipments of mobile homes	1,562,000	1,913,000	1,870,000	2,581,000	2,905,000
Total housing starts	1,322,000	1,500,000	1,469,000	2,084,000	2,330,000
Private	1,292,000	1,467,000	1,434,000	2,052,000	2,300,000
Public	30,000	33,000	35,000	32,000	30,000
Mobile home shipments to dealers	240,000	413,000	401,000	497,000	575,000

	Percent change 1971–72	1973 [1]	Percent change 1972–73	1980 [1]	Percent change 1972–80 [2]
New construction put in place ($ billions)	12	130.0	7	220.0	7.6
Total housing starts and shipments of mobile homes	13	2,805,000	−3	3,330,000	1.7
Total housing starts	12	2,180,000	−6	2,530,000	1.0
Private	12	2,150,000	−7	2,500,000	1.0
Public	−6	30,000	0	30,000	0
Mobile home shipments to dealers	16	625,000	9	800,000	4.2

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth.

Source: Bureau of the Census, Mobile Homes Manufacturers Association, and Bureau of Domestic Commerce.

tinues to provide Federal aid in the financing of both private and publicly owned hospital facilities.

Upsurge Continues for Electric Energy

In recent years, public utilities construction has maintained a strong pace; primarily electric light and power and telephone. In 1973, the increase in spending for utilities will account for 22 percent of the $8 billion increase in total new construction. All types of public utilities will contribute to the uptrend. The sector's $14.9 billion estimated expenditures in 1973, a 13-percent increase, will be third largest after residential and nonresidential buildings. Gas utilities construction is expected to rise after several years of virtually level expenditures. The more than 50 percent 1973 rise in spending for electric power facilities over 1970 reflects the strong demand for electric energy.

Public Construction To Outpace Private Outlays

With the housing boom expected to slow down in 1973, private construction as a whole will be rising at a more modest pace than public construction. If realized, the 10-percent rise foreseen for all publicly owned facilities would be the sector's best year-to-year actual growth since the mid-sixties. While spending has been rising slowly for some years, gains generally reflected cost increases only.

Outlays in 1972—$30 billion—were only a shade above those in 1971. Two-thirds of the $3 billion increase foreseen for 1973 will go for highway construction—up $750 million; sewer and water projects—up $600 million; hospitals—up $300 million; and miscellaneous public buildings (including office buildings)—up $400 million.

New highway spending dropped in 1972 for the first time in decades, possibly because in many instances satisfactory bid prices were not obtained and possibly because of the unwillingness of State and local governments to use funds for projects for which Federal aid is not available. In any event, 1973 should be a catchup year for road building. Increased revenues especially the indirect impact of revenue sharing grants from the Federal Government, should help push spending up to over $11 billion.

Sewer and water projects which have been deferred in many local areas because of lack of funds, even as housing development intensified, should have one of its strongest years in 1973. Because of intense community pressure for more facilities, both to deal with pollution and to spur housing construction, bond issues to finance these projects have become increasingly acceptable to voters. However, although sewer systems outlays will probably reach another new high in 1973 of $2.25 billion, water supply facilities outlays at $1.35 billion will still be below the $1.5 billion peak of 1968.

Possibly the weakest sector among the nonresidential types of public buildings is educational construction. In physical volume, a further decline in 1973 is likely to take place, although total spending should be close to 1972 levels. Basically, falling elementary school enrollments and school financing problems will limit new school construction. Strong resistance to new bond issues for school construction (in contrast to support for sewer and water bonds) in many communities has increased the difficulty of financing school expansion plans in many areas. Also, recent court decisions on the unconstitutionality of funding public schools through local property taxes may delay further large scale construction pending new ways to finance public school facilities.

Among public buildings, the estimated 29-percent gain in the hospitals category in 1973 will be the largest in any new public or private construction category.

In federally owned construction, office buildings—part of the "other public buildings" category—also will rise significantly. However, many of the dollars spent for office building construction, primarily for use by the Federal Government, will show up in the statistics for private commercial buildings because of the recent trend to "build-lease" contracts. Federal construction expenditures as a whole should come close to the $5 billion mark in 1973 after exceeding an estimated $4.5 billion last year.

Long Term Outlook

Construction activity in 1980 is projected at $220 billion; private housing starts are estimated at 2.5 million units in 1980. By then the Nation shall have more than fulfilled its 10-year housing goal of 26-million units established for the period 1969–78. It is also likely that as a result of technical research in the field of housing, including such government sponsored programs as "Operation Breakthrough," a large proportion of homes to serve the needs of lower and middle income families will be produced. Possibly a sizeable proportion—1 out of 5 housing units—will be produced under factory conditions (not including mobile homes) and not onsite.

By 1980, need for energy and environmental conservation will have an increasing impact on both building design and materials and components. Developments in community planning will probably make multipurpose buildings for housing and other uses increasingly popular. While housing units will be of primary importance to the creation of new communities or redevelopment of existing ones during the 1970's, emphasis by 1980 will be on types of construction other than housing, such as schools, health care facilities, and libraries.

Public utilities construction should be particularly strong to satisfy energy demand and communication needs. In the public area, emphasis may be less on highway construction and more on building mass urban-suburban transportation facilities. Water supply facilities and sewer systems will also receive high priority within the public sector.

Expenditures for labor will account for a smaller proportion of total onsite construction costs, reflecting strong efforts during the 1970's to spur construction productivity.—*Aaron Sabghir, Office of Business Research and Analysis.*

New Construction Put in Place: Trends and Projections 1970–73

[In millions of dollars]

Type of Construction	1970 [1]	1971 [1]	1972 [2]	1971–72 Percent Change	1973 [2]	1972–73 Percent Change
Total new construction	$94,030	$109,399	$122,000	12	$130,000	7
Private construction	65,932	79,535	92,000	16	97,000	5
Residential buildings	31,864	43,062	53,300	24	53,500	(3)
New housing units	24,272	34,860	44,000	26	44,000	0
Additions and alterations	6,234	6,8[illegible]7	7,350	8	7,400	1
Nonhousekeeping	1,358	1,395	1,950	40	2,100	8
Nonresidential buildings	21,417	22,479	23,700	5	26,600	12
Industrial	6,538	5,423	4,700	-13	5,550	18
Commercial	9,754	11,619	13,200	14	14,500	10
Religious	931	813	850	5	875	3
Educational	865	943	950	1	975	3
Hospital and institutional	2,529	2,864	3,150	10	3,750	19
Miscellaneous nonresidential buildings	800	817	850	4	950	12
Farm construction, nonresidential	824	826	850	3	900	6
Public uitilities	10,881	12,175	13,150	8	14,900	13
Telephone and telegraph	2,968	3,005	3,200	6	3,600	13
Electric light and power	5,804	7,068	7,850	11	8,850	13
Gas	1,578	1,571	1,600	2	1,850	16
Railroad	304	301	275	9	325	18
Petroleum pipe lines	227	230	225	-2	275	22
All other private	946	993	1,000	1	1,100	10
Public construction	28,098	29,864	30,000	(3)	33,000	10
Buildings	10,657	11,397	11,050	-3	11,825	7
Housing and redevelopment	1,107	1,136	850	-25	900	6
Industrial	499	572	550	4	575	5
Educational	5,619	5,564	5,300	-5	5,300	0
Hospital	837	981	1,050	7	1,350	29
Other public buildings	2,595	3,144	3,300	5	3,700	12
Highways and streets	9,981	10,658	10,400	-2	11,150	7
Military facilities	718	894	1,050	17	1,200	14
Conservation and development	1,908	2,095	2,400	15	2,750	15
Other public construction	4,834	4,820	5,100	6	6,075	19
Sewer systems	1,544	1,829	1,900	4	2,250	18
Water supply facilities	1,094	996	1,100	10	1,350	23
Miscellaneous public construction	2,196	1,995	2,100	5	2,475	18

[1] Bureau of the Census figures.
[2] Estimated by Bureau of Domestic Commerce.
[3] Less than one-half of 1%.

Mobile Homes

Reflecting increased demand for large, well-equipped mobile homes, retail sales in 1972 jumped 18 percent to about $3.9 billion, almost triple the sales value in 1967. About 575,000 units were shipped to dealers, 16 percent more than in 1971.

Many manufacturers increased production schedules in 1972 in order to meet immediate housing needs of flood victims. Because units purchased directly by governmental agencies are not included in the industry shipments and retail sales data, the several thousand units purchased in 1972 by Federal, State, and local governments for flood and hurricane victims represented production not included in industry output figures. For example, about 11,500 units were purchased by governmental agencies for this use last July and August.

Shipments in 1973 are expected to increase about 9 percent to 625,000 and retail sales will probably rise 13 percent to $4.4 billion.

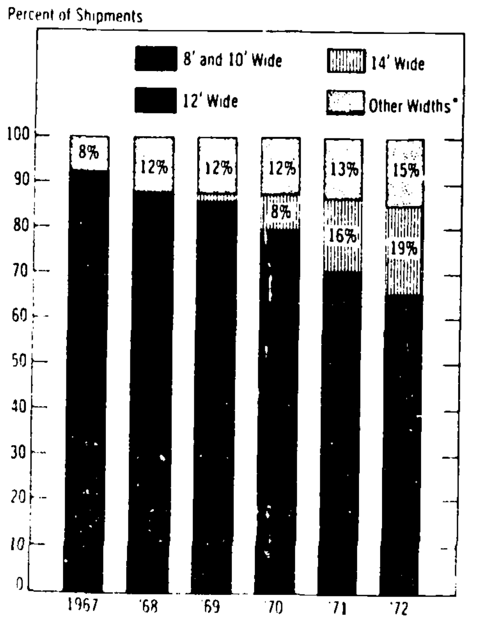
Mobile home production is significantly contributing to the Nation's 10-year goal for 26 million homes by 1978, outlined in the Housing and Urban Development Act of 1968. Since 1969, mobile homes have accounted for 20 percent of total housing additions.

Wider Mobile Homes Popular

Mobile homes are increasingly becoming almost as large as the average conventionally built home started in the years immediately following World War II. Mass production of 14-foot-wide units began in 1969 after legislatures in several States amended laws permitting such units to move on their highways. Shipments of 14-foot-wide units rose from only 2 percent of all mobile home shipments in 1970 to 16 percent in 1971. Combined shipments of 14-foot-wide units and double-wide models jumped from 11 percent in 1969 to 28 percent in 1971.

Resembling many conventionally built homes in structural characteristics as well as in size, mobile homes use lumber (for floor joists, roof joists and studs), plywood and hardboard, and fiberglass

Market expanding for wider mobile homes



Manufacturers' Shipments of Mobile Homes to Dealers in the United States and Value of Retail Sales 1967-80

Year	Units shipped to dealers	Percent increase from previous year	Retail sales (millions)	Percent increase from previous year
1967	240, 360	10. 6	$1, 370. 1	10. 6
1968	317, 950	32. 3	1, 907. 7	39. 2
1969	412, 690	29. 8	2, 496. 8	30. 9
1970	401, 190	-2. 8	2, 451. 3	-1. 8
1971	496, 570	23. 8	3, 297. 2	34. 5
1972	575, 000	15. 8	3, 900	18. 3
1973 [1]	625, 000	8. 7	4, 400	12. 8
1980 [1]	800, 000	[2] 4. 2	6, 400	[2] 6. 4

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth from 1972.

Source: Mobile Homes Manufacturers Association and Bureau of Domestic Commerce.

(for insulation). Kitchen and bathroom fixtures are similar to those found in conventionally built homes. Exteriors are usually aluminum or steel siding with a trend developing toward use of horizontal siding and special roof treatments to make the outside resemble conventional homes. Mobile homes are shipped from the plant with furniture, draperies, venetian blinds, carpets, standard kitchen appliances, and, in some cases, clothes washers, dryers, dishwashers and airconditioning equipment.

Most Mobile Homes in South and West

According to the 1970 Census of Housing, 1.3 million of the Nation's 2.1 million mobile homes—nearly 62 percent—were located in Southern and Western States, especially areas with a relatively mild climate. These two regions contain less than half of the Nation's year-round housing supply.

About 42 percent of the mobile homes were located in 16 Southern States—with Florida, North Carolina, Texas, and Georgia alone accounting for 21 percent—and 20 percent are located in the 13 Western States. In the two areas, four States—California, Florida, North Carolina, and Texas—accounted for more than one-fourth of all mobile homes.

Production Concentrated in 10 States

Because of the high cost of shipping mobile homes, the industry's major production originates in the States where demand is high. Mobile home manufacturers in 10 States accounted for almost three-fourths of production in 1971. Eight of these major producing States are also leading mobile home users.

Sales of mobile homes tend to be high in States where they are already popular. Shipments in relation to existing supply in 1971 varied greatly, from a low of 8 percent in Connecticut to a high of 36 percent in Texas. Shipments to Texas, Colorado, Arizona, Oregon, Mississippi, and Tennessee were equal to more than 30 percent of the mobile homes already in the area. Other fast-growing markets were Alabama, Georgia, Arkansas, Florida, Kentucky, North Carolina, Utah, New Mexico, Idaho, Oklahoma.

Home Costs Favor Industry Growth

Factory-built mobile home markets have expanded during recent years when conventional home building was affected by rapidly rising costs. Mobile home manufacturers were able to keep labor costs from rising as fast as conventional construction labor costs.

Square foot prices of mobile homes have been relatively stable in recent years, particularly because of relatively low labor costs and also because of freedom from the disrupting effects of bad weather, better conditions for scheduling and materials handling, and quality control techniques.

Marketing costs in the industry are not excessive. The lack of exclusive franchising arrangements with dealers makes it possible for a dealer to offer products from as many as six different manufacturers at one location. This helps to hold down the number of dealerships and reduces the need for manufacturers and dealers to increase prices in order to protect high investments in dealers' showrooms and facilities.

Technical Standards Protect Consumers

With growing acceptance of the mobile home as a form of permanent housing accommodations,

Mobile Homes Location, Production and Shipments to States [1]

[Thousand units]

	Location in 1970—			1971—	
	Mobile homes	Total Year-round housing units	Mobile homes as a percent of Year-round housing units	Shipments to States	Production in States
U.S. total	2,073	67,699	3.1	497	507
Northeast	241	16,198	1.5	42	33
Connecticut	10	969	1.0	1	0
Maine	16	339	4.7	4	0
Massachusetts	11	1,839	.6	1	0
New Hampshire	13	249	5.2	2	(3)
New Jersey	15	2,305	.7	2	(3)
New York	78	6,159	1.3	12	(3)
Pennsylvania	88	3,880	2.3	18	32
Rhode Island	2	307	.7	(2)	0
Vermont	9	150	6.0	1	0
East North Central	331	13,114	2.5	75	98
Illinois	74	3,692	2.0	12	1
Indiana	68	1,712	4.0	15	62
Michigan	75	2,845	2.6	23	14
Ohio	86	3,448	2.5	18	10
Wisconsin	28	1,416	2.0	7	12
West North Central	168	5,561	3.0	35	44
Iowa	24	955	2.5	5	(3)
Kansas	27	788	3.4	5	20
Minnesota	30	1,220	2.5	7	6
Missouri	51	1,666	3.1	10	7
Nebraska	15	511	2.9	4	9
North Dakota	10	200	5.0	2	(3)
South Dakota	12	222	5.4	2	2
South Atlantic	504	10,148	5.0	133	134
Delaware	9	175	5.1	2	0
Florida	172	2,491	6.9	49	35
Georgia	76	1,467	5.2	23	57
Maryland	20	1,235	1.6	2	(3)
North Carolina	98	1,620	6.0	27	26
South Carolina	50	805	6.2	12	7
Virginia and District of Columbia	51	1,763	2.9	11	7
West Virginia	27	593	4.6	7	(3)
South Central	364	10,736	3.4	111	119
Alabama	51	1,115	4.6	16	29
Arkansas	30	673	4.5	9	10
Kentucky	43	1,061	4.1	12	5
Louisiana	38	1,146	3.3	8	6
Mississippi	31	697	4.4	10	10
Oklahoma	28	938	3.0	7	5
Tennessee	48	1,297	3.7	15	8
Texas	95	3,809	2.5	34	46
Mountain	175	2,721	6.4	47	23
Arizona	52	579	9.0	17	7
Colorado	31	743	4.2	11	2
Idaho	16	238	6.7	4	11
Montana	17	241	7.1	3	(3)
Nevada	21	172	12.2	3	0
New Mexico	19	322	5.9	5	(3)
Utah	9	312	2.9	2	(3)
Wyoming	10	115	8.7	1	(3)
Pacific	289	9,221	3.1	54	56
Alaska	10	89	11.2	1	(4)
California	197	6,976	2.8	33	43
Hawaii	(2)	216	.1	(2)	0
Oregon	38	736	5.2	12	9
Washington	44	1,205	3.7	8	4

NOTE.—May not total due to rounding.

[1] 1970 Census of Housing, Mobile Home Manufacturers Association, Bureau of Domestic Commerce.

[2] Less than 1,000 units.

[3] Withheld to prevent disclosure of individual plant production.

[4] Included in Mountain total.

quality and safety standards have become matters of great concern to both consumers and the industry. Mobile homes are not generally covered by local building codes.

The Mobile Home Manufacturers Association, in cooperation with the National Fire Prevention Association and other organizations, developed the industry's standard for mobile home construction. The American National Standard Institute's standard, A119.1, "Mobile Homes Body and Frame Design and Construction Requirements, Installation of Plumbing, Heating and Electrical Systems," is mandatory for all mobile homes built by members of the Mobile Home Manufacturers Association, which account for the bulk of the output; for all units financed under FHA- and VA-insured loan programs; and is incorporated in legislation in more than 30 States. Unannounced inspections of manufacturers' plants are carried out by the industry association and government representatives to monitor compliance.

Park Situation Changing

Because of reluctance of zoning and planning officials to permit mobile homes in residential areas of conventional homes, most are in parks on the outskirts of metropolitan areas. Zoning restrictions barring mobile homes result from concern that residents would overburden existing school facilities and public services and would not contribute significantly to tax receipts since mobile homes have generally been exempt from property taxes.

Recent court cases on school financing may have a liberalizing influence on zoning and planning decisions affecting mobile home parks. These cases concern the need for States to adopt school financing programs which would tend to equalize expenditures on public education throughout a State and counteract the effects on local schools of large local differences in property taxes.

Many new parks are being built to accommodate the rapidly rising number of mobile homes. Newer parks are generally larger than older parks (150 to 300 sites compared with about 60 to 75 sites), provide less density (seven to eight sites per acre, rather than 15 to 18) and provide larger sites to accommodate larger units. Some of the newer parks incorporate recreational facilities and community amenities usually associated with suburban living.

Consumer Financing Improves

Availability of financing to mobile home purchasers is a most important influence on growth of the industry. Commercial banks and finance companies now finance most mobile homes by extending credit to dealers and their customers on consumer installment loan terms similar to loans provided for the purchase of cars or home improvements. However, more buyers are obtaining loans with maturity periods up to 15 years through insured loan programs. These FHA and VA loans also have lower monthly payments because of the use of simple interest rates rather than "add-on rates." Improved financing opportunities have increased sales of more expensive units.

In mid-1972, of an estimated $10 billion of outstanding mobile home loans, about half were held by commercial banks. Smaller banks located outside SMSA's held two-thirds of all bank-held mobile home loans.

Since federally insured savings and loan institutions received authority to finance mobile homes in late 1969, their loans outstanding rose from about $200 million at the end of 1970 to about $650 million by mid-1972. Only a small portion of this portfolio is in FHA-insured or VA-guaranteed loans. To facilitate such financing, the Veterans' Administration permits experienced lenders to extend loans without individual prior VA approval. Recently, the Government National Mortgage Association (GNMA) encouraged investment by pension funds, savings banks, insurance companies and credit unions in securities backed by pools of FHA-insured mobile home loans. Purchasers of these securities receive a guaranteed

1972 Profile

Mobile Homes

SIC code	3791 (part)
Retail value of units shipped (millions)	$3,900
Quantity shipped	575,000
Number of establishments	650–700
Compound annual average rate of growth 1967–72 (percent):	
Quantity shipped	19.1
Retail sales	23.0
Major producing areas	Indiana, Georgia, Texas, California, Florida, Pennsylvania, Alabama

payment reflecting interest and repayment of the principal by the home owners.

6 Million More Mobile Homes by 1980

Mobile home shipments in 1980 are expected to total about 800,000 units, with a retail sales value of about $6.4 billion. The average annual increase in unit shipments between 1972 and 1980 will be 4.2 percent, a lower rate of increase than in recent years. However, at this rate, almost 6 million new mobile homes will be shipped between 1973 and 1980.

Major markets for mobile homes will continue to be in rural areas and the urban fringes where they are one of the few sources of low cost housing for low- and moderate-income families. The placement of mobile homes on concrete "shelves" several stories high, as has been done in some places, may help augment the housing supply in suburban areas where land is relatively expensive.

The fast growing number of mobile homes in use in the United States has created a large stock of used units for sale to potential housing purchasers. Because mobiles depreciate quickly, the price of a 3- to 5-year-old unit is attractive compared to other available housing alternatives. Insurance companies, for example, have used depreciation factors as high as 50 percent in the first 5 years.

In addition to the year-round housing market, the industry is involved in markets for vacation homes, commercial structures (construction job-site offices, banks, stores, etc.), public service buildings (libraries, clinics, etc.), and emergency housing. The industry has the ability to provide these multiuse and emergency use units with a minimum of lead time.—*Abraham Goldblatt and Charles B. Pitcher, Office of Business Research & Analysis.*

CHAPTER 3

Building Materials

Demand for building materials and products reached new peaks in 1972, with construction at a record high. The boom in housing and in some types of nonresidential construction—electric light and power, commercial, hospital and conservation and development—resulted in uneven pressures on the materials supply industries. As construction growth varied among geographic areas, local supply problems in some building materials developed for the first time in many years, especially for cement, plumbing fixtures and brick.

While high levels of construction will continue in 1973, growing shortages of building materials (except lumber) are unlikely, because of shifts in the construction mix. Some tapering off in demand for residential housing construction materials is expected, even as demand for materials for nonresidential construction increases.

Price Rises Slowing

Wholesale prices of all construction materials rose 5.4 percent in 1972, compared with 6.2 percent in 1971. Most of the overall increase reflected rising lumber and wood products prices, which advanced at three times the rate of the composite index—16 and 19 percent respectively.

Prices of most other types of building materials increased at significantly lower rates in 1972 than a year earlier. The rate of increase for prepared asphalt roofing dropped sharply from 24 percent in 1971 to only 5.5 percent in 1972, suggesting some amelioration of a tight raw material supply.

The largest 1972 price rise, apart from some lumber and wood products, was for gypsum wallboard, required in large quantities for housing. Partly reflecting weaker demand in the nonresi-

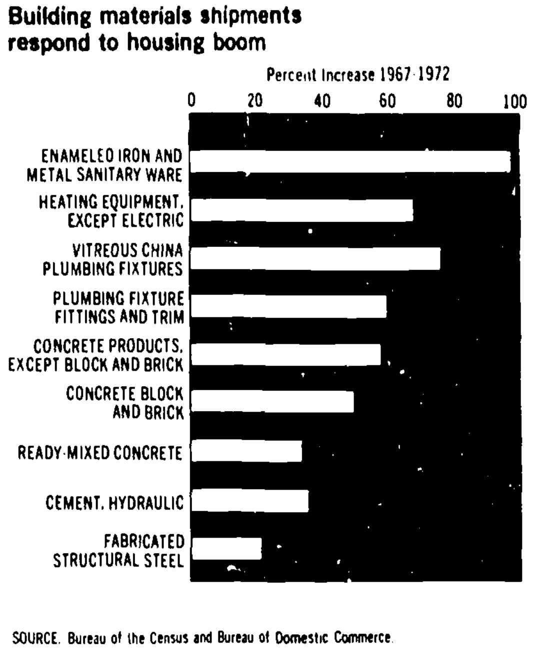
Building Materials: Projections 1972-80[1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971-72	1973	Percent increase 1972-73	1980	Percent increase 1972-80[2]
3241	Hydraulic cement	$1, 700	9	$1, 850	9	$3, 100	7. 8
3271	Concrete block and brick	825	7	875	6	1, 350	6. 3
3272	Concrete products, except block and brick	1, 900	9	2, 100	11	3, 500	7. 9
3273	Ready-mixed concrete	3, 600	8	3, 850	7	6, 000	6. 6
3261	Vitreous plumbing fixtures	300	28	350	17	475	5. 9
3431	Metal sanitary ware	500	15	525	5	750	5. 2
3432	Plumbing fittings, brass goods	650	21	725	12	1, 200	8. 0
3433	Heating equipment, except electric	1, 800	36	1, 950	8	3, 000	6. 6
3441	Fabricated structural steel	3, 650	9	4, 000	10	6, 200	6. 8

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.



dential building market, copper building wire prices fell 5 percent.

Pollution Control Costly

Along with meeting renewed demand for building materials, producers' efforts were directed toward compliance with Federal, State, and local regulations on air and water pollution. Cement producers, nearing capacity operations to meet customer needs, had to cope at the same time with rising capital costs of pollution abatement equipment for both new and existing plants. Similarly, while sales of asphalt roofing products rose sharply, producers were also required to lower pollution emissions.

Substitutions Continue

Rapidly rising prices in the construction industry sector in recent years have had a rippling effect on building materials producers. Users and designers now emphasize use of cheaper materials, and of products which require less labor for on-site

Wholesale Price Indexes for Selected Construction Materials, 1970-72 [1]

[1967=100]

	1970	1971	1972 [2]	Percentage change	
				1970–71	1971–72
All construction materials	112.5	119.5	126.0	6.2	5.4
Lumber and wood products	113.7	135.5	156.8	19.2	15.7
Millwork	116.0	120.7	127.6	4.1	5.7
Softwood lumber	113.4	141.0	164.9	24.3	17.0
Softwood plywood	113.6	127.2	154.0	12.0	21.1
Gypsum wallboard	93.4	99.7	107.6	6.7	7.9
Fabricated structural steel for buildings	110.6	118.7	123.7	7.3	4.2
Reinforcing steel bars (concrete)	109.2	117.1	114.8	7.2	−2.0
Galvanized sheets	109.7	114.9	122.1	4.7	6.3
Finished steel structural shapes	115.3	126.8	134.6	10.0	6.2
Heating equipment	110.6	115.5	117.9	4.4	2.1
Warm-air furnaces	111.1	114.5	115.2	3.1	0.6
Steam and hot water heating equipment	110.7	116.4	119.3	5.1	2.5
Metal doors, sash and trim	112.9	118.1	120.2	4.6	1.8
Insulation materials (mineral wool)	123.1	131.7	136.7	7.0	3.8
Portland cement	115.7	124.6	131.1	7.7	5.2
Sand, gravel and crushed stone	113.5	119.1	121.4	4.9	1.9
Concrete building block	113.2	118.3	122.1	4.5	3.2
Concrete pipe	103.5	112.0	115.4	8.2	3.0
Ready-mixed concrete	113.6	122.7	127.5	8.0	3.9
Prepared asphalt roofing	101.8	126.5	133.4	24.3	5.5
Masonry brick (common and face)	112.2	117.4	121.5	4.6	3.5
Plumbing fixtures and brass fittings	112.5	116.4	119.3	3.5	2.5
Brass fittings	115.8	120.0	121.9	3.6	1.6
Enameled and iron plumbing fixtures	111.4	114.4	120.4	2.7	5.2
Vitreous china fixtures	108.9	111.8	115.2	2.7	3.0
Copper water tubing, straight lengths	123.1	108.5	115.7	−11.9	6.6
Copper building wire	123.0	97.9	92.6	−20.4	−5.4
Builders' hardware	112.9	117.7	120.0	4.3	2.0
Window glass	116.1	124.8	128.5	7.5	3.0

[1] Source: Bureau of Labor Statistics and Bureau of Domestic Commerce.

[2] Estimated on basis of first 9 months of 1972.

installation, or produce savings in long-term maintenance and operating costs. Although industrialized housing gains are not yet significant, use of factory prefabricated components and systems for other types of building construction continues to grow. There is renewed emphasis on testing new materials and combinations of materials involving plastics, mineral boards and various waste materials. An example of this move into substitute materials is the growing popularity of steel studding.—*Aaron Sabghir and Charles B. Pitcher, Office of Business Research and Analysis.*

CEMENT AND CONCRETE

1972 Profile

Cement and Concrete

SIC Codes	3241, 3271, 3272, 3273
Value of industry shipments (millions)	$8,025
Number of establishments	10,000
Employment (thousands)	195
Compound annual rates of growth 1967–72 (percent):	
Value of shipments (current dollars)	6.1
Employment	2.3
Value of Portland cement imports	32.6
Value of Portland cement exports	−5.8
Major producing areas	Throughout the United States

Portland cement shipments rose about 5 percent in 1972 to a record 82 million short tons. Value of industry shipments increased 9 percent to about $1.7 billion. In 1973, value of shipments is expected to increase 9 percent further to almost $1.9 billion.

Some 50 companies operate about 170 cement clinker producing plants in the United States. Plants are usually situated near limestone quarries and generally fairly close to major areas of demand. Land transportation costs are high relative to the value of the cement. Distribution terminals established to expand market areas are erected on waterways accessible to the plants, because of lower water transportation rates.

Producers of ready-mixed concrete, primary customers of the cement industry, purchased 63 percent of all cement shipments in 1971. Concrete product manufacturers (block, pipe, precast, and prestressed) purchased 13 percent, highway contractors 9 percent, and building materials dealers, almost 9 percent. Customers also include other construction contractors and Government agencies.

Cement shipments in tonnage from U.S. plants increased at an annual average rate of 3.1 percent from 1967 to 1972 while imports grew at a 32.6 percent average annual rate. In 1972, with apparent U.S. consumption (domestic shipments plus imports less exports) at 86.3 million tons, imports accounted for 5.3 percent of domestic consumption. Most cement imported into the United States is supplied by Canada, the Bahamas, and Norway. Exports in 1972 were insignificant.

Wholesale prices for cement rose almost 10 percent in 1970, 8 percent in 1971 and an estimated 6 percent in 1972. Prices increased at an average annual rate of 5.7 percent in the period 1967–72.

Local Cement Shortages

In 1972, cement shortages developed in some parts of the country, largely because of sharply increased new residential building. Shortages were most critical in the Southeastern States, with Florida most affected because of overall construction market demand and because of the popularity of cement and concrete products in that State.

Development of the cement supply problem dates from the late 1950's and early 1960's when the industry greatly expanded capacity to meet projected rapid growth in demand, especially in highways. When demand did not grow to the extent projected, production fell well below capacity. Capacity utilization in the 1960's ranged from a low of 71.5 percent in 1962 to a high of 78.7 percent in 1969, resulting in severe price competition. As a result, capital expenditures for new plants and equipment declined during these years.

Because of the housing boom, cement capacity utilization rose to 87.7 percent in 1971. Plants in many States, including Georgia, Alabama, Virginia, North Carolina, South Carolina, Maryland, West Virginia, Wyoming, Montana, Idaho, Indiana, Kentucky and Wisconsin, registered even higher capacity utilization. Estimated capacity utilization in 1972 was above 90 percent for the entire industry. With a relatively mild 1971–72 winter in the Northeast, construction activity was higher than usual, reducing the amount of cement usually available for shipment to Southern States.

Cement industry shipments are expected to rise at an average annual rate of 7.8 percent between 1972 and 1980, reaching over $3 billion by 1980.

Ready-Mixed Concrete

The ready-mixed concrete industry is an important supplier to almost all construction projects. Expansion in concrete shipments may be hampered in some areas by cement shortages. Shipments of the ready-mixed industry should reach almost $3.9 billion in 1973, 7 percent over estimated 1972 shipments of $3.6 billion. From 1967 to 1972, shipments rose at an average annual rate of 6.1 percent. Shipments are expected to increase at a 6.6 percent rate from 1972 to 1980, reaching $6 billion by 1980.

The ready-mixed concrete industry consists of almost 5,000 plants located throughout the United States, generally near metropolitan markets. Major problems of the industry are cement availability, the need to meet air and water pollution standards, and the increasing competition for poured-in-place concrete from precast and prestressed structural and cladding elements.

Producers of the increasingly popular precast and prestressed units generally buy cement directly from cement producers and mix it in their

Cement and Concrete: Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971[p]	1972[1]	Percent increase 1971–72	1973[1]	Percent increase 1972–73
Hydraulic cement, SIC 3241:								
Value of shipments	1, 247	1, 392	1, 376	1, 560	1, 700	9	1, 850	9
Total employment (thousands)	33	30	30	29	30	3		
Production workers (thousands)	26	25	24	23	24	4		
Value added	812	891	880	976	NA			
Value added per production worker man-hour	$15. 47	$17. 60	$18. 06	$20. 63	NA			
Product:[2]								
Value of shipments	1, 222,	1, 375	1, 362	[1] 1, 545	1, 680	9		
Quantity shipped (thousands of short tons)[3]	70, 315	77, 047	73, 408	77, 882	81, 870	5		
Imports (thousands of short tons)	1, 112	1, 821	2, 597	3, 087	4, 560	48		
Exports (thousands of short tons)	184	111	159	125	136	8		
Wholesale price indexes (1967=100)	100	105. 6	115. 7	124. 6	132. 0	6		
Concrete Block and Brick, SIC 3271:								
Value of shipments	550	644	652	775	825	7	875	6
Total employment (thousands)	21	21	23	22	22	0		
Production workers (thousands)	15	14	16	15	15	0		
Value added	274	318	351	391	NA			
Value added per production worker man-hour	$8. 96	$10. 84	$10. 80	$12. 99	NA			
Product value of shipments[2]	502	581	577	[1] 700	750	7		
Wholesale price indexes (1967=100)	100	107. 9	113. 2	118. 3	122. 7	4		
Concrete Products, n.e.c.; SIC 3272:								
Value of shipments	1, 201	1, 408	1, 496	1, 739	1, 900	9	2, 100	11
Total employment (thousands)	57	59	63	65	65	0		
Production workers (thousands)	45	47	51	52	53	2		
Value added	723	849	917	1, 055	NA			
Value added per production worker man-hour	$7. 67	$8. 46	$8. 77	$9. 98	NA			
Product value of shipments[2]	1, 148	1, 356	1, 440	[1] 1, 680	1, 840	10		
Wholesale price indexes (1967=100), concrete pipe	100	101. 6	103. 5	112. 0	115. 6	3		
Ready-mixed Concrete, SIC 3273:								
Value of shipments	2, 684	2, 925	3, 143	3, 322	3, 600	8	3, 850	7
Total employment (thousands)	75	75	83	78	78	0		
Production workers (thousands)	49	49	59	56	57	2		
Value added	1, 156	1, 321	1, 404	1, 457	NA			
Value added per production worker man-hour	$11. 47	$12. 86	$12. 53	$13. 19	NA			
Product value of shipments	2, 331	2, 471	2, 579	[1] 2, 750	3, 000	9		
Wholesale price indexes (1967=100)	100	107. 2	113. 6	122. 7	127. 9	4		

[1] Estimated by Bureau of Domestic Commerce.
[2] Value of shipments of cement and concrete products made by all industries.
[3] Bureau of Mines.
[p] Preliminary.

Note.—NA=not available.
n.e.c.=not elsewhere classified.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

own batching plants, bypassing the ready-mixers. At the construction site, these products may be substituted for poured-in-place concrete for many applications.

Precast Units Gaining

The concrete products (except block and brick) industry produces precast and prestressed concrete building units and concrete pipe. Shipments of this industry are expected to reach $2.1 billion in 1973, 11 percent over 1972 levels. Shipments rose 9 percent in 1972 to $1.9 billion. The industry comprises about 3,600 plants spread across the country usually on the fringe of urban areas. The industry's markets are chiefly nonresidential construction projects and multifamily housing.

The industry continues to be the fastest growing segment of the cement and concrete industries. Demand is high for reinforced and pressure pipe because of rapidly growing expenditures for water and sewer construction. Use of precast and prestressed products is growing because they require less on-site labor and reduce seasonal shutdowns. Demand for concrete building systems (panels and modular) produced in industry plants is also expected to increase. Concrete product shipments are expected to grow at an average annual rate of 7.9 percent between 1972 and 1980 to total $3.5 billion, about double the value of shipments in 1971.

Block Shipments Rise

Shipments of the concrete block industry in 1973 are expected to reach $875 million, 6 percent over 1972 shipments of $825 million. The concrete block industry consists of about 1,500 establishments dispersed across the country. Its products are used mainly in housing construction—particularly in the South—and for industrial buildings. Producers are striving to develop and market factory-produced block panels and walls to compete with other industrialized building components. Shipments are expected to rise to almost $1.4 billion in 1980, reflecting an average annual increase of 6.3 percent from 1972. —*Charles B. Pitcher, Office of Business Research and Analysis.*

1972 Profile

Plumbing and Heating Equipment

SIC codes	3261, 3431, 3432, 3433
Value of industry shipments (millions).	$3,250
Number of establishments	825
Employment (thousands)	82
Compound annual rates of growth 1967–72 (percent):	
Value of shipments (current dollars).	11.4
Employment	2.1
Major producing areas	Middle Atlantic and East North Central

PLUMBING AND HEATING EQUIPMENT

Shipments of plumbing fixtures and fittings increased sharply in 1972. Vitreous fixtures shipments rose 28 percent to $300 million. Plumbing fittings and brass goods shipments grew 21 percent to $650 million. Metal plumbing fixtures shipments increased about 15 percent to $500 million. Contractors in some areas encountered delays in delivery.

With high construction activity continuing in 1973, vitreous fixtures shipments are expected to rise 17 percent to $350 million; plumbing fittings, 12 percent to $725 million; and metal plumbing fixtures, 5 percent to $525 million.

These industries' markets divide into new building construction and replacement needs. The housing sector is most important; a larger number of fixtures and fittings is required per square foot of floor area than in most nonresidential buildings.

Factory-built complete bathroom units, which are set in place at the construction site, have been used in both rehabilitation work and in new housing. These units are produced both by plumbing fixture firms and by companies in the prefabrication field. Some units include plumbing walls for kitchens, along with set-in-place counters and appliances. Others are one-piece or several-piece units of molded plastic with fixtures as parts of the molded wall, floor and ceiling. There are "wet core" modular type units, made of conventional materials, including regular type bathroom fixtures.

Plastic Fixtures Popular

Shipments of plastic plumbing fixtures, such as bathtubs, shower stalls, and laundry sinks, are growing rapidly. During the first half of 1972 plastic bathtubs accounted for 11 percent of the 1.9 million bathtubs shipped. Plastic shower stalls

Plumbing and Heating Equipment: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [p]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1971–73
Vitreous Plumbing Fixtures, SIC 3261:								
Value of shipments	170	229	210	235	300	28	350	17
Total employment (thousands)	8	10	9	9	10	11		
Production workers (thousands)	7	8	8	8	9	13		
Value added	111	157	142	148	NA			
Value added per production worker man-hour	$8.07	$9.60	$9.48	$9.74	NA			
Product value of shipments [2]	149	196	181	[1] 195	245	26		
Quantity shipped (thousands of units)	138	170	157	182	215	18		
Wholesale price indexes (1967=100)	100	106.3	108.9	111.8	115.5	3		
Metal Sanitary Ware, SIC 3431:								
Value of shipments	251	359	369	435	500	15	525	5
Total employment (thousands)	10	13	14	14	15	7		
Production workers (thousands)	8	11	11	11	12	9		
Value added	141	190	195	234	NA			
Value added per production worker man-hour	$8.57	$8.78	$9.20	$10.35	NA			
Product value of shipments [2]	213	259	241	[1] 305	360	18		
Quantity shipped (thousands of units)	181	219	201	237	270	14		
Wholesale price indexes (1967=100) Enameled iron fixtures	100	108.5	111.4	114.4	121.3	6		
Plumbing Fittings and Brass Goods, SIC 3432:								
Value of shipments	405	505	465	539	650	21	725	12
Total employment (thousands)	15	17	15	16	17	6		
Production workers (thousands)	11	13	12	12	13	8		
Value added	183	258	221	273	NA			
Value added per production worker man-hour	$8.04	$10.19	$9.74	$11.38	NA			
Product value of shipments	405	471	465	[1] 530	645	22		
Wholesale price indexes (1967=100) Brass fittings	100	108.8	115.8	120.0	122.2	2		
Heating Equipment, Except Electric, SIC 3433:								
Value of shipments	1,069	1,283	1,257	1,321	1,800	36	1,950	8
Total employment (thousands)	41	43	41	38	40	5		
Production workers (thousands)	29	30	28	27	28	4		
Value added	548	659	638	636	NA			
Value added per production worker man-hour	$9.53	$11.07	$11.70	$12.02	NA			
Product value of shipments: [2]								
Wholesale price indexes (1967=100):	955	1,089	1,102	[1] 1,160	1,630	41		
Warm air furnaces	100	105.2	111.1	114.5	115.5	1		
Steam and hot water	100	107.4	110.7	116.4	119.7	3		

[1] Estimated by Bureau of Domestic Commerce.
[2] Value of shipments of plumbing and heating equipment made by all industries.
[p] Preliminary.

NOTE.—NA = not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

accounted for 62 percent of the 185,000 units shipped. Plastic units accounted for about 12 percent of shipments of all types of plumbing fixtures which amounted to $270 million during the half-year.

Wholesale prices for enameled iron plumbing fixtures in 1972 rose about 6 percent. Increases for brass fittings and vitreous fixtures were lower—1.6 and 3 percent respectively.

By 1980, the value of vitreous plumbing fixture shipments is expected to reach $475 million; metal plumbing fixtures, $750 million; and plumbing fittings and brass goods, $1.2 billion. Average annual growth rates from 1972 to 1980 will be 5.9 percent, 5.2 percent, and 8 percent, respectively.

Heating Equipment Demand Up

After little change from 1968 to 1970, shipments of heating equipment, except electric, increased 5 percent in 1971. Industry shipments in 1972 soared 36 percent, reflecting strong demand generated by the housing boom and the lag between housing starts and installation of equipment. Shipments in 1973 will probably reach almost $2 billion, 8 percent over 1972 levels.

Replacements Increase

As available housing increases, replacement markets for heating equipment will expand significantly. Markets for total comfort equipment systems—heating, air cooling, humidification, and air cleaning—are growing. Of all heating systems installed in new single family homes in 1971, 74 percent were warm air central units, 20 percent were built-in noncentral baseboard, panel, radiant, or space heating units, and the remaining 6 percent were hot water central units.

Electric heating equipment shipments have been growing the last few years. In 1971, about 30 percent of all new single family homes were heated by electricity, 60 percent by gas, and 8 percent by oil. In 1967, 20 percent were heated by electricity, 64 percent by gas and 13 percent by oil. Electric units are making inroads into heating markets for multifamily and nonresidential buildings, although gas-fired equipment still dominates. Several types of electric heating systems are available, including natural convection baseboard, ceiling cable, heat pumps, electric furnaces, duct heaters, and radiant baseboard units.

Exports of heating equipment, except electric, decreased in 1972 for the first time in several years. They declined 17 percent to about $45 million, or 2.5 percent of industry shipments.

Wholesale prices for warm air furnaces rose less than 1 percent in 1972. Prices of steam and hot water systems increased less than 3 percent, the smallest advance in recent years.

By 1980, the value of shipments for the heating equipment, except electric, industry should reach $3 billion, an average annual rise of 6.6 percent for the period 1972–80.—*Charles B. Pitcher, Office of Business Research and Analysis.*

FABRICATED STRUCTURAL STEEL

Shipments of fabricated structural steel are expected to advance 10 percent from nearly $3.7 billion in 1972 to $4 billion in 1973.

The fabricated structural steel industry consists of about 2,000 establishments engaged primarily in punching, drilling, bending, and welding steel mill shapes to produce such items as columns, joists, trusses, and specially designed structural framework. Most structural steel is purchased by the construction industry. Lesser amounts are consumed in the manufacture of such products as components for boats, ships and barges.

Major construction markets for fabricated structural steel are highway bridges, trestles and viaducts, and private industrial, commercial and utilities projects. Those markets accounted for 71

Fabricated Structural Steel: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [p]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	2,968	3,056	3,139	3,344	3,650	9	4,000	10
Total employment (thousands)	108	105	100	95	95			
Production workers (thousands)	80	77	74	71	71			
Value added	1,319	1,411	1,461	1,579	NA	NA		
Value added per production worker man-hour	$8.06	$8.95	$9.78	$8.99	NA	NA		
Product: [3]								
Value of shipments	2,562	2,650	2,696	2,871	3,130	9		
Value of imports	27	43	58	57	59	4		
Value of exports	32	40	47	43	45	4		
Wholesale price indexes (1967=100)	100.0	104.0	110.6	118.7	123.7	4		

[1] Estimated by Bureau of Domestic Commerce.
[2] Value of all products and services sold by the fabricated structural steel industry (SIC 3441).
[3] Value of shipments of fabricated structural steel made by all industries.
[p] Preliminary.

NOTE.—NA=not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

1972 Profile

Fabricated Structural Steel

SIC code	3441
Value of industry shipments (millions)	$3,650
Number of establishments	2,000
Employment	95,000
Exports as a percent of product shipments	1.4
Imports as a percent of apparent consumption	1.9
Compound annual rates of growth (1967–72 percent):	
Value of shipments (current dollars)	4.2
Value of exports (current dollars)	7.3
Value of imports (current dollars)	17.0
Employment	−2.6
Major producing areas	Plants located throughout the United States

percent of the industry's total orders for the construction market in 1971.

Although there are a few large producers, most structural steel fabricators are small. There is no national market for the industry's output, only many overlapping local markets. A firm usually delivers within a 200-mile radius of its plant.

Bookings for fabricated structural steel for construction in 1972 were estimated at 4.3 million tons, up 13 percent from an estimated 3.8 million tons the previous year. It is expected that 1973 bookings will total 4.5 million tons. Shipments will be about 4.6 million tons. The 1973 outlook for industrial, commercial, and utilities construction is for rises of 12, 18 and 13 percent respectively. That promises a strong market for fabricated structural steel products. Prices for fabricated structural steel for buildings rose at an average annual rate of 4.3 percent from 1967 to 1972.

After increasing steadily in the late sixties, imports of fabricated structural steel declined in 1971. From 1967, when the U.S. imported 118,445 tons of fabricated structural steel, imports reached a high of 178,946 tons in 1970. Largely because of voluntary export restraint agreements between the U.S. Government and the steel industries of Japan, the European community, and the United Kingdom, imports declined to 162,661 tons in 1971.

Shipments of fabricated structural steel are expected to increase at a rate of 6.8 percent a year in the next several years, reaching $6.2 billion in 1980.—*Franklin E. Williams, Office of Business Research and Analysis.*

CHAPTER 4

Lumber and Wood Products

The lumber and softwood plywood industries enjoyed unprecedented demand for virtually all types, species, and grades in 1972. Although plants were operating at or near capacity to meet the needs of record residential construction, supply could not match demand for some items. Inventories were reduced to their lowest levels in several years. Lumber production exceeded 1971 levels by 5 percent, and softwood plywood output increased 12 percent. In addition to construction, strong demand from the other major consuming industries—materials-handling equipment and furniture—contributed to the high level of activity.

A growing export market was also a factor. Lumber exports in 1972 increased by 30 percent in volume and softwood plywood exports more than doubled. Major lumber markets were Japan and Canada; leading markets for softwood plywood were Canada, Denmark, and the United Kingdom.

To offset increasing costs and remain competitive, the lumber and softwood plywood industries have made many technological improvements. Consolidation of facilities, often through mergers, has resulted in increased operating efficiency. Frequently mergers entail the acquisition of timberlands that provide the vital raw material.

Raw material availability will probably be a limiting factor in both lumber and plywood production in the immediate future, according to industry leaders who urge that land-use programs to provide wildlife preserves, recreation facilities, and environmental protection also ensure a supply of timber for the wood-using industries.

Lumber and softwood plywood are expected to grow moderately in the 1970's to meet continuing requirements of the residential construction industry and for miscellaneous wood products, such as containers, pallets, furniture, and transportation equipment. Railroads indicate that the replacement of ties will provide a strong demand for the next few years. A substantial demand for hardwood paneling, kitchen cabinets, moldings and other wood products is forecast.

Combined value of shipments for lumber and plywood in 1973 is projected to reach nearly $7.4 billion, an increase of about 7 percent above 1972. By 1980 shipments are expected to total about $9.6 billion, with growth averaging about 4.2 percent a year from 1972.—*Adair Mitchell, Office of Business Research and Analysis.*

Lumber and Wood Products: Projections 1972–80 [1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
2421	Sawmills and Planing mills	5, 285	10	5, 650	7	7, 300	4. 1
24322–24323	Softwood Plywood [3]	1, 625	30	1, 720	6	2, 330	4. 6

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth.
[3] Product Value of Shipments

Sawmills and Planing Mills: Trends and Projections 1976–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry [2]								
Value of shipments	3,056	4,411	3,936	4,790.4	5,285	10	5,650	7
Total employment (thousands)	181	178	175	171	176	3		
Production workers (thousands)	165	161	157	154	NA			
Value added	1,556	2,025	1,735	2,227	NA			
Value added per production worker man-hour	$4.82	$6.40	$5.65	$7.34	NA			
Product [3]								
Value of shipments, total	3,288.0	4,179.1	3,691.1	[1]4,227.0	4,965	16	5,365	8
Quantity shipped (million board feet)	34,499	35,099	33,490	36,570	40,000	9	41,200	3
Quantity of production (million board feet)	34,443	35,449	34,462	36,990	38,000	3	38,500	1
Quantity of exports (million board feet)	1,129	1,142	1,289	1,096	1,400	28	1,440	3
Value of exports	133	177	195	180	280	56	300	7
Quantity of imports (million board feet)	5,140	6,300	6,114	7,618	9,100	18	9,300	2
Value of imports	390	620	496	622	1,050	69	1120	7
Wholesale price indexes (1967=100)								
Hardwood lumber	100.0	120.1	114.7	113.4	124.1	9		
Softwood lumber	100.0	134.5	113.4	140.5	163.8	17		
Total lumber	100.0	131.6	113.7	134.8	155.8	16		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the sawmills and planing mills industry (SIC 2421).
[3] Includes value of shipments of lumber made by all industres.

NOTE.—NA-not available.
P Preliminary

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

LUMBER

In 1972 lumber consumption was estimated at 43.2 billion board feet, a record high. With production rising about 3 percent to an estimated 38.0 billion board feet, softwood inventories dropped to extremely low levels. Softwood production reached an estimated 31.4 billion feet and hardwood production about 6.6 billion board feet.

Lumber shipments were valued at $5.3 billion in 1972, 10 percent above year earlier levels. In 1973, shipments are expected to rise 7 percent to $5.7 billion. Because of current high levels of plant utilization, output will probably increase only 1 percent to 38.5 billion board feet. The volume of both imports and exports will also rise about 3 percent in 1973, to 9.3 and 1.44 billion board feet, respectively.

Production Incentives

High levels of production and consumption in 1972 were stimulated by demand from major wood-using industries—conventional and factory-built housing, furniture, and materials handling. Single family detached units, for example, require about 10,800 feet per unit. Pallet production, another major use for lumber, was 15 percent higher in 1972 than the 138 million units produced a year earlier. Expanding export markets, particularly increased hardwoods to Japan, further boosted demand.

World Trade Up

Lumber exports rose sharply in 1972 to an estimated 1.4 billion board feet, about 30 percent above 1971. Japan continued to be the leading customer, although shipments of bowling alley bed stock leveled off in the latter half of the year. Canada remained in second place, followed by other major customer countries including Italy, Australia, West Germany and Mexico. These six countries purchased about four-fifths of U.S. lumber exported in 1972.

Encouraged by a strong domestic market for lumber, particularly in the construction industry, imports increased 19 percent over 1971 levels to reach an estimated 9.1 billion board feet in 1972. Canada supplies nearly 95 percent of the lumber imported into the United States, practically all consisting of softwood.

Sawmills and Planing Mills Decline

Consolidations of operations and mergers of companies have reduced the number of plants in operation. In 1967, for example, establishments had declined to 10,271 from 12,189 in 1963. There are some of the small mills which operate intermittently and apparently are not surveyed by Census. The total number of mills ranges from 10,000 to 35,000. Active mills in 1972 are estimated at about 25,000.

Employment Up Slightly

Reversing a downward trend of the last several years, employment in the sawmill and planing mill industry rose 3.2 percent in 1972 over 1971. More workers were needed to meet the heavily increased demand for lumber in both domestic and overseas markets.

Wholesale Prices Up

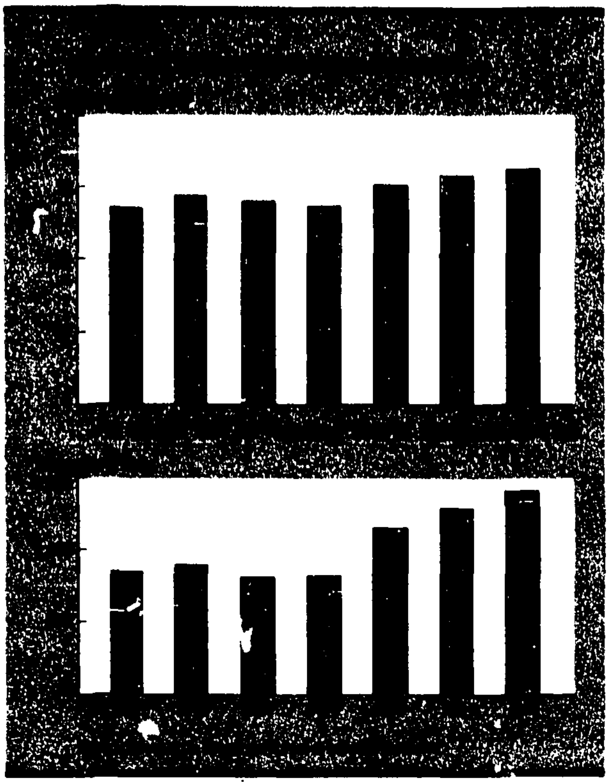
Wholesale lumber prices advanced steadily between January and September 1972, following the price freeze in late 1971. Prices for all lumber rose more than 12 percent, softwood lumber prices advanced 13 percent, while hardwood lumber prices increased 10 percent from January to September.

In May 1972, the Cost of Living Council removed wage and price controls from companies with 60 or fewer employees. Since most lumber companies employ fewer than 60 workers, a large portion of the industry became exempt from controls. However, wage and price controls were reimposed on 62,000 lumber firms in late July following sharp lumber price increases. Only firms with annual sales under $100,000 remain exempt from controls and price restraints on large companies are expected to influence price levels of smaller firms.

Coping With Ecology Problems

The lumber and wood industries have been working to solve industry-generated environmental problems. An Advisory Panel on Timber and the Environment established by the President in 1971 is charged with the responsibility for recommending desirable levels of timber harvest, timber sales from Federal lands, environmental standards, and related matters.

The lumber and wood products industries have progressed in eliminating waste through conversion of residues into new products. Also, increased recycling of paper could reduce the amount of



wood used. Efforts are also being made to eliminate soil, water, and air pollutants through improved equipment and methods of production. For example, some of the bark which was formerly burned and caused air pollution is now being developed into salable products.

Increased Output Depends Upon Resources

Lumber production will probably grow at a rate of 1.1 percent in the next several years, reaching about 41.4 billion board feet by 1980. Shipments are expected to increase at an annual rate of 4.1 percent and total $7.3 billion in 1980.

Lumber output depends on demand levels, raw material supply, and productive capacity. Demand will be determined by activity in residential and other construction, furniture production, and other user industries as well as on the acceptance of substitute materials in the years ahead.

Raw material availability of course will affect future production. While much of the commercial timber is on public lands, effective forest management practices on both public and private lands can contribute to timber supply. Special programs will be needed to harvest sufficient timber to meet the industry demands for lumber and at the same time conserve the Nation's forests.

Softwood Plywood: Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Product [2]								
Value of shipments, total	784	1,086	959	1,247	1,625	30	1,720	6
Quantity of production (million square feet, ⅜-inch basis)	12,840	13,538	14,149	16,358	18,300	12	18,500	1
Quantity shipped, total (million square feet, ⅜-inch basis)	12,914	13,406	14,127	16,472	18,000	9	18,200	1
Value of imports	.3	1.4	.3	.2	.3	50	.3	0
Quantity of imports (million square feet, ⅜-inch basis)	2.7	14.9	2.3	3.5	4.3	23	5.0	16
Value of exports	8.9	26.6	13.3	13.1	29.2	123	30.6	5
Quantity of exports (million square feet, ⅜-inch basis)	84.9	199.3	113.8	99.0	207.2	109	218.4	5
Wholesale price indexes (1967=100)	100.0	139.2	113.6	126.4	156.7	24	...	...

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of shipments of softwood plywood made by all industries (SIC 24322 and 24323).

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Annual lumber practical production capacity is estimated at about 32 billion board feet for softwoods and 9 billion board feet for hardwoods. If raw materials are available, additional production may be obtained through extended workshifts when it is profitable.—*Adair Mitchell, Office of Business Research and Analysis.*

SOFTWOOD PLYWOOD

Production of softwood plywood in 1973 should reach 18.5 billion square feet on a ⅜-inch thickness basis; a 1-percent increase over 1972, when output gained 12 percent over the 16.4 billion square feet of 1971. Value of 1973 shipments is expected to increase 6 percent to $1.7 billion from $1.6 billion in 1972.

Record Market Demand

Resurgence of general economic activity, combined with record residential and commercial construction, pushed softwood plywood industry operations to maximum capacity in 1972. Almost the entire range of softwood plywood end-use markets exhibited solid gains.

Besides the construction industry, demand has increased for industrial applications such as materials-handling pallets, containers, truck and bus bodies, industrial trucks, truck trailers, travel trailers, campers, intermodal containers and railroad and rapid transit vehicles. In addition, the do-it-yourself market of homeowners, farmers, and hobbyists accounted for an estimated 1 billion square feet in 1972.

Overall, the industry operated at 100 percent of practical capacity in 1972. Five new plants added their share to the record 18.3 billion square feet of output in 1972, but inventory at year end was the lowest in a decade. Log prices, not subject to price controls, continued to move upward.

Timber Resources a Problem

Industry leaders fear that as much as 25 percent of Federal commercial forest land may be withdrawn from harvest as the outcome of restraining litigation begun by preservationist organizations. Any further loss of access to domestic forest resources will intensify the need for additional imports of wood and wood-based products.

Technology Fosters Innovation

The American softwood plywood industry ranks among the most forward-looking in product applications research and adoption of improved technology. Its work in adapting factory-produced housing to the use of softwood plywood is an example. Applications found by research yesterday show up today in plywood folded-plate and barrel-vault roof systems, glue-fastened subfloors, specialized ocean cargo transport containers, and other innovations in materials handling.

Acoustic holography—seeing by sound—is being investigated as a method of scanning plywood panel surfaces for blisters caused by localized vapor pressure buildup inside hot-pressed plywood.

Computer simulation of veneer drying is showing promise in ascertaining the optimum conditions for operating veneer dryers and the variables associated with operating veneer processing equipment. A study showing how knot debris on veneer surfaces leads to below-grade plywood led to development of a veneer cleaning machine that reduced indent damage by 82 percent. Repaired plywood panel recovery gained from 8 to 10 percent. If all mills veneer were cleaned, the study estimated, the recovery rate of repaired plywood panels would be as high as 60 percent.

Imports and Exports Expand

The United States continues to lead the world in production of softwood plywood, with 44 percent of total output. Russia is second and Canada is third.

Exports jumped 109 percent from 99 million square feet in 1971 to 207 million square feet in 1972, with a 5-percent rise to 218 million square feet expected in 1973. The value of exports also more than doubled, from $13.1 million in 1971 to $29.2 million in 1972, with expectation of a probable further 5 percent gain to $30.6 million in 1973. The Economic Stabilization Program tended to stimulate 1972 exports of softwood plywood items, since these sales could be made without reference to the price ceilings established for the domestic market. So did the movement of Denmark and the United Kingdom toward joining the European Economic Community. Lower quotas for U.S. softwood plywood exports to these countries are expected when they attain full EEC membership.

Canada, Denmark, and the United Kingdom continued to be major markets in 1972 for U.S. softwood plywood exports, with Finland and Canada providing competition.

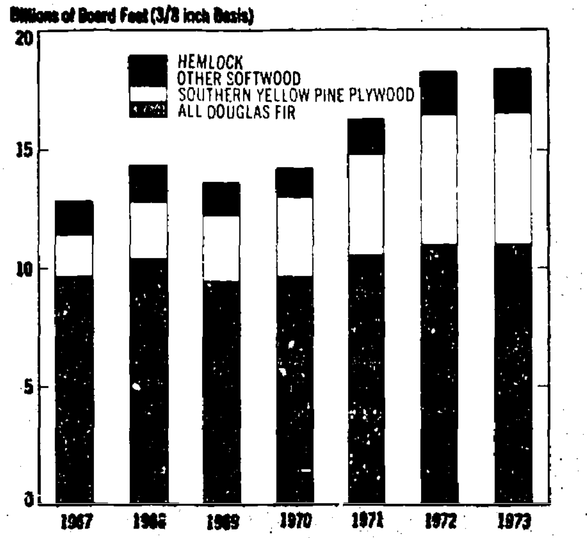
Imports increased 23 percent from 3.5 million square feet in 1971 to 4.3 million square feet in 1972; a further 16-percent increase to 5 million square feet is forecast for 1973. Primary sources of U.S. softwood plywood imports in 1972 were Canada, Taiwan, and Nicaragua.

1972 Profile

Softwood Plywood

SIC Codes	24322 and 24323
Value of industry shipments (millions).	$1,625
Number of establishments	195
Exports as a percent of product shipments.	1.1
Imports as a percent of apparent consumption.	Negligible
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	15.7
Value of exports (current dollars).	26.8
Major producing areas	Pacific northwest and the South

Pine leads plywood growth



SOURCE: Bureau of the Census and Bureau of Domestic Commerce.

Pine Leads Plywood Growth

In 1967, western plants numbered 136, southern plants 32. By 1972, there were 195 plants throughout the United States with 141 in the West and 54 in the South.

The coming factor in softwood plywood growth is southern pine. Western plywood accounted for 76 percent of all U.S. softwood output in 1972 and southern pine for 24 percent. In 1973, a change is expected, with the West accounting for 70 percent and the South 30 percent of total softwood output. In general, newer plants in the South produce a single plywood item—sheathing—compared to multiple-item production in the west. Production specialization tends to raise output efficiency.

Output per plant in the West and South changed dramatically in the 1967–72 period. Western establishments increased output 18 percent from 77 million square feet in 1967 to 91 million square feet in 1972. Southern plants bettered this increase, expanding 40 percent from 73 million square feet in 1967 to 102 million square feet in 1972. Overall, U.S. softwood plywood production per plant gained an estimated 24 percent from 76 million square feet in 1967 to 94 million in

1972—an average growth rate of 5.8 percent per year. During the 1967–72 period, total U.S. softwood plywood production increased 42 percent—an average of 7.4 percent compounded annually.

Traditional Markets Still Strong

Captive wholesale operations and private wholesalers each distribute about half of the total mill output of softwood plywood. Direct mill and private wholesaler sales to end users are declining, with retail organizations increasing their share of this business. Residential construction, always the major outlet, consumed about 56 percent of the total production in 1972, nonresidential construction 20 percent, and miscellaneous and industrial applications 24 percent. About 5,450 square feet of softwood plywood was incorporated into the average new single-family house constructed in 1972. Usage in multifamily dwellings is estimated at 2,100 square feet per unit. In 1972 residential construction, softwood plywood uses were (1) roof sheathing, 83 percent overall—80 percent for conventionally built units and 97 percent for factory produced houses; (2) wall sheathing, a modest 15 percent in single-family and only 5 percent in multifamily units; and (3) floor systems, overall 56 percent—53 percent in conventionally constructed homes and 87 percent in manufactured units.

Prices Up and Leveling Off

The industry, historically one with low profits, generally has not set mill prices at levels designed to earn a fixed percentage on sales. Instead prices depended on what the market would bear. Over the years, the industry has had excess production capacity.

In 1972, a reversal occurred, with unprecedented demand forcing the industry to 100 percent of capacity. Inevitably, prices rose to the highest levels permitted under the economic stabilization program and broke records set early in the 1950's.

Pollution Controls Accelerating

Softwood plywood manufacturers generate pollutants, including gaseous emissions from wood veneer dryers, water-suspended waste glue solids from the washing of glue mixing and spreading equipment, and sawdust and bark particle discharge into water where floating veneer logs at the receiving dock are crosscut to length.

The industry is moving to clean up its pollution. Settling ponds have been installed and are removing glue waste solids from equipment wash water. Water reuse is increasing and more research is being conducted for ways to handle liquid effluents.

Dryland log sorting is increasing, and systems to control dust and particles are being implemented. Dust and particle control methods have been developed that use a specially designed high-temperature incinerator with an afterburner that consumes sander dust and eliminates the problems of veneer dryer exhausts. A further example of pollution elimination is a log receiving and processing center employing a special system called fire ash reinjection, which reduces wood ashes to mineral residuals.

Impact of Stabilization Program

Direct effects of the Economic Stabilization Program on the softwood plywood industry are difficult to measure. It has been reported that producers are discontinuing items with low ceiling prices and replacing them with those of higher ceilings. A result of this has been the apparent removal from the market of much lower priced softwood plywood and also the rise in the wholesale price index (1967=100) from 126.4 in 1971 to an estimated 156.7 in 1972.

Outlook for 1980

Output and shipments of softwood plywood are expected to be about 24 billion square feet in 1980, with value of shipments increasing to approximately $2.3 billion.

Scarcity of raw timber probably will become one of the foremost problems of the industry. This may lead to the use of other wood-based materials in combination with wood veneers for the production of composite panel products.

Production and product process research should enable the industry to move toward more efficient end uses of the product, and to expand in both traditional and new markets.—*Paul H. Koenig, Office of Business Research and Analysis.*

CHAPTER 5

Paper and Board

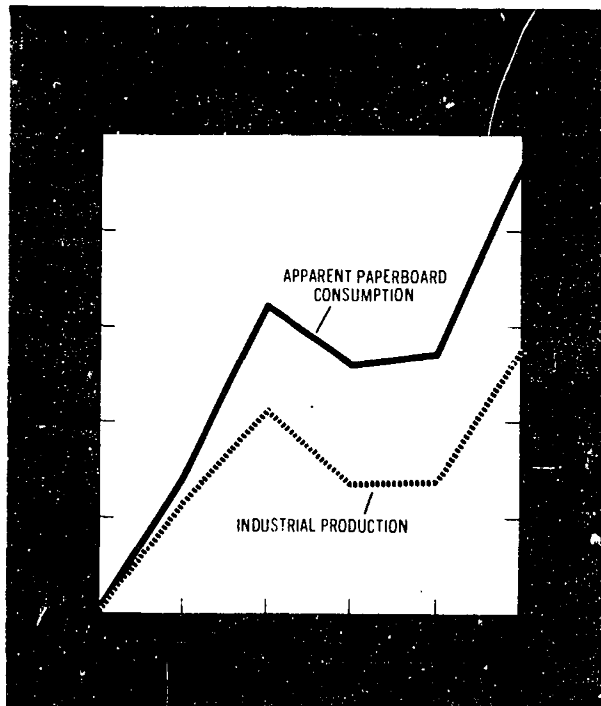
The economic expansion envisioned for 1973 should bring record production, sales and earnings for the paper and board industry. Industry shipments are expected to total $10.9 billion in the coming year, up 5 percent from the record sales figure estimated for 1972.

Part of the revenue increase is expected to come from a higher-priced product mix; tonnage is projected to rise 4 percent to 60.5 million tons from 1972's record volume. The ratio of output to capacity was already high in 1972, and only moderate capacity additions are in sight for 1973, which means that production will be up against the capacity ceiling. Paperboard mills operated at an average of 98 percent of practical capacity throughout 1972; papermills operated at an average ratio of 93 percent, closer to 97 percent in the last quarter of the year.

Because of the time required to add new capacity, a supply-demand balance usually results in sharply rising prices. Without the Economic Stabilization Program, prices of grades of packaging paper and board in strong demand would have climbed steeply. Some price increases, in fact, have been approved by the Price Commission. Since price indices for the major component products rose only 2 to 3 percent during 1972, the high operating rates have been the major factor contributing to improved industry profits.

Federal Trade Commission data revealed that during the first 6 months of 1972 paper and allied products sales reached $11,360 million, or 6.7 percent over the same period in 1971. Net profits after taxes for the paper and allied products industry for the first half of 1972 totaled $439 million, 55 percent over the depressed levels in the first half of 1971. After-tax profits for the industry in the second quarter of 1972 rose to 4.6 percent of sales, surpassing the 4.5 percent posted for all manufacturing concerns. With higher levels of demand and higher operating rates expected through 1973, improved profitability should continue.

Hurricane Agnes cut into profits in the Eastern region. Twenty mills were damaged; losses of a single fine-paper maker reached $1 million.



Paper and Allied Products: Selected Financial Ratios 1965–72

	1965	1966	1967	1968	1969	1970	Year ending June 30 1971	Year ending June 30 1972
Net profits (after taxes) as percent of sales	4.9	5.4	4.7	4.7	4.8	3.4	2.7	2.9
Net profits (after taxes) as percent of net worth	9.2	10.5	8.8	9.6	9.7	7.0	5.5	6.3
Annual depreciation as percent of gross fixed assets	4.9	4.6	4.7	4.9	4.8	4.9	4.9	5.0
Sales of net fixed assets (ratio)	2.2	2.1.	2.0	2.1	2.2	2.2	2.1	2.3
Current assets to current liabilities (ratio)	2.5	2.4	2.4	2.4	2.0	1.8	2.2	2.3

Source: Federal Trade Commission, and Securities and Exchange Commission, Quarterly Financial Reports.

Following the normal pattern, consumption of paper and board rose with the upturn in general economic activity. It was estimated at 62.9 million tons in 1972, and a 4 percent increase, to 65.3 million tons, is projected for 1973.

Within the industry, sales of most grades of printing and writing paper were slow in recovering from the slack demand of 1970 and 1971, but accelerated sharply in the last half of the year, especially in the fourth quarter. Demand for paper and board in construction and packaging was strong throughout 1972 and is expected to continue so in 1973.

Since paper and board are generally used as raw materials in the manufacture of other products, with their cost representing a small percentage of the value of the finished article, demand for them is little influenced by price.

Substitute materials are not available at competitive costs, so the industry's customers neither increase their buying during periods of price softness, nor skimp when prices go up. However, there is some anticipatory buying when it becomes obvious that shortages will bring price rises. An exception is exports, where price differentials might divert purchases from one country to another. But there again the United States is so predominant a supplier of such an important product as kraft linerboard that an alternative does not really exist.

Export trade has been developed into an important element in the industry's overall marketing picture, accounting for around 5 percent of total output. The paper industry's successful export expansion program had been slowly reducing a traditional net trade deficit resulting from heavy reliance on imports of Canadian newsprint. However, 1972 was the first year in more than a decade that export shipments of paper and board did not gain appreciably. Estimated exports totaled 3 million tons, about equal to the record set in 1971 and volume is expected to remain at the same level or decline in 1973. However, the value of export shipments, at $580 million in 1972, should rise slightly in 1973 as a result of anticipated price increases on kraft linerboard.

While exports slowed, estimated imports of paper and board—more than 90 percent normally newsprint—climbed 3 percent in volume and 6 percent in value in 1972. Newsprint imports, mainly from Canada, were estimated at 7 million tons last year. With U.S. newsprint consumption projected to rise 5 percent in 1973, imports of newsprint, which account for 70 percent of the U.S. consumption—will probably rise accordingly. In 1973, newsprint imports are expected to reach 8 million tons valued at $1.2 billion, widening the trade deficit in paper and board.

Environmental Regulation

As the third largest water consumer among manufacturing industries, pulp and paper has a major stake in water quality improvement programs. New and stricter antipollution regulations will not only cost the industry a great deal of money, but will probably accelerate the trend toward concentration of production in larger units in the South and West.

During 1971, $234 million, nearly one-fifth of all capital expenditures by the pulp and paper industry, went for pollution abatement facilities. Future spending, under pressure from the newly enacted Clean Waters Act, is unlikely to fall below that ratio for several years.

Forty-five percent of the industry's mills produce only 5 percent of its tonnage—rather more of its revenues, because they include some specialty producers whose wares command higher prices. A

Paper and Board: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 p	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	8,092	9,505	9,459	9,828	10,400	6	10,900	5
Total employment (thousands)	219	223	217	210	213	1		
Production workers (thousands)	176	179	174	167	168			
Value added	4,049	4,592	4,506	4,502				
Value added per production worker man-hour	$10.41	$11.35	$11.97	$12.39				
Product: [3]								
Value of shipments, total	7,730	8,987	8,986	9,336 [1]	9,888	6	10,300	5
Quantity of production (thousand short tons)	46,926	54,187	53,516	55,092	58,200	6	60,500	4
Apparent consumption (thousand short tons)	52,035	59,000	58,056	59,640	62,950	5	65,300	4
Per capita consumption (pounds)	523	580	564	575	600	4	620	3
Value of imports	738	1,039	1,039	1,091	1,160	6	1,200	3
Quantity of imports (1,000 short tons)	7,075	7,416	7,238	7,578	7,780	3	8,000	3
Value of exports	383	492	516	575	580	3	590	1
Quantity of exports (1,000 short tons)	1,966	2,603	2,698	3,030	3,030		3,000	
Wholesale price indexes [4] (1967=100):								
Paper	100	105.5	111.0	114.1	116.2	2		
Paperboard	100	99.4	101.1	102.4	106.0	4		
Building Paper and Board	100	105.2	101.2	103.0	106.6	3		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the paper and board industry (SIC 262, 263, and 266).
[3] Includes value of shipments of paper and board made by all industries.
[4] As of June 1972.

Source: Bureau of the Census. Bureau of Labor Statistics, Bureau of Domestic Commerce.
p Preliminary.

private study concluded that most of those mills were marginal by today's standards of efficiency. Permanent closing of some units has begun because they cannot meet the costs of compliance with the new pollution standards.

The survey forecast that the greatest impact would fall on small makers of printing and writing papers, construction paper, tissues, combination paperboard, sulfite pulp, hardboard, newsprint and groundwood paper.

Employment losses from closings of mills may reach 16,000 jobs by 1976, with the affected products moving to the southern and western mills that already account for two-thirds of national production.

Some operating problems have resulted from applying new technologies to combat pollution. For example, the closing of water systems used in the papermill process as well as in the processing of pulp mill wastes encourages greater bacteriological growth, creates new corrosion problems and increases operating and quality control problems.

However, efforts by manufacturers have resulted in progress in virtually all areas of environmental concern. By 1975, manufacturers are expected to have installed adequate equipment for air and water pollution control at most of the industry's major pulp mills, reducing water pollution by 85 percent and air pollution by 95 percent.

Continued industry research is underway to develop technologies for removing color and turbidity from effluent water and for further abatement of odor and sulfur in boiler stack emissions.

Capacity Growing Slowly

Historically, the sequence of additions to capacity in the paper industry is this: An industry-wide decision to invest in new plant at the same time brings overcapacity, price cutting, and vanishing profits. Growth of the economy absorbs the new production, then outruns it. Prices rise, profit margins widen, several companies invest in new plant, and the cycle resumes.

The meager profits of 1970 and 1971, compared with those of the sixties, have had their effect. Additions to capacity in 1972—to a total of 62.1 million tons of paper and board—were estimated at no more than 2.7 percent. An additional 2.3 percent is the estimate for 1973. Both figures are far below annual additions in the sixties. Paper company financing has turned from equities to debt; addi-

Paper and Board: Trends and Projections 1972-80 [1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971-72	1973	Percent increase 1972-73	1980	Percent increase 1972-80 [2]
2621	Paper mills						
2631	Paperboard	10, 400	6	10, 900	5	15, 500	5. 1
2661	Building paper and board						
2647	Sanitary paper products	1, 810	8	1, 940	7	3, 070	6. 8

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

tions are financed by borrowing. At the end of 1970, fixed obligations were more than 45 percent of the paper industry's capitalization.

Expenditures for new plant and equipment by the paper and allied products industry were estimated at $1.37 billion in 1972, 9.6 percent above 1971 levels. About $2 of new capital are now needed to generate $1 of sales. Capital outlays have increased at a faster rate than productive capacity in recent years, reflecting higher construction costs, costly computerized and automated process control systems and greater pollution abatement spending.

Market Structure

Although paper and board are used in thousands of products, their major markets in order of importance including packaging and industrial converting paper and boards, writing and printing papers, sanitary paper, and construction paper and board. Packaging and converting grades along with printing and writing papers accounted for more than 80 percent of 1971 output with the greatest share purchased for packaging and converting use.

Growth has resulted not only from increased demand for established products as the economy expands, but also from the industry's ability to meet new needs through original research and market development.

New and improved industry products include strippable wallpaper; paper for new office copiers; a wide range of polymer and paperboard composites for industrial applications; hydrophilic fibers capable of absorbing moisture 38 times their own weight; corrugated boxes which remain rigid when wet; paperboard forms designed to replace plywood in construction of heavy concrete form work and as a substitute for formed plywood in covered furniture. Because of such new developments, about 20 percent of the items produced today were not in existence 20 years ago.

Merger Activity Up

Paper industry merger activity was sharply higher in 1971 than a year earlier. Slackened demand and reduced profits induced many paper and board manufacturers to divest themselves of whole or partial operations the following year. At the same time, acquisitions by paper and allied products companies fell nearly 50 percent to almost the lowest level in the past 10 years.

Foreign Trade Outlook Dampened

The paper industry has been proud of its export expansion record during recent years. Exports of paper and board rose almost 9 percent annually since 1967 from $383 million to an estimated $580 million in 1972. However, the 1972 volume of exports was at about the same level as in 1971, a record year. With paper and board capacity utilization at extremely high levels and only modest increases anticipated in capacity in 1973, volume of exports will probably remain at the 3 million ton level or perhaps decline if domestic demand remains strong.

Other developments in 1972 also may adversely affect the short and intermediate outlook for the Nation's exports of paper and board. During the year, the EEC (Common Market) offered special tariff concessions on paper products to several nonmembers including Sweden and Finland, both major producers of pulp and paper for world trade. This action places the United States at a competitive disadvantage in its most important foreign markets. Common Market countries, including new member countries, purchased more than half of the U.S. kraft linerboard exports in 1971. Linerboard, used in the manufacture of corrugated cartons, accounts for nearly 45 percent of the volume or $250 million of the industry's foreign trade in paper and board. Additional kraft linerboard capacity expected from new plants in Newfoundland and Europe will probably replace some U.S. tonnage in nearby European markets.

The long-range outlook for export trade is favorable, however, because world demand for paper and board is expected to double by 1985. The U.S. paper industry, with its large supply of raw materials and advanced technologies, should be able to compete successfully in meeting the expanding world demand.

Overall Employment Stable—Costs Increase

Since 1967, employment has fluctuated, ranging from a high of 223,000 in 1966 to a low of 210,000 in 1971. In 1972, employment was 213,000. Production workers account for about four-fifths of the work force. In 1970 and 1971, because of negotiated increases in wages and fringe benefits, payroll costs averaged $38 per ton or $3 higher than the previous average. Based upon 1972 estimates, output per production worker rose 4.8 percent to 346 tons, a new all-time record.

Recycling Remains Popular Issue

In past years, waste paper has supplied about 20 percent of the industry's fiber needs. However, in recognition of the need to conserve fiber and alleviate the pressing solid waste disposal problems, interest has been focused on new ways to increase the waste fiber content of the industry's products.

A recycling target of 35 percent by 1985 has been projected by the National Academy of Sciences. If domestic paper consumption grows as predicted, the 35 percent recovery rate would represent a 300 percent increase in volume of recycled paper by the mid 1980's.

To increase use of waste paper, sufficient quantities of acceptable quality must be available at prices competitive with virgin wood pulp. Also needed are expanded markets for products presently utilizing waste paper, development of new products employing waste paper and improvements in recycling, including the collection and segregation of waste fibers. Legislation was introduced last year to encourage recycling by providing tax incentives. The proposal incorporated specific tax deductions for companies utilizing recycled materials in useful raw materials or suitable products and a 5-year amortization of solid waste material handling facilities.

1972 Profile

Paper and Board

SIC Codes	2621, 2631, 2661
Value of industry shipments (millions).	$10,408
Number of establishments (estimated).	715
Employment (thousands)	213
Exports as a percent of production.	5
Imports as a percent of apparent consumption.	12.4
Net profits as a percent of net worth (SIC 26, year ending June 30, 1972).	6.3
Compound annual growth rates 1967–72 (percent):	
Value of shipments (current dollars).	5.0
Value of exports (current dollars).	8.8
Value of imports (current dollars).	9.5
Employment	– 0.1
Major producing areas	South, Northeast, Lake States, and Pacific States

Combination board is made almost exclusively of waste paper and represents the major use of recycled fiber. It accounts for around 70 percent of the total consumption of waste paper by the industry and is used to manufacture cartons for soaps, cereals, crackers, and other food and nonfood products. Last year the Food and Drug Administration placed strict limitations upon the level of polychlorinated biphenyls (PCB's) found in paperboard used in food containers because of possible health hazards. The prohibited PCB chemicals find their way into combination board from mixed waste papers that contain NCR (no carbon required) papers. Substitute materials for the toxic PCB's are now used in the manufacture of NCR copy papers but previously manufactured paper from inventory stocks containing PCB's pose continuing contaminant problems.

Long-Term Outlook Favorable

Supported by a growing domestic market and endowed with ample supplies of raw materials, the paper and board industry should share in meeting the projected increases in world paper and board demand. By 1980, the value of paper and board shipments are expected to reach $15.5 billion, representing a 5.1 percent annual growth rate.—*Donald W. Butts, Office of Business Research and Analysis.*

SANITARY PAPER PRODUCTS

Shipments of sanitary paper products increased an estimated 6 percent in tonnage and 8 percent in value to $1.8 billion in 1972 over 1971, a year of virtually no growth. The turnabout in 1972 is expected to continue in 1973, when shipments should exceed $1.9 billion. Such performance promises to return the industry to its annual growth of 7.9 percent averaged in the period beginning 1967. In both volume and value of shipments, sanitary paper products grew a little faster than the paper and board industry as a whole during 1972.

Growth Tied to Disposable Income

Growth in the value of the literally hundreds of kinds and grades of sanitary paper products manufactured and shipped nearly parallels the long-term trend in discretionary spending and disposable personal income. For example, last year's growth of 8 percent in sanitary paper products shipments about equals the growth in disposable personal income.

Although sanitary paper products as such are daily necessities in the form of household, industrial, health or personal hygiene items, there are such wide variations in quality grades and uses that they also can be classified as luxury items. Consequently, during economic slowdowns or recessions, buyers reject those items which are considered luxuries. In 1971, shipments of multi-ply toilet tissues declined about 4 percent while single-ply tissue shipments increased nearly 2 percent. Paper towel shipments fell 6 percent; wipers dropped 4 percent; multi-ply napkins declined 12 percent while single-ply sales increased; and facial tissues dropped.

Toilet Tissue Shipments Lead

When the economy resumed its upward trend last year, however, towels recovered, with the gain mostly in the luxury multi-ply grades; wipers and facial tissues improved; and napkins shipments in both single and multi-ply grades increased. Growth in other sanitary paper products, including personal health and hygiene items, was slower. In terms of specific tonnages shipped among six broad groups of products: toilet tissues, including both single and multi-ply grades, maintained the lead with over 1.3 million tons shipped; towels wiped up with about 1.2 million tons shipped; and napkins and facial tissues (sometimes used interchangeably) peaked at about 350,000 tons of each product shipped; while shipments of personal health and other miscellaneous sanitary products approached 300,000 tons.

Per Capita Consumption Up

Per capita consumption of sanitary paper products for 1972 is estimated at close to 34 pounds, a record and slightly exceeding expectations. Per capita consumption of sanitary paper products in 1973 should continue upwards to surpass the 1972 record volume.

Production Capacity Adequate for Demand

About 3.8 million tons of converted products were shipped in 1972, derived from an estimated production of 4.0 million tons of base papers. Since capacity was about 4.3 million tons in 1972, the operating rate of production-to-capacity was close to 93 percent for the year. With the flexibility of modern paper machinery for a wide range of sanitary grades at high production speeds, and despite shutdown of at least two tissue mills with capacity of 65,000 tons annually, planned capacity additions through 1974 averaging 2 percent should take care of demand increases expected in the near future. Additional new machines, or speed-up and modernization of old ones, can be expected on the drawing boards soon to meet long term requirements.

1972 Profile

Sanitary Paper Products

SIC Code	2647
Value of shipments (millions).	$1,810
Number of establishments (1967).	125
Total employment (thousands)	25
Exports as a percent of product shipments.	1.0
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	7.9
Value of exports (current dollars).	9.6
Employment	2.6
Major producing areas	East-North-Central, Middle Atlantic, East-South-Central, Pacific and New England

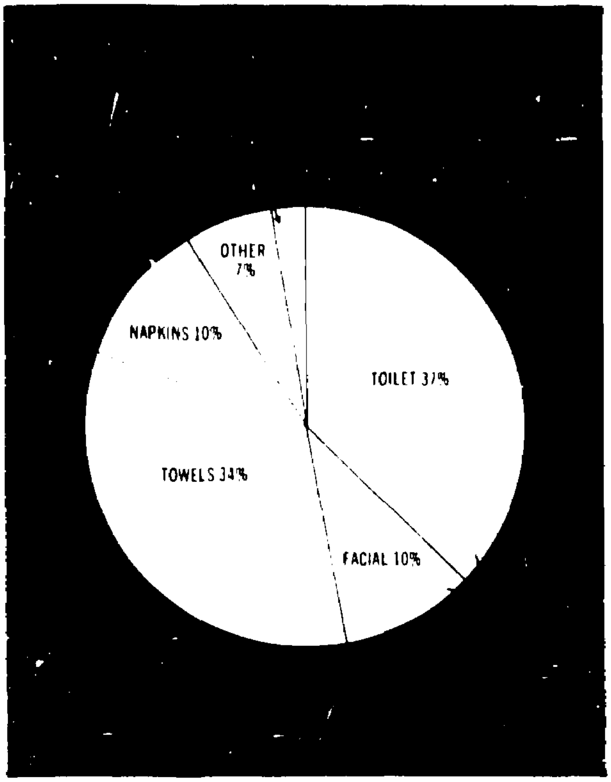
Exports and Imports Small

Because of their bulky nature along with the desire of most nations to be self-sufficient, especially in the basic products of facial and toilet tissues, towels and napkins, exports have been small—generally only 1 percent or less of the value of domestic shipments. Exports surged upward an estimated $18.8 million in 1972, for a percentage increase over 37 percent, but still accounted for only 1 percent of all shipments; the rise is expected to continue in 1973. Leading exports were toilet tissue and other sanitary base paper stocks for conversion. Exports of converted products in order of total value were: toilet tissues, napkins, facial tissues, and sanitary napkins and tampons. U.S. firms continue to penetrate foreign markets through direct investment in part or whole ownership of manufacturing facilities or through transfer of technology. Leading export markets for products in 1972 were Australia, Bahamas, Bermuda, Canada, Jamaica, Mexico, Venezuela, with Canada being by far the largest.

Imports were insignific. it in view of the sophistication of U.S. markets and of the industry and its efficient production of literally hundreds of grades of products.

1973 To Be Good Year

Technological advances and new or improved products, combined with improved demand and growing disposable personal income, point to a



good year for sanitary paper products in 1973. The year's projected growth of 7 percent in value of shipments for all products is a continuation of the long-term annual increases. With the industry price situation somewhat improved and operations expected to continue substantially above a 90

Sanitary Paper Products: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970 R	1971 [1]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Product [2]:								
Value of shipments	1,234	1,562	1,639	1,679	1,810	8	1,940	7
Total employment (thousands)[3]	22	25	26	25	25	0		
Production workers (thousands)[3]	18	21	21	20	21	5		
Value added	515	696	703	713	NA			
Value added per production worker man-hour (dollars)	14.36	16.53	16.70	16.94	NA			
Quantity shipped (1,000 short tons)	2,828	3,221	3,250	3,326	3,585	8	3,790	6
Value of exports	11.9	15.8	14.6	13.7 R	18.8	37		
Wholesale price indexes (1967=100)	100.0	108.9	115.1	119.9	122.5	2		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of shipments of sanitary paper products (SIC 2647) made by all industries.
[3] Employment within the sanitary paper products industry (SIC 2647).

R Revised.

NOTE.—NA = Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

percent production-to-capacity ratio, shipments should rise to nearly 4 million tons. The paper towels product group should regain its position as a leader in growth along with the recovery of the multi-ply luxury grades in napkins, toilet and facial tissues. Since the charges of color contamination of receiving waters made by environmental action groups have been refuted, the trend again may be toward colors—especially in towels and tissues—with even deeper colors displacing substantial volumes of white grades.

Numerous specialized convenience service items including bibs, special wipes, seat covers, head rests, and related products utilized in hospitals, dental and medical offices, and food and other service establishments should continue a steady growth. Because of high unit value, lesser bulk and their specialized nature, they should be candidates for export.

View to 1980

Shipments of sanitary paper products are anticipated to move at about a 6.8 percent compound average annual growth to about the $3 billion level by 1980. This rate will be influenced by increasing consumption of higher value items. Growth in volume of shipments of sanitary paper products of all grades is expected to be at a lower rate. Tonnage should reach the 5.5 million level by 1980 for a compound average annual growth from 1972 of 5.5 percent.

The relatively new fluffed pulp, an important newcomer in the market with potential for new products, may displace cellulose wadding in some converted personal health and industrial products. Whether fluffed pulp, cellulose wadding or paper grades are used in disposable diapers, that product continues to startle the market with its growth. From 11,000 tons in 1969, use of disposable diapers is expected to grow to 57,000 tons by 1980. If data on these products were included in the sanitary paper commodities group, estimates of shipments of the industry would probably be about 15 percent higher than at present.

The sanitary paper products segment of the pulp, paper and board industry will continue to reflect leadership of the industry in pollution abatement through installation of pollution control facilities in their mills. Water and air pollution control facilities required by local, state, and Federal laws will involve capital investments of as much as 15 percent of total plant investment. Pollution control processes will increase operating costs per ton of product. Although pollution control costs will be high, efficiently producing plants should be able to minimize the impact on consumer prices.—*Howard A. Post, Office of Business Research and Analysis.*

CHAPTER 6

Containers and Packaging

Shipments of containers and packaging materials, excluding contract and captive packaging, were valued at approximately $23.5 billion in 1972, almost 10 percent above the 1971 figure. The sizable 1972 rise stemmed from a combination of increased physical volume and higher prices. It came principally from large gains in shipments of corrugated shipping containers, metal cans, glass containers, and folding boxes—all high dollar volume industries. Containers and packaging shipments are expected to reach $25 billion in 1973.

Nearly all products moving in commerce require packaging; the markets of packaging industries are the Nation's 300,000 manufacturing establishments and 2 million retail and wholesale establishments. Packaging demands of those markets are met by more than 5,000 plants, with employment of 1 million workers, in 40 separately defined industries manufacturing containers.

Packaging is a major consumer of steel, paper, and paperboard, aluminum foil, cellophane, wood, textiles, nonflat glass, and plastics.

Packaging Industry Highly Competitive

Many different materials—steel, glass, aluminum, plastics, and paper—compete for a share of packaging markets. The plastic bottle is challenging the glass bottle, the aluminum can competes with the steel can, plastic film has replaced paper in many applications, and the metal can and glass bottle contend for the expanding beer and soft drink markets. Often a package is made of a combination of materials, such as plastic-coated paper, steel cans with aluminum ends, and plastic-coated glass. The possibility that a customer or a supplier of raw material will produce packages adds competition; several large food companies manufacture part or all of their containers, and some aluminum companies produce aluminum cans.

Despite some decline in use of textile and wooden containers and a relatively large increase in plastics, there has been little change since 1963 in the market share of the various packaging materials. A more significant shift may occur in the next few years, depending largely on the markets cap-

Containers and Packaging: Projections 1972–80 [1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
2651	Folding paperboard boxes	1, 325	6	1, 390	5	1, 800	3. 9
2653	Fibre boxes	4, 200	12	4, 600	9	8, 500	9. 0
3221	Glass containers	2, 180	7	2, 280	5	2, 800	3. 2
3411	Metal cans	4, 600	9	4, 900	7	7, 200	5. 8
3491	Metal barrels, drums, and pails	450	8	470	5	605	3. 8

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

tured by containers made from recycled materials, and on the course of legislation to combat solid-waste pollution.

Extended Growth in Prospect

Growth in shipments of containers and packaging will be closely correlated with levels of general economic activity, especially consumer expenditures for food and related products, which account for almost 60 percent of container output.

Although there is overcapacity in many segments of the industry, new demands are likely to lead to expenditures for new plants and new equipment. Competition within and among packaging industries will increase research and development spending. Disposal will be a major consideration in all programs for developing new containers. While growth rates for individual products will vary, the overall industry is expected to expand at an annual average rate of 5 percent, reaching a total volume of $35 billion by 1980.

Ecological Activity

The volume of residential, commercial, and institutional solid waste is currently estimated at 360 million tons annually. That amount is expected to double in the next 15 to 20 years, because of population growth and rising personal consumption. Although packaging materials constitute only about 13 percent of all municipal refuse, containers and their manufacturers have been prime targets because of containers' visibility.

In 1972, State legislatures considered over 150 bills affecting packaging. Over half of these bills required deposits on containers or prohibited the sale of products in nonreturnable packaging. Other bills dealt with recycling and the sale of containers with detachable easy-open closures.

While package producers have tried using lighter weight materials to reduce the bulk of waste generated, most activity has centered around recovery and recycling materials. Technology for the use of secondary or reclaimed packaging raw materials has long existed. But the cost of collecting, sorting, and transporting packaging waste to mills, and removing contaminants before reprocessing, usually makes the use of secondary materials more costly than the use of virgin materials.

Nevertheless several container industries have established programs and systems to obtain discarded package materials, including setting up centers for their collection. Some municipalities have introduced improved techniques for sorting and reclaiming recyclable materials. Trade associations and individual companies support or sponsor educational programs to discourage littering.

The Federal Government is participating in programs to encourage recycling of packaging materials. The General Services Administration has amended Federal specifications for the corrugated board it purchases to require that it contain at least 35 percent waste fibers. Ten percent of total weight must consist of consumer waste and 25 percent of waste from manufacturing.

Plastic Packaging Sets Pace

Plastics are expected to remain the fastest growing and most dynamic packaging material throughout the 1970's. So far most plastic growth has been at the expense of such conventional packaging materials as paper, paperboard, glass and metal. Future growth is likely to result from new technology and innovations. Those may include new materials, and the use of plastics in combination with conventional materials. Many major container companies that began with traditional types of packaging are now in plastics packaging, both to participate in its growth and to protect themselves against possible losses in their conventional lines.

Total plastic packaging is expected to reach a value of about $2.2 billion in 1973 and to grow at an average of approximately 10 percent a year from 1972 to $4 billion in 1980.

In 1972, approximately 6.5 billion blow-molded plastic bottles were used for household and industrial chemicals, toiletries and cosmetics, medicinal and health products, food and beverages, and automotive and marine products. The bottle segment of the plastic industry is expected to grow about 12 percent annually from 1972 to about 15 billion units by 1980, valued at $1.1 billion and consuming an estimated 1.4 billion pounds of materials.

Although the approximately 1.1 billion plastic bottles used in 1972 was relatively small compared to the number of glass and metal containers used to package food and beverages, those industries offer the best long-range potential for plastic bottles. Much research and development has gone into overcoming some of the problems associated with the plastic bottle, e.g. permeability to oxygen and vapors, cost competitiveness, biodegradability, and shelf life. Several leading beverage companies are now market testing plastic bottles for carbonated beverages. Inter- and intra-industry competition for the large beverage market will undoubtedly be keen in the next few years.

Among the advances in the packaging film market in the past decade, the greatest were made by polyethylene. The versatility and low price of this film gave it a dominant place in the plastic industry, with production exceeding 1.5 billion pounds annually. Shipments of flexible packaging films, including polyethylene, cellophane, and other films such as vinyl, polypropylene, polyvinylidine chloride, and polystyrene, are estimated at approximately $675 million in 1972. Those shipments exclude combinations with other materials and direct sales of unconverted films.

Total converted flexible packaging products, including coextruded films and films combined with paper, foil, or other films and shipped either in the form of rolls and sheets or fabricated as bags or similar preformed packages, are estimated at over $1.5 billion in 1972. Largest user of flexible packaging materials is the food industry for such items as bread and other bakery products, fresh produce, snack foods, and frozen foods. Nonfood flexible packaging uses include textiles, apparel, shipping bags, garment bags, and refuse bags.

Plastic packaging is popular with consumers because of its light weight, resistance to breakage, and convenience. It has made inroads into many of the older, more conventional types of packaging. The industry must now find ways to produce economical containers that can be readily disposed of without contributing to pollution.

Sanitary Food Containers Grow Slowly

Shipments of the sanitary food container industry, composed of several product groups using special food-grade paperboard made from virgin fiber, were valued at about $1.3 billion in 1972. Milk and beverage carton shipments, the largest product group, totaled over $300 million in 1971. Other groups include cups and other disposable paperboard food serving products, liquid-tight containers and cartons for butter, ice cream, and frozen foods. Because plastic containers have successfully penetrated many of the markets that traditionally belonged to sanitary paper food containers, average annual growth for the industry in the remainder of the 1970's is expected to be under 3 percent.

Rigid Boxes Offer Prestige Packaging

The rigid-box industry's shipments in 1971 totaled $336 million, 3.5 percent above the 1970 level. Because of strong positions in their historical markets—prestige packing for candy, gifts, jewelry, cosmetics, and the like—shipments will probably continue to grow at about 2.5 to 3 percent a year, the same rate as in the few years past, to approximately $425 million by 1980.

Aluminum Foil Packaging Up

Shipment increases of aluminum foil for containers and packaging end uses have averaged over 15 percent a year during the last 10 years, the highest growth of all major markets for aluminum, according to the Aluminum Association. The packaging industry, consumer of 81 percent of all aluminum foil, is expected to continue growing strongly at about 7 percent annually in the 1970's, because of the expanding convenience foods market and the developing market in institutional and commercial volume feeding.

Fibre Cans Maintain Market Dominance

The fibre can and tube industry experienced extremely rapid growth during the late 1950's and most of the 1960's, largely due to the development of composite structures, which permitted use of fibre cans with wet products. Shipments to four large end-use markets—refrigerated dough, motor oil, frozen concentrated fruit juices, and ammunition and spare parts—enjoyed extremely high annual growth between 1961 and 1968, as the industry captured almost those entire markets. Fibre cans and tubes will undoubtedly develop new end-use applications, although growth will probably not match the rates of the last three or four years.

Foreign Trade Relatively Low

U.S. foreign trade in containers and packaging materials is small compared to total U.S. production. In 1971 exports were approximately $168 million, almost 12 percent above 1970, while imports totaled $63 million, 5 percent below the 1970 level. Foreign trade is low because most containers are generally produced locally and it is uneconomic to ship low-cost bulky items over great distances.

Canada, Mexico, and the United Kingdom are the leading foreign markets for U.S. containers, while Canada, West Germany, and Japan are the most important countries of origin for U.S. imports.

Plastic packaging, cooperage, aluminum foil, and glass containers are the more important export items. Metal drums, flasks, and similar containers, aluminum foil, and rubber or plastic containers are the more important import items.—*Ray Weinstein, Office of Business Research and Analysis.*

FOLDING PAPER BOXES

Shipments of folding paper boxes in 1973 are expected to reach $1.39 billion, 5 percent above the 1972 level. This increase will represent conversion of approximately 2.6 million tons of folding boxboards, a 2–3 percent gain in tonnage. Folding paper box sales reached an estimated $1.32 billion in 1972—a record high.

Twenty Companies Dominate

The folding carton industry consists of about 475 companies operating 660 plants and employing approximately 44,000 people. Despite the large number of firms in the industry, sales are relatively concentrated, with 20 companies accounting for more than half of shipments. The industry is also highly integrated, with converters who make their own paperboard accounting for over 80 percent of total shipments.

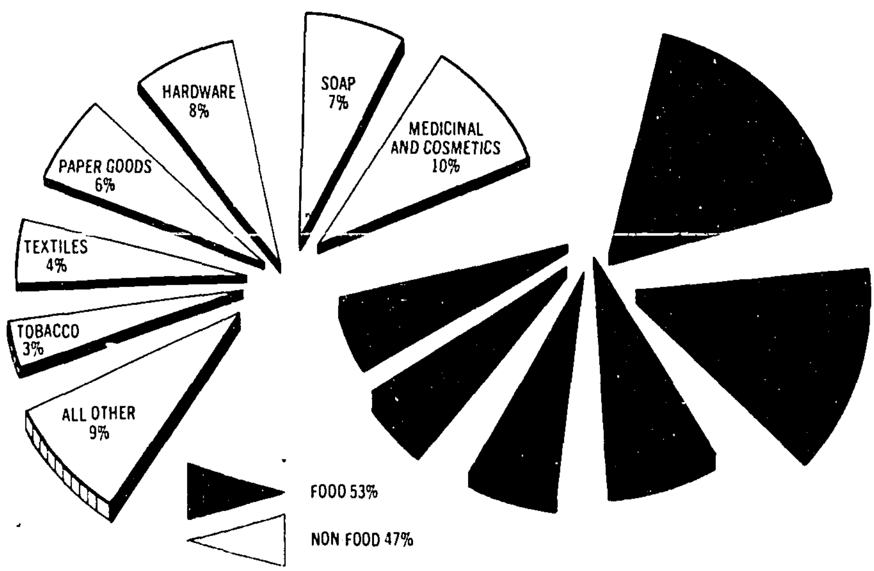
Production of folding cartons is regionalized to serve customers' specific needs effectively and to save on transportation costs. Geographically, the North Central area accounted for 38 percent of sales volume in 1971, slightly more than the Eastern region. Together, these two areas represented three-fourths of total industry sales, while the Southern and Pacific regions accounted for 13 and 12 percent respectively. Although nearly two-thirds of the dollar gain in sales since 1967 went to folding carton manufacturers in the Eastern and North Central region, the 5 percent annual sales growth of the two smaller regions was twice the rate of the two larger regions.

Major End Uses—Consumer Goods

More than 90 percent of folding cartons are used to package nondurable consumer products, over half consisting of food. Largest 1971 dollar gains were in cartons for paper goods, retail and laundry, hardware, and perishable bakery products. Major declines occurred in beverage containers, where competitive materials made significant

Food industry is largest user of folding paper boxes

Dollar Distribution 1967-1972 Average



SOURCE Paperboard Packaging Council and Bureau of Domestic Commerce.

Folding Paper Boxes: Trends and Projections 1967–73

[In millions of dollars, except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Product: [2]								
Value of shipments	1, 109	1, 229	1, 225	1, 250	1, 325	6	1, 390	5
Total employment (thousands)	49	54	48	44	44	0		
Production workers (thousands)	39	43	38	35	35	0		
Value added	532	590	575	610	NA			
Value added per production worker man-hour (dollars)	6. 48	6. 59	7. 26	8. 37	NA			
Quantity shipped (thousands of short tons)	2, 510	2, 627	2, 490	2, 445	2, 500	2	2, 575	3
Value of exports	4. 3	4. 4	4. 9	6. 5	6. 0	−8		
Wholesale price indexes (1967=100) [3]	100. 0	104. 4	108. 2	111. 6	115. 3	3		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of shipments of folding paper boxes made by all industries.
[3] Price index includes shipping containers.

NOTE.—NA=not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

inroads, and in tobacco packaging because of a decline in consumption that year. However, in volume, perishable bakery and dry bakery packaging and retail boxes and cartons for paper goods, toys, and hardware increased.

Based on value of shipments, about two-fifths of all food folding cartons are used for wet foods and perishable bakery products, two-fifths in dry foods, candy and crackers, and the remainder in beverage carriers and cartons. In the nonfood segment, 22 percent of the 1971 shipments of folding boxes were for packaging medicinals and cosmetics, 21 percent for toys, sporting goods, and hardware, and 57 percent for soap, textiles, tobacco, retail, and laundry, paper goods, and miscellaneous.

Emphasis on Quality Boards Continues

With end uses for packaging remaining fairly stable, the folding carton industry has focused on improving product quality by using boards that are lighter, and meeting customer demands for products with greater strength for high-speed converting, better barrier properties for product protection, and superior surface for high volume printing and merchandising appeal.

Higher quality boards—solid bleached sulphate, clay coated, and lined kraft—accounted for almost 73 percent of total consumption in 1971 compared with only 58 percent in 1967. As a result, production of cheaper bending chip, manila, and patent coated boards declined. Solid bleached sulphate is used principally for wet food products, perishable bakery items, cosmetics and medicinals, while lower quality cylinder boards—patent coated, manila, and bending chip—are used primarily for beverage carriers, soap and retail boxes, paper products, textiles, and dry foods with printed overwrap.

Value per ton of folding boxes shipped in 1971 ranged from $311 for bending chip to $681 for solid bleached sulphate, while the average increased to $511 per ton compared with $442 per ton in 1967. By specific end use, the average value per ton in 1971 ranged from $329 for biscuits and crackers to $1,060 for cosmetics. Improved quality of folding cartons has partially contributed to rising prices.

Profits Remain Low

Net profits of the folding paper box industry totaled $30 million in 1971, about 7 percent over the depressed 1970 level.

Although the net profits-to-sales ratio of 2.4 percent in 1971 improved fractionally over the 1970 ratio of 2.3 percent, profits remained well below the 3.2 percent rate averaged from 1966 to 1969. In terms of return on stockholders' equity, the 7.8 percent return in 1971 reflected an improvement over the low of 6.8 percent in 1970. However, this rate was considerably below the nearly 9 percent return achieved from 1966 to 1969 and about 20 percent less than the 9.7 percent average for all manufacturing industries.

The folding paper box industry's estimated capital investment in 1971 totaled $695 million as com-

1972 Profile

Folding Paper Boxes

SIC Code	2651
Value of industry shipments (millions).	$1,325
Number of establishments	660
Total employment (thousands).	44
Exports as a percent of product shipments.	0.4
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	3.6
Value of exports (current dollars).	6.9
Employment	−2.2
Major producing areas	Eastern and North-Central areas

pared with $474 million in 1965, an increase of 47 percent. However, limited profit margins may adversely affect future capital spending.

Environmental Problems Minimal

Environmental problems in the folding paper box industry are relatively minor, since the manufacturing process does not release large amounts of pollutants into the air or water. Furthermore, scrap resulting from the paperboard converting operation is normally returned to mills for recycling into combination paperboards and for producing 100 percent recycled fibers. However, with the trend toward pure white finish folding cartons obtained only through use of virgin wood fibers, prospects for increased recycling and use of combination paperboards do not appear promising.

Recent major capital spending has been on new pulpwood-based mills, rather than on mills with recycling facilities. Recycling levels in the folding paper box industry will increase significantly only with the development of new products using reclaimed paperboard fibers, expansion of existing markets, and investment in efficient equipment to lower the cost of paperboard production from secondary fibers.

Industry to Gain

The value of shipments of folding paper boxes is expected to grow to $1.8 billion by 1980, with growth averaging 3.9 percent yearly. In terms of tonnage, shipments should increase to approximately 3.3 million tons, an average annual growth of 3.5 percent. Changing population mix and consumer purchasing patterns will probably increase retail purchases of food products, with the largest dollar volume gain expected in wet foods. Among nonfood uses, significant growth is expected to continue in the medicinal, cosmetic, toy, and hardware areas—at an annual rate of 3 to 5 percent in tonnage and 4 to 7 percent in dollar value. Other categories will probably gain at a rate of less than 3 percent a year. The only decline anticipated in the next few years is in the tobacco segment.

In 1971, solid bleached sulphate accounted for about 33 percent of all tonnage used by the folding box industry. As this higher grade board continues to displace other board in certain end use markets, production will probably increase from 1 million to about 1.6 million tons by 1980.

In an effort to offset the challenge of other packaging materials (primarily plastics) making inroads into customary folding box markets, manufacturers are emphasizing new product developments. To bolster the industry's competitive position, folding cartons lined with film or foil are being introduced, along with improved lock structures, preformed liners, increased scuff resistance, and pouch-in-the-carton packs for wet products. Continued growth of the industry is probably dependent on the use of laminates, particularly those involving foils and films.—*Ray Weinstein, Office of Business Research and Analysis.*

FIBRE BOXES

The heavy demand for fibre boxes experienced in 1971 continued through 1972, resulting in an 8-percent increase in volume. Further growth in end-use markets should push box shipments in 1973 to a new high, almost 6 percent above the 1972 record of 206 billion square feet. Value of shipments, estimated at $4.2 billion in 1972, is expected to reach $4.6 billion in 1973, a growth of 9 percent, compared with 12 percent the year before.

Demand for fibre boxes for shipping food—the largest single market, with 29 percent of total shipments—is expected to increase only 2 percent in 1973. However, gains of 7 percent are forecast for machinery, furniture, chemicals, beverage, rubber, and plastic products markets.

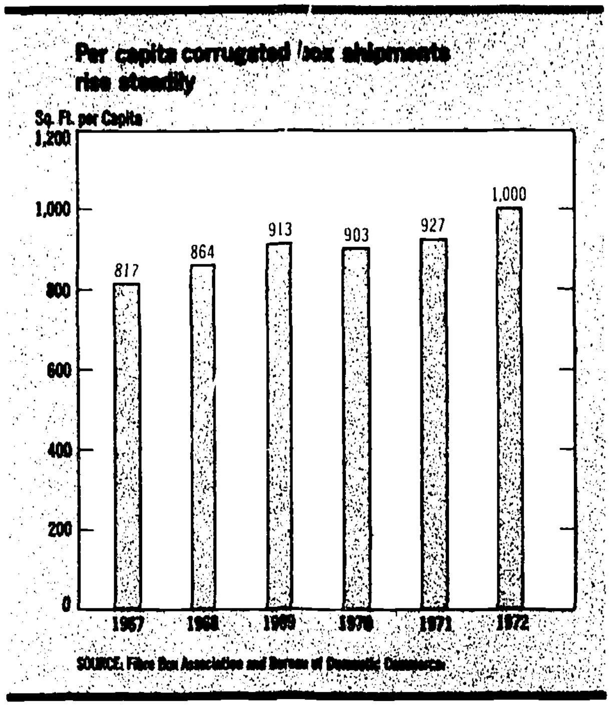
Sustained High Volume

Major impetus for the record volume of shipments in 1972 came from the furniture, appliance, rubber, plastics, machinery, fabricated metal and textile industries. As box users built inventories in anticipation of increasing demand, makers' own inventories of finished boxes were reduced.

Linerboard in Tight Supply

Industry consumption of containerboard in 1971 totaled 13.8 million tons, comprising 68 percent linerboard, 30 percent corrugating material, and 2 percent chip and filler board. Consumption of containerboard in 1972 was about 15 million tons. Rapidly expanding use of containerboard strained supplies of linerboard, the major component, despite near-capacity operations of board mills. With no new linerboard mills scheduled to begin operations, the tight demand-supply situation is expected to continue through 1973. Box plants' inventories of containerboard declined in 1972 to 5 weeks' supply, from the 1971 level of 6 weeks' supply.

The trend toward using lighter weight kraft and semichemical board continued through 1972. Single wall boxes represented about 80 percent of box output. However, significant gains in recent years in the proportions of double and triple wall boxes produced reflect increased demand for heavy-duty containers. Such containers have opened new markets for the industry.



Solid fibre shipping containers, once a major product, continued to decline. They were less than 0.5 percent of total industry shipments. Although use of solid fibre is down, lighter caliper board gained slightly at the expense of the heaviest caliper.

Per capita consumption of fibre boxes in 1972 exceeded 980 square feet, 6 percent over 1971 and

Fibre Boxes: Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Industry [2]								
Value of shipments	2,960	3,500	3,508	3,650	4,200	12	4,600	9
Total employment (thousands)	97	106	104	104	106.	2		
Production workers (thousands)	73	79	78	78	80	3		
Value added	1,130	1,419	1,459	1,505	NA			
Value added per production worker man-hour	$7.41	$8.50	$9.29	$9.76	NA			
Product [3]								
Value of shipments	2,893	3,401	3,435	3,575	4,115	15	4,505	9
Quantity shipped (billion square feet)	163	186	185	192	206	8	218	6
Value of exports	4	4	4	4.4	6	36		
Wholesale price indexes (1967=100)	100	105	108	112	116	3.5		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the fibre boxes industry (SIC 2653).
[3] Includes value of shipments of fibre boxes made by all industries.

NOTE.—NA = not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

1972 Profile

Fibre Boxes

SIC Code	2653
Value of industry shipments (millions).	$4, 200
Number of establishments	1, 377
Employment (thousands)	106
Exports as a percentage of product shipments.	Negligible
Imports as a percent of apparent consumption.	Negligible
Compound annual rates of growth 1967–72 (percent):	
Value of shipments (current dollars).	6. 0
Employment	1. 8
Major producing areas	Central and Eastern States

12 percent over 1967. Per capita value was $18.47 in 1972, compared with $16.73 in 1971.

Plants Down, Employment and Hours Up

In 1972, 730 companies operated 1,377 plants located near major distribution centers in every State. Major producing areas are the Central and Eastern States. Forty-six percent of the plants are converters. They combine linerboard and corrugated medium to produce fibre shipping container. Fifty-four percent are sheet plants that manufacture fibre boxes from containerboard purchased from converters. In 1971, 88 percent of fibre boxes were shipped by converters and 12 percent by sheet plants.

Twenty-four plants have closed since the end of 1970 for economic reasons 15 in 1971 and 9 between January and August 1972. Five plants were opened and four shifted production to newer facilities. The closings resulted in the first net decline in number of converting plants.

The 10 largest companies accounted for 43 percent of box shipments in 1971 and the first 20 companies for 63 percent. The proportion shipped by companies outside the top 100 has increased every year, from 7 percent in 1961 to 9.5 percent in 1967 and 11 percent in 1971. The industry is highly specialized; only 2 percent of its output consists of commodities other than fibre boxes.

To increase production in response to heavier demand, production worker employment rose 2 percent from 104,000 in 1971 to 106,000 in 1972. The average workweek increased to 42 hours, 5 percent above the previous year's 40 hours. Hourly earnings rose 5 percent in 1972 from 1971's average.

Prices Up—Profit Low

The Wholesale Price Index (1967=100) for corrugated shipping containers advanced in 1972 to 116 from 112, or about 4 percent above the previous year. Price increases on the west coast were slightly below the average for other major regions of the country. The WPI for container board in 1972 increased about 3 percent from the 1971 level, which was only 0.3 percent above the 1967 base year. An industry study of profit position in 1970 indicated a return on sales of 0.8 percent before taxes and interest. The 1971 financial survey reveals that the industry sustained a net loss of .03 percent before taxes and interest. Greater productivity, heavy box demand, and the price advances of 1972 should result in an improved profit situation.

Export Market Small

Total exports of corrugated shipping containers in 1971 amounted to $4.4 million, up almost 5 percent from $4.1 million in 1970. Exports have increased each year since 1969. Canada and Mexico continue as the major markets for U.S. fibre boxes. Export potential for fibre boxes is limited, industrialized countries produce their own and manufacturing facilities are expanding in developing countries. It is more economical to ship raw materials abroad and convert them into boxes near their markets.

Future Growth

Expanding use of improved waxes and hot-melt adhesives has been a major factor in developing new markets for fibre boxes. Greater strength and utility has resulted in a strong growth pattern for fibre boxes compared to competitive shipping containers. One such development has been the application of waxes and hot-melts to corrugated containers to obtain water resistance without loss of strength. Future research and development efforts on materials, supplies, technology and machinery and equipment are expected to provide better boxes for existing uses and the basis for further industry expansion. Market growth is expected to result in a 9 percent a year increase in the value of fibre box shipments from 1972 to $8.5 billion in 1980.—*Osker C. Reynolds, Office of Business Research and Analysis.*

GLASS CONTAINERS

Shipments of glass containers in 1973 are expected to total 273 million gross, 2 percent more than in 1972. Value of shipments is forecast to reach $2.3 billion, an increase of 5 percent. Tonnage shipped is expected to just about match the 5 percent increase in value.

Nonreturnable soft-drink bottles, which each year account for more of the industry's total volume, are expected to appear in the larger sizes more and more often; the breakthrough was the development of the twist-off, twist-on cap.

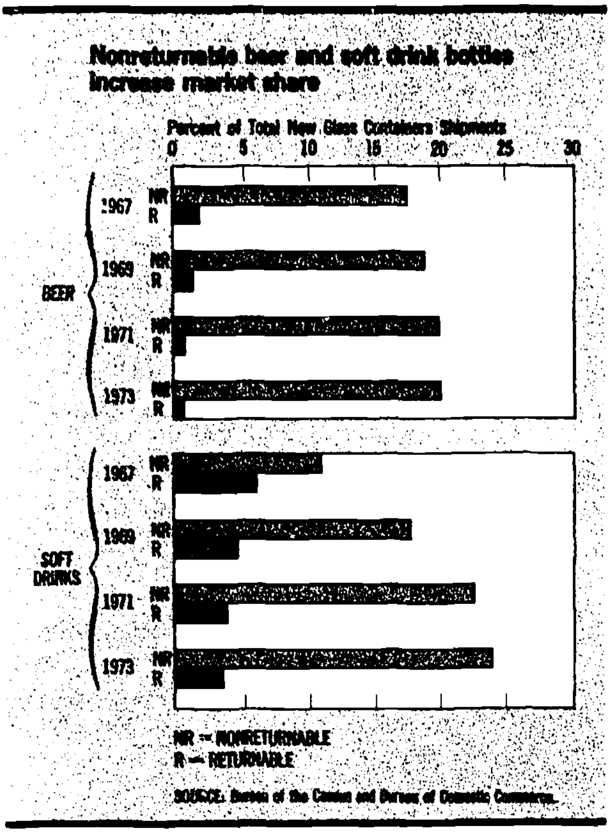
The glass container industry got back to its normal shipment pattern in 1972 from the lowered volume of 1971. In late 1970 it was assumed that prices would have to rise the following January, and there was some fear of work stoppages before a new labor contract was signed. Consequent anticipatory buying borrowed 7 million gross in volume from 1971, which fell 4 percent from 1970's figure. Volume recovered in 1972 by the same amount.

Beverage Bottles in Forefront

Nonreturnable soft drink bottles resumed their volume growth in 1972 after a virtual standstill in 1970 and 1971, and this is expected to accelerate in 1973. The increase will not match the average 29 percent yearly increase of the latter half of the 1960's, however. these bottles are expected to account for 24 percent of total glass container volume in 1973, compared with 23 percent in 1972 and a little less in 1971. Average capacity has risen from 14.1 ounces in 1967 to 17.4 ounces in 1972; by 1975 it is expected to average 18.5 ounces.

Despite ecological considerations and numerous legislative proposals to restrict use of nonreturnable beverage containers, demand for returnable soft drink bottles continues to decline. The share of nonreturnable bottles in the packaged soft drink market is expected to increase to about 30 percent in 1973 from 28 percent in 1972 and 25 percent in 1971. In 1965 nonreturnables represented only 5 percent of that market, and returnables held 83 percent. Returnables are expected to represent only 35 percent of packaged soft drink fillings this year, down from 38 percent in 1972 and 44 percent in 1971. Cans have taken the rest of the market with a threefold rise from 12 percent in 1965 to a current 35 percent.

Nonreturnable beer bottles will gain in volume, but not as swiftly as in past years, because of product maturity and the inroads of metal cans. Use of returnable beer bottles is expected to keep falling. Nonreturnables are expected to keep about 20 percent of the packaged beer market in 1973—a share virtually unchanged from 1972 and 1971, up from 17 percent in 1965. Returnables' share seems likely to fall to 20 percent in 1973, from 21 percent in 1972 and 22 percent in 1971. Back in 1965 it was 41 percent. All glass containers for beer should constitute 20 percent of total industry shipments in 1973, equaling 1972 and 1971.



Food Containers Keep Pace

Shipments of glass food containers—the largest end-use category—are expected to maintain 32 percent of the total market, and enjoy a comparable increase in volume. That 32 percent figure is a decline of almost a fourth from the 41 percent market share of 1960, even while the actual number of food containers shipped has risen almost a third. Tremendous growth in beer and soft drink containers—now leveling out—accounts for the apparent contradiction.

The steady rise in food manufacturing and higher consumption of prepared foods assure a moderate year-to-year increase in glass food packaging. More babies promises gains in the wide-mouth, or jar, segment even while plastics are encroaching on the narrow-neck sector as containers for spring water, edible oils and syrups and flavoring extracts.

Plastics Inroads Significant

Glass containers for the medicinal and health market in 1973 should equal 1972 volume, which was slightly above 1971's. Shifts toward other types of packaging, notably plastics, however, have resulted in a long term leveling in shipments of glass medicinal and health bottles.

The relative importance of glass packaging in the toiletry, cosmetic, household and industrial products markets should also decline further, as competition from plastics and aerosols increases.

Liquor and Wine Gain

Liquor and wine bottles should continue to gain volume. There are more Americans in the age groups that consume liquor and wine. Disposable income is rising, and there is more leisure time. Marketing of light whiskeys and introduction of new brands should favorably affect liquor sales. So far, competition from lighter weight plastic liquor bottles made of polyvinyl chloride (PVC) has been relatively minor. PVC liquor bottle usage may depend largely on Internal Revenue Service decisions on the environmental effects of PVC plastic on solid waste disposal systems.

Growing popularity of fruit and cola flavored carbonated wines with low alcoholic content (10 to 12 percent)—so-called pop wines—among teenagers and young adults, and more frequent use of wines with meals, particularly when dining out, contribute to the continued high growth rate of this industry.

Glass Plants Near Markets

The glass container industry includes some 40 companies operating about 120 plants. The four largest account for about 60 percent of total shipments; the eight largest for about 75 percent. The largest companies are well diversified, producing a broad line of containers and other glass products, many not directly associated with glass containers.

Glass Containers: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	1,352.4	1,664.7	1,863.9	2,046.2	2,180.0	7	2,280	5
Total employment (thousands)	66.7	71.5	74.6	76.6	77.5	1		
Production workers (thousands)	59.4	63.5	66.3	67.9	68.5	1		
Value added	842.2	1,112.4	1,222.6	1,358.6	NA	7		
Value added per production worker man-hour	$7.05	$8.94	$9.28	$10.21	NA	5		
Product [3]								
Value of shipments	1,331.0	1,638.7	1,842.9	[1] 2,020.0	2,150.0	6	2,250	5
Quantity shipped (1,000 gross)	231,046	253,198	268,158	257,129	267,000	4	273,000	2
Value of imports	2.4	5.6	5.6	6.5	7.0	8	7	
Value of exports	21.1	20.5	23.1	22.4	22.0	−2	22	
Wholesale price indexes (1967=100)								
Glass containers	100.0	114.8	120.4	131.6	135.1	3		
Wide mouth food	100.0	115.4	120.7	132.9	136.9	3		
Beer bottle, nonreturnable	100.0	108.6	112.5	117.3	117.9	1		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the glass container industry (SIC 3221).
[3] Includes value of shipments of glass containers made by all industries.
[P] Preliminary.
NOTE.—NA = Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Plants are located in 27 States and all regions of the country, with the Middle Atlantic and North Central areas the most important.

Total employment in 1972 was estimated at about 77,500, of whom 88 percent were production workers. Earnings of industry production workers averaged $4.18 an hour in July 1972, compared with $3.79 for all factory workers. In 1971, earnings in the glass container industry averaged $3.91 an hour, compared with $3.57 for all manufacturing. Annual payrolls totaled almost $700 million, or more than 30 percent of the value of shipments, while materials costs accounted for about 35 percent.

The wholesale price index for glass containers rose almost 4 percent in April 1972, marking the first increase since January 1971, when a 6 percent rise followed the new labor contract.

1972 Profile

Glass Containers

SIC Code	3221
Value of industry shipments (millions).	$2,180
Number of establishments	120
Total employment (thousands).	77.5
Exports as a percent of product shipments.	1.0
Imports as a percent of apparent consumption.	0.3
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	10.0
Value of exports (current dollars).	0.8
Value of imports (current dollars).	23.9
Employment	3.0
Major producing areas	Middle Atlantic and North-Central areas

Production and Inventory Steady

The industry was operating at about 80 to 85 percent of capacity toward the end of 1972, maintaining inventory levels at about 42 days' supply. In the two years before the 51-day strike in February–March 1968, inventories were maintained at a 45 to 46 days' supply. Present 3-year labor contracts are in effect until 1974. Because the production of glass containers is a continuous and automated operation, plants generally operate 24 hours a day, 7 days a week.

Raw Materials Plentiful

Basic raw materials used in the production of glass—silica sand, limestone, and soda ash—are relatively low in cost and in plentiful supply. Cullet, or crushed glass, normally between 10 to 15 percent of the raw material mix, is generally added to facilitate the melting process.

Product Developments Move Ahead

Considerable research and development in the glass container industry has been devoted to making the containers stronger, safer and better fitted to the packaging operations of customers. A glass-and-plastic nonreturnable container encased in a wraparound plastic sleeve, providing less weight and added safety, was introduced into the soft drink market in late 1971. Production of these containers in a range of sizes has expanded considerably since then. They are also being used in beer packaging. Another bottle embodying the glass/plastic concept was test marketed in March 1972, in a 28-ounce size. This bottle, initially aimed at the soft drink market, features a plastic coating that envelopes it from neck to base. It is also lighter in weight than its all-glass counterpart and, along with added strength, increases handling efficiency. Both glass/plastic bottle types can be made on conventional forming machines and are believed to be as recyclable as conventional glass containers.

Also undergoing test-marketing is a glass container coated with a very thin layer of plastic that imparts a color to the glass and protects light sensitive contents from ultra violet rays.

Pilot production tests of chemically tempered glass, looking toward the improvement of glass surface strength, are under way.

Foreign Trade Relatively Minor

U.S. exports of empty glass containers average less than 2 percent of total value of industry shipments. High transportation costs generally discourage foreign trade in this commodity. Automatic glass manufacturing plants are located throughout the world. Several U.S. companies also produce glass containers in large markets abroad.

Although U.S. exports of glass containers are worldwide, Canada accounts for about half of the dollar volume. Other leading customers are Venezuela, Panama, and Australia. Exports consist primarily of beverage, medicinal, chemical, and toiletry containers, with food and miscellaneous glass container exports relatively small.

Imports are generally well under 1 percent of the value of industry shipments. France has been our major supplier, shipping primarily perfume and toiletry bottles. Canada, Italy, Mexico, and Japan are other important suppliers.

Imports of empty glass containers are subject to varying tariff duties, depending on the type and size of container. Rates which went into effect January 1, 1972, represent the fifth and final stage of successive annual reductions in tariff rates resulting from trade agreement concessions granted by the United States under the General Agreement on Tariffs and Trade (GATT) concluded in 1967.

Environmental Operations Grow

Discarded glass containers collected for recycling under the bottle redemption and recycling program initiated by the glass container industry in mid-1970 are currently being retrieved for crushing into cullet at an annual rate considerably in excess of 1 billion units. Virtually all reclaimed bottles are recycled into new glass containers. Some are being used experimentally in street paving and in the development of a number of secondary products such as bricks and building blocks, terrazzo flooring, glass wool insulation, construction panels, and other items.

Collection poses the greatest reclamation problem. Labor, transportation, and other costs involved in obtaining and supplying cullet to manufacturers are not cost-competitive with the basic raw materials. Ongoing research and development sponsored by both government and industry is on systems designed to mechanically recover recyclable refuse from municipal waste. The Nation's first successful system to separate and salvage the various components from municipal refuse is in operation in Franklin, Ohio.

A Look Ahead

Glass container shipments are expected to increase about 2 percent a year in physical units in the remainder of the 1970's, less than half the rate of the previous decade. By 1980, shipments are projected to reach 300 million gross, valued at $2.8 billion.

Product maturity in the convenience packaging of beer and soft drinks, the two major growth segments, along with increasing competition from metal cans in these markets, the possibility of widespread introduction and use of all-plastic beverage bottles, and continued plastic inroads into other glass packaging areas are slowing the growth rate. In addition, the trend to larger size bottles—particularly in the packaging of soft drinks—should further reduce the number of containers required to handle the same volume.

Investment emphasis in the glass container industry is expected to focus primarily on processes and techniques rather than on capacity expansion. The industry is actively upgrading and replacing old facilities with new and more efficient equipment, and moving plants closer to high volume user markets.

The long term effects of ecological considerations on shipments of nonreturnable containers will depend on what programs are eventually decided upon.—*Louis Kupper, Office of Business Research and Analysis.*

METAL CANS

Metal can shipments are expected to total 175 million base boxes in 1973, 4 percent over the 1972 estimated volume of 168.4 million boxes. Value of shipments is expected to total $5 billion in 1973, a gain of 7 percent above the 1972 level of $4.6 billion. Shipments in 1972 were about 4 percent above those of the previous year. Except for aluminum cans, industry shipments in 1971 declined slightly. Hedge buying in late 1970, in anticipation price increases and of possible work stoppages at contract renewal time in early 1971, borrowed some 1971 volume.

Beverage Cans Pace Growth

Despite pressures on ecological grounds for restrictive legislation on nonreturnable beverage containers, soft drink and beer cans continue as the major factor in metal can growth. Increasing population, particularly of teenagers and young adults, growth in personal disposable income, and greater leisure time favor the steady climb of soft drink and beer can production.

Soft drink cans—the fastest growing segment in volume—are expected to represent about 19 percent of total can output in 1973, in contrast to only 6 percent in 1965. Metal cans will probably account for 35 percent of the soft drink package market in 1973, up from 31 percent in 197[illegible] and 12 percent in 1965.

Metal Cans: Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [p]	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Industry [2]								
Value of shipments	2,890.6	3,548.4	3,912.7	4,223.0	4,600.0	9	4,900	7
Total employment (thousands)	60.3	65.1	71.0	70.3	68.6	−2		
Production workers (thousands)	52.3	56.4	60.3	60.2	58.5	−3		
Value added	1,141.5	1,410.4	1,638.9	1,716.1	NA	NA		
Value added per production worker man-hour	$10.13	$11.87	$12.84	$13.77	NA	NA		
Product [3]								
Value of shipments	2,585.7	3,198.7	3,512.5	3,800.0 [1]	4,140.0	9	4,400	6
Quantity, total base boxes (thousands) [4]	133,980	152,617	159,969	161,890	168,400	4	175,000	4
Steel	126,141	140,248	142,825	140,475	144,000	3	148,000	3
Aluminum	7,839	12,369	17,144	21,415	24,400	14	27,000	11
Value of exports	12.3	11.1	12.3	12.4	13.0	5	13	
Wholesale price indexes (1967=100)								
Metal cans	100.0	106.8	112.3	122.0	129.3	6		
303×406 can	100.0	107.0	113.1	123.8	131.8	6		
12-ounce beer can	100.0	106.9	111.8	121.1	128.7	6		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the metal can industry (SIC 3411).
[3] Includes value of metal cans made by all industries.
[4] A base box is 31,360 square inches, equivalent to 112 sheets 14" x 20".
[p] Preliminary.

NOTE.—NA not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Beer cans are expected to post significant gains in 1973 and account for about a quarter of all metal can shipments, compared with 24 percent in 1971 and 10 percent in 1965. Cans are expected to command about 60 percent of the total beer packaging market in 1973, up from 58 percent in 1971 and 42 percent in 1965.

Food Cans Stable

The overall share of food cans continues to decline. Food cans are expected to be about 40 percent of all can shipments in 1973. That is sharply lower than the 60 percent share in 1965, and 65 percent in 1960. Rising income and steady population growth have tended to sustain absolute volume of food cans through the years. Also, the accelerated trend toward consumer convenience has increased the use of metal cans in single-portion packaging for vending as well as other consumer markets.

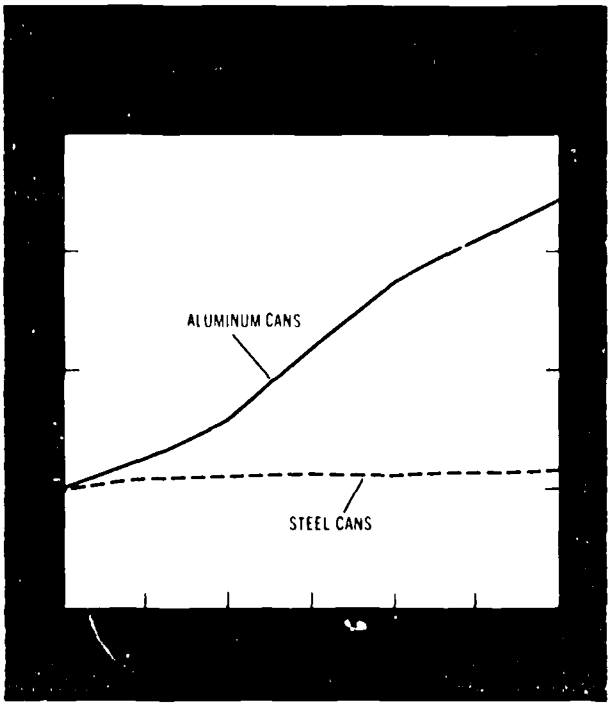
Nonfood Markets Mixed

Following a temporary halt in 1971 in the otherwise uninterrupted growth pattern of aerosol cans, new product applications and technological innovations spurred advances for aerosol cans in 1972, a trend that will carry into 1973. Increased housing starts should stimulate sales of paint and varnish cans. Captive motor oil packaging operations will assure a steady volume of oil can shipments. The market for antifreeze cans should continue to decline as competitive plastic packaging increases.

Eight Firms Largest

The metal can industry consists of over 100 companies operating 299 plants. The four largest account for almost three-fourths of all can production. In addition, nearly a fifth of metal can output is produced by companies for their own use. The large metal can manufacturers are generally well diversified and involved in other types of packaging, with some producers operating plants in foreign countries. The major metal can production areas are the East North Central, Pacific, and Middle Atlantic Regions, which together account for about 65 percent of total can production.

Industry employment in 1972 averaged about 68,600, of whom about 58,500 were production workers. Average hourly earnings of production workers in August 1972 were $4.83. Annual payrolls exceed $700 million, representing about 16 to 18 percent of the value of shipments in the industry. Tinplate and other tin mill products are by far



the major items in the cost of materials, which account for about 60 percent of the total value of metal can shipments.

The industry is currently completing the second year of a 3-year labor contract, in effect since February 1971. Unused industry capacity has resulted in some price erosion in the beverage can market. However, the industry was granted price increases in 1972 to offset higher labor and other costs. Wholesale prices for metal cans rose 6.5 percent during the first 9 months of 1972 over the like period of 1971.

Tin-Free Steel Cans Gaining

Nearly 6 million tons of steel are currently consumed by the metal can industry. Although tinplate remains the major type of steel product utilized, expanding usage of tin-free steel (TFS) in the production of beer and soft drink cans has progressively reduced tinplate from approximately 85 percent of total tin mill product shipments for metal can manufacture in 1969 to about 77 percent in 1972. In that period the share of tin-free has risen from 11 to 19 percent. Estimates of TFS beer and soft drink can production in 1972 range between 11 and 12 billion, compared with 8 to 9 billion cans in 1971. A 13 to 14 billion TFS beverage can market is expected in 1973. Output of beer and soft drink cans is estimated at about 38 billion units in 1972, compared with approximately 35 billion in 1971. A further increase to 41 billion units is looked for in 1973.

Aluminum Share Up

The aluminum share of the total metal can market is expected to rise beyond 15 percent in 1973, from 14.5 percent in 1972, 13.2 percent in 1971, and only 4 percent in 1965. All-aluminum beer and soft drink can production is estimated at over 8.5 billion cans in 1972 compared with about 6.5 billion in 1971. Over 10 billion all-aluminum cans will probably be produced in 1973. Aluminum is also used in the production of aluminum ends with easy-opening devices, featured on about 95 percent of steel beverage cans. Although beverage cans remain the primary outlet for aluminum metal can production, small aluminum cans are also making steady gains for meats, desserts and other applications.

New Steel Can Enters Market

A recent development in the highly competitive beverage can materials market has been the introduction of a seamless steel (tinplate) beverage can produced by the draw-and-iron process. The can is drawn from steel in a manner similar to the present method used to make aluminum beverage cans. The product is a two-piece seamless can with thinner sidewalls, lighter in weight than the conventional three-piece side-seamed steel can. Current production of seamless two-piece steel beverage cans is relatively minor, but additional production is expected in 1973 as new draw-and-iron can lines become operational.

Ecological Activity Pushed

Growing concern over the environment has stimulated numerous legislative proposals to ban, tax, or otherwise restrict the sale and use of nonreturnable beer and soft drink containers.

As with glass containers, comprehensive collection and recycling programs for metal cans have increased in the past few years. Collections of discarded all-aluminum cans for recycling in 1972 were estimated at double the previous year's total, while collection outlets for scrap steel cans and steel/aluminum bimetal cans also expanded. Can recycling programs are sponsored primarily by major metal can and can materials producers in cooperation with breweries and soft drink bottlers.

More effective collection techniques, automated sorting systems, improved municipal waste recov-

1972 Profile
Metal Cans

SIC Code	3411
Value of industry shipments (millions).	$4,600
Number of establishments	299
Exports as a percent of product shipments.	0.3
Compound annual average rates of growth 1967–72 (percent):	
Value of shipments (current dollars).	9.7
Value of exports (current dollars).	1.1
Employment	2.6
Major producing areas	East North Central, Pacific, and Middle Atlantic

ery systems, and new markets for recycled materials are currently under development. An increasing number of cities have begun to use the magnetic separation technique to salvage scrap steel cans and bimetal cans from municipal refuse. The volume of cans reclaimed by this process rose appreciably in 1972.

Foreign Trade Small

Metal can exports from the United States account for less than 1 percent of production. Cans are generally available overseas, and their transportation to distant markets is not economically feasible. Canada, Mexico, Venezuela, and the Dominican Republic account for about 60 percent of all exports on a dollar value basis. The balance is distributed worldwide.

Imports are also relatively insignificant, consisting primarily of specialty containers.

Outlook for the 1970's

The volume of metal can shipments is expected to increase at an annual rate of 3.7 percent in the next several years to total about 225 million base boxes by 1980. The value of shipments will probably rise at a 5.8 percent annual rate, reaching approximately $7.2 billion at the end of this decade.

To improve customer servicing and profit margins, metal can manufacturers are transferring and building new and more efficient facilities closer to customers' production plants, and are gradually phasing out obsolete and uneconomically located plants.

Aluminum use in can production will continue to rise, particularly in the beverage can area. The two-piece seamless drawn-and-ironed can, made of tinplate, may become a formidable competitor, especially if it is found technologically feasible in the next several years to produce the can from less costly blackplate.

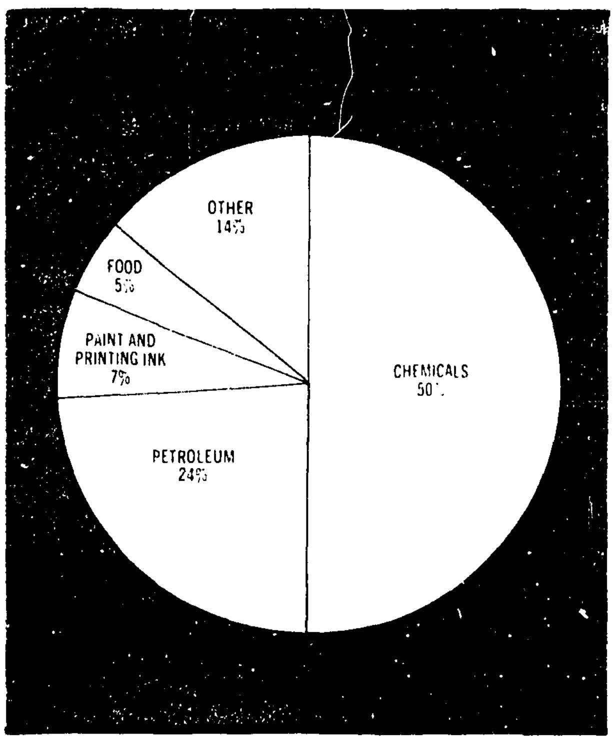
Problems of solid waste disposal and control will continue to concern the packaging markets in the years ahead, and both governmental and industry efforts to solve waste disposal problems will intensify.—*Louis Kupper, Office of Business Research and Analysis.*

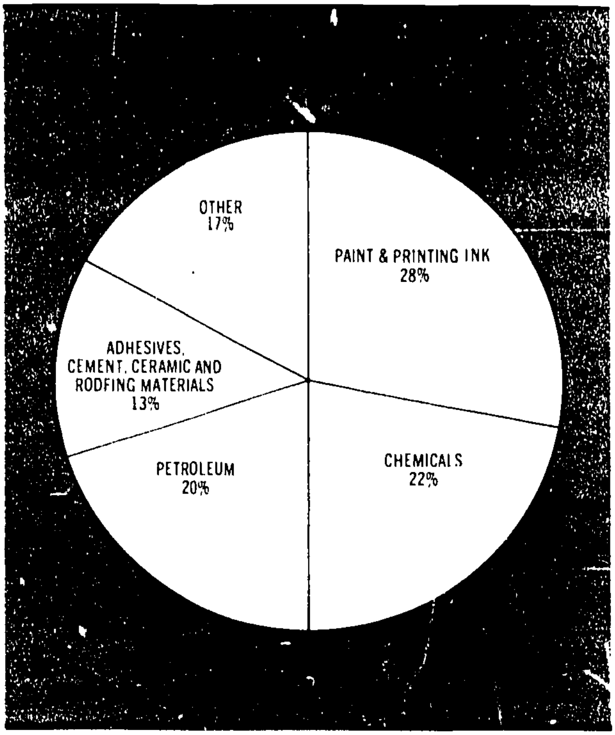
METAL SHIPPING DRUMS AND PAILS

Shipments of metal shipping drums and pails reached a new high of $465 million in 1972, up 8 percent from 1971 levels. In units, shipments of steel drums rose 2 percent and pails 5 percent, with combined shipments 4 percent ahead of 1971. With demand of major users of drums and pails expected to be heavier in 1973, shipments will probably reach $475 million to exceed the 1972 record by nearly 6 percent.

Growth Steady

Historically, drums and pails have grown steadily at about 4 percent per year. The 149 plants in the industry are located near major marketing areas almost equally distributed in the North East, North Central, Southern and Western regions. The





industry consists of 95 companies with employment of 11,000.

The industry, third largest consumer of cold-rolled sheets and the fifth largest in total sheet consumption, used 640,000 tons to produce over 34 million steel drums and 86 million steel pails in 1972.

Principal markets for drums are agricultural chemicals, antifreeze, coal tar products, detergents, dry cleaning agents, naval stores, pharmaceuticals, asphalt, petroleum products and solvents. Food, paint products, and janitorial supplies are smaller markets for drums. In addition to their use for the same products as drums, pails are used for adhesives, glues and cement ceramics, but their major markets are paints and printing inks, followed by chemical and petroleum products.

A 15-percent increase in demand for paint and printing inks and a 14-percent rise in demand for janitorial supplies contributed to higher drum shipments in 1972. A modest gain was also realized in shipments of chemical drums as compared with 1971 whereas demand by the petroleum and food industries declined slightly. Healthy gains of 5 to 15 percent were registered in 1972 shipments of pails for chemicals and paint and printing inks followed by adhesives and petroleum products. Pails for janitorial supplies were down about 3 percent from the 1971 volume.

Industry Highly Specialized

Drums and pails account for 92 percent of all industry products. Some drums and pails are manufactured by metal can and metal stamping industries. The leading four companies account for about 35 percent of industry shipments.

Most of the largest metal shipping container producers are integrated with the basic steel industry. Captive production represents about 3.5 percent of total output—4.7 percent for pails and 0.7 percent for drums. In 1972 shipments of drums made by integrated establishments are expected to decrease about 4 percent from 1971, whereas output of pail captive establishments are expected to exceed 1971 volume by 10 percent.

The physical qualities of superior strength and durability of metal shipping containers contribute to stability of container markets. Fibre drums, reconditioned drums, bulk shippers, and, to a much lesser extent, plastic drums are the major competitors for new metal shipping container markets.

End-Use Distribution of Steel Pails, 1967–72

End use	Percentage of total shipments					
	1967	1968	1969	1970	1971	1972
Chemicals	19.5	20.9	21.8	20.6	21.9	23.5
Petroleum	19.2	18.7	18.7	20.5	19.7	18.7
Paint and printing ink	27.7	28.7	28.9	27.8	27.9	28.2
Janitorial supplies	5.8	5.5	5.8	5.5	5.1	4.5
Adhesives, cement, ceramic and roofing material	14.3	13.3	11.2	12.9	13.1	12.3
All other	13.5	12.9	13.6	12.7	12.3	12.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Steel Shipping Container Institute, Inc; Bureau of the Census, BDC.

End-Use Distribution of Steel Barrels and Drums, 1967–72

End use	Percentage of total shipments					
	1967	1968	1969	1970	1971	1972
Chemicals	52.0	50.9	50.5	50.8	49.6	50.7
Petroleum	28.7	27.6	27.1	26.8	24.4	23.5
Paint and printing ink	6.3	6.6	7.3	6.9	7.0	8.2
Janitorial supplies	3.2	3.1	3.1	3.2	3.4	3.9
Food	2.7	3.8	4.2	4.3	5.3	4.7
All other	7.1	8.0	7.8	8.0	10.3	9.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Steel Shipping Container Institute, Inc.; Bureau of the Census, BDC.

Industry efforts to expand current markets and develop new ones have resulted in lighter weight steel drums and the use of plastic liners or inserts. Despite expanding markets for steel pails, particularly for inks and foods, producers are facing strong competition from plastic pails. Research is continuing in the industry to develop improved containers and techniques that are less expensive without compromising product performance.

Prices and Costs Higher

The Wholesale Price Index (1967=100) for 55-gallon steel drums was an estimated 125.6 in 1972, 4.4 percent over the 1971 average. For 5-gallon steel pails, the Index for 1972 was 127.4, up 5.2 percent from the 1971 level. These 1972 price increases reflect added costs of 8 percent over 1971 for hot and cold rolled sheets and wage costs built into existing labor contracts. Cost of materials

Metal Barrels, Drums, Kegs, and Pails: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	371	399	401	418	450	8	475	6
Total employment (thousands)	12	11	11	10	11	10		
Production workers (thousands)	9	9	9	8	9			
Value added	151	168	172	179	NA			
Value added per production worker man-hour	$7.76	$8.89	$9.33	$10.53	NA			
Product: [3]								
Value of shipments	378.2	414.9	408.6	[1] 430	465	8	490	5
Steel drums	212.6	236.7	237.5	250	268	7	280	4
Steel pails	111.6	119.5	113.3	120	132	10	140	6
Drums and pails	54.0	58.7	57.8	60	65	8	70	6
Quantity shipped (millions)	121	125	116	115	120	4	125	4
Steel drums	33	36	34	33	34	2	35	2
Steel pails	88	89	82	82	86	5	90	4
Value of exports	2.6	2.2	1.7	1.8	3	67		
Wholesale price indexes (1967=100):								
Steel drums	100	107.3	114.1	120.3	126.5	5.2		
Steel pails	100	108.9	115.2	121.0	127.9	5.7		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the metal barrels, drums, kegs and pails industry (SIC 3491).
[3] Includes value of shipments of metal shipper containers made by all industries.

P = Preliminary.

NOTE.—NA = not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

1972 Profile

Metal Shipping Containers

SIC Code	3491
Value of industry shipments (millions)	$450
Number of establishments	149
Employment (thousands)	11
Exports as a percent of products shipped	0.7
Compound annual rates of growth 1967-72 (percent):	
Value of shipments (current dollars)	3.6
Value of exports (current dollars)	2.4
Employment	0
Major producing States	California, Illinois, New York, New Jersey, Ohio, Pennsylvania, and Texas

represent about 57 percent of value of drum and pail shipments whereas salaries and wages represent about 22 percent of the shipment dollar.

Export Trade Strong

Exports of metal shipping barrels, drums and pails reached a peak of $3 million in 1972, up 67 percent from 1971, but less than 1 percent of total U.S. shipments. Canada continued to be the major market, although 1972 sales to that country declined about 25 percent from the previous year. Honduras and Mexico were also major purchasers of metal drums whereas West Germany continues to be the leading export market for pails. Compared with 1971, shipments to Honduras decreased about 30 percent but increased about 5 percent to Mexico and 60 percent to West Germany. Foreign trade is not expected to increase significantly because it is not economically feasible to ship empty drum and pails long distances.

Future Growth Steady

Steady rates of growth expected by major end-users of drums and pails assure market stability for producers. Intensified competition from plastics, bulk handling systems, and reconditioned drums is expected to limit long-range growth in volume to an average of 2 to 3 percent a year. Industry research efforts will be in the direction of product innovations emphasizing physical characteristics of strength and durability that will enable industry to meet marketplace competition.

Growth averaging about 4 percent annually is expected for the remainder of the 1970's, which will push drum and pail shipments to approximately $655 million in 1980.—*Osker C. Reynolds, Office of Business Research and Analysis.*

CHAPTER 7

Printing and Publishing

The printing and publishing industries continue to mirror the Nation's economic and demographic trends. Demand for printed products is stimulated by a combination of population growth, rising school enrollments, higher income levels and expanded business activity. The graphic arts industries are characterized by steady growth, stable employment, high wage rates, and a large number of small establishments.

The 15 industry groups classified as printing, publishing and allied industries provide employment for more than 1 million people with a total payroll approaching $10 billion. The average hourly wage of $4.49 for production workers in 1972 is the second highest wage rate among manufacturing industries.

With a newspaper or commercial printing plant in virtually every county, the industry's influence is widespread. The small entrepreneur continues to be attracted to printing and publishing; only one plant in five in the industry has more than 20 employees.

Outside Factors Affect Industry

Technological advances, business activity levels and legislative actions all have signficant impacts on individual printing and publishing industries.

Publishers derive the greatest portion of their receipts from advertising revenue, which is largely determined by levels of business activity. Shifts in placement of ad dollars among competing media affect individual publishers greatly. Direct mail advertising, a major segment of the commercial printer's total dollar volume, is also sensitive to the changes in business activity.

Publishers of books and magazines, greeting cards and similar consumer goods are designing more products to appeal to the Nation's growing young adult population. Higher school enrollments influence the demand for textbooks and similar educational materials, and rising household formations present new opportunities for publishers of home-oriented periodicals.

Legislative actions are of major importance to the industry. Postal rates are a prime cost element

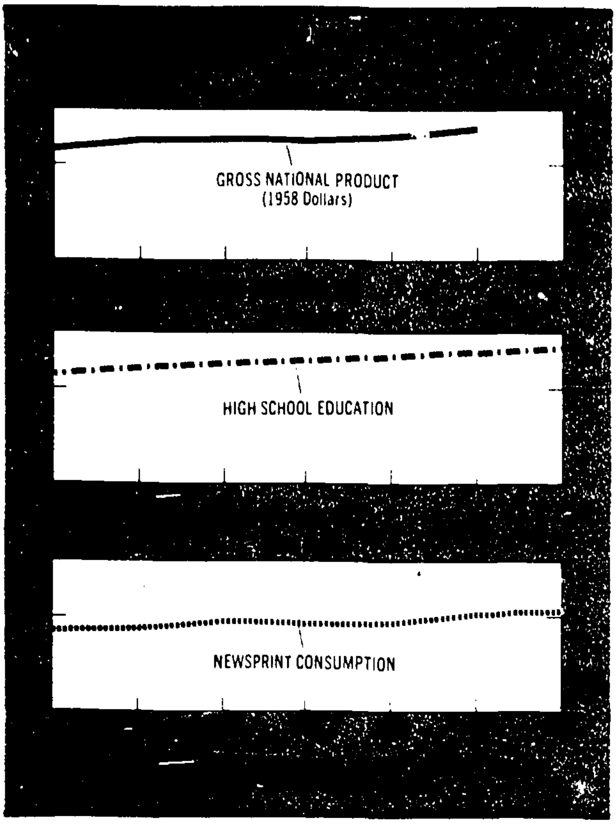
Selected Printing and Publishing Industries: Projections 1972–80 [1]

[Value of shipments in millions of dollars]

SIC Code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
2711	Newspaper publishing and printing	$7, 840	6	$8, 250	5	$11, 600	5 .0
2721	Periodical publishing and printing	3, 460	7	3, 655	6	5, 515	6 .0
2731	Book publishing	2, 880	6	3, 050	6	4, 770	6 .5
2732	Book printing	985	5	1, 045	6	1, 550	5 .8
2751–2	Commercial printing	9, 231	13	10, 096	9	17, 303	8 .0
2761	Manifold business forms	1, 386	9	1, 510	9	2, 750	9 .0
2791	Typesetting	530	8	576	9	980	8 .0

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.



to the entire industry; educational allocations by Federal, State, and local governments are dominant factors to textbook publishers; copyright laws have a significant bearing on the distribution and use of published materials.

Environmental Concern

Environmental concern in the graphic arts industry centers primarily on problems of air pollution. Efforts are being made by manufacturers to reduce the discharge into the air of harmful solvents vaporized in ink drying after printing. Economical recovery processes, new formulations of printing inks that contain no harmful solvents, and different drying operations are all currently being tested throughout the industry.

Impact of Technology Advances

The small size of most graphic arts establishments forbids substantial investment in research and development activities. Technological improvements of basic printing processes and procedures generally are initiated by suppliers to the graphic arts industry.

While many technological advances have benefited the printing industry, others continue to provide competition to publishing industry products. Among these are microimagery, cable television, facsimile transmission, and other modern methods of disseminating information—all completely different from traditional informational techniques.

Future Is Bright

Printing and publishing industries entered the 1970's on an economic plateau. The current upsurge in economic activity coupled with other demand factors favorable to a rise foretell a bright outlook for printed products in the next few years. Receipts of the printing and publishing industries are expected to reach a record level of $30 billion during 1973, 7 percent above 1972. By 1980, receipts probably will be about $45 billion, reflecting an average annual growth rate of 6 percent.—*Charles R. Cook, Office of Business Research and Analysis.*

NEWSPAPERS

Receipts from newspaper publishing are expected to increase 5 percent to $8.2 billion in 1973. Estimated receipts of $7.8 billion for 1972 were 6 percent over 1971's. Higher economic activity, stimulating a resurgence in advertising expenditures, accounted for most of the growth in 1972. The continuing advance in education levels and the growing numbers of the adult population increased demand for newspapers. The newspaper industry maintains its place as the Nation's 10th largest industry with total 1972 employment estimated at 372,000, of whom about half were production workers.

Newspaper Circulation Up

In 1971 daily newspaper circulation reached a new high of over 62 million copies, with weekly circulation over 30 million and Sunday over 50 million. Over-all advertising revenue was up 9 percent over 1970. Revenue from national adver-

1972 Profile

Newspapers

SIC Code	2711
Value of industry shipments (millions)	$7, 840
Number of establishments	8, 094
Total employment (thousands)	372
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars)	6. 3
Employment	1. 0

Newspaper Publishing and Printing: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	5, 757	6, 823	6, 991	7, 385	7, 840	6	8, 250	5
Total employment (thousands)	355. 1	368. 1	373. 0	370. 0	372. 0	1		
Production workers (thousands)	169	182	169	171				
Value added	4, 185	5, 029	5, 214	5, 540	NA			
Value added per production worker man-hour	$13. 86	$15. 63	$16. 82	$17. 90	NA			

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the newspaper publishing and printing industry (SIC 2711).

P Preliminary.

NOTE.—NA=not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

tising rose 14 percent, from retail advertising 8 percent and from classified ads 9 percent. With newspaper advertising expenditures running at a $6.7 billion annual rate in the first half of 1972, up 13.6 percent from the like period of 1971, newspapers should maintain their market share of advertising revenue.

At the beginning of 1972, 1,749 daily newspapers were being published in the United States—only one more than in 1971. Weeklies numbered 7,610 in 1971 and declined to 7,567 in 1972. The minor gains and losses probably resulted from mergers and changes in frequency of publication, as well as from business failures.

Competition Continues Intense

Competition among the media for the U.S. advertising dollar continues to be intense, with newspapers hard pressed to maintain their share against radio, TV, CATV, and direct mail. In 1971 newspapers increased their share to 30.3 percent from 29.3 percent in 1970. Increasing use of color, both printed and inserted in the paper, inclusion of advertising supplements, and more aggressive sales efforts, plus the use of regional features, served to maintain ad revenues.

Newsprint Essential to Industry Growth

Newsprint remains a major cost in the production of a newspaper, ranging up to 35 percent of total publishing costs for a daily paper of medium circulation. Newsprint consumption for the first 8 months of 1972 was 7.3 percent ahead of the like period in 1971. Total tonnage consumed in 1972 should exceed 10 million tons. About 70 percent of all newsprint used comes from Canada. Newspaper publishers normally stock a three- to four-week supply, with another week's supply in transit from mills to publishers. Current supply remains adequate and U.S. prices under controls remain relatively stable.

Expansion of newsprint capacity for future demands requires a long lead time; newspaper publishers as consumers and newsprint mills as producers carefully monitor economic trends, exchange rates, newspaper circulation and advertising. Future growth of newspapers, estimated at 5 percent annually to 1980, will require increased newsprint capacity for future U.S. requirements.

Technological Innovation Continues

Faced with increasing labor and material costs and aggressive competition by the other advertising media, newspaper publishers have been quick to exploit modern technologies for storage, retrieval and editing of information and for improved methods of typesetting, printing and delivery. An estimated 5,233 weeklies—almost 70 percent of the total—have converted to offset printing. Among the dailies 741, or 42 percent, were printed by this process in 1971. Offset printing and photo typesetting have resulted in an economical manufacturing system in addition to providing the advantages of color illustrations and improving the appearance of the newspaper. Although most installations were in the small- and medium-circulation plants, the larger dailies are increasingly converting either partially or wholly to this combined process. Other new developments include the use of optical character recognition (OCR) for computer input with video display terminals for editing and computer related photo typesetting.

Newspaper plants with large capital investments in letterpress equipment have been converting from conventional hot metal stereotypes to photosensitive plastic plates, usable with material from the phototypesetter and printable on the conventional newspaper letterpresses. The term "complete news system" is rapidly becoming a reality in many newspaper publishing plants. Companies with several plants systematize further by using facsimile and microwave transmission of copy from the home publisher to the subordinate plants.

International Trade

Newspapers move to a limited degree in international trade because of the unique contents of each paper and in the way each interprets the news of its own country. Therefore, competition between foreign and domestic newspapers is almost nonexistent, the exchange being primarily informational, educational, or cultural.

A Strong Future

Newspaper publishers foresee continued growth for the next decade, assuming that new technologies, new services and features can maintain readership and thus attract advertisers. Advertising revenue will still account for two-thirds to three-fourths of newspaper receipts and contribute substantially to a strong viable industry. Industry receipts should continue to grow at 5 percent a year, to reach a total of $11.6 billion in 1980.—*Harold F. Drury, Office of Business Research and Analysis.*

PERIODICAL PUBLISHING

Receipts of the periodical publishing industry, reflecting overall growth in the national economy, are projected at just under $3.7 billion for 1973, an increase of 6 percent over 1972's estimated receipts of $3.5 billion. Gains in U.S. industrial production in 1972 brought advertisers back into the media marketplace. U.S. magazine publishers experienced a surge of advertising revenue that should continue through 1973. The appearance of new publications, prompted by renewed interest in magazines to serve the needs and activities of more segments of the population, accounted for some of the rise in circulation revenues.

Periodical publishing employment, at 70,000 in 1972, declined 18 percent from the peak of 85,100 in 1969. In both 1971 and 1972, magazine publishing firms increased revenues without adding to payrolls. The further gains in receipts expected in 1973 will probably raise employment in the publishing industry by about 3 percent.

Magazine Publishing More Specialized

The U.S. periodical publishing industry consists of more than 2,400 firms producing about 9,000 different magazine titles each year. While the principal markets of these publications are consumers, businessmen, and the farm population, a broad range of scholarly, religious, and other nonprofit-oriented magazines minister to particular interests. Circulation per issue of for-profit magazines extends from the hundreds to the millions, with publications competing vigorously for readers and advertisers.

Periodical Publishing: Trends and Projections 1967–73

[In millions of dollars except as note]

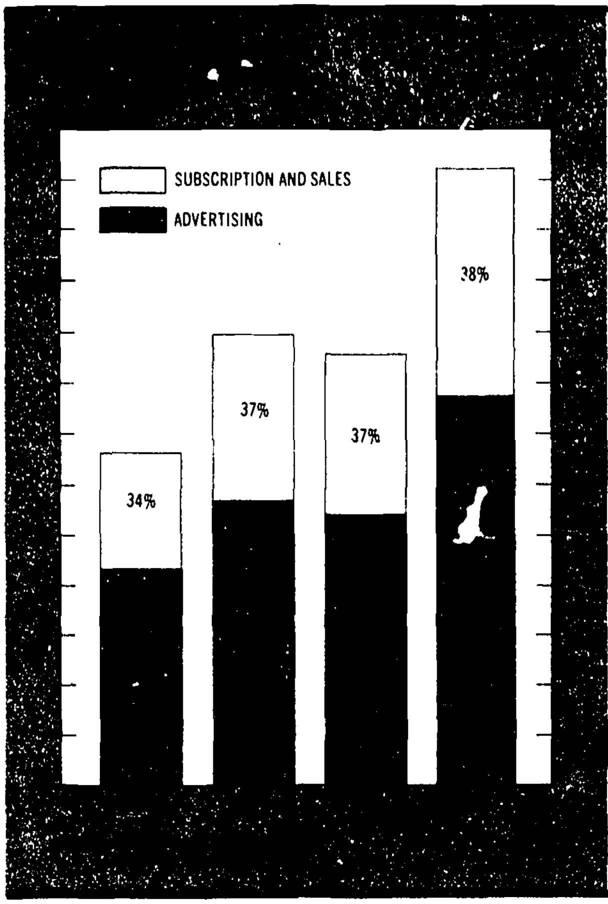
	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of receipts	3,095.9	3,468.4	3,157.9	3,242.0	3,460.0	7	3,655	6
Total employment (thousands)	79.1	85.1	76.9	71.4	70.0	−2		
Production workers (thousands)	14.5	16.0	13.7	13.7	13.5	−1		
Value added	1,868.7	2,118.0	1,930.6	2,013.4	NA			
Product: [3]								
Value of receipts	2,668.2	2,896.6	2,797.8	2,860.0	3,050.0	7	3,220	6
Value of imports	3.8	8.0	16.9	16.5	17.2	4	18	5
Value of exports	76.4	79.0	83.7	86.5	93.0	8	100	8

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the periodical publishing industry (SIC 2721).
[3] Includes value of receipts of periodicals published by all industries.
[P] Preliminary.

NOTE.—NA = not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Advertising is the largest single source of revenue for practically all magazines. Consumer-oriented publications generally rely on advertising for 55 to 65 percent of their receipts. The rest of their income is supplied by subscriptions or single copy sales. Hundreds of controlled-circulation magazines—generally limited to specialized segments of U.S. industry—are distributed without cost to recipients. Such publications look to advertising for virtually 100 percent of their revenue. Business and farm publications with paying subscribers generally count on advertising for over 70 percent of income. While magazine advertisers run the gamut of U.S. industry, one segment—tobacco manufacturers—contributed to a rebound of consumer magazine revenue in 1971–72. They increased their print advertising expenditures considerably after cigarette advertisements were banned on radio and television.

An estimated 5.6 billion copies of periodicals a year are distributed by the magazine industry. They reach about 63 million households. Readership has grown steadily; media studies link interest in magazines with rising incomes and higher educational attainment. Size and diversity of the population present a challenge to the magazine industry, with publishers attempting to serve every facet of the country's interests. For every magazine title disappearing from the marketplace, five are born to take its place. In the period 1967–71, for example, the Magazine Publishers Association, Inc., reported 92 magazines were sold, merged, or discontinued while 478 new magazines were introduced. The more successful periodicals are usually personalized, individually tailored publications designed for specific rather than general tastes and interests.



1972 Profile

Periodical Publishing

SIC Code	2721
Value of industry receipts (millions).	$3,460
Number of establishments	2,425
Total employment (thousands).	70
Exports as a percent of product receipts.	3.0
Imports as a percent of apparent consumption.	0.6
Compound annual average rate of growth 1967–72 (percent):	
Value of industry receipts (current dollars).	2.1
Value of exports (current dollars).	4.0
Value of imports (current dollars).	35.3
Employment	−2.4
Major producing areas	New York, Chicago, Philadelphia, and Los Angeles

Publishers Seek Cost Controls

Periodical publishers face significant cost increases from the paper manufacturing industry and the U.S. Postal Service. Excess capacity, endured by papermakers for a number of years, has been overtaken by strengthened demand, creating pressures for higher paper prices.

U.S. Postal Service policy requiring rates for handling commercial classes of mail to be high enough to cover all costs has adversely affected the U.S. periodical industry. Approximately two-thirds of the 5.6 billion copies of magazines go to their readers through the mails, with the other third sold through newsstands. Postal Service rates on second-class mail, primarily magazines and newspapers, are in the first year of a 145-

percent increase to be spaced over the period 1972–76. Since postal charges count for between 5 and 10 percent of publishers' costs, the magazine industry has taken a 3-pronged approach to solving the rate problem: (1) use of lighter weight paper and, in some instances, of smaller dimensioned magazines have lowered costs by reduction of bulk; (2) publishers are exploring use of alternate distribution methods, such as private delivery systems, including dairy produce carriers; and (3) consumer magazines are seeking aid from the Congress in reducing postal costs, particularly for low circulation magazines.

Technology has aided the periodical publishing industry in resisting cost increases. Editorial departments of a few of the larger magazine publishers employ electronic display systems for more efficient processing of articles, photos, and information before actual press production. Circulation departments use computers to evaluate subscription lists and generate material useful to the advertising sales staff.

Most publishers rely on commercial printers for the physical production of their magazines. The close relationship between publishers and printers has been strengthened by increased linkups to facsimile transmission systems whereby publishers' materials are quickly transmitted over long distances to their waiting supplier printers. A trend toward producing magazines on web offset printing equipment has been underway for the past 5 to 10 years because of the process's cost advantages.

Magazine Exports Near $100 Million

Exports of U.S. periodicals should reach about $100 million in 1973, an 8 percent gain from 1972's estimated shipments of $93 million. By far the largest buyers are the Canadians, whose annual purchases account for about two-thirds of total U.S. export revenues. Other substantial markets include the English-speaking countries of Australia, the Republic of South Africa, and the United Kingdom.

While U.S. magazine exports have risen steadily at about 4 percent per year in the period 1967–72, U.S. periodical publishers have frequently sought to reach world markets through copublishing or joint venture arrangements with foreign publishers, primarily because of the high cost of distributing magazines internationally.

Many periodicals contain topical articles that require speedy dissemination. International air mail or air freight shipments, which would be ideal for foreign distribution of U.S. magazines, cannot be used by many publishers because of their high rates. Some consideration has recently been given to charter flight shipments of U.S. periodicals to selected foreign countries, a practice initiated by some U.S. book and magazine wholesalers.

Establishment of the DISC program (Domestic International Sales Corporations), designed to shield U.S. export-derived revenue from Federal taxes, was at first welcomed by the periodical publishing industry. However, the U.S. Treasury recently ruled that magazines whose income was derived from sale of advertising space rather than from subscription and sales were ineligible for DISC benefits, eliminating most publishers' interest in DISC.

U.S. demand for foreign magazines has surged in recent years, although U.S. exports outpace imports more than 5 to 1. Imports for 1973 are expected to reach $18 million, an impressive gain from 1967's figure of $4 million. The United Kingdom and Canada supply about half of the U.S. market for foreign periodicals.

Industry Marked By Diversification

Publishers of periodicals are situated in virtually every state and region of the U.S. New firms appear each year, with initial capitalization of these establishments running from thousands of dollars for very small circulation publications to millions of dollars for magazines with circulations starting at 100,000. Some concentration of shipments exists in the periodical publishing industry, particularly in the farm and consumer magazine segments. The 20 largest farm magazine publishers account for over 80 percent of total farm advertising and subscription sales revenue. The 20 largest publishers of consumer magazines garner 80 percent of consumer magazine subscription revenue and 90 percent of advertising revenue. Very little information is available on industry profitability: the vast majority of periodical publishing companies are privately held.

Magazines are classified by the markets they serve, as well as by whether the publication is (1) audited by an independent circulation agency, (2) paid for by the reader or (3) issued free of charge. Auditing a magazine's circulation verifies the publisher's claims of readership—an assurance to advertisers. Despite the values of circulation auditing, more than half of all business magazines remain unaudited.

Proponents of paid circulation magazines—subscriptions are paid for by the reader—claim high reader involvement. Yet magazines issued free of charge—controlled-circulation publications—have grown rapidly because of their ability to reach large, specialized reader groups. While controlled-circulation magazines began by serving individual segments of U.S. business, recently some have appeared to serve the consumer market.

Publishers are expanding into many nonmagazine sectors. Newsletters, book publishing and book club operations, seminars, phonograph record and audiovisual cassette sales, and direct mail lists have grown to become important, profitable activities within publishing establishments. By drawing on the circulation lists built up for each magazine, publishing management can construct a variety of information packages for particular markets.

Industry Prospects Brighten

Periodical industry receipts should exceed $5.5 billion by 1980, representing an average annual growth in the period 1972–80 of 6 percent. Advertiser recognition of the value of print media is expected to continue, along with increased reader interest and involvement with magazines.

New forms of disseminating information, particularly micropublishing, will attract the attention of the periodical industry. Microfiche may, for example, be used to provide subscribers with additional background or supplementary information that can't be presented within the limits of magazine space.

Advanced distribution methods are expected to be available by the end of the decade. The U.S. Postal Service is working to assist the periodical publishing industry by establishing the highly automated distribution centers that will be needed to speed handling of increasing numbers of magazines.

More efficient distribution is also the key factor in the potential expansion of international markets for U.S. periodicals. Breakthroughs in air freight shipments or in international air mail rates are essential if the periodical publishing industry is to capitalize on foreign demand for U.S. magazines. U.S. publishers will continue to explore joint publishing ventures overseas and seek wider markets for both their printed and nonprinted products.—*William S. Lofquist, Office of Business Research and Analysis.*

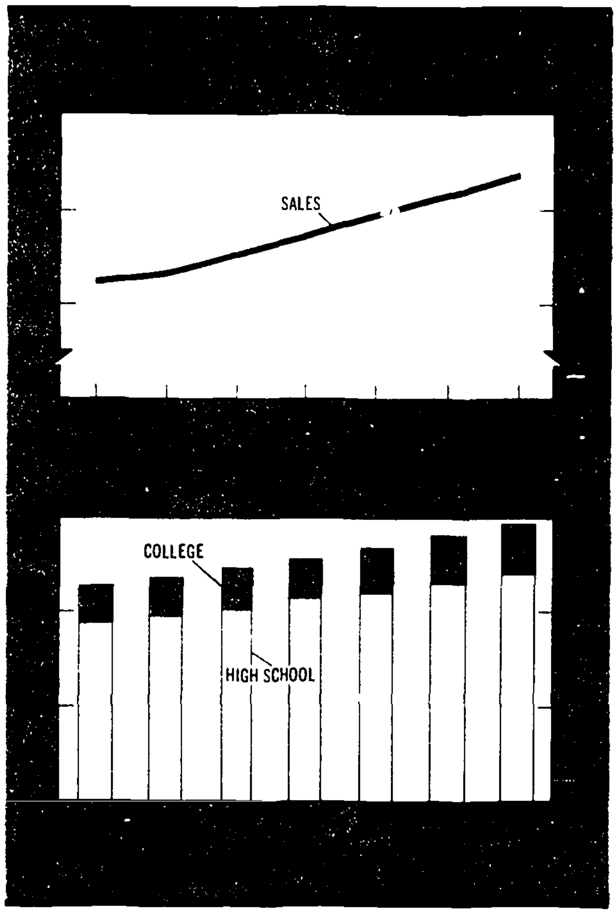
BOOK PUBLISHING

Expanding book markets, reflecting additional new readers with higher incomes and widening interests, should push book publishing industry receipts to over $3 billion in 1973, 6 percent above 1972 levels.

Publishing employment topped 60,000 in 1972, a gain of 8,000 in the 1967–72 span. About half of the gain is in production workers, indicating a step-up in publishers' concern for improvement in the noneditorial aspects of book publishing activity. The number of production workers averaged 18,000 in 1972.

Paperbacks Pace Industry Sales

Paperback books, particularly mass market paperbounds, sold through drug and chain store outlets, have become the fastest growing segment of the U.S. book publishing industry. Mass market



Book Publishing: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of receipts	2, 134. 8	2, 417. 2	2, 437. 3	2, 726. 6	2, 880. 0	6	3, 050	6
Total employment (thousands)	52. 0	56. 4	55. 7	59. 6	60. 5	1		
Production workers (thousands)	13. 3	14. 2	14. 8	17. 6	18. 0	2		
Value added	1, 456. 6	1, 563. 1	1, 703. 9	1, 869. 1	NA	NA		
Product: [3]								
Value of receipts	2, 255. 3	2, 521. 8	2, 723. 1	2, 950. 0 [1]	3, 150. 0	7	3, 340	6
Value of imports	69. 2	78. 4	92. 0	101. 0	120. 0	19	134	12
Value of exports	143. 2	166. 1	174. 9	176. 7	186. 0	5	197	6

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the book publishing industry (SIC 2731).
[3] Includes value of receipts of books published by all industries.
P Preliminary.

NOTE.—NA = Not available.
Source: Bureau of the Census, and Bureau of Domestic Commerce.

paperbound titles jumped 25 percent to 2,985 in 1971 from 2,393 in 1970, a trend that is expected to continue in the next several years. Public acceptance of softbound books is attributable to many factors including price, availability, and improvements in the technical qualities of the product (such as adhesive binding, cover stock and type design). Popularity of paperbacks has encouraged paperbound publishers to become more active in producing original titles. Recently, some well known authors have received competitive bids for their works from both hardbound and paperbound publishers.

Although title production of mass market paperbounds has reached new levels, title output for the entire book industry has declined. In the first 6 months of 1972, title output dropped 6 percent to 17,940 new books and editions from 18,997 titles in the same period a year earlier. Particularly noticeable were declines of 25 percent in the fields of history, 22 percent in literature, and 17 percent in fiction.

New management techniques have been introduced in an effort to increase profits. Manuscripts are reviewed more closely, size of print runs have been reduced to lower inventory costs, and greater attention is being paid to savings in book production.

Books Reach Fragmented Markets

The book publishing industry serves a variety of individual markets. Textbooks and related instructional materials, accounting for about a third of the industry's receipts, meet the Nation's educational demands. Religious books usually appeal to specific denominations although some titles are aimed at broader audiences.

Changes in individual book markets and in methods of reaching these markets have had an impact on the publishing industry. Population shifts to the suburbs have spawned new bookstores and larger book displays in chain and drug stores. Increasing numbers of readers with larger incomes and specialized, diversified interests have caused a surge in book club activity. While the U.S. population is approaching a level of relative stability, educational attainment in the United States is reaching up to new levels. More than half of the population has graduated from high school and the number of participants in fast-growing adult education courses currently exceeds 13 million. While declines in the U.S. birth rate have slowed enrollments in elementary schools, educational funding levels have been maintained and higher-per-student spending for instructional materials may enable publishers to offset fluctuating changes in demand. Libraries have been hard pressed for funds and some publishers, including university presses and publishers of reference works, are attempting to reach library markets with information produced on microfiche.

Inventory Management Improves

Steps toward better inventory management have contributed to U.S. book publishing industry gains. Use of computers through stages of warehousing, distribution, and order fulfillment has aided publishers to both reduce inventory control costs and speed up the process of shipping books to customers. Rising costs of carrying inventory have encouraged publishers to opt for shorter printing runs. Book printers have accommodated book publishers by offering quality short run work and reducing the costs of going back on press for additional printings when market demand for an individual title outpaces the original supply.

Climbing paper prices and larger contracts for the manuscripts of established authors present publishers with new problems of cost control. Demand for certain grades of paper used in book manufacturing has gradually increased to the point where U.S. papermills are being pushed to capacity limits, with resulting pressure on prices. The search for authors whose works are assured of public acceptance has forced publishers to bid high for books.

The book publishing industry is beginning to experiment with the use of computers. More and more manuscripts are being set by computerized typesetting, affording opportunities for both lower initial typesetting costs and subsequent ease of storage and retrieval for reprint purposes. Some book publishers foresee the day when editing of manuscripts will be accomplished on computer display screens, a process currently used by a few newspaper and magazine companies.

1972 Profile

Book Publishing

SIC Code	2731
Value of industry receipts (millions).	$2,880
Number of establishments	1,050
Total employment (thousands).	60.5
Exports as a percent of product receipts.	5.9
Imports as a percent of apparent consumption.	4.5
Compound annual average rate of growth 1967–72 (percent):	
Value of industry receipts (current dollars).	6.2
Value of exports (current dollars).	5.4
Value of imports (current dollars).	11.6
Employment	3.1
Major producing areas	New York, Chicago, Boston, Philadelphia, and Los Angeles

Export Growth Slower Than Imports

The United States dominates international trade in books. The U.S. exports and imports more books than any country in the world. In 1972, book exports totaled an estimated $186 million and were shipped to over 100 countries. Book imports have increased substantially in recent years and were estimated at $120 million in 1972.

The slow rise in U.S. book exports over the past few years does not indicate a lack of publisher interest in international markets since increasing joint activities between United States and foreign publishers—sales of translation rights, rights of foreign manufacture or agreements of a copublishing/distribution nature—are not reflected in trade statistics.

New efforts to improve the U.S. book export position include the Federal Government's provision for Domestic International Sales Corporations (DISC) and the search by U.S. publishers for lower cost overseas air freight transport services. The DISC program permits U.S. companies to establish wholly export-oriented corporations that enjoy the privileges of deferring payment of Federal income taxes on half of their export earnings. Publishers have expressed interest in the program and several firms are in the process of establishing export activities to conform to DISC requirements.

Major U.S. trading partners are Canada, the United Kingdom, Japan and Australia. Exports to these four countries account for over 70 percent of U.S. book shipments abroad. International demand for books, whether published by the United States or by other countries, represents an essentially noncompetitive activity. Books compete on a title-by-title basis and international copyright protects each member country's authors. Lack of U.S. book export growth results not from increased foreign competition but because of such obstacles as the high cost of foreign distribution and a shortage of foreign exchange in many of the developing countries.

New Approaches to Book Marketing

Advertising of books on television, sale of encyclopedias through bookstores, and the growth of bookstore franchises all represent new marketing techniques designed to increase book sales. Favorable displays of books via TV through author appearances and book-related movies and dramas has caused several publishers to seek out that medium for advertising selected titles. Encyclopedia publishers, generally selling their volumes on a door-to-door basis, are considering sales through retail bookstores. Publishers feel that this method may generate new markets as well as counter past criticisms of door-to-door selling practices.

Specialty Publishing Firms

The U.S. book publishing industry consists of over 1,000 publishers, all vigorously competitive. While relative ease of entry into the industry encourages the establishment of new firms, achievement of a strong foothold is more difficult as witnessed by the degree of industry concentration in selected product categories. For example, the eight largest book publishing companies account for 91 percent of total industry net sales of reference books, 54 percent of technical, scientific and professional books, and 50 percent of text books. These eight firms, however, are not necessarily the same companies in each of the listed product categories. Industry concentration is lowest in the general or trade book field where 46 percent of total net sales is attributable to the eight largest companies.

The Economic Stabilization Program

Revaluation of foreign currencies vis-à-vis the U.S. dollar has not yet increased U.S. book exports, perhaps an indication of the relative inelasticity of book prices to less than substantial changes in exchange rates.

Few Clouds on Publishing Horizon

The U.S. population's higher educational attainment, rising incomes and broad interests in many fields should enable publishers' receipts to reach nearly $4.8 billion by 1980, representing an average annual growth of 6.5 percent. Increased activity in the international trade area could push this growth rate even higher.

The publishing industry will face many changes in the next 8 years. On the technological front, computers and facsimile transmission will play greater roles in the physical production of books. Distribution channels will become more responsive to changes in demand, as the tools of automation and data processing become commonplace in linking distribution centers to bookstores or individual customers. The small, single proprietor bookstore will cope with increased competition from growing chain operations. The considerable purchasing power and substantial number of outlets provided by large chain or franchise bookcenters will offer publishers more opportunities for establishment of pricing and discount policies. Publishers' movement towards new methods of transmitting knowledge and information—through products such as microfiche and multimedia packages of books, films, and other materials—should continue.

International demand for U.S. books will reach new levels in the years ahead but breakthroughs will be required to capitalize fully on foreign markets. International copyright problems, relating particularly to needs of the developing countries, must be reconciled while protecting the rights of authors and publishers. But these factors should not detract from the well-founded optimism underlying the U.S. book publishing industry: both domestic and international demand for U.S. books is expanding and the U.S. book publishing industry will meet this demand with all the talents at its disposal.—*William S. Lofquist, Office of Business Research and Analysis.*

BOOK PRINTING

A growing demand for books of all types should push receipts from book printing sales to $1,045 million in 1973, a gain of 6 percent over 1972's estimated receipts of $985 million. Book consumption per capita will probably continue to gain under the stimulus of rising income levels and increased size and diversification of interests of the U.S. reading population. Federal expenditures for education have become a key factor in the sale of instructional materials, including textbooks and supplemental printed materials, and such funds are expected to be maintained at a level consistent with previous years' appropriations.

Book printing employment increased about 2,000 between 1967 and 1972, and totaled just over 46,000 in 1972. Production workers account for an estimated 80 percent of total industry employment.

Printers Face Many Challenges

The book printing industry is encountering new sets of demand pressures from its customer: book publishers. After a steady rise in the annual output of book titles through the decade of the sixties, book publishers have put a brake on the number of titles published. Through the first half of 1972,

Book Printing: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of receipts	787.4	883.9	939.3	942.5	985.0	5	1,045	6
Total employment (thousands)	44.7	44.2	47.0	45.9	46.4	1		
Production workers (thousands)	36.7	35.3	37.4	37.0	37.2	1		
Value added	510.9	597.2	617.6	615.6	NA			
Value added per production worker man-hour (dollar)	6.96	8.24	8.41	8.61	NA			
Product: [3]								
Value of receipts	900.3	1,005.1	971.6	975.0 [1]	1,015.0	4	1,065	5

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the book printing industry (SIC 2732).
[3] Includes value of receipts of book printing sold by all industries.
P Preliminary.
NOTE.—NA=Not available.
Source: Bureau of the Census, and Bureau of Domestic Commerce.

there were 6 percent fewer publishers' titles than during the first half of 1971. Equally disturbing to book printers were the generally smaller print runs ordered per title published.

Textbooks account for over a third of the book printing industry's total output. While textbook sales have increased annually in recent years, recent declines in the birth rate that are now reflected in lower elementary school enrollments may adversely affect future demand for textbooks. A growth sector for the book industry is post-secondary education—community colleges, vocational and adult education, and traditional 4-year colleges, universities and their graduate schools. Although book demand should continue strong in this educational sector, a marked trend toward lower priced soft cover (paperbound) books rather than casebound (hard cover) books is underway. Printers geared primarily to the long run hard cover textbook market may be forced to adjust their operations to serve specialized, diversified soft cover markets that have been growing rapidly.

Seasonality and Capacity Requirements

Seasonality in sales of books has its effect on book printers. Thus, textbooks and the wide range of supplemental instructional materials from book printers must be available by the opening of schools in autumn, while general (trade) books must be in bookstores before their peak selling season—Christmas. This traditional seasonality has been somewhat offset by the rapid growth of book clubs and paperbound books, whose sales are steady and less affected by the seasons.

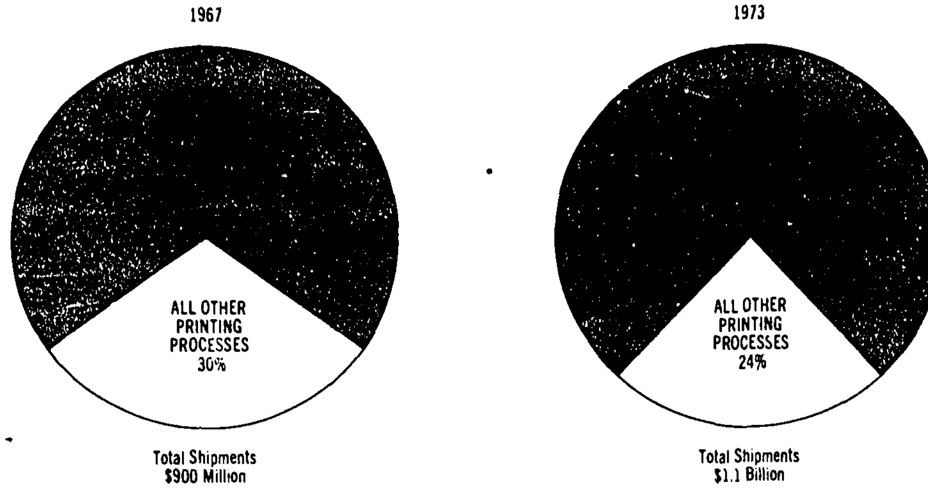
In order to meet time requirements, book printers have been particularly sensitive to advances in technology. Large capacity, high speed web offset printing machines were readily purchased by book printers in the 1960's, largely because of increased demand for books from both educators and the general population. Presses offering advanced computer controlled systems and adaptable to photographic typesetting gave printers a competitive edge by supplying high quality, significantly faster print runs at lower unit costs. By the early 1970's, however, both the textbook and general book markets had stabilized, leaving some printers with excess press capacity and thus heightening competition in an already competitive industry.

Inventories have traditionally been the bane of the book industry. Assessing the market for an individual title is more frequently "art" than "science" and vast fluctuations in inventory are the result. The booming book demand of the late 1960's that resulted in large inventory accumulations have made publishers more critical of the size of current print runs. As a consequence, publishers are now keeping inventories of bound and unbound books to a minimum. Book printers have turned to smaller size web offset presses offering faster speeds, reduced operating costs and a greater degree of job flexibility.

Technology's Impact Assessed

The book printing industry relies to a great extent on its suppliers—paper, equipment and ink manufacturers—for technological improvements

Lithography leading book printing process



SOURCE: Bureau of the Census and Bureau of Domestic Commerce.

in traditional book production. The computer is being increasingly utilized by book printers in both pre-press (primarily typesetting) and press control operations. Continued refinements in the automation of platemaking and in-line binding activities have increased plant productivity.

A significant breakthrough in press design resulted with the development of the belt printing press. By setting individual rubber or plastic page plates on a flexible belt of variable length, a complete book may be printed on one continuous pass through the press. The press is primarily suited for short run books consisting wholly of text and/or line illustrations, but work is progressing on providing acceptable halftone illustrations (generally artwork or photographs).

Close relationship between book printers and book publishers has brought about improvement in many technical aspects of the book format. Joint technical committees evaluate school specifications on textbooks, book cloth, covers and paper. The quest for better materials and equipment to improve productivity is supported by a variety of technical and trade organizations serving the industry.

Printers Seek New Markets

Establishments specializing in the printing of books account for about 70 percent of the total printing dollar spent by publishers for the production of their works. Most of the remaining 30 percent accrues to nonspecialized commercial printers. Large capital expenditures required to obtain the most productive, specialized book printing and binding equipment indicate that the current 70 percent ratio of book printing receipts recorded by firms specializing in book printing is increasing. While book printers account for more and more of total receipts of U.S. book production, management is seeking ways to diversify into other printed products that are (1) compatible with existing machinery, and (2) advantageous in filling unused press capacity. Catalogs, directories, circulars, and pamphlets are typical of products meeting these requirements.

1972 Profile
Book Printing

SIC code	2732
Value of industry receipts (millions)	$985
Number of establishments	700
Total employment (thousands)	46.4
Compound annual average growth 1967–72 (percent):	
Value of industry receipts (current dollars)	4.6
Employment	0.8
Major producing areas	New York, Chicago, Boston, Philadelphia

Mergers Declining

In the past decade the industry witnessed an unusually large number of mergers and/or acquisitions brought about by competitive pressures and need for capital investment funds. The merger pace slowed in the past 2 years, perhaps foretelling a period of stability and readjustment.

Book printing has a relatively low degree of industry concentration, with the 20 largest companies accounting for less than half of total industry shipments. These 20 firms tend to be the industry's technological leaders, however, since their aggregate capital expenditures represent over 70 percent of total book printing investment in new plant and equipment.

Heat Dryers Eliminate Harmful Solvents

Efforts at controlling environmental pollution have assumed high priority throughout the industry. The industry has made substantial investments in heat dryers designed to eliminate harmful solvents emitted during high speed press operations. Printers are coordinating their anti-pollution activities with those of their suppliers—the ink and paper manufacturers.

Diversification Key to Future

Net receipts of the book printing industry are expected to climb to about $1.6 billion by 1980, representing increases averaging 5.8 percent annually through the period 1972–80. Competitive pressures tied both to new products vying with books in the informational marketplace and new technologies in book production will place fresh demands on the printer's managerial abilities.

The late 1970's will see increased use of microforms, video cassettes, and facsimile transmission to bring information to the public. Many of these items will supplement rather than compete with books, but their growth and acceptance may place subtle constraints on certain types of information such as reference works, previously available only in the traditional book format.

Although advances in printing technology in the past have tended to be evolutionary, recent developments in electrostatics, facsimile transmission, and belt printing point to a new threshold in production operations which will affect the book printing industry by the end of this decade. The conflict between standardization and flexibility in book production will continue to absorb management's attention.

As a medium, the book is facing new challenges as the most cost effective method of storing and transmitting knowledge and information. Book printers are sensitive to change and the industry will continue to produce books and related informational material in formats consistent with the Nation's growing, diversified interests.—*William S. Lofquist, Office of Business Research and Analysis.*

COMMERCIAL PRINTING

Total value of shipments by the commercial printing industry during 1972 increased 13 percent, reflecting a recovery from the slower performance of the 1970–71 period to a record $9.2 billion. With expansion in economic activity expected to continue throughout 1973, the value of commercial printing is expected to gain another 9 percent to $10.1 billion by the end of the year.

Manpower Situation Tightens

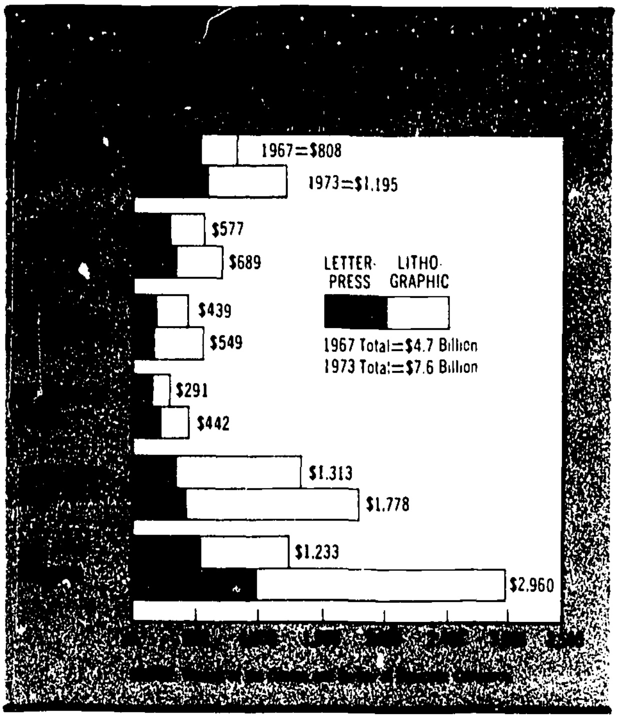
With increased demand for all types of printed matter brought on by the surge in economic activity, printers in the Nation's major centers of industrial activity are beginning to experience difficulties in filling manpower needs. The situation is not presently as severe as the shortages experienced by printers at the close of the sixties, but continued market pressures without long-range planning by employers for the hiring, training and/or retraining of personnel could result in a similar situation.

Five years ago, in 1967, employment in commercial printing plants was near a third of a million persons. By the end of 1972 total employment had

1972 Profile

Commercial Printing

SIC Codes	2751, 2752
Value of industry shipments (millions).	$9, 231
Number of establishments	19, 000
Total employment (thousands).	345
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	7.6
Employment	1.4
Major producing areas	New York, Chicago, Los Angeles, Philadelphia



grown by 23,000 persons and totaled 345,000. The annual rate of growth has averaged 1.4 percent.

Total employment in the industry is expected to grow moderately, advancing approximately 3 percent in 1973 to exceed 350,000. The ratio of production worker to total employment will remain constant at about 80 percent.

A Business of Small Businesses

Eight of every 10 of the 19,000 printing plants in the United States have fewer than 20 employees. These 15,000 small businesses account for a fourth of the industry's total shipments. At the other end of the size scale, the approximately 150 plants with more than 250 employees also produce a fourth of all printing. In the middle range are 3,000 print shops with between 20 and 250 employees accounting for half of the Nation's printing.

While printing establishments are among the most widely dispersed of all manufacturing activities, the largest number are located close to the industrial centers. Major centers are New York City, Chicago, Los Angeles, and Philadelphia. Beyond these major cities, a viable printing industry exists in even the smallest cities and towns serving local needs. In many instances, these small printing plants also serve customers from the major metropolitan centers.

Printers Benefit From Others' R. & D.

Even though over three-fourths of all printing establishments have fewer than 20 employees, these small shops benefit from extensive research and development by large corporations that are not directly engaged in printing, but serve the graphic industries. With a view to widening their markets, these companies are constantly improving papers, inks, machinery, and other capital equipment. Almost without exception, major technological innovations in the commercial printing industry have come from the laboratories of firms that supply or service the industry.

Process Competition Continues Strong

The volume of commercial printing will continue to be influenced by technological developments. The number of web-fed offset press installations continues to increase, and further refinements in the development of multi-color balance for high-

Commercial Printing: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	6,394.9	7,464.9	7,881.9	8,168.5	9,231	13	10,096	9
Total employment (thousands)	321.6	333.3	349.5	335.3	345	3		
Production workers (thousands)	254.5	265.8	275.3	259.9				
Value added	3,845.6	4,541.6	4,799.2	5,034.2	NA			
Product: [3] Value of receipts, total	6,397.9	7,378.0	7,817.6	8,087.0	9,093	12	9,963	9

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the commercial printing industry (SIC 2751, 2752).
[3] Includes value of shipments of commercial printing by all industries.

P Preliminary.

NOTE.—NA = Not available.

Source: Bureau of the Census, Bureau of Domestic Commerce.

speed, web-fed presses will accelerate the already high growth in use of lithography for most types of printed products.

Technology, furthermore, has been improving other areas of graphic imagery. Electrostatic assist in gravure printing is now an accepted practice, making this a versatile process for printing on many surfaces that hitherto yielded unsatisfactory images. Also, research continues on reducing the high cost of gravure cylinder making. Lower pre-press costs would certainly place gravure printing in a very advantageous position to obtain a greater share of the commercial printing dollar.

Refinements in photo-polymer letterpress plates and the introduction and general acceptance of the belt press for special printing applications augur well for letterpress printing, and will in time help this process recapture some of the printing dollars lost to competitive processes.

Foreign Trade Minimal

Movement of printed matter between the United States and other countries continues to be relatively small compared to total dollar volume. All developed nations of the world have a viable, indigenous printing industry that serves local demand sufficiently well. Printed matter is traded between nations primarily because of its unique content and not so much for economic reasons. Consequently, U.S. exports of books accounted for more than half of the $350 million of printing shipped from this country in 1972. Similarly 50 percent of the $200 million of printed matter imported to the United States consisted of books.

Canada continues as America's major customer for printing, receiving about half of our total exports. The major source of printing imports to this country is the United Kingdom, which accounted for about one-fourth of all printing imports.

Prosperous Future for Printers

Continued advances in more productive, refined capital equipment and increasing demand from all segments of the economy for more printed materials should produce an annual growth averaging 8 percent from 1972 to bring the total value of all commercial printing to over $17 billion by 1980.—*Charles R. Cook, Office of Business Research and Analysis.*

MANIFOLD BUSINESS FORMS

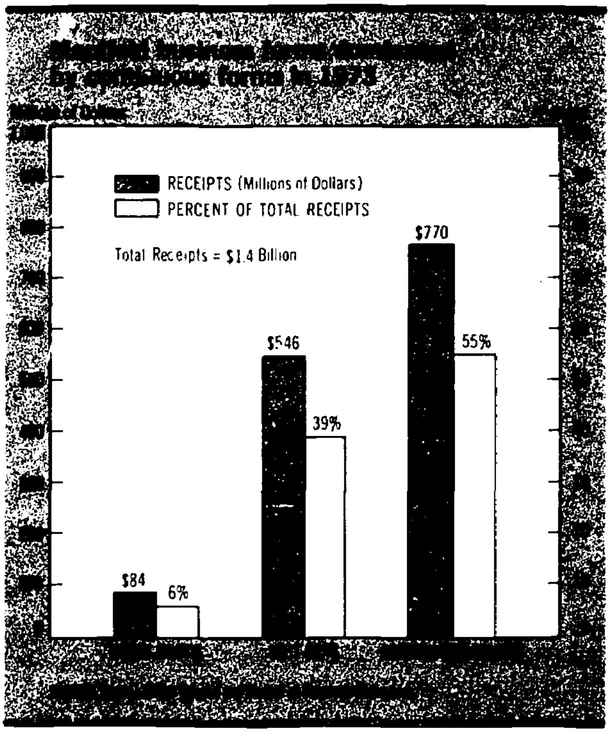
Following a 2-year period of lagging demand, activity in the manifold business forms industry rebounded in 1972. Receipts reached an estimated $1.4 billion, 9 percent higher than in 1971. A further 9-percent rise is forecast, with a volume of $1.5 billion in 1973.

Consistent increases in the use of sophisticated data processing equipment give the major impetus to rising demand for computer papers. Optical character recognition (OCR) is an increasingly important method for data recording and information storage and retrieval. OCR forms, along with the greater use of both input and output data forms for computers, will sustain growth of the business forms industry.

Mainly Large Firms

Almost 600 establishments are primarily engaged in the production of business forms. Unlike the commercial printing industry where the great majority of plants are small, about a third of all forms plants employ more than 100 workers each. A third employ fewer than 20 each.

Establishment ownership is highly concentrated among several large corporations. The 10 largest companies operate over 100 manufacturing plants,



Manifold Business Forms: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry:[2]								
Value of shipments	932.3	1,152.2	1,233.2	1,272.1	1,386.0	9	1,510	9
Total employment (thousands)	34.4	37.1	38.3	37.2	38.8	4		
Production workers (thousands)	25.3	28.1	28.6	27.5	28.5	4		
Value added	550.5	667.1	709.7	724.5	NA.			
Product:[3] Value of shipments	895.8	1,113.5	1,171.9	[1]1,213.6	1,322.0	9	1,440	9

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the manifold business forms industry (SIC 2761).
[3] Includes value of shipments of manifold business forms made by all industries.

P Preliminary.

NOTE.—N.A. = Not available.
Source: Bureau of the Census, Bureau of Domestic Commerce.

whose shipments now exceed $800 million a year; over half of total industry sales.

Employment Recovers

Total employment in the industry declined slightly to about 37,200 in 1971. However, with increased demand for business forms during 1972 and high expectations for 1973, employment will probably average 40,000, a gain of about 3 percent over 1972. Since 1963, employment increases have averaged between 3 and 4 percent each year, for a total of 11,000 new jobs.

New plant facilities are being built in suburban or rural locations. With excellent transportation facilities by truck, rail, and air available, shipments from any geographic location present few problems. Major consideration in plant location decisions is the availability of labor. Many companies are locating new plants away from metropolitan centers to reduce labor costs. Also, in rural areas, the generally untrained work force can be trained in "company methods".

1972 Profile

Manifold Business Forms

SIC Code	2761
Value of industry shipments (millions).	$1,386
Number of establishments	580
Total employment (thousands).	38.8
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	8.1
Employment	2.5
Major producing areas	East Coast, North Central region

Technology Increases Forms Demand

New technology has resulted in the availability of less complex machines. As these come into use they increase demand for business forms. More and more companies can now afford some of the lower cost data processing recordkeeping devices that utilize some type of input or output form. Those companies appreciate the savings and convenience of having recordkeeping requirements performed by machinery. New forms-using devices are continually being introduced to the business world to confine the "paper explosion."

Continuous Forms Remain Popular

Continuous business forms, the type most commonly consumed by computers, provides over half the dollar volume of forms production. Value of production of continuous forms is estimated at more than $700 million, or 55 percent of total production. Included in this category are stock and specially printed continuous forms, tabulating cards in continuous form, fanfold forms, and autographic register type forms.

Unit set forms, estimated at just over $500 million in 1973, represent a little over a third of total dollar volume. Unit sets or snap-out type forms include the many types of forms used today for optical character and mark reading machines. Tabulating card sets most commonly used for credit transactions at retail stores, gasoline stations and similar consumer oriented sales outlets are one kind. The most common type is a tabulating card in any combination with other types of paper for customer copy and company records interleaved with one-time carbon paper. While there is a trend toward one of the many types of carbonless sheets for unit set forms, this type of image transfer for extra copies still is more expensive than carbon paper. Multipart carbonless forms are still, for the most part, limited to uses where convenience is sought and cost is a secondary factor.

The third type of business form is the sales book or related manifold forms types. Estimates place this small segment at $84 million, a 6-percent share of the 1973 total.

Expectations of Growth Optimistic

Growth in the forms industry is determined by the extent of usage of computers and peripheral high-speed printers. As the number of installations of computers and other modern, sophisticated data processing, storing and retrieving equipment expands, demand for business forms for this machinery will also expand. The years ahead will bring increased competition from such nonform media as computer-output-microfilm and visual display devices that eliminate the need for paper forms. However, the continuing growth in the size and complexity of business activity will benefit the business forms industry. Looking ahead, manifold business forms receipts are expected to increase on an average of 9 percent annually and approach $2.75 billion by 1980.—*Charles R. Cook, Office of Business Research and Analysis.*

TYPESETTING

Business prospects for typographers during 1973 are favorable as the typesetting industry continues to fulfill growing demands of its major customer, the commercial printing industry. By the end of 1973, receipts for the 1,600 establishments primarily engaged in typographic services are expected to exceed $534 million, a 9 percent increase over 1972 receipts. This rise, coupled with gains of previous years, indicates the stability of growth of the typesetting industry.

During the 1960's, industry employment registered annual gains of approximately 3 percent. Since 1970, however, employment has remained relatively stable. In 1972, total employment averaged 29,300 and a small gain is anticipated in 1973. The ratio of production workers to total employment remains constant, with eight of every 10 workers engaged in production activities.

Typographers Located Near Customers

Since the commercial printing industry is found in almost every county of the Nation, typesetting plants are widely dispersed. The greatest concentration of type houses is in New York City, Chicago, Los Angeles, Philadelphia and other major printing and publishing centers. The eastern seaboard of the United States contains approximately half of all typesetting establishments; one-third are located in the central region of the Nation and the remaining portion of the industry is on the west coast. Little change has occurred in geographic distribution of typographers in the past two decades.

Technology Advances Typography

Although three-fourths of the plants in this industry have fewer than 20 employees, this segment of the graphic arts industry has experienced much volatile technological change in recent years. As lithography made rapid inroads into traditional letterpress markets, a natural marriage of this process and typography by photographic and strike-on methods was consummated. These two methods of type imagery have gained a significant portion of the hot metal market. Demand for hot

Typesetting: Trends and Projections 1967–73

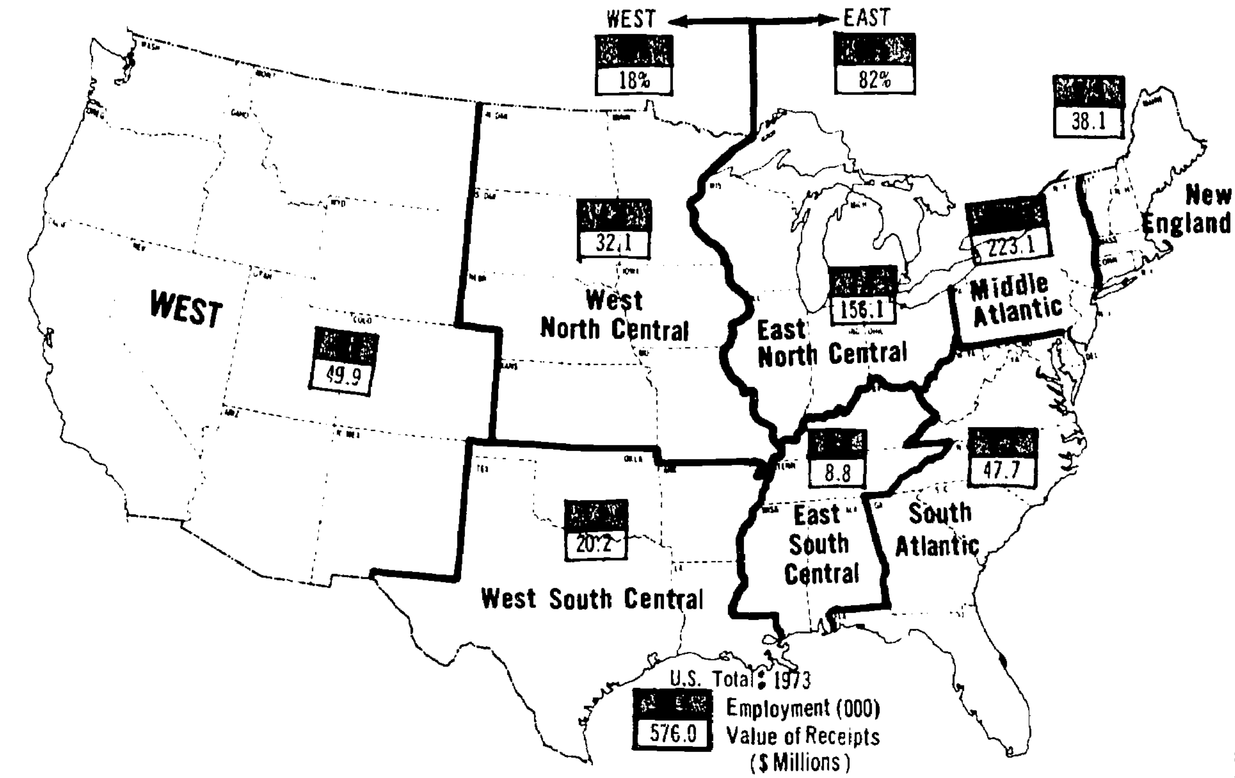
[In millions of dollars except as noted]

	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	356.7	417.2	462.9	450.6	488.5	8	534.0	9
Total employment (000)	25.5	27.3	29.5	29.0	29.3	1		
Production workers (000)	20.9	22.7	23.8	23.1	23.5	1		
Value added	304.3	363.1	403.5	393.8	426.9	8		
Product: [3]								
Value of shipments	362.1	428.3	431.9	[1] 457.4	495.8	8	542.0	9

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the typesetting industry (SIC 2791).
[3] Includes value of shipments of typography for others by all industries.
[P] Preliminary.

Source: Bureau of the Census, Bureau of Domestic Commerce.

Typesetting Concentrated in Eastern U.S.



Source: U.S. Department of Commerce, Bureau of Domestic Commerce.

metal composition continues to soften as technological changes bring still greater market shares to the competitive process of typography.

Foreign Trade Minimal

With the advent of highly transportable photo- and cold-composition, a few typographers have lost typesetting contracts to foreign competition. However, neither imports nor exports are a significant part of U.S. production or use. The service nature of the industry precludes doing business at a distance and both imports and exports of printing plates, cuts, and similar typography account for less than 1 percent of all foreign trade of printed matter.

1972 Profile
Typesetting

SIC Code	2791
Value of industry shipments (millions).	$529.8
Number of establishments	1,600
Total employment (thousands).	30
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	8.2
Employment	3.3
Major producing areas	New York City Chicago, Los Angeles, Philadelphia.

Forecast Favorable as Competition Increases

Improvements in the quality of machine printouts by line printers and increasing use of film from computer output for reproduction will probably intensify competitive pressure among type houses in the years ahead. However, the outlook for the industry is favorable and growth anticipated in type-consuming industries will probably increase receipts for typesetting to about $915 million by 1980, reflecting an annual rate of 7.1 percent.—*Charles R. Cook, Office of Business Research and Analysis.*

CHAPTER 8

Food Products

Shipments of food and kindred products industries (excluding beverages) are expected to increase 6 percent to $100 billion in 1973, compared with 1972 estimated shipments of $94 billion. Population growth and higher prices will account for the increase; per capita food consumption is expected to remain at the 1972 level of approximately 1,560 pounds.

Acreage Down—Livestock Stable

In 1972, planted acreage of all crops dropped approximately 3 percent, although lower grain production was partially offset by gains in cotton and soybean plantings. Fresh vegetable supplies in 1972 were slightly smaller with the exception of carrots and tomatoes.

Production of livestock in 1972 changed little from 1971 although beef slaughter increased in the second half of 1972. Poultry supplies were also up substantially in 1972, while hog supplies, materially below 1971 levels, may continue low through the first half of 1973.

Employment Declines

Employment in the food and kindred products industries, excluding beverage industries, declined slightly to an estimated 1,360,000 in 1972 from 1,364,000 in 1971, mainly because of increased use of automated equipment.

Unfavorable Trade Balance

The unfavorable balance of trade in processed food products was estimated at $335 million in 1972, up from $327 million in 1971. The 2-percent increase in the deficit resulted mainly from higher imports of meat after quota restrictions were removed in June. Processed food imports in 1972 totaled approximately $3.1 billion and exports amounted to $2.7 billion. Imports of processed food in 1973 are expected to be $3.2 billion and exports will approximate $2.8 billion.

Unprocessed Foods Under Price Control

Price controls were established in June of 1972 on unprocessed agricultural and seafood products.

Food Products: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [2]	Percent increase 1971–72	1973 [2]	Percent increase 1972–73
Industry								
Value of shipments	74, 267	81, 716	85, 494	[1] 89, 318	94, 303	5.6	99, 791	6
Total employment (thousands)	1, 429	1, 429	1, 409	[1] 1, 364	1, 360	−0.3		
Value of imports	2, 154	2, 451	2, 838	2, 958	3, 056	3.3	3, 157	3
Value of exports	1, 961	2, 171	2, 434	2, 637	2, 721	3.2	2, 808	3
Wholesale price indexes (1967=100)	100	109.6	113.2	115.6	120.2	4.0	125.0	4

[1] Preliminary.
[2] Estimated by Bureau of Domestic Commerce.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Selected Food Products: Projections 1971–80

[Value of shipments in millions of dollars except as noted]

SIC	Industry	1971[P]	1972[1]	Percent Increase 1971–72	1973[1]	Percent Increase 1972–73	1980	Percent Increase 1972–80[2]
20	Total food	89, 318	94, 303	6	99, 791	6	145, 155	5 .5
2011	Meat packing plants	18, 747	19, 870	6	21, 065	6	31, 590	6 .0
2013	Sausage and other prepared meat products	3, 749	3, 975	6	4, 210	6	6, 830	6 .0
2015	Poultry and small game dressing and packing, wholesale	3, 493	3, 705	6	3, 925	6	5, 845	6 .0
2022	Cheese, natural and processed	2, 565	3, 027	18	3, 602	19	6, 890	11 .6
2023	Condensed and evaporated milk	1, 569	1, 820	16	2, 129	17	2, 860	6 .9
2024	Ice cream and frozen desserts	1, 171	1, 194	2	1, 224	3	1, 525	3 .0
2026	Fluid milk	8, 443	8, 612	2	8, 827	3	11, 015	3 .0
2032	Canned specialities[3]	1, 727	1, 830	6	1, 945	6	2, 940	6 .1
2033	Canned fruits, vegetables preserves, jams and jellies[3]	3, 932	4, 060	3	4, 190	3	5, 220	3 .2
2035	Pickles, sauces and dressings[3]	1, 197	1, 315	10	1, 425	8	2, 365	7 .5
2037	Frozen fruit, fruit juices, vegetables, specialities[3]	3, 197	3, 565	12	3, 875	9	6, 780	8 .3
2041	Flour and other grain mill products	2, 471	2, 545	3	2, 647	4	3, 515	4 .0
2042	Prepared feeds for animals and fowls	5, 727	6, 013	5	6, 374	6	9, 675	6 .0
2051	Bread and other bakery products except cookies and crackers	5, 737	5, 909	3	6, 145	4	8, 525	4 .5
2052	Cookies and crackers	1, 646	1, 745	6	1, 850	6	2, 900	6 .5
2062	Cane sugar refining	1, 641	1, 707	4	1, 784	5	2, 545	5 .0
2071	Candy and other confectionery products	2, 002	2, 082	4	2, 186	5	2, 745	3 .5
2072	Chocolate and cocoa products	655	717	10	785	10	1, 135	6 .3
2092	Soybean oil mills	2, 861	3, 033	6	3, 215	6	4, 835	6 .0
2095	Roasted coffee	2, 350	2, 419	3	2, 490	3	3, 050	3 .0
2096	Shortening, table oils, margarine and other edible fats and oils n.e.c	2, 021	2, 122	5	2, 228	5	3, 134	5 .0
	All other food and kindred products (except beverages)	12, 417	13, 038	5	13, 670	5	19, 236	5 .0

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual growth rate.
[3] Value of production.
[P] Preliminary.
n.e.c. = not elsewhere classified.

Markups and profit margins of retailers of these products became subject to Price Commission regulations. However price controls do not apply to farmers and fishermen.

FDA Survey on Low-Acid Foods

The Food and Drug Administration in 1972 started a massive survey of name brand and private label low-acid canned foods in retail groceries to determine industry compliance with standards on product safety, quality and truthfulness of labeling. The survey, conducted in 10 metropolitan areas, analyzed samples of large volume production items such as canned mushroom soup, canned corn, and baby food carrots. After the data are evaluated and specific areas earmarked for a quality control team inspection, another sampling survey will be conducted in fiscal 1974 to measure improvement.

Integration in Cattle Operations

Vertical integration in cattle operations may be on the upswing. Highly integrated cattle complexes include raising and producing feeder cattle; a feed mill; manufacture of specialty agricultural systems and equipment; and a meat packingplant. This type of operation provides for buying and selling cattle for maximum profit and assures adequate supplies for slaughtering operations.

Canning Up

Value of production of the canned specialties industry—including such items as nationality foods, baby foods, pork and beans, soups, and spaghetti—is estimated at $1.8 billion in 1972, up 6 percent from $1.7 billion in 1971.

The 1972 pickle, sauces, and salad dressing industry pack is estimated at approximately $1.3 billion, 7 percent over the $1.2 billion pack a year earlier.

Dairy Products on Rise

Production of milk rose and consumer purchases of milk and dairy products increased in 1972. Shipments of the fluid milk industry in 1972 are estimated at $8.6 billion, a 2-percent rise over 1971 shipments of $8.4 billion.

Continued strong demand for American cheese in 1972 led to increases in manufacturers' sales to $3 billion, a gain of 18 percent over $2.6 billion the previous year. Higher meat prices encouraged greater consumption of cheese, helping to push cheese prices up in 1972.

Shipments of the ice cream and frozen desserts industry rose to an estimated $1.2 billion in 1972, up 2 percent from the previous year.

Per capita consumption of ice cream and frozen desserts are estimated to have remained at approximately the 1971 level during the following year.

Coffee and Soybeans

In 1972 shipments of roasted coffee totaled an estimated $2.4 billion, 3 percent above 1971's $2.3 billion. Green coffee imports, at $1.3 billion, were slightly below 1971. Stock in hands of roasters were ample to meet the coffee demand in 1972.

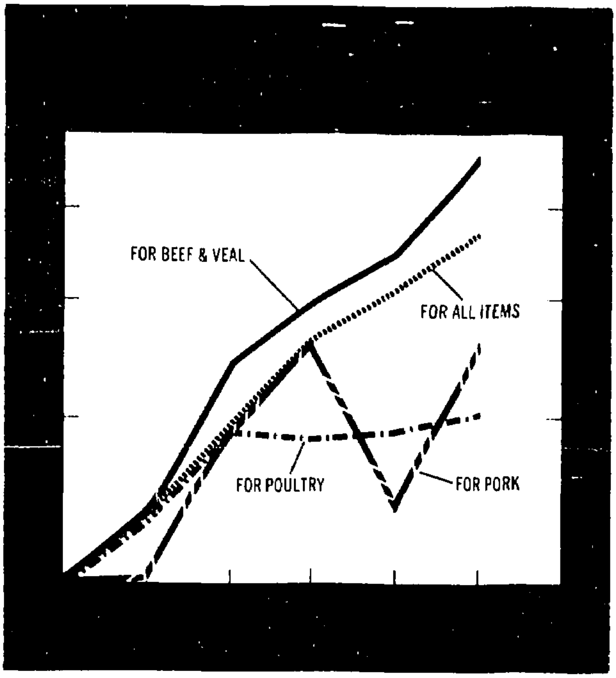
Soybean crushings in 1972 approximated the 1971 level of 722 million bushels. Shipments from the soybean oil mills in 1972 are estimated at $3 billion, compared with $2.9 billion the year before. As a result of continued high demand and tight supplies, soybean meal prices in 1972 rose approximately 10 percent over 1971, while soybean oil prices declined an estimated 8 percent.

Outlook 1980—$145 Billion

Shipments of the food and kindred products industries are expected to exceed $145 billion in 1980, with an annual growth averaging 5.5 percent from 1972. Emphasis will continue on nutritional value of food products as well as on convenience-type foods. Steady increases in population and income will contribute to the growth of food products industries.—*Carroll V. Danielson, Office of Business Research and Analysis.*

MEAT AND POULTRY PRODUCTS

Shipments of the meat slaughtering, meat processing, and poultry industries are expected to reach approximately $30 billion in 1973, compared with an estimated $27.6 billion in 1972, growth remaining at the 6 percent rate of 1971 and 1972, respectively. Gains in each of the three industries last year were approximately 6 percent—with meat slaughtering shipments totaling $19.9 billion, meat processing $4 billion, and poultry products $3.7 billion.



Total employment in the meat and poultry industries declined to 312,000 in 1972, because of introduction of new labor saving processing equipment by the meat packing and meat processing industries. In poultry processing, employment rose about 4 percent.

Demand for Beef Continues to Rise

Per capita consumption of beef was approximately 115 pounds in 1972, up 2 pounds from 1971. Per capita consumption of lamb and mutton continued to decline in 1972 to less than 3 pounds; a record low.

Cattle Supply Increases Slightly

The calf crop was up 2.3 percent in 1971. Since most of this supply became available for slaughter a year later, cattle slaughter is estimated to have increased by 2 percent in 1972. The 1972 calf crop was estimated to be higher by 3 to 4 percent, so more cattle should be available for slaughter in 1973. There was a sharp decline in numbers of sheep and lamb on U.S. farms.

Fed Cattle Prices to Remain High

Omaha fed-cattle prices reached approximately $34 per hundred pounds in September 1972 and were expected to remain at that level through the balance of the year. The 1971 average was approximately $32.50. The average price of hogs (barrows and gilts) in major markets in early September,

Meat and Poultry Products: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971[P]	1972[1]	Percent increase 1971–72	1973[1]	Percent increase 1972–73
Industry:[2]								
Value of shipments, total	21, 520	24, 803	25, 039	25, 989	27, 560	6	29, 200	6
Meat slaughtering plants	15, 576	17, 968	18, 055	18, 747	19, 870	6	21, 065	6
Meat processing plants	3, 008	3, 368	3, 520	3, 749	3, 975	6	4, 210	6
Poultry dressing plants	2, 936	3, 467	3, 464	3, 493	3, 700	6	3, 925	6
Total employment (thousands)	310	311	317	313	312			
Production workers (thousands)	249	251	255	252	251			
Value added	3, 551	4, 712	4, 316	4, 965	N.A.			
Value added per production worker man-hour	$7. 07	$8. 06	$8. 28	$8. 62	N.A.			
Value of imports	739	923	1, 012	1, 029	1, 132	10		
Value of exports	265	277	234	236	269	14		
Wholesale price indexes (1967 = 100)	100	113. 6	113. 3	112. 1	N.A.			

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the meat and poultry products industries (SIC 2011, 2013, 2015).
[P] Preliminary.

NOTE.—NA = not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

1972, was approximately $29 per hundredweight, $11 above a year earlier. Despite later declines, 1972 prices averaged well above 1971.

Beef and Hog Prices Rose

While the Chicago average wholesale steer carcass price declined to $55.14 per hundred in August, 1972, from $58.69 in July, it was higher than the August, 1971, price of $53.99. Retail choice grade beef averaged $1.17 per pound in August, 1972, up from the $1.04 average reported for 1971; the estimated average retail price of beef for 1972 was below $1.15 per pound.

The sharp decline in hog supplies caused increased raw material costs and unfavorable operating conditions. Hog slaughter was down 8 percent in the first quarter of 1972 and 9 percent in the second quarter. In the last half of 1972, estimated hog slaughter was lower than for the like period in 1971. Following a gradual upward trend, hog prices approached $29 per hundredweight last July, a rise of approximately $9 from a year earlier.

Higher Costs Hold Down Profit Margin

Higher costs for labor, livestock, packaging materials, transportation, and specialized processing equipment continue to hold down profit margins, despite efforts to increase efficiency.

According to an industry survey, 124 companies' total expenditures for new plants and equipment were $250 million in 1971. That compared with $198 million spent by 141 companies in 1970. While sales of 20 representative companies in the first half of the 1972 production year averaged a 9-percent increase, their net income was down 43 percent from the like 6-month period in 1971. Those 20 companies reported an average earnings-

1972 Profile

Meat and Poultry Products

SIC codes	2011, 2013, 2015
Value of industry shipments (millions).	$27,559
Number of establishments	4,914
Total employment (thousands).	312
Exports as a percent of product shipments.	1.0
Imports as a percent of apparent consumption.	3.9
Net profits as a percent of net worth.	6.6[1]
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	5.1
Value of exports (current dollars).	0.3
Value of imports (current dollars).	8.9
Employment	0.1
Major producing areas (Meat).	North-Central States, Pacific States

[1] Source: First National City Bank of New York Monthly Economic Letter, April 1972.

to-sales ratio of .8 percent for the first 6 months of "production year" 1972, compared with 1.5 percent in the like period of 1971.

Many meat packers use a substantial part of their facilities to process such pork products as hams, bacon, sausage meat, and other products, as well as fresh pork. When hog supplies are not adequate to keep operating facilities running near capacity, overhead and other costs continue and product prices increase.

Meat Technology Advances

In 1971 the meat packing and processing industries invested approximately $232 million in new plants and equipment to increase efficiency and improve profit margins. Some new automated processing equipment is being installed in older plants.

Larger quantities of portion-controlled meats are being processed in response to greater demand by restaurants, institutions, fast-food carry-outs, and hotels. Improvements have been effected in handling livestock "on the rail" and in high volume machines to make variety meats, sausage, frankfurters and hamburger patties.

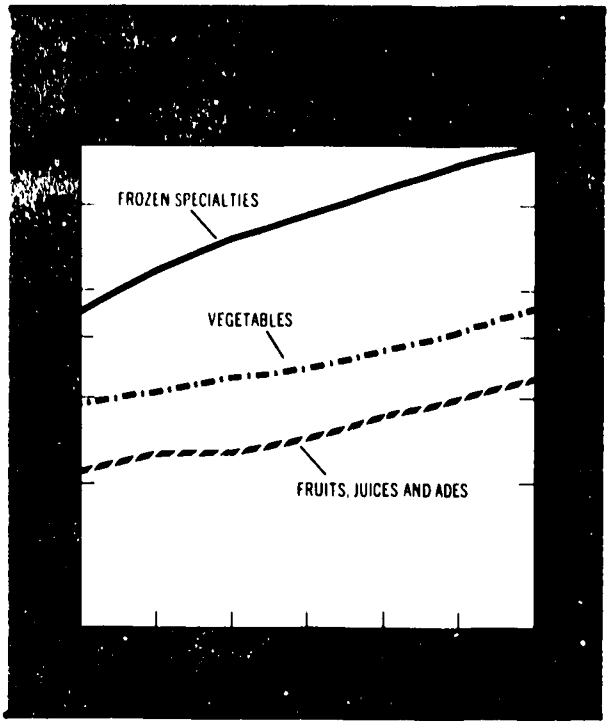
Import Quotas Removed

On June 26, 1972, all quantitative restrictions on meat imports were removed to help meet increased demand for beef and curb increases in meat prices. Under the meat import law, quotas may be increased or suspended because of overriding economic or national security interests, or because domestic supplies are inadequate to meet demand at reasonable prices.

Value of all meat imports for 1972 is estimated at $1.13 billion, up 10 percent from 1971 imports of slightly over $1 billion. Meat exports in 1972 are estimated to have increased 14 percent to $269 million, from $236 million in 1971. Increased exports of pork products as well as higher prices were mainly responsible.

Prospects for 1980

Shipments of the meat and poultry industries are projected to approximate $44 billion in 1980, assuming continuation of the industry's present annual growth rate of 6 percent. A growing population, rising incomes and increased demand for portion-control processed meats for fast-food outlets will stimulate expansion.—*Carroll V. Danielson, Office of Business Research and Analysis.*



FRUITS AND VEGETABLES

Value of production by the canned and frozen fruits and vegetables industries in 1973 is expected to top $8 billion, an increase of 6 percent over 1972's $7.6 billion. The frozen food industry will have a gain of 9 percent to $3.9 billion in 1973 while the canning industry is expected to pack products valued at $4.2 billion, up 3 percent from 1972.

The frozen food industry processes frozen fruits, vegetables, juices, ades, and frozen specialties such as frozen dinners, soups, pastries, and pies. The canning industry cans fruits and vegetables as well as catsup, other tomato sauces, jams, jellies, and preserves.

Stocks of canned vegetables on January 1, 1973 were estimated to be up slightly from a year earlier, mainly because of larger supplies of canned tomatoes and tomato products on hand, while frozen vegetable stocks, except potatoes, were about the same. Stocks of canned and frozen fruits, except citrus, were estimated to be down considerably from January 1, 1972.

1972 Pack Up

Vegetables canned and frozen during 1972, which for the most part are marketed in 1973, var-

Canned Fruits and Vegetables: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [p]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry:[2]								
Value of production	3, 468	3, 677	3, 629	3, 932	4, 060	3	4, 190	3
Total employment (thousands)	100. 0	101. 3	96. 4	93. 9	93. 0	−1		
Production workers (thousands)	88. 9	90. 2	85. 0	82. 6	81. 2	−1		
Value added	1, 413	1, 384	1, 444	1, 586	NA			
Value added per production worker man-hour	$8. 12	$8. 11	$8. 70	$8. 65	NA			
Product:[3]								
Value of production, total	3, 222	3, 481	3, 378	3, 660	3, 775	3	3, 895	3
Vegetables (except hominy and mushrooms)	958	1, 010	944	1, 055	1, 090	3	1, 125	3
Fruits	818	960	905	975	1, 005	3	1, 035	3
Catsup and other tomato sauces	508	525	450	560	580	3	600	3
Fruit juices, nectars, and concentrates	414	502	531	535	545	2	555	2
Not elsewhere classified	524	484	548	535	555	4	580	4
Value of imports	146	169	183	204	225	10	245	9
Value of exports	101	99	111	100	101	1	102	1
Wholesale price indexes (1967=100):								
Fruits and juices	100	109	113	118	123	4		
Vegetables and juices	100	100	105	108	110	2		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of production of the canned fruits and vegetables industry (SIC 2033).
[3] Includes value of production of canned fruits and vegetables made in all industries.

[p] Preliminary.

NOTE.—NA = not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

ied in size of pack. Tomatoes, corn, lima beans, and broccoli were up approximately 5 percent, green beans up 2 percent, while beets remained at approximately the 1971 level. The 1972 pea pack was down 2 percent.

Because of a large crop in 1972, canning of cranberries and cranberry products rose 20 percent from 1971 production.

The pack of peaches, tart cherries, and plums increased slightly while all other noncitrus fruits declined because adverse weather conditions reduced the crops. The pack of apricots and grapes dropped substantially.

Canned and frozen citrus fruit packs represent 54 percent of total processed fruit products. The citrus fruit pack is 70 percent frozen and 30 percent nonfrozen.

Orange juice concentrates, representing 90 percent of frozen citrus fruit production, were 8 percent higher in 1972 and concentrated frozen grapefruit juice increased 38 percent.

In 1972, wholesale price rises were 2 percent for most canned vegetables, 4 percent for frozen vegetables, 9 percent for frozen fruit, and 4 percent for canned fruit. While most processed fruit and vegetable wholesale prices are expected to remain stable during 1973, variations will probably occur among individual products.

California, Florida Still Lead

California leads with 30 percent of canned fruits and vegetables shipments followed by New York with 8 percent and Florida with 7 percent. Florida leads in frozen fruit and vegetable processing, accounting for 16 percent, while California is second with 13 percent.

Research Aids Food Processors

Many new products and product mixes are being developed and tested on the consumer market, such as frozen dinners, pies, pastries, and nationality dishes.

Research and development activities are also directed toward improving quality of water effluents from processing plants.

In response to consumer demand, the industry is providing more information on nutritive value, ingredients and content weight on can labels, to enable comparison among products. Portion control for dietetic menus as well as bigger portions for larger appetites have been consumer accepted and are growing in demand.

Frozen Fruits and Vegetables: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of production	2,066	2,623	2,810	3,197	3,565	11	3,875	9
Total employment (thousands)	64	69	71.8	75.6	77	2		
Production workers (thousands)	56	59	61.6	64.3	65.5	2		
Value added	759	983	1,048	1,307	N.A.			
Value added per production worker man-hour	$6.88	$8.35	$8.81	$9.20	N.A.			
Product: [3]								
Value of production, total	2,021	2,489	2,672	3,035	3,380	11	3,680	9
Fruits, juices, and ades	420	464	492	550	610	6	660	8
Vegetables	580	664	691	760	850	5	925	9
Specialties	889	1,281	1,413	1,640	1,830	10	2,000	9
Not elsewhere classified	132	80	76	85	90	6	95	6
Value of exports	23.4	28.1	32.3	39.6	44.0	11	48.0	9
Wholesale price indexes (1967=100):								
Fruits and juices	100	126	115	124	136	9		
Vegetables	100	114	115	116	121	4		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of production of the frozen fruits and vegetables industry (SIC 2037).
[3] Includes the value of production of frozen fruits and vegetables made in all industries.
P Preliminary.

NOTE.—NA=not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Net Income Declines

Although the net income of representative large corporations declined 12 percent during 1971, the net income as a percent of net worth improved slightly. Net income is expected to improve considerably in 1972 and will continue upward in 1973.

Diversification Continues

Through mergers and acquisitions, many companies have expanded the number of food products packed. Seasonality and fluctuations in size of crops from year to year make it uneconomical to pack only a few items. Hence, the trend is for processors to pack a large variety of fruits and vegetables and combinations of products. The new larger and highly automated plants in the canning industry require fewer employees. However the frozen food industry, equally automated, has increased employment due to the much higher annual growth rate in production.

1972 Profile

Canned Fruits and Vegetables

SIC code	2033
Value of product shipments (millions)	$4,190
Number of establishments	1,223
Employment (thousands)	93
Exports as a percent of product shipments	2.3
Imports as a percent of apparent consumption	5.3
Compound annual average rates of growth 1967–72 (percent):	
Value of product shipments (current dollars)	3.2
Value of exports (current dollars)	−1.2
Value of imports (current dollars)	9.1
Employment	−1.5
Major producing areas	California, New York, and Florida

1972 Profile

Frozen Fruits and Vegetables

SIC code	2037
Value of product shipments (millions).	$3,565
Number of establishments	608
Employment (thousands)	77
Exports as a percent of product shipments.	1.2
Compound annual average rates of growth 1967–72 (percent):	
Value of product shipments (current dollars).	11.5
Value of exports (current dollars).	13.5
Employment	3.8
Major producing areas	Florida, California

Confectionery Products: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971[1]	1972[1]	Percent increase 1971–72	1973[1]	Percent increase 1972–73
Product:[2]								
Value of shipments	1,645	1,870	1,910	2,002	2,082	4	2,186	5
Bar goods	533	608	624	667[1]	693	4	728	5
Bulk goods	204	183	177	178[1]	185	4	195	5
5¢ and 10¢ specialities	189	225	235	262[2]	273	4	286	5
Packaged goods	615	792	812	832[1]	864	4	907	5
Penny goods	104	62	62	63[1]	67	6	70	4
Quantity shipped	3,769	3,968	3,938	3,975	4,015	1	4,095	2
Value of imports	38.0	44.3	51.0	49.4	56.8	15	61.6	8
Value of exports	6.9	6.8	6.5	7.9	10.3	31	11.2	8
Industry:[3]								
Total employment	67.9	67.8	69.4	63.4	59.4	−6	-------	-------
Production workers	57.1	56.0	56.6	50.8	47.2	−7	-------	-------

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes only those confectionery products specified.
[3] Includes all of SIC 2071 (candy and other confectionery products industry).

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Exports Increase Slightly

Canned fruits and vegetables exports amounted to $101 million during 1972, up 1 percent over 1971. Exports of frozen fruits and vegetables increased 11 percent to $44 million but are still considerably below the canned goods volume. Leading canned and frozen fruit and vegetable exports are frozen orange juice concentrate, canned peaches, fruit cocktail, pineapple, tomatoes, asparagus and corn. Major U.S. export markets for these products are Canada, West Germany, United Kingdom, Belgium, Netherlands, Sweden, and Denmark. Citrus juices are expected to be in good supply in 1973 and exports of that commodity are likely to increase.

1980 Shipments—$12 Billion

The canned and frozen fruit and vegetable industries should attain shipments of $12 billion in 1980. The canning industry pack is expected to exceed $5 billion based on an anticipated average annual growth rate of 3 percent. Frozen fruit and vegetable industry shipments are expected to have a much higher growth rate of 8 percent, reaching $6.8 billion by 1980.—*Shandon D. Knape, Office of Business Research and Analysis.*

CONFECTIONERY PRODUCTS

Value of confectionery products shipments in 1973 is expected to reach $2,186 million, 5 percent above 1972 sales, estimated at $2,082 million. The volume of shipments should reach 4,095 million pounds, 2 percent above the 1972 total, estimated at 4,015 million pounds. The industry, which did not have a price increase in 1972, hopes for one in 1973.

After reaching 20.3 pounds in 1968, per capita consumption of candy declined each year until 1971, when it was 19.8 pounds. It is believed to have remained unchanged in 1972.

Ingredient costs accounted for 37.5 percent of 1971 sales; the 1970 figure was 38.5 percent. A large U.S. corn crop and a large African cocoa crop reduced prices of corn syrup and chocolate.

Wholesalers Largest Market

In 1971, the last year for which detailed figures are available, confectionery manufacturers shipped $873 million worth of candy to wholesalers, including grocery cooperatives and voluntary buying groups. That was 42 percent of sales; proportionate markets are not believed to have changed materially in 1972. The wholesaler accounted for more than half the sales of makers of general line, bar goods, 5-cent and 10-cent specialties and penny goods.

Direct sales to retailers were 40 percent of manufacturers' shipments, or $837 million, in 1971. Direct retail sales are more than half the volume of manufacturers in the package goods and bulk goods fields. Grocery stores are the chief retail outlets; their 1971 purchases were $341 million. Variety stores followed with purchases of $103 million. Vending machine operators bought confectionery valued at $101 million, of which three-fourths was bar goods.

Government sales, direct sales to consumers, manufacturers' sales through their own retail stores, direct mail order and school sales, church and organizational fund raising programs, and exports are the other major markets.

Under an amendment to the School Lunch Act passed in 1972, the decision on selling candy in schools is left to school authorities rather than the Federal Government.

Supermarket Potential Lost

A recent industry inquiry into the decline in sales of boxed candies came up with several reasons: higher costs at retail, more competition from snack foods, concern for health, and lack of interest by young consumers. While consumers indicated that supermarkets would be the outlets through which they would find it most convenient to buy boxed candies, four out of five manufacturers of boxed candy were not selling in those stores.

The survey concluded that more imaginative merchandising could have a powerful influence in increasing sales.

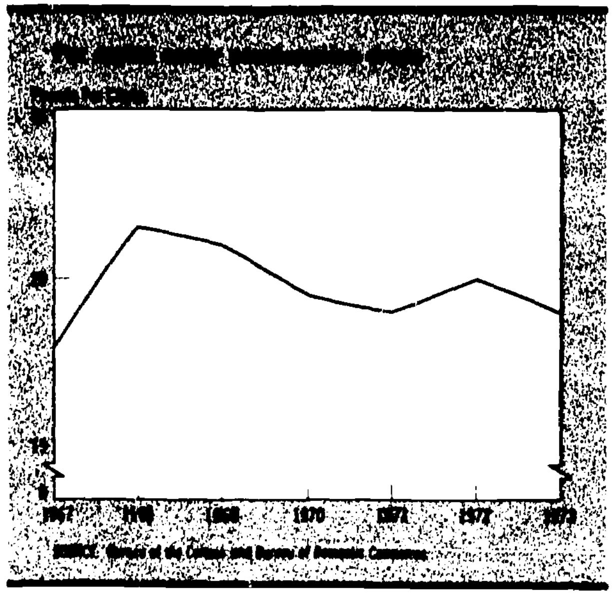
Alcohol in Candy

Legislation was proposed in 1972 to allow sales in interstate commerce of candy with an alcoholic

1972 Profile

Confectionery Products

SIC Code	2071, excludes unsweetened popcorn, nuts, glaces, and cough drops, but includes candy made in 2072
Value of industry shipments (millions)	$2,082
Number of establishments	1,183 (1967)
Total employment (thousands)	59.4
Exports as a percent of product shipments	0.5
Imports as a percent of apparent consumption	2.7
Compound annual average rate of growth 1967-72 (percent):	
Value of shipments (current dollars)	4.8
Value of exports (current dollars)	8.4
Value of imports (current dollars)	8.4
Employment	-2.6
Major producing area	Illinois



content of as much as 8.5 percent. Opposition developed to the extent that bills in both House and Senate were set aside. The law now provides a limit of one half of 1 percent of alcohol by volume.

Sponsors of the legislation said it was aimed solely at allowing sales across state lines of a high-cost specialty candy now made and sold only in Tennessee and Kentucky. Opponents said that under the proposed law liquor could be added to any candy. They expressed concern that children might eat such candies and develop a taste for alcohol.

Employment Down, Productivity Up

Total employment in the industry declined 6 percent from 63,400 in 1971 to 59,400 in 1972. Production worker employment also declined, as a result of continuing automation of plants as well as of recent mergers and acquisitions.

According to preliminary estimates by the U.S. Department of Labor, productivity in the confectionery industry increased in 1971, reversing a downtrend that began in 1968. The index of output per man hour of all employees was at 108.4 in 1971, almost 10 percent above 1970.

U.S. Net Candy Importer

The United States continued to be a net importer of confectionery, with a trade deficit of $46 million in 1972. Imports totaled $57 million in 1972, up 15 percent over 1971. Exports rose from not quite $8 million in 1971 to more than $10 million in 1972, an increase of 31 percent. The United Kingdom was the major supplier of both nonchocolate and chocolate candies. Principal markets for U.S. products were West Germany and the United Kingdom.

Confectionery Import Quota

The Secretary of Agriculture established the 1972 global quota of sweetened chocolate (other than in bars and blocks of 10 pounds or more each), candy, and confectionery imported into the United States and Puerto Rico at 196,641,400 pounds, to be filled on a first-come, first-served basis. The total includes 21,680,000 pounds of chocolate crumb, for which import licenses must be obtained from the Department of Agriculture. U.S. imports of chocolate and nonchocolate confectionery in the first 9 months of 1972 amounted to 93,909,236 pounds.

1980 Shipments to Reach $2.7 Billion

With growth in population and disposable personal income expected to continue, the outlook for the confectionery industry through the seventies is good. Total value of shipments is expected to reach $2.7 billion in 1980. That will represent a compound annual rate of growth for the 1972–80 period of 3.5 percent.—*Edward L. Herbert, Office of Business Research and Analysis.*

CHAPTER 9

Beverages

Beverage industry shipments in 1973 are expected to set another record, advancing to about $15.5 billion, an increase of 9 percent over the estimated 1972 value of shipments of $14.2 billion. Growth in population and income, higher levels of employment and increased leisure time all favor the beverage industry.

The beverage industry has five distinct segments: Wines and brandy, distilled liquor except brandy, flavorings, malt liquor, and bottled and canned soft drinks. Between 1967 and 1972, industry shipments grew at an average annual rate of 10 percent.

Employment in the beverage industry in 1972 continued the downturn that started in the previous year, dropping about 1 percent from 215,900 in 1971 to 212,700. Increased automation, improved materials handling and mergers and acquisitions have reduced industry worker requirements. Following the pattern of previous years, employment was highest in the soft drink industry, followed by malt liquors with slightly fewer than half as many workers. Distilled liquors ranked next in number of employees, followed by flavorings and the wine and brandy industry.

Imports Exceed Exports

The estimated 1972 value of exports was $90 million, surpassing the previous year's exports of $78 million by 15 percent. Exports are expected to approach $102 million in 1973. In 1972, all categories of beverage exports increased, ranging from 10 percent for flavorings to 83 percent for malt liquors.

Estimated 1972 imports declined 14 percent to $659 million from $765 million in the previous year. In 1973, imports are expected to climb about 7 percent to $707 million. The 1972 decline is primarily attributable to a $117 million drop in imports of distilled liquor. The only other beverage import to decline was malt beverages, from $33.7 million to an estimated $33.3 million.

Demand for Wines and Brandy

The wine industry continued to prosper in 1972. Shipments soared to an estimated $873 million, 16 percent over the previous year's level of $753 million. Shipments are expected to approach $1 billion in 1973. Intensive promotion of the more frequent use of wines with meals reinforced the favorable income and population factors.

Consumption of wine in the United States will probably grow at an unprecedented rate during the remainder of the seventies.

Rush To Acquire Wineries

The list of companies striving to get into the lucrative wine business grows longer every year. Many new entrants into the wine industry are also in distilled liquors, soft drinks or candies. Although many firms are seeking to acquire established import firms or domestic vineyards, their success has been limited. Many small California vineyard owners are not eager to sell regardless of price. One company purchased a prune orchard in California and at considerable expense transformed it into a vineyard. It will be 3 years before the first grapes are harvested.

According to the Wine Association, of the 305 million gallons of wine sold in the United States in 1971, 226 million were California wines, 43 mil-

Beverage: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [p]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Value of shipments,[2] total	8, 886	10, 819	11, 950	13, 004	14, 177	9	15, 462	9
Wines and brandy	410	493	585	753	873	16	1, 013	16
Distilled liquor [3]	1, 364	1, 669	1, 758	1, 833	1, 925	5	2, 021	5
Flavorings	1, 009	1, 174	1, 319	1, 323	1, 416	7	1, 515	5
Malt liquor	2, 930	3, 419	3, 685	4, 140	4, 512	9	4, 918	9
Bottled and canned soft drinks	3, 173	4, 064	4, 605	4, 955	5, 451	10	5, 995	10
Value of exports, total	49. 1	62. 4	71. 4	78. 3	89. 9	15	102. 2	14
Wines and brandy	1. 0	1. 3	1. 4	1. 3	1. 6	24	2. 0	24
Distilled liquor	8. 9	12. 9	16. 1	20. 1	24. 5	22	29. 9	22
Flavorings	36. 7	45. 2	49. 9	53. 5	58. 9	10	64. 8	10
Malt liquor	1. 1	1. 2	1. 3	1. 2	2. 2	83	2. 5	14
Bottled and canned soft drinks	1. 4	1. 8	2. 7	2. 2	2. 7	23	3. 0	11
Value of imports, total	524. 4	652. 7	700. 3	765. 1	659. 0	−14	707. 1	7
Wines and brandy	98. 0	128. 9	158. 6	180. 5	191. 3	6	202. 8	6
Distilled liquor	395. 5	486. 0	508. 9	541. 1	424. 0	−22	457. 9	8
Flavorings	7. 7	9. 6	8. 4	8. 7	9. 0	3	9. 3	3
Malt liquor	22. 8	27. 4	32. 2	33. 7	33. 4	−1	35. 4	6
Bottled and canned soft drinks	. 4	. 8	1. 2	1. 1	1. 4	27	1. 7	21
Total employment (thousands)	218. 8	223. 4	227. 8	215. 9	212. 7	−1		

[1] Estimated by Bureau of Domestic Commerce.

[2] Includes value of all products and services sold by malt liquor, wines and brandy, distilled spirits, bottled and canned soft drinks, and flavoring industries (SIC 2082, 2084, 2085, 2086, 2087).

[3] Value of production.

[p] Preliminary.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

lion were from the other wine producing States, and 36 million were imported.

California Wine Industry

California, the major wine producing State, is enjoying a boom of unprecedented strength. Its share of the U.S. wine market is estimated at 73 percent. Imports account for about 11 percent and the balance comes from other wine producing States, of which New York is the major producer.

California makers produce two general but overlapping wine categories—"premium" and "standard." Premium wines, those selling for more than $1.50 a fifth, account for about 12 percent of California shipments and constitute the fastest growing segment of the industry. Supply of those wines can hardly keep up with the demand.

"Standard" wine processors make low-priced wines from grapes that grow remarkably well and rapidly in California. Wines from those grapes, in contrast to premium wines, require little aging. Their major product is table wine having an alcoholic content of 14 percent or less.

Standard wines include fruit flavored and sparkling wines, such as low-priced champagne or the mixture of champagne and sparkling burgundy called Cold Duck. Makers of standard wines are steadily increasing output of ordinary wines such as the dry reds, rosés, and whites which are sold in half gallons or gallons as well as the familiar fifths.

Brandy Consumption Promoted

The California Brandy Advisory Board launched a promotional campaign in the summer of 1972 to convince consumers that California brandy is suited for use in mixed drinks. The promotional campaign was aimed particularly at young men and women between the ages of 18 and 34, who are assumed to be ready to experiment with food and drink.

Demand for Flavorings

Strong demand from the confectionery, ice cream, frozen desserts, soft drinks, and baking industries pushed 1972 shipments of flavoring up to almost $1.5 billion, an increase of 7 percent over the previous year's $1.3 billion. Value of shipments of flavorings is expected to advance 5 percent in 1973 to slightly more than $1.5 billion. The industry grew at an average annual rate of 7 percent during the 1967–72 period. Shipments are projected to rise at about the same rate to more than $2.4 billion in 1980.

Whiskey Production Higher

Production of distilled liquors was estimated at slightly more than $1.9 billion in 1972, 5 percent over the 1971 level of $1.8 billion. It is expected to approximate $2 billion in 1973. Per capita consumption of distilled spirits has risen steadily over the past to 1.85 gallons in 1971.

Liquor Consumption Increases

Consumption of distilled spirits increased 5 percent in 1972, compared to a 4 percent increase in 1971. Over the past decade, U.S. drinkers' taste has shifted from domestic whiskeys to Scotch and Canadian whiskies. California was the largest consumer of distilled spirits in 1971, followed by New York and Illinois.

Sales of distilled liquor have gained with the upward shift in the age composition of the population.

Light Whiskey Appears

The distilling industry hopes that the light whiskey, which became legal in July, 1972, will stem the flow of imports. Light whiskey differs from rye, bourbon, and other domestic liquors in that it is distilled at higher proofs (160° to 190°), aged in used oak casks rather than in new charred oak barrels, and has a lighter taste and aroma. The Treasury Department amended its regulations in 1968 to permit the domestic distillers to produce the new whiskey. According to the Light Whiskey Institute, 50 brand names for it have been registered with the Government by distillers. Promotional costs are high and market competition intense.

Beer Sets New Record

Shipments of malt liquors, estimated at $4.5 billion in 1972, are expected to gain 9 percent in 1973 to a new high of about $4.9 billion.

Production of beer in 1971 set a new world record as U.S. brewers filled 137,352,016 barrels, and 1972 production was believed to be even higher.

Beer Consumption Rises

Per capita consumption of beer among the population 18 years and over increased from 28.4 gallons in 1971 to 29.4 gallons in 1972. More than half of the beer consumed is by the 18 to 44 year old group. As beer consumption in bars, taverns, and restaurants has declined, beer drinking in homes has grown. More than half of all beer is consumed in seven States. California leads the list, followed by New York, Pennsylvania, Texas, Illinois, Ohio, and Michigan.

Soft Drink Shipments Up

Shipments of canned and bottled soft drinks, estimated at $5.4 billion in 1972, rose 10 percent over the previous year. They are expected to reach $6 billion in 1973 for another annual increase of 10 percent. Between 1967 and 1972, the industry grew at an average annual rate of 11 percent. Per capita consumption of soft drinks in 1972 is estimated at 26 gallons compared with 24.3 gallons in 1971.

While U.S. population growth rate has slowed, the heavy soft drink consumer group (ages 15 to 39) is expected to continue to expand during most of the seventies, together with the other factors favorably influencing the beverage industry, that should push shipments to $12 billion by 1980.

Ecology Problem Divisive

Concern for the environment has created two major points of view in the soft drink industry. One group believes the soft drink industry should

Beverages: Projections 1972–80 [1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
	Total	$14, 177	9	$15, 462	9	$28, 960	9.4
2082	Malt liquor	4, 512	9	4, 918	9	8, 990	9.0
2084	Wines and brandy	873	16	1, 013	16	2, 945	16.4
2085	Distilled liquor [3]	1, 925	5	2, 021	5	2, 910	5.3
2086	Bottled and canned soft drinks	5, 451	10	5, 995	10	11, 685	10.0
2087	Flavorings	1, 416	7	1, 515	5	2, 430	7.0

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth.
[3] Value of production.

go back to returnable bottles and abandon the nonreturnables with their problems of litter and solid waste. The other group feels that neither mandatory deopsits nor outright bans on the use of nonreturnables would eliminate the environmental problem—that consumers would continue to discard bottles in parks and on highways and beaches.

The industry has sponsored recycling centers for bottles and cans in some places. Some centers pay a premiums for bottles and cans brought in.

Industry Outlook Favorable

The long range industry outlook appears favorable as the expansionary market factors are expected to continue during the remainder of the seventies. Shipments of beverages are projected to grow to \$29 billion by 1980 at an annual average rate of 9.4 percent.—*Edward L. Herbert, Office of Business Research and Analysis.*

MALT LIQUORS

The malt liquor industry continues to maintain a strong market position in 1972. Product shipments for 1973 are expected to reach \$4.9 billion, 9 percent above 1972 estimated shipments of \$4.5 billion. The product continued to rank fourth among grocery store volume leaders in 1971. Growth of demand for beer is bolstered by its popularity among the expanding young-adult population between the ages of 20 and 44, and by rising personal income. Per capita consumption of malt liquor among the population age 18 years and over was 29.4 gallons in 1972, up ab ut 4 percent from 28.4 gallons in 1971.

Concentration Continuing in the Industry

National brewers continue to grow at the expense of regional and local brewers. The rate of increase in volume of shipments by the leading national brewers is expected to continue to exceed the industry rate. Market share of the 3 top brewers in the 1960's expanded from 21 to 39 percent, and was estimated at approximately 41 percent in 1971. The five top producers of the industry accounted for approximately 53 percent of shipments in 1971, while the 25 top firms with annual sales of 1 million barrels each represented 95 percent of the total. As the national brewers have been adding new plants, the number of regional breweries has declined. The number of brewing plants in the United States declined from 176 in 1967 to 147 in 1972.

Basic Costs High

Demand for beer is seasonal and, since beer cannot be stored more than a month without quality deterioration, production capacity is geared to meet peak demand of summer months, causing a relatively high capital cost per unit of output. The trend toward more highly automated plants will reduce the labor/cost ratio for leading brewers in the years ahead despite rising wage rates.

The most important raw material used in brewing is malt and its price follows that of barley, from which malt is made. Many large brewers produce their own malt and also sell some to others.

Packaging and related packaging materials are of more concern as a cost element than are ingredients. Consumers are willing to pay a premium for easy-open and throw-away containers, and except in localities that may severely tax or ban nonreturnables, no great resurgence is anticipated in the use of returnable bottles. To combat rising costs, a number of brewers have arranged with container manufacturers to establish canmaking facilities adjacent to their plants.

Packaged Sales Continue Upward

Packaged sales of malt liquor beverages continued upward, accounting for 86.4 percent of sales in 1971, up from 85.9 percent in 1970, the

1972 Profile

Malt Liquors

SIC Code	2082
Value of product shipments (millions).	\$4, 476
Number of establishments	147
Employment (thousands)	54. 6
Exports as a percent of product shipments.	Negligible
Imports as a percent of apparent consumption.	0. 7
Compound annual average rates of growth 1967–72 (percent):	
Value of product shipments (current dollars).	9. 1
Value of exports (current dollars).	14. 9
Value of imports (current dollars).	7. 9
Employment	– 1. 8
Major producing areas	Midwest and Mid-Atlantic

Malt Liquors: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	$2,930	$3,419	$3,685	$4,140	$4,510	9	$4,920	9
Total employment (thousands)	59.6	57.3	56.8	57.0	56.6	−4		
Production workers (thousands)	40.0	38.6	37.6	37.2	35.4	−5		
Value added	1,546	1,788	1,899	2,177	NA			
Value added per production worker man-hour	$20.13	$24.09	$25.83	$30.40	NA			
Product: [3]								
Value of shipments	2,900	2,391	3,663	4,107	4,476	9	4,879	9
Value of imports	22.8	27.4	32.2	33.7	33.3	−1	35.4	6
Value of exports	1.1	1.2	1.3	1.2	2.2	83	2.5	14
Wholesale price indexes (1967=100)	100.0	103.2	106.1	110.2	111.0	1		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the malt liquors industry (SIC 2082).
[3] Includes value of shipments of malt liquors made by all industries.

NOTE.—NA = Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

balance being in draught beer. Sales of beer in cans increased from 52 percent of packaged beer sales in 1970 to 56 percent in 1971; sales of beer in nonreturnable bottles rose from 24 to 25 percent; sales in returnable bottles fell from 24 to 19 percent.

New Beer Packaging

Radically different packaging in terms of outer container and bottle appearance has been introduced by a brewing company—a new plasti-shield quart bottle and a new type of 7-ounce bottle called "pony pack." The plasti-shield bottle has a foamed polystyrene jacket that requires up to a third less glass than conventional nonreturnables and can be recycled. The 7-ounce, no-deposit bottle "pony pack" comes in special, open eight-pack cardboard carriers.

Pricing Practices Under Review

Competition has intensified between regional and national brand brewers. Anti-trust legislation is being sought by regional brewers against alleged unfair pricing practices. The price squeeze on popular-priced brands of regional breweries reduces their competitive advantage over national breweries because of rising costs and price ceilings. National brewers of premium beer with greater operational and purchasing efficiencies can brew and sell cheaper than regional brewers.

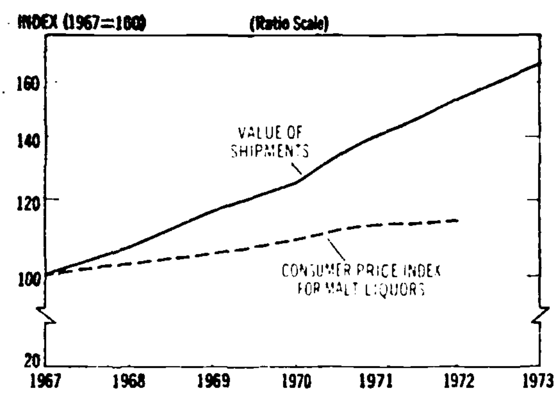
The Ecology Factor

The brewing industry is attempting to eliminate litter through recycling promotion programs and centers in order to minimize the need for legislation requiring use of "returnables only".

Employment Down and Productivity Up

Average total employment in 1972 declined to an estimated 56,600 from 57,000 in 1971, while production worker employment fell from 37,200

Malt liquor shipments continue to rise



SOURCE: Bureau of the Census, Bureau of Labor Statistics and Bureau of Domestic Commerce.

in 1971 to an estimated 35,400 in 1972. Output per man-hour rose 7.2 percent in 1971 for all employees, and 6.2 percent for production workers. The rise in productivity is chiefly the result of automation and improved materials handling.

Foreign Trade Limited

Imports, which amount to less than 1 percent of apparent consumption, declined slightly to $33.3 million in 1972, but are expected to rise to $35.4 million in 1973. Principal U.S. suppliers of ale, porter, stout, and beer in 1971 continued to be West Germany, The Netherlands, and Canada.

Malt liquor exports, while historically negligible, increased from $1.2 million in 1971 to an estimated $2.2 million in 1972, with shipments to The Bahamas, Hong Kong, and The Netherlands Antilles showing substantial gains.

Continued Growth Foreseen

Faster growth of the malt liquors industry is anticipated in the seventies as a result of increasing popularity, expanding population, larger personal income, and more leisure time. With an expected average annual growth rate of 9 percent, malt liquor shipments will amount to about $9 billion in 1980.—*Rita Bacon, Office of Business Research and Analysis.*

SOFT DRINKS

Reflecting strong consumer demand, the soft drink industry is expected to continue as one of the Nation's growth industries. In 1973, value of shipments for the bottled and canned soft drink industry will probably reach $6 billion, 10 percent above estimated 1972 shipments of $5.5 billion. The industry's average annual growth was 11.4 percent for the 1967–72 period.

Contributing to expanding consumer markets for soft drinks are rising disposable personal income, population growth—particularly among the teenage and young adult groups with the highest per capita consumption—introduction of new products, and persistent and imaginative advertising and promotion. Since 1967, soft drink consumer prices have increased at an annual average rate of 5.2 percent.

Franchisers and Bottlers

The soft drink industry consists of formula owners or franchisers who produce either flavoring concentrate or syrup (flavoring concentrate plus sugar) and independent franchised bottlers who purchase the concentrate or syrup and bottle soft drinks. Formula owners rely on local franchised bottlers to process, bottle, and distribute finished products since shipping of bottled and canned goods to distant retail outlets is uneconomical. This outlook is concerned with bottlers, whose primary products include bottled and canned soft drinks, fruit-ades, and carbonated water.

Independent franchised bottlers operate about 2,750 soft drink bottling plants located throughout the country, with the greatest concentration in the Southern States. Since 1967, the number of plants has declined about 20 percent, mainly as a result of mergers. Through consolidation, the industry is becoming more regionally oriented thus increasing operational and distribution efficiency.

Consumers Prefer Cola Flavor

Per capita consumption of soft drinks was estimated at 26.0 gallons in 1972, compared with 24.3 gallons a year earlier, continuing the average annual growth rate of 7 percent in recent years. Cola continued as the most popular packaged beverage, accounting for more than 60 percent of 1971 sales volume of both regular and low calorie or diet soft drinks. Lemon-lime flavored drinks ranked second with about 14 percent of volume. Diet drinks continued at about 7 percent of packaged sales volume. Packaged soft drinks accounted for four-fifths of sales in 1971. The remaining fifth represents products in bulk sold through such retail outlets as soda fountains. About 20 percent of the packaged volume was in cans.

A recent industry survey disclosed that use of

1972 Profile

Soft Drinks

SIC Code	2086
Value of industry shipments (millions).	$5, 451
Number of establishments	2, 750
Employment (thousands)	118.4
Compound annual average rates of growth 1967–72 (percent):	
Value of shipments (current dollars).	11.4
Value of exports (current dollars).	14.0
Value of imports (current dollars).	28.0
Employment	–0.8
Major producing areas	Southern States

Bottled and Canned Soft Drinks: Trends and Projections, 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	3, 173	4, 064	4, 605	4, 955 P	5, 450	10	5, 995	10
Total employment (thousands)	123. 3	128. 5	131. 5	120. 0 P	118. 4	−1. 3		
Production workers (thousands)	46. 6	49. 3	50. 8	46. 5 P	46. 3	−0. 4		
Value added	1679	1942	2147	2182 P	NA			
Value added per production worker man-hour	$17. 62	$19. 86	$20. 84	$23. 58	NA			
Value of imports	0. 4	0. 8	1. 2	1. 1	1. 4	27	1. 7	21
Value of exports	1. 4	1. 8	2. 7	2. 2	2. 7	23	3. 0	11
Wholesale price index (1967=100)	100. 1	114. 7	120. 4	124. 0	126. 2	2		
Consumer price index (1967=100)	100. 0	112. 7	119. 0	125. 9	128. 7	2		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the bottled and canned soft drink industry (SIC code 2086).
P Preliminary.

NOTE.—NA=not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

nonreturnables or one-way cans and bottles gained 13 percent in 1971 over 1970, and accounted for a 41-percent share of the market. Returnables rose by 5 percent in 1971, the first rise in several years, but their market share dropped from 61 to 59 percent.

The Sweetener Issue

After recouping its market share with a costly reformulated diet drink using sugar and saccharin following the cyclamate ban, the industry is now concerned over possible imposition of a similar ban on use of saccharin. The Food and Drug Administration dropped it from the generally regarded as safe (GRAS) additive list; so while not yet banned, concentrated use of saccharin is prohibited. A ban would affect producers of saccharin and diet foods as well as soft drink producers, but hardest hit would be those soft drink companies whose diet drink products constitute a significant portion of their production. Chemical houses are searching for a saccharin replacement against the possibility of its being banned. A reformulated diet soft drink with sugar as the only sweetener has already been developed and is now being tested. Also a saccharin-free sugar substitute has been developed that is said to be almost twice as sweet as sugar and containing about half the carbohydrates, with no bitter aftertaste. This new substitute, manufactured from natural food derivatives and two approved GRAS ingredients and reported to hold carbonation very well, has not yet been offered to soft drink producers.

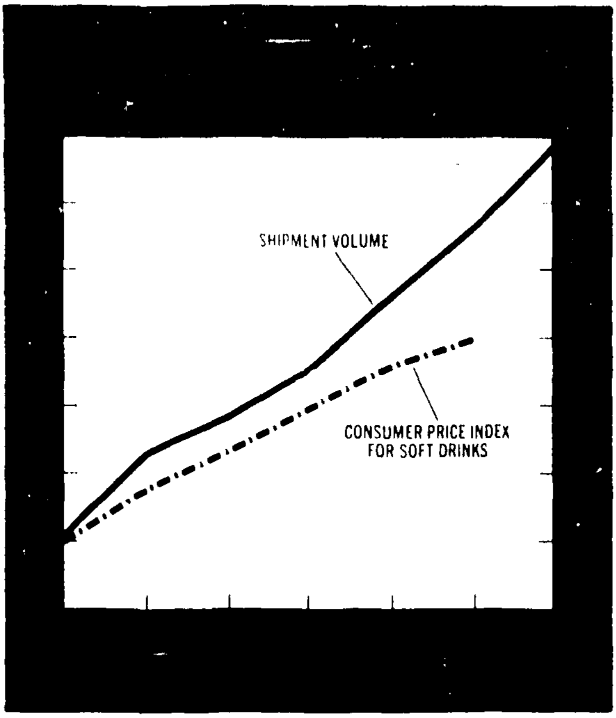
Labeling Requirements May Increase

Proposed legislation before Congress to amend the Fair Packaging and Labeling Act would require the manufacturer, distributor, and packager of a product to be listed in order to reduce consumer confusion when FDA orders a product recall. Under such legislation, higher priced manufacturers' brands would compete with private label brands, a concern to both manufacturers and grocers. Grocers claim that the code recall method now used is more effective in identifying private label products.

Returnables Versus Nonreturnables

Solid waste disposal is the major ecological problem affecting the soft drink industry. Attempts to solve the problem include antilitter campaigns, reclamation recycling centers, recycling of cans, and development of plastic bottles which disintegrate when exposed to the elements or can be incinerated without giving up toxic fumes. The plastic bottle program, however, would be affected by already enacted or proposed legislation in a number of States that ban or tax one-way beverage containers. Major financial commitments for new equipment and containers may be delayed.

Opinion is divided as to whether returnable or nonreturnable containers create the greater litter problem. Proposals suggested are a complete changeover to returnable bottles with mandatory deposits or outright bans on nonreturnable bottles. However, some maintain that container deposits,



taxes, and bans will not solve the litter problem; that the consumer has been demonstrating less and less interest in savings inherent in the returnable system; and that the decline in trippage with a corresponding drop in earnings gave birth to the one-way container, and not vice versa. On the basis of a recent sample survey, the industry claims that a shift to the returnable bottle would not only be costly but that solid waste volume would be reduced by only 1.37 percent. roadside litter at most by 11.2 percent.

Franchising Agreements Challenged

A number of soft drink franchisers may be affected by a Federal Trade Commission complaint challenging legality of territorial limits of their standard franchise agreements which would reduce the parent company's control over the bottlers. Hearings by the Federal Trade Commission on this issue were continuing during the latter part of 1972 and a decision was not expected until 1973.

Employment Declines

Employment in the bottled and soft drink industry decreased 1.3 percent from 120,000 in 1971 to an estimated 118,400 in 1972. However, the number of production workers in 1972 is estimated at 46,300, reflecting a decline of only 0.4 percent. Mergers and consolidation of bottling plants as well as more mechanization and automation are responsible for the decline.

Exports Insignificant

Exports of soft drinks are negligible, amounting to less than 1 percent of U.S. production in 1972. Soft drinks do not readily lend themselves to foreign trade because of high shipping costs. However there is a promising export potential for soft drink concentrate and syrup to overseas bottling and canning facilities.

Industry Growth Will Continue

Per capita consumption of soft drink is expected to continue to rise at an average annual growth rate of 10 percent during the 1972–80 period, with the value of shipments expected to reach $11.7 billion in 1980.—*Rita Bacon, Office of Business, Research and Analysis.*

CHAPTER 10

Tobacco

The value of manufactured tobacco products is expected to top $4.6 billion in 1973, a 5-percent increase over 1972. The projected gain reflects small increases in both demand and price. The value of production in 1972 increased approximately 7 percent over 1971. Output of cigarettes, cigars, cigarette-size cigars, looseleaf and fine-cut chewing tobacco rose while production of snuff remained level and other manufactured tobacco products continued downward.

Exports of manufactured tobacco products during 1972 amounted to $237 million while imports totaled $26 million.

Wholesale prices of tobacco products increased 2 percent during 1972.

Cigarette output in 1973 is expected to increase 2 percent to 620 billion in response to demand from the larger population group of 18 years and over, while the value of production is expected to rise 5 percent to $3.9 billion. Production volume declined in 1971 because of the need to reduce inventories. The cigar industry in 1973 probably will hold production of large cigars at the 1972 level of 7 billion units, but is expected to advance output of cigarette-size cigars by 50 percent to 3.3 billion units. Value of production of the cigar industry should rise 3 percent to $400 million in 1973. Shipments of chewing tobacco, smoking tobacco, and snuff are expected to increase to $315 million during 1973, a gain of about 4 percent.

The tobacco stemming and redrying industry output during 1973 is estimated at $1.2 billion, 1 percent more than a year earlier. In addition to processing tobacco for sale to domestic producers of tobacco products, a substantial portion of this industry's sales are exported.

Product Success Story of 1972

Cigarette-size cigars, generally referred to as little cigars, began to show surprising consumer appeal in 1971 when the industry produced 1.1 billion units. In 1972 consumer demand increased and production doubled. Small-size cigars have three sales advantages over cigarettes: (1) No restriction on TV or other advertising; (2) lower taxes imposed by Federal, State, and local governments; and (3) no requirement to include an adverse health warning on labels, or in public adver-

1972 Profile

Tobacco

SIC Code	21 [1]
Value of industry shipments (millions).	$4,395
Number of establishments	210
Employment (thousands)	55
Exports as a percent of product shipments.	5.4
Imports as percent of apparent consumption.	0.6
Compound annual rates of growth 1967-72 (percent):	
Value of shipments (current dollars).	5
Value of exports (current dollars).	12
Value of imports (current dollars).	30
Employment	-2
Major producing areas	Middle Atlantic, South Atlantic, and East South Central Regions

[1] Excludes SIC 2141

tising. In addition, the retail price of a pack of 20 small cigars is about half the price of a pack of 20 cigarettes. Estimates are that 1973 production will rise 50 percent over 1972.

Employment and Location

Industries manufacturing tobacco products had employment averaging 55,000 in 1972, the same as in 1971. Production workers accounted for 48,000. Main manufacturing facilities of the cigarette industry are located in North Carolina, Virginia, and Kentucky. The cigar industry is located in Pennsylvania and Florida, while the chewing and smoking tobacco industry is located mainly in Tennessee, Virginia, and Kentucky.

Productivity Up

Productivity continues to increase as this already highly automated industry continues to invest in more labor saving machinery to effect greater manufacturing efficiencies. Value added per production worker man-hour during 1971 of $23.64 was 12.5 percent above the $21 reported for 1970.

Profit Margins Improve

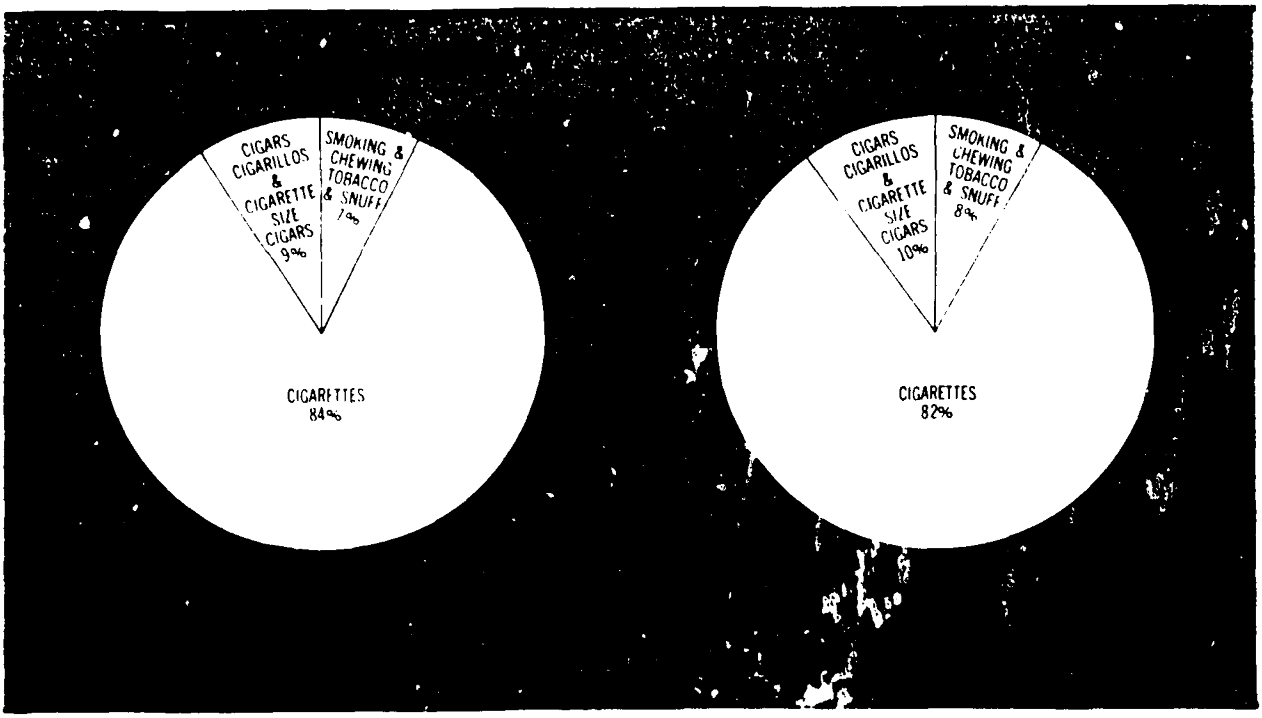
Following a period of declining profits, cigarette companies reported improved profit margins for the past few years probably because of product price increases, improved operating efficiencies, increased labor productivity and increasing demand. Product demand continues firm and similar profit margins are expected in 1973.

Diversification Continues

Because of the health-in-smoking issue, cigarette companies continue restructuring corporate organizations away from tobacco products. New acquisitions include containerized shipping, oil exploration, land development, and office equipment. These activities along with consumer products such as beverages, frozen food, confectionery, pet foods, clothing, razor blades, and cosmetics accounted for an estimated 40 percent of their sales during 1972.

Smoking Taxes Increase

Federal excise taxes on cigarettes of 8 cents per pack brought more than $2.2 billion into the U.S. Treasury during 1972. All 50 States and the District of Columbia impose excise taxes on cigarettes ranging from a low of 2 cents per pack in North Carolina to a high of 21 cents per pack in Connecticut. During 1972 taxes in four States were increased from 2 cents to 5 cents per pack. State taxes amounted to $2.9 billion during 1972. Ap-



Tobacco: Trends and Projections: 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 p	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments:								
Cigarettes	3,045	3,165	3,503	3,573	3,805	6	4,020	6
Cigars	364	366	375	359	380	6	388	2
Chewing and smoking tobacco	122	179	179	187	210	12	220	5
Total value of production	3,531	3,710	4,057	4,119	4,395	7	4,628	5
Tobacco stemming and redrying [3]	1,373	1,282	1,288	1,406	1,425	1	1,440	1
Total employment (thousands)	75	72	71	68	68	0		
Production workers (thousands)	66	63	63	59	59	0		
Value added	2,032	2,101	2,488	2,561	NA			
Value added per production worker man-hour	$16.19	$17.91	$21.00	$23.64	NA			
Product: [4]								
Value of shipments:								
Cigarettes	2,942	3,265	3,364	3,445	3,685	7	3,890	5
Cigars	362	375	383	369	390	6	400	3
Chewing and smoking tobacco	194	213	274	280	302	8	315	4
Total manufactured tobacco products	3,498	3,853	4,021	4,094	4,372	7	4,605	5
Tobacco stemming and redrying	1,112	1,085	1,065	1,175	1,200	2	1,210	1
Quantity produced:								
Cigarettes (billions)	576	558	583	576	607	5	620	2
Cigarette sized cigars (billions)	0.4	0.7	0.9	1.1	2.2	100	3.3	50
Cigars (billions)	6.9	6.9	7.1	6.7	7.0	4	7.0	0
Smoking tobacco (million pounds)	65	64	69	61	60	2	60	0
Chewing tobacco (million pounds)	64	70	69	71	74	4	74	0
Snuff (million pounds)	29	28	27	26	26	0	26	0
Value of imports:								
Manufactured	7	12	17	18	26	44	29	12
Unmanufactured	129	128	128	141	148	5	155	5
Value of exports:								
Manufactured	137	155	191	221	237	7	247	4
Unmanufactured	487	529	488	463	575	25	580	1
Wholesale price indexes (1967 = 100):								
Cigarettes	100.0	107.6	115.1	117.2	121.7	4		
Cigars	100.0	103.5	106.4	107.5	109.0	1		
Chewing and smoking tobacco	100.0	105.7	113.9	125.3	126.0	0		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services produced by tobacco industries (SIC 2111, 2121, 2131, and 2141).
[3] The tobacco stemming and redrying industry is an intermediate processing industry, the products of which are consumed in the production of other tobacco products in the United States or exported.
[4] Includes total value of production of cigarettes, cigars, chewing and smoking tobacco and tobacco stemmed and redried made in all industries.
p Preliminary.

NOTE.—NA = Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Economic Research Service, Internal Revenue Service.

proximately 300 counties, cities, and municipalities also impose excise taxes ranging from 2 cents to 10 cents per pack which produced more than $130 million in revenue in 1972. Direct taxes on other tobacco products amounted to $90 million. In the aggregate, Federal, State, and local taxes on tobacco products amounted to $5.1 billion, and accounted for 46 percent of the average consumer price on a pack of cigarettes.

Synthetics Far Off

The industry continues research to improving productivity, and to develop a better tobacco product and tobacco substitutes. Latest innovation in the manufacture of cigarettes is the use of puffed tobacco. Puffing is a modification of freeze-drying. Synthetic tobacco, for many reasons, is unlikely to be offered on the consumer market in the near future.

Cigarette Consumption Up

While per capita consumption of cigarettes by the population group over 18 years of age rose to 204 packs during 1972, 1 percent more than in 1971, total per capita consumption of tobacco in cigarettes was 7.7 pounds, or slightly below 1971 levels. Per capita consumption of tobacco in all manufactured products in 1972 was 9.5 pounds, or 1 percent less than in 1971. For a number of years use of tobacco has been declining due to size and diameter of cigarettes, filters, and the use of more sheet and stem tobacco. This trend is expected to continue during the next few years.

Consumer Expenditures Higher

Consumer spending for tobacco products during 1972 totaled $12.9 billion, 5 percent above 1971 expenditures. Cigarettes accounted for 91 percent, cigars 6 percent, and other tobacco products the remaining 3 percent.

Because of increases in State and local taxes and a rise in manufacturers' prices, the retail price of a pack of cigarettes in 1972 rose 3 to 4 percent, and in 1973 is expected to increase by approximately the same amount.

Trade Balance Favorable

The favorable balance in tobacco and tobacco products increased in 1972 to $638 million compared with $525 million during 1971. Exports of manufactured tobacco products during 1972 were $237 million, up 7 percent from 1971. The value of cigarette exports gained 6 percent over 1971 to $194 million while other manufactured tobacco products exports were $43 million, up 13 percent over 1971. U.S. exports of unmanufactured (redried) tobacco products during 1972 amounted to $575 million, up 25 percent from the $463 million in 1971.

Imports of manufactured tobacco products during 1972 totaled $26 million, or 44 percent above 1971 imports of $18 million. Unmanufactured tobacco products imports during 1972 amounted to $148 million, up 5 percent over 1971.

Leading foreign markets for manufactured tobacco products during 1972 were Hong Kong, Spain, Panama, The Netherlands Antilles, and Kuwait. Major markets for unmanufactured products were the United Kingdom, West Germany, and the Netherlands. Tariff and nontariff barriers in foreign countries, including tobacco monopolies, continue to limit U.S. tobacco exports.

Principal foreign sources for U.S. imports unmanufactured tobacco include Turkey, Greece, Yugoslavia, the Philippines, the Dominican Republic, and Lebanon. The Netherlands, Sweden, Canary Islands, Jamaica, and the United Kingdom are major sources for manufactured tobacco imports.—*Shandon D. Knape, Office of Business Research and Analysis.*

Household Consumer Durables

A combination of demand from growing numbers of new families and high consumer spending in 1973 should result in a 6 percent increase in manufacturers' shipments of household appliances and furniture to an alltime high of $14.6 billion.

Appliance shipments in 1973 are projected at $7 billion, a gain of 6 percent over 1972. Introduced into the market for the first time are a combination blender, juicer, crusher, whipper, grinder and sharpener; compact gas dryer; portable pizza cooker; and a microwave oven that browns meat.

In cooperation with environmental improvement groups, the industry has initiated research into noise control of household appliances and recycling of old appliances. Product safety studies are being made to eliminate clothing fire hazards in the use of gas and electric ranges, while new standards are being developed for vacuum cleaners.

Imports of household appliances are estimated at $398 million in 1972, an increase of 30 percent over 1971. Exports, estimated at $176 million, were 20 percent over 1971.

Furniture industry shipments are expected to reach $7.7 billion in 1973, a 5 percent increase compared with the 11 percent gain in 1972 to $7.4 billion. Sales of vertical furniture have accelerated, reflecting the trend toward construction of smaller homes and apartment living. Armoires and étagères, relegated to attics and refuse heaps when clothes closets and storage rooms became standard in the larger housing units built during the last half century, are now integral parts of homes and apartments. Coupled with the trend are multipurpose products such as sofa beds and cabinet type room dividers.

Packaged knockdown furniture rapidly is becoming a strong marketing ally in manufacturers' constant battle against rising assembly costs shortage of skilled labor, warehousing and stock room costs, and damage in transit. This new merchandising concept is being applied to fine well-designed furniture as well as the usual unpainted do-it-yourself type.

Flammability standards were established by the

Household Consumer Durables: Projections 1972–80 [1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
	Total	$13, 875	9	$14, 658	6	$22, 481	6. 2
3631-36, 3639	Household appliances	6, 522	8	6, 911	6	10, 200	5. 8
2511-12, 2514 2515, 2519	Household furniture and bedding	7, 353	11	7, 747	5	12, 281	6. 6

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth.

Household Appliances: Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Industry: [2]								
Value of shipments, total	5, 328	6, 155	6, 053	6, 064	6, 522	8	6, 911	6
Cooking equipment	552	679	656	751	826	10	876	6
Refrigerators/freezers	1, 785	2, 036	2, 022	1, 698	1, 783	5	1, 908	7
Laundry equipment	982	1, 122	1, 081	1, 191	1, 310	10	1, 376	5
Electric housewares/fans	1, 112	1, 311	1, 276	1, 332	1, 399	5	1, 469	5
Vacuum cleaners	293	332	346	387	418	8	443	6
Sewing machines [4]	124	146	136	143	150	5	158	5
Household appliances, not elsewhere classified	480	529	536	563	636	13	681	7
Total employment (thousands)	169. 2	175. 3	174. 3	179. 2	188. 2	5		
Production workers (thousands)	135. 2	140. 7	139. 7	142. 2	150. 7	6		
Value added by manufacture	2, 540	3, 052	3, 045	3, 122	NA			
Value added per production worker man-hour	$9. 69	$11. 28	$11. 26	$13. 29	NA			
Product: [3]								
Value of shipments, total	4, 506	5, 258	5, 305	5, 780	6, 284	9	6, 626	5
Cooking equipment	632	794	793	880	968	10	1, 026	6
Refrigerators/freezers	988	1, 180	1, 213	1, 310	1, 488	9	1, 499	5
Laundry equipment	932	1, 024	1, 015	1, 137	1, 251	10	1, 314	5
Electric housewares/fans	1, 073	1, 224	1, 264	1, 327	1, 393	5	1, 463	5
Vacuum cleaners	254	310	328	358	387	8	410	6
Sewing machines [4]	117	138	126	134	141	5	148	5
Household appliances, not elsewhere classified	5[illegible]0	588	566	634	716	13	766	7
Quantity shipped (thousand units):								
Dishwashers	1, 585	2, 118	2, 116	2, 477	2, 849	15		
Disposers	1, 357	1, 943	1, 977	2, 294	2, 661	16		
Electric ranges	1, 910	2, 343	2, 362	2, 714	3, 067	13		
Gas ranges	2, 123	2, 471	2, 362	2, 550	2, 652	4		
Refrigerators	4, 713	5, 296	5, 286	5, 691	6, 146	8		
Freezers	1, 100	1, 195	1, 359	1, 407	1, 520	8		
Washing machines	4, 323	4, 379	4, 094	4, 609	5, 024	9		
Dryers	2, 648	3, 022	2, 981	3, 377	3, 748	11		
Vacuum cleaners	5, 677	7, 124	7, 382	7, 973	8, 531	7		
Irons	10, 020	9, 375	9, 275	9, 430	9, 336	-1		
Coffee makers	8, 000	8, 400	8, 100	8, 550	8, 978	5		
Value of exports	146. 0	156. 0	137. 7	146. 3	176	20		
Value of imports	124. 1	231. 0	253. 4	306. 5	398	30		
Wholesale price index (1967 = 100)	100	103. 1	105. 3	107. 2	107. 5			

[1] Estimated by Bureau of Domestic Commerce.

[2] Includes value of all products and services sold by the household appliance industries (SIC 3631, 3632, 3633, 3634, 3635, 3636, 3639).

[3] Includes value of shipments of household appliances made by all industries.

[4] Includes non-household sewing machines, as reported by Census Bureau.

P Preliminary.

NOTE.—NA = not available.

Source: Merchandising Week, Bureau of the Census, Bureau of Labor Statistids, and Bureau of Domestic Commerce.

Department of Commerce to apply to all mattresses produced or sold after June 7, 1973. The Federal Trade Commission is responsible for overseeing compliance with standards by bedding manufacturers.

Imports of household furniture in 1972 are estimated at $180 million, a 22 percent gain over 1971. Exports also gained to $26 million or 12 percent over 1971.

Household consumer durable shipments are expected to rise to $22.5 billion by 1980, averaging about 6.2 percent a year increases, in response mainly to demands of a growing population.—*Louis A. Traxel, Office of Business Research and Analysis.*

HOUSEHOLD APPLIANCES

Manufacturers' shipments of household appliances are expected to total $6.6 billion in 1973, more than 5 percent over the 1972 figure. Shipments of appliances in 1972 increased about $500 million, or 9 percent, from 1971 estimated sales of $5.8 billion. Large increases were reported for nearly all appliances in 1972, and especially for dishwashers, disposers, electric ranges and dryers. A continued high level of new housing construction, as well as another large increase in consumer spending, should generate increased demand for appliances in 1973.

Appliance Spending Surveyed

A survey by the Bureau of the Census indicates that a typical U.S. household spent $90 on major appliances in 1971, compared with $125 for furniture and floor coverings, and $68 for television and hi-fi equipment. Cash expenditures, not including trade-in allowances, were $78, $119 and $67, respectively. Households with larger incomes spent more per household for appliances—up to $152 net for households with incomes of $25,000 and over.

Considering age alone, younger household heads at all income levels are the biggest appliance buyers. Heads of households 25 to 29 years of age, for example, spent an average of $122 net on appliances, well above the individual average of older age groups. Those with incomes of $15,000 and over in this younger group had the highest average expenditures for major appliances, $230 net per household.

Older adults are the most important appliance buying group. Persons 35 years of age and older account for almost 75 percent of heads of households and about 75 percent of total expenditures for appliances.

New Appliances Marketed

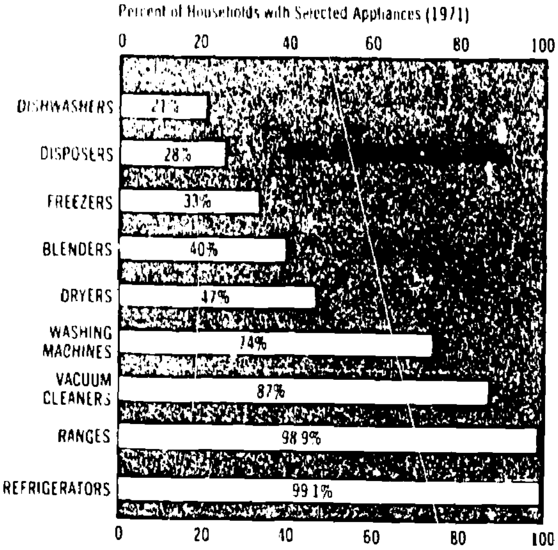
New appliances and new designs of standard appliances are continually being marketed; many

1972 Profile

Household Appliances

SIC codes	3631-36, 3639
Value of industry shipments (millions).	$6,522
Employment (thousands)	188.2
Exports as a percent of product shipments.	2.8
Imports as a percent of apparent consumption.	6.5
Compound average annual rates of growth 1967-72 (percent):	
Value of shipments (current dollars).	6.9
Value of exports (current dollars).	3.8
Value of imports (current dollars).	26.3
Major producing areas	East North Central States

Markets exist for many appliances



SOURCE: Merchandising Week, Bureau of the Census and Bureau of Domestic Commerce

new items were introduced in 1972. While a new major appliance is unusual, a modification of an old standby has recently appeared. It is a compact gas dryer, the first to be produced in this country. Another innovation in laundry appliances is the "double-scrub" washing machine. Its tub rotates in the opposite direction from the agitator for more thorough cleaning.

In the field of portable appliances, one new item is a blender-type appliance that grinds coffee, crushes ice, juices oranges and sharpens knives, in addition to blending and whipping. An innovation from Japan is a toaster with a lid that seals the heat inside, retaining moisture and toasting more evenly and faster than traditional toasters.

Recently introduced is the self-cleaning spray-steam-dry iron designed to solve the problem of clogged vents resulting from the use of faucet water instead of distilled water. Another new iron is a small travel iron with a divided soleplate for creasing trousers or skirt pleats. Other new electric portables include a porcelain pizza warmer, a towel steamer for shaving and relieving body aches, a shaver with four rotary heads, and a hand-held sewing machine.

Productivity Rises

Productivity in major household appliances manufacturing has increased in recent years. According to the Bureau of Labor Statistics, output per manhour increased 14 percent from 1967 to 1971. A gain of 6 percent was reported in 1971 alone. The 4 year gain matches the average productivity gain of 14 percent among 37 manufacturing industries studied.

Vacuum Cleaner Standards

A steering committee was formed in 1972 to help establish standards for the vacuum cleaner industry. The 20-man committee, organized on the initiative of the Vacuum Cleaner Manufacturers Association and the American Society for Testing and Materials, has representatives from Government agencies, consumer groups, testing laboratories, and retailing and manufacturing firms.

Standards to be considered by the committee will cover better terminology and more clearly defined claims regarding power, suction, bag capacity and cleaning capability. One of the most troublesome standards to be resolved by the committee will be horsepower rating. Formulas are available; what is debated is whether to measure power at start-up or at peak load, and under what electrical conditions.

Range Design May Change

Kitchen range manufacturers and the National Bureau of Standards (NBS) of the Department of Commerce have begun a program to determine the changes of design in gas and electric ranges needed to reduce the danger of accidental clothing fires. More than a third of clothing fires which cause injury involve kitchen ranges.

This cooperative program of the American Gas Association, Underwriters' Laboratories and NBS seeks to find out how kitchen range accidents occur, evaluate suggested design changes, and recommend performance standards to meet new voluntary safety guidelines. Design changes under consideration include control knobs that cannot be accidentally turned on, controls that do not necessitate reaching over one burner to operate another, and eliminating the danger of "invisible" hot burners. The kitchen range safety report was about complete at the end of 1972.

Microwave Oven Shipments Soar

U.S. shipments of household microwave ovens amounted to 32,600 units in 1970, the year when the microwave radiation standard was developed. Industry sources estimate that retail sales of these ovens, including imports, approached 200,000 in 1972, about double 1971 sales. About a dozen U.S. manufacturers are marketing perhaps 18 brands of microwave ovens.

Increasing popularity of microwave ovens has resulted from lower prices and promotional campaigns to instruct potential consumers on their use. Two years ago nearly all ovens were priced at $400 or more. Recently a large retailing chain offered one model at only $199. Most ovens are still priced well above this figure. Low-priced ovens are invariably imported, although not all imports have low price tags.

A new type of microwave oven introduced in Japan last year features an infrared ribbon heater for browning, as well as the usual magnetron for rapid cooking. This oven can be used as either an electric or electronic oven. Oven temperature is relatively low in either mode, eliminating heavy insulation, and neither burn nor char stains are produced from the browning process, making cleaning easy. Cooking time for a 1-pound slab of pork is 15 minutes, including browning time, compared with about 27 minutes for other microwave systems. The oven is priced at $421 in Japan.

In late 1972, the Department of the Treasury started an investigation into complaints that Japanese microwave ovens are being sold at less than fair value in the U.S. market. An affirmative finding would send the case to the Tariff Commission, the agency responsible for determining whether underpriced imports were injuring domestic producers. If the commission concludes that there has been injury, retaliatory duties may be imposed.

Imports and Exports Rise

Imports of household appliances from about 40 countries reached an estimated $398 million in 1972, about 30 percent over 1971 levels. Sewing machine imports accounted for about a third of the total. Nearly half of U.S. imports came from Japan in 1972, and were mostly sewing machines. Italy was the second largest source of appliances—primarily refrigerators and freezers—accounting for about 14 percent of the total. Other leading appliance country suppliers in 1972 were Sweden, The Netherlands, United Kingdom, and West Germany, each accounting for about 6 percent of imports.

Appliance exports to more than 140 countries in

1972 totaled an estimated $176 million, about 20 percent over the previous year levels. Canada was the biggest customer purchasing a variety of appliances and taking 46 percent of total appliance exports. Venezuela was the second leading customer, accounting for about 9 percent of the exports, of which nearly half were laundry appliances. About 2 to 3 percent of U.S. appliance exports were shipped to each of the following countries: West Germany, United Kingdom, Japan, France, Kuwait, and Saudi Arabia.

F.o.b. factory prices of U.S. appliances destined for export increased about 17 percent during the period 1967–72, compared with about 8 percent for domestic wholesale prices.

Appliance Noise Is Studied

With national concern focused on an improved environment, efforts are being made to lower noise levels. More labor-saving appliances in homes has resulted in increased noise levels.

The U.S. Environmental Protection Agency (EPA) recently published a report on the level of noise produced by several types of machinery, including household appliances. Appliances were tested at a distance to 3 feet, with the noise level reported in decibels (db.) The noisiest appliances tested were disposers, with an average noise level of 78 db.; the quietest appliances were freezers, at 41 db. Results for several other appliances were: blenders, 75 db.; vacuum cleaners, 72 db.; dishwashers, 65 db.; electric shavers, 60 db.; fans 57 db.; and refrigerators, 42 db.

Environmental noise control legislation to empower EPA to set standards limiting noise generating characteristics of appliances and other machinery and to require sound-labeling of both U.S.- and foreign-made products was considered by Congress in 1972.

Recycling Appliances

Discarded household appliances create a waste handling and disposal problem. In the past, disposal has usually consisted of burial in municipal landfills. Abandoned mines have been suggested to replace landfills.

Recently, a major appliance manufacturer announced plans to examine the feasibility of recycling scrapped appliances. With the assistance of a large steel firm, a test program is studying the separation-and-compaction process. The process requires removal of all extraneous materials from the appliance, which is then compacted and shipped to the steel mill for test melts.

Long Range Prospects Good

Shipments of household appliances are expected to rise steadily through the seventies and reach $10.2 billion in 1980, reflecting an average annual growth rate of about 6.3 percent from 1972. Demand for appliances is expected to continue high with projected large increases in consumer spending for durables and new housing.

Favorably influencing increased appliance sales in the next several years is the expected large increase in the population group 25–34 years of age, the heavy appliance spenders. Between 1972 and 1980 this younger population group is expected to increase about 33 percent, compared with an 11 percent increase in the total population.—*Office of Business Research and Analysis.*

HOUSEHOLD FURNITURE

Manufacturers' product shipments of household furniture and bedding are expected to total about $7.5 billion in 1973, an increase of more than 5 percent over 1972. Shipments in 1972, estimated at $7.1 billion, showed an unusually large increase of more than 11 percent over 1971.

The sharp expansion in factory sales of household furniture during the 1971–72 period is largely the effect of the near-record levels of new housing starts, including the production of mobile homes as well as on-site residential construction. A second reason is the much heavier consumer spending on home furnishings that began in the latter part of 1971 and is expected to continue through 1973.

Production Advances Sharply

Output of the household furniture industry according to Federal Reserve Board's index of industrial production was 103.8 (1967 = 100) in 1970. The index was 110.3 in 1971 and had reached 126.8, seasonally adjusted, by July 1972. These advances are much greater than for all manufacturing, which was 113.0 percent of 1967 in July 1972.

Vertical Furniture Sales Rise

With the trend toward construction of smaller houses as well as apartment living, use of floor space for home furnishings often requires careful planning. Many consumers are relying more and

Household Furniture: Trends and Projections 1967–73

[In millions of dollars, except as noted]

	1967	1969	1970	1971 [p]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments, total	5, 107	6, 047	5, 932	6, 628	7, 353	11	7, 747	5
Wood	2, 439	2, 868	2, 641	3, 025	3, 448	14	3, 655	6
Upholstered	1, 242	1, 555	1, 675	1, 819	1, 983	9	2, 082	5
Metal	618	697	714	764	810	6	842	4
Bedding	743	869	848	969	1, 056	9	1, 109	5
Household furniture (not elsewhere classified)	65	58	54	51	56	9	59	5
Total employment (thousands)	297. 8	314. 5	299. 7	308. 8	334. 4	8. 3		
Production workers (thousands)	257 3	271. 3	255. 8	263. 1	285. 5	8. 5		
Value added by manufacture	2, 650	3, 180	3, 093	3, 441	NA			
Value added per production worker man-hour	$5. 16	$5. 88	$6. 14	$6. 61	NA			
Product: [3]								
Value of shipments, total	4, 893	5, 791	5, 740	6, 418	7, 121	11	7, 504	5
Wood	2, 300	2, 677	2, 551	2, 921	3, 330	14	3, 530	6
Upholstered	1, 216	1, 506	1, 667	1, 810	1, 973	9	2, 072	5
Metal	588	690	651	697	739	6	769	4
Bedding	710	832	792	905	986	9	1, 035	5
Household furniture, (not elsewhere classified)	79	86	79	85	93	9	98	5
Value of exports	22. 2	25. 4	23	23. 3	26	12		
Value of imports	61. 6	113. 6	140. 3	147. 1	180	22		
Wholesale price index (1967=100)	100	108. 9	111. 6	114. 8	117. 4	2. 3		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the household furniture industries (SIC 2511, 2512, 2514, 2515, 2519).
[3] Includes value of shipments of household furniture made by all industries.
[p] Preliminary.

NOTE.—NA = Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

more on vertical furniture such as armoires and étagères to help solve space and storage problems.

Retailers are reporting sales of armoires, for example, running 25 to 50 precent above a few years ago, and prices ranging from about $250 to several thousand dollars. The main advantage of an armoire is that it offers a large amount of storage space while occupying a minimum of floor space. One unusual interior design is an armoire fitted out as a complete bar, with space for bottles, glasses, ice bucket and other items.

Another innovation in vertical furniture is a tall curio cabinet with a large built-in clock at the top, similar to a grandfather's clock.

K–D Furniture Catches On

Packaged knockdown (K–D) furniture is one answer to the delivery problems of the furniture industry, in addition to other advantages, including lower transportation costs, and less incidence of damage in transport, less space required in warehouses and stock rooms, and savings for the consumer. These savings undoubtedly account for its growing popularity.

The earlier unattractive do-it-yourself furniture has given way to a new wave of well-designed tables, chairs, cabinets and other items. Parts are precisely cut to form strong solid joints. Quality control inspections are often more strict for K–D furniture than for pre-assembled units. Styles include traditional and period furniture as well as modern. Some of the materials used are wood, plastic, and chrome plated steel. Although knockdown furniture requires special design and very detailed instructions, many manufacturers feel the advantages outweigh the disadvantages.

Imports Show Further Gains

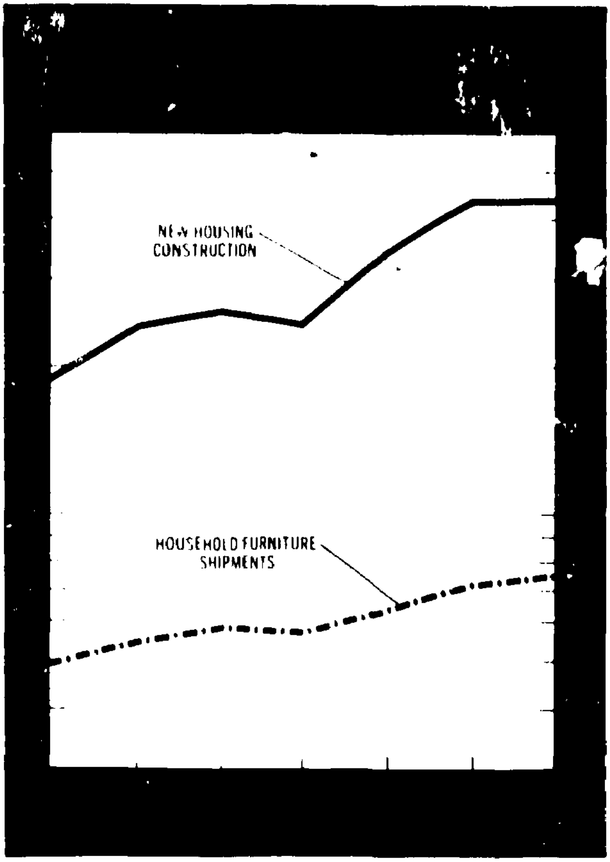
While imports of household furniture continued their rapid growth in 1972 and are estimated to have reached $180 million, 22 percent over 1971, they still represent only about 2.5 percent of domestic consumption. Principal sources of U.S. imports of household furniture, and the 1971 share for each, are: Canada, 18.6 percent; Japan, 12.3 percent; Yugoslavia, 10.7 percent; Italy, 9.0 percent; Taiwan, 7.6 percent; and Denmark, 7.5 percent.

Exports of household furniture are much below imports and have shown little change in recent years except for the increase of 12 percent in 1972 when exports reached an estimated $26 million. Canada, The Bahamas and Mexico have traditionally been our principal markets, accounting for about three-fourths of our total furniture exports. During the past 2 years, exports to Canada have increased substantially, while exports to the Bahamas and Mexico have dropped.

Labor Shortage Reported

Many furniture manufacturers, especially in southern states, have been faced with serious labor shortages during the past year.

Demand for skilled or trainable furniture workers has been steadily increasing for several years. To ease the shortage of workers, training programs in furniture technology were instituted in high schools, sponsored by the National Alliance of Businessmen and the Department of Labor, and supported by furniture makers. However, sufficient numbers of students have not been participating in these programs to meet the needs of the industry. Furniture is a labor-intensive industry and some manufacturers are considering relocating in other geographic areas to meet future labor needs.



1971 Profits Improve

Profits of wood and upholstered household furniture manufacturers in 1971 increased appreciably over 1970, according to Seidman and Seidman, Grand Rapids, Michigan accounting firm. After-tax profits in 1971 were 4.31 percent of sales compared with 3.18 percent in 1970. In 1969, profits were 4.55 percent and in 1968, 4.80 percent. A breakdown of the two major segments of the industry shows 1971 profits in wood furniture as 4.94 percent of sales and in upholstered furniture, 3.94 percent.

Profit margins for most size categories of household furniture manufacturers were higher in 1971, with profits of larger firms generally better. Those with sales over $10 mill on had 5.12 percent profit on sales after taxes; smaller size firms showed progressively smaller rates of profit, while firms averaging sales under $500,000 showed losses.

The industry's net return on capital investment in 1971 was 9.11 percent compared with 7.21 percent the previous year.

1972 Profile
Household Furniture

SIC codes	2511, 2512, 2514, 2515, 2519
Value of industry shipments (millions).	$7,353
Number of establishments	6,306
Employment (thousands)	334.4
Exports as a percent of product shipments.	0.4
Import as a percent of apparent consumption.	2.5
Average annual growth rates 1967–72 (percent):	
Value of shipments (current dollars).	7.8
Value of exports (current dollars).	3.2
Value of imports (current dollars).	23.9
Employment	2.4
Major producing areas	Middle Atlantic, South, East North-Central, and Pacific States.

Mattress Flammability Standard Issued

In June 1972 the U.S. Department of Commerce published its final standard for mattress flammability. The standard requires that all mattresses produced or sold in the U.S. after June 7, 1973 protect the consumer who smokes in bed against the hazard of fires. To provide this assurance, mattress makers must test their products before production of a particular "model" begins, and then test samples periodically to insure that fire retardance is maintained.

The standard spells out the procedure to be followed in testing mattresses. Lighted cigarettes are to be placed at several points on the mattress. Should the charred area extend more than two inches in any direction from the cigarettes, the mattress fails the test and cannot be marketed. The Federal Trade Commission has been designated as the agency responsible for overseeing compliance by manufacturers with the provisions of the standard.

The National Association of Bedding Manufacturers has been sponsoring a series of seminars in various cities to assist bedding manufacturers in complying with the new flammability standard.

Pollution Problems Minimal

While pollution problems within the furniture industry are not as complex as in many other industries, smoke resulting from burning of wood waste, frequently used as fuel for kiln drying, creates pollution.

One method of easing the smoke problem is double burning, i.e. passing the smoke through a second flame—the same principle as dissipating the smoke from a burning cigarette by allowing the smoke to rise through a lighted match. When this system is used in a furniture plant with modernized equipment, the smoke from the burning wood rises into the flame of the burner. It then ignites, burns, provides heat and passes up the stack as carbon dioxide and steam.

The woodworking industry is the only major industry in the United States that does not recycle or upgrade its waste to reduce the costs of operation. Enforcement of air pollution standards has forced some furniture manufacturers to seek markets and uses for waste other than burning it with outmoded equipment. The National Association of Furniture Manufacturers for a number of years has been exploring potential markets for wood waste such as paper products, particle board, charcoal, and other uses.

Long Range Outlook Favorable

Sustained increases in consumer expenditures for durable products anticipated for the remainder of this decade as well as prospective increases in new households affect the long range outlook for the furniture industry quite favorably.

By 1980, manufacturers' shipments of household furniture are expected to reach $11.9 billion, representing an annual average increase of 6.6 percent for the 8-year period, 1972–80. If the trend since 1967 continues, the upholstered furniture segment of the industry will show the greatest rate of growth.—*Office of Business Research and Analysis.*

CHAPTER 12

Personal Consumer Durables

Rising disposable personal income and discretionary purchasing power should lead in 1973 to increased shipments of personal durable good including jewelry, sporting and athletic goods, toys, games, dolls, and children's vehicles. Sales of these industries are expected to reach nearly $4.8 billion, 6 percent over 1972 estimated shipments of $4.5 billion.

Precious jewelry sales for 1973 should reach $1.1 billion, up 9 percent from 1972, while shipments of costume jewelry are expected to total $545 million, an 8 percent increase over 1972. Leading the genuine jewelry field will be diamonds and pearls. From the Edwardian splendor of the last two seasons, clothes stylists are concentrating on simple, more conservative creations with which pearl necklaces and diamond chokers are most appropriate. Retail promotion will be aimed at those in the over $10,000 salary bracket for anniversary and Christmas gifts. While longer hemlines and conservative attire have stimulated precious jewelry sales, they have not diminished those in costume jewelry. Sales of imitation stones, particularly diamonds, have been vigorous.

Industry shipments of sporting and athletic goods should exceed $1.2 billion in 1973, 5 percent over the $1.15 billion in 1972, when manufacturers of bowling, tennis, and billiards equipment had an outstanding year. The bowling rage in Japan, construction of year-round enclosed tennis courts, and increased purchases of billiard tables by recreation centers for golden age and youth groups and for home use contributed significantly to the higher sales. Golf and skiing equipment makers have not maintained earlier phenomenal growth because of increasingly large investments needed. Heavy promotion and design changes in bows have spurred archery sales. Lighter weight bows have enlarged the market by making the sport more available to women.

Progress has been made in the last few years, toward establishment of product safety standards, particularly in football helmets, ski bindings, boots, straps, and other accessories. Task forces

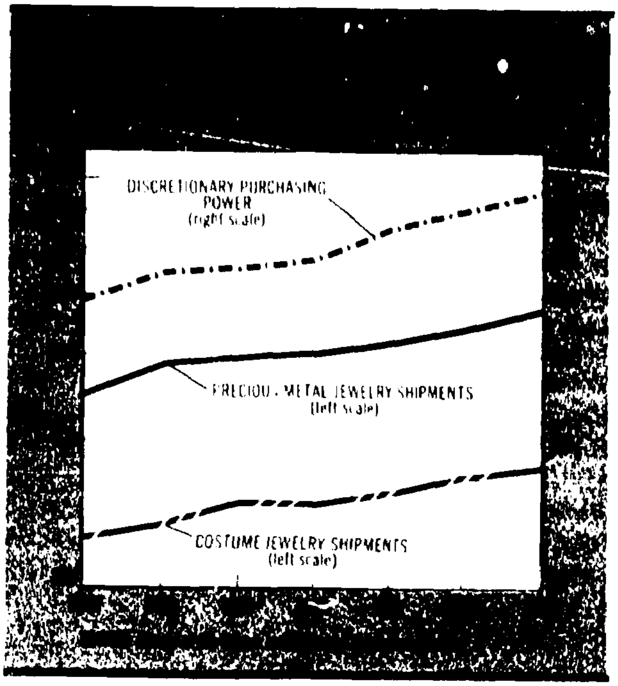
Personal Consumer Durables: Projections 1972–80 [1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
	Total	$4,510	7	$4,775	6	$6,905	5.[illegible]
3911, 3961	Jewelry	1,535	8	1,665	9	2,510	6.0
3949	Sporting goods	1,150	7	1,210	5	1,700	5.0
3941, 3942, 3943	Toys, games, dolls, and children's vehicles	1,825	6	1,900	4	2,695	5.0

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.



of the medical profession, Government, testing societies, and industry are working toward establishment of minimum standards for all sports equipment and facilities.

Industry shipments of toys, games, dolls, and children's vehicles will gain 4 percent in 1973 to $1.9 billion, a smaller increase than in 1972, principally because of the rise in imports. Chess and checker set sales continue to flourish from the interest generated by the Fischer-Spassky international matches. Preschool and educational toys, yo-yos, and model trains are being promoted heavily.

Product and safety standards for toys now being reviewed by the National Bureau of Standards should go into effect by the middle of 1973. Foreign manufacturers are also showing interest in adopting similar standards. Sales of toys have been slowed by consumers' reluctance to accept products potentially hazardous.

Exports and imports include U.S. raw materials and components that are shipped abroad for further processing and assembly and then returned to this country. Accordingly, estimated net imports of toys in 1972 totaled $274 million, a gain of 22 percent over 1971. Principal suppliers were Hong Kong and Japan. Net exports amounted to $37.5 million, 23 percent over 1971.

Shipments of personal durables are expected to rise an average of 5.5 percent a year from 1972 to reach $6.9 billion in 1980.—*Louis A. Traxel, Office of Business Research and Analysis.*

JEWELRY

The strong upward trend in shipments of jewelry which developed in 1972 is expected to continue in 1973. Product shipments of precious and costume jewelry are expected to rise to $1.55 billion, a 10-percent increase over 1972, estimated at $1.41 billion.

Jewelry Demand Elastic

Demand for jewelry—a luxury—is elastic, and sensitive to changes or forecasts of changes in economic activity. The jewelry industry is one of the first to experience a dropoff in sales during a business slowdown and one of the last to recover in the subsequent upturn. Sales of high-priced jewelry in particular are considered to be responsive to the ups and downs of the stock market.

Jewelry shipments tend to increase as disposable personal income and discretionary purchasing power increase. In 1973 both of these indicators are expected to show sizable gains. Leading the advances in precious jewelry for 1973 will be rings and ring mountings—expected to comprise 40 percent of precious jewelry product shipments. More specifically, diamond rings and other diamond

1972 Profile
Jewelry

	Precious metal	Costume
SIC Codes	3911	3961
Value of industry shipments (millions).	$1,030	$506
Number of establishments	1,490	760
Total employment (thousands).	36.2	20.7
Exports as a percent of product shipments.	3.2	0.9
Imports as a percent of apparent consumption.	5.1	5.6
Compound annual average rate of growth 1967–72 (percent):		
Value of product shipments (current dollars).	6.4	10.0
Value of exports (current dollars).	-7.2	-7.6
Value of imports (current dollars).	28	9.2
Employment	3.9	-1.6
Major producing areas	(1)	(1)

[1] New England and Middle Atlantic States.

Precious Metal Jewelry: Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [p]	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Industry: [2]								
Value of shipments	742	892	904	954	1,030	8	1,120	9
Total employment (thousands)	29.9	32.0	34.1	34.1	36.2	6		
Production workers (thousands)	22.8	23.2	25.3	24.6				
Value added	353	430	432	478	NA			
Value added per production worker man-hour	$8.00	$9.85	$9.14	$10.13	NA			
Product: [3]								
Value of shipments	633	753	761	[1] 800	865	8	945	9
Value of imports	13	27.1	26	33.1	45	36	54	20
Value of exports	39.7	40.2	41.8	31.4	28	−11	26	−7

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the precious metal jewelry industry (SIC 3911).
[3] Includes value of shipments of precious metal jewelry made by all industries.
[p] Preliminary.
NOTE.—NA=not available.

jewelry will be among the sales leaders. Extensive efforts to promote sales of diamond jewelry are being directed toward families with incomes of $10,000 or more. According to an industry survey, diamond jewelry, exclusive of engagement rings, is now a more frequent gift than in the past.

Clothing Styles Influence Design

Jewelry designs tend to be dictated by clothing styles. The current trend to more conservative clothing creates a demand for new fashions in jewelry. For example, pearl necklaces are being shown to complement the longer hemlines and demand for them should consequently increase sharply. Other pearl jewelry is expected to score impressive gains during 1973 along with diamond jewelry.

The more conservative clothing styles will have only a minor effect on costume jewelry styles. Silver jewelry will exemplify the conservative influence in producing the dressed-up look. Usually, however, costume jewelry will portray the relaxed, casual look familiar in the colorful and exaggerated designs of medallions, pins, bracelets, and brooches which are so much in evidence today. The wearing of multiple rings is another manifestation of successful costume jewelry promotion. High demand for imitation diamonds and for other imitation and synthetic stone jewelry is expected to continue during the coming year. To offset the decline in cuff link sales caused by the increased popularity of button cuffs in men's shirts, the jewelry industry is promoting cuff button covers. Large tie tacks set with semiprecious stones are also being widely promoted.

Overall Employment Up

Reflecting renewed vigor in the precious metal jewelry industry, employment increased 6 percent in 1972. Costume jewelry industry employment dipped 1 percent despite higher shipment levels, which may be partly attributable to more efficient utilization of labor and partly to increased costume jewelry production by other industries.

Trade Deficit Worsens

In the last 2 years, a complete turnabout has occurred in the trade balance for precious metal jewelry. A trade surplus in 1970 of almost $16 million had turned into a deficit of about the same amount by the end of 1972. From 1967 to 1971, imports increased an average of 26 percent a year and the rate of increase was probably higher in 1972. Expectations for 1973 are for imports to increase to $54 million and exports to decline to $26 million, resulting in an unfavorable trade balance of $28 million.

Costume jewelry imports have been gradually increasing over the last 5 years, while exports have been declining. The trade balance for costume jewelry is estimated at a negative $27 million for 1972.

Gold Price Soars

The assurance of an adequate supply of gold at reasonable prices has been a continuing problem for the jewelry industry since 1968. Because of the

Costume Jewelry: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [p]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	377	445	447	473	505	7	545	8
Total employment (thousands)	22.4	24.7	23.1	21.0	20.7	−1		
Production workers (thousands)	19.4	21.1	19.0	17.0				
Value added	221	258	268	289	NA			
Value added per production worker man-hour	$6.01	$6.34	$7.28	$9.10	NA			
Product: [3]								
Value of shipments	338	422	450	[1] 495	545	10	605	11
Value of imports	20.6	21.8	29.7	28.5	32	12	35	9
Value of exports	7.2	6.7	6.5	5.7	5	−12	4.5	−10

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the costume jewelry industry (SIC 3961).
[3] Includes value of shipments of costume jewelry made by all industries.
[p] Preliminary.
NOTE.— NA = not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

run on U.S. Treasury gold in 1968, its use was limited to international payments and Treasury sales were no longer made to industry or speculators. The jewelry industry thereafter obtained gold from private sources and the two-tier price system came into being: $35 per ounce for the international payments and a floating price above $35 for private gold transactions. In 1971, after the United States suspended redemption of foreign held dollars for gold, the tier-two floating price level began to rise.

Later, when the dollar was devalued and the tier-one price of gold became $38 per ounce, the tier-two price continued to rise. Rumors of further dollar devaluation during 1972 caused fluctuation in gold prices of more than 50 percent.

The limited supply of gold from private sources also figures prominently in recent price increases of tier-two gold. South Africa—producer of about 70 percent of the world's supply of primary gold—is obliged by international monetary agreement to sell enough gold to cover her balance-of-payments deficit. However, because her recent balance-of-payments position has been strong, she has sold less gold than formerly and gold prices have skyrocketed as a result.

In recent years, U.S. consumption of gold has averaged 6 to 7 million ounces per year, with the jewelry industry taking over 50 percent. Most of the jewelry industry's share is imported, since annual U.S. production is only 1½ million ounces.

An industry trade association has requested the Treasury to exercise its authority to resume the sale of gold to licensed domestic industrial users, to declare 8 million ounces of gold surplus, and allot this surplus to gold licensees under GSA disposal regulations. If adopted, this proposal would insure an adequate supply of gold for the jewelry industry and other industrial users for a year and, at the same time, stabilize its price which now can vary greatly from day to day.

Jewelry Glitters in 1980

By 1980, industry shipments are expected to grow to $2.5 billion, with both the precious metal and costume jewelry industries having annual growth rates from 1972 of 6 percent.—*John S. Hopper, Office of Business Research and Analysis.*

TOYS, GAMES, DOLLS, AND CHILDREN'S VEHICLES

Manufacturers' shipments of toys, games, dolls, and children's vehicles are expected to approach $1.78 billion in 1973, more than 4 percent above estimated 1972 shipments of $1.7 billion.

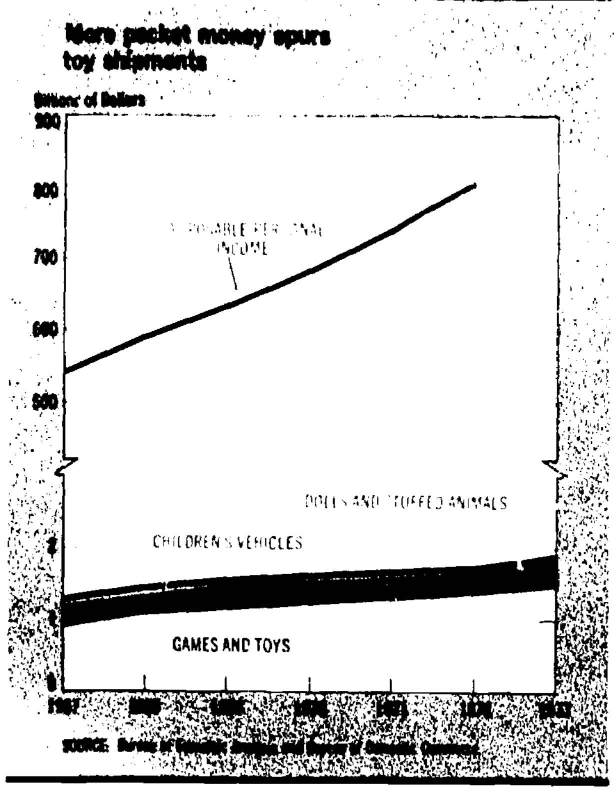
Product shipments of games and toys are projected at $1.39 billion, dolls and stuffed toy animals at $252 million, and children's wheeled vehicles (except bicycles) at $137 million.

Bright spots on the 1972 scene included the spurt in sales of chess sets at all price levels, occasioned by public interest in the Fischer-Spassky championship match. Checkers and other board games were also stimulated by the chess phenomenon. Yo-yos and spinning tops regained a measure of popularity, while sales of stuffed toy animals, puppets, and boys' dolls also showed gains. The pair of pandas presented to the United States by the Peoples' Republic of China inspired a proliferation of pandas in the stuffed toy market.

In most areas, preschool and educational toys constituted the largest segment of retail purchases. Hobbies and crafts also accounted for a large share of retail sales. Model trains and accessories, in particular, increased in popularity.

Retail sales in 1972 were inhibited in some areas by inclement weather, by strikes and unemployment that reduced consumer buying, and by price conscious purchasers seeking lower priced toys rather than big ticket items. The consequent reluctance of many retailers to stock more than minimal inventories made it difficult for manufacturers to schedule production runs for current orders and anticipate future demand for particular products.

Consumerism and growing concern about product safety also were unsettling influences on the market.



1972 Profile
Games, Toys, Dolls, Stuffed Animals, and Children's Vehicles

	Games and Toys	Dolls and stuffed animals	Children's vehicles
SIC Codes	3941	3942	3943
Value of product shipments (millions)	$1,328	$241	$131
Number of establishments	684	340	46
Exports as a percent of product shipments	3.2	2.5	1.0
Imports as a percent of apparent consumption	15.0	30.0	3.0
Compound annual rate of growth 1967-72 (percent):			
Value of product shipments (current dollars)	6.9	2.0	9.9
Value of exports (current dollars)	14.2	−5.7	14.2
Value of imports (current dollars)	21.6	16.2	5.9
Major producing areas	(1)	(2)	(3)

[1] Middle Atlantic and East North-Central States.
[2] Northeast States.
[3] Northeast and North-Central States.

Standard on Product Safety Imminent

A formal product standard for toy safety has been prepared under the sponsorship of the Toy Manufacturers of America and is expected to be issued in 1973 following its review, possible revision, and approval by the National Bureau of Standards (NBS). The standard was drafted after extensive consultation and cooperation with NBS, the Food and Drug Administration, the American Academy of Pediatrics, engineers and executives of toy manufacturers, and leading retailers with long experience in quality control and product testing.

In addition to the foregoing, a wide range of toy firms and consumer groups will be asked to comment on the proposed standard, which consists of requirements for materials, energy sources, mechanical properties, testing, labeling, graphics, and instructional literature. Sharp edges, points, small parts, projectiles, hinges, and chains are some of the potential causes of accidents specifically covered.

In the interest of greater product safety in world markets, European toy associations will probably adopt similar standards.

Toys, Games, Dolls, and Children's Vehicles: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	1,356	1,651	1,775	1,719 [P]	1,825	6	1,900	4
Total employment (thousands)	70.7	76.1	73.9	66.0 [P]	66.8	1		
Production workers (thousands)	59.9	64.2	60.2	52.9 [P]	53.1			
Value added	736	916	1,004	961 [P]	NA			
Product: [3]								
Value of shipments, total	1,266	1,547	1,615	1,620 [1]	1,700	5	1,775	4
Games and toys	949	1,175	1,260	1,263 [1]	1,328	5	1,386	4
Dolls and stuffed animals	217	245	229	231 [1]	241	4	252	5
Children's vehicles except bicycles	100	127	126	126 [1]	131	4	137	5
Value of imports	115	193	230	233	285	22	330	16
Value of exports	26	28	31	41	48	17	55	15
Wholesale price indexes (1967=100)	100.0	105.1	109.3	112.6	115.7	3		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the toys, games, dolls, and children's vehicles industry (SIC-3941-42-43).
[3] Includes value of shipments of toys, games, dolls, and children's vehicles made by all industries.

[P] Preliminary.
NOTE.—NA = Not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Legislation similar to the Federal Child Protection and Toy Safety Act of 1969 was introduced or enacted in several states, including Hawaii and Illinois. A law passed by the New York legislature was vetoed by the Governor because it conflicted with Federal laws and regulations. Proposals were made in some states to ban manufacture or sale of toys depicting torture or resembling bombs or grenades.

The Food and Drug Administration (FDA) is continuing the listing and recall of hazardous toys, and its National Electronic Injury Surveillance System, which became fully operational in July 1972, is now providing current statistics on the incidence of accidents related to toys and other products.

Industry Involved in Diverse Consumer Issues

The toy industry and the Association of National Advertisers have formulated guidelines for television and other advertising involving all categories of products for children, including toys. The purpose of guidelines is to eliminate advertising practices that might be construed as misleading or distasteful or as representing undue pressure on impressionable young children.

The industry has also participated in seminars with educators, the news media, and consumers on the direction of toy research and development, types of toys best suited for infants and young children, and labeling of toys by age categories.

Foreign Assembly of U.S. Products Boosts Imports

Imports rebounded in 1972, partly because the dock strike was resolved and also because U.S. firms were shipping domestic made materials to foreign countries, chiefly Mexico, for processing, assembly, and reimportation into the United States. Estimated 1972 imports of $285 million

U.S. Imports of Toys, Games, Dolls, Children's Vehicles: 1971 and Estimated 1972 Increase

[Foreign value in $-U.S. millions]

Country of origin	1971 imports (foreign value)	Estimated 1972 percent increase	Percent of total	
			1971	1972
Hong Kong	84.3	20	36	35
Japan	68.9		29.5	24
Mexico	23.0	19	10	10
Taiwan	15.3	44	7	8
West Germany	8.5	9	3.5	3
United Kingdom	7.5	14	3	3
Italy	7.5	9	3	3
Canada	7.0	25	3	3
Other countries	11.3	170	5	11
Total	233.3	22	100	100

Source: Bureau of Census and Bureau of Domestic Commerce.

were 22 percent over 1971. Dolls and stuffed toy animals declined slightly to $76 million, children's wheeled vehicles rose slightly to $3.2 million, and other toys and games jumped 36 percent to $206 million. Eight countries accounted for 89 percent of 1972 imports, seven of which registered gains over 1971.

Roughly 13 percent of U.S. imports consisted of the reimportation of U.S. materials processed and assembled abroad under section 807.00 of the Tariff Schedules of the United States, which assesses duty only on value added by the labor performed abroad. These accounted for approximately 32 percent of the total value of doll imports; 17 percent of stuffed toy animals; 33 percent of toys with electric motors; over 10 percent of model planes, trains, boats, etc., and construction kits; and 20 percent of toys with spring mechanisms. In 1971, section 807.00 imports amounted to almost $31 million and came primarily from Mexico.

Export Gain Largely Illusory

Exports in 1972 were estimated at $48 million, nearly 17 percent over 1971. About 95 percent of the dolls and stuffed toys and 18 percent of other toy exports were materials and components destined for processing or assembly and reimportation into the United States. In 1971, exports amounted to $40.7 million while more than $10.3 million of imports were U.S. components previously sent overseas. Consequently, net exports into world markets probably represented only $30.4 million. In 1972, net exports were estimated at $37.5 million, a gain of about 23 percent despite increasing overseas processing and assembly by U.S. firms.

Exports of children's wheeled vehicles in 1972 were estimated at $3.2 million, 14 percent over $2.8 millon in 1971; dolls and stuffed toy animals at $2.6 million, 4 percent over $2.5 million in 1971; and other toys and games at $42.2 million, 17 percent over $35.9 million in 1971.

Principal export markets in 1972 were again Canada, Mexico, Japan, the United Kingdom, Venezuela, West Germany, and Hong Kong. These seven countries accounted for approximately 82 percent of total exports.

Growth To Pace Rise of Disposable Income

Improved economic conditions should serve as an impetus to continued industry growth in the seventies. Increased emphasis on leisure time activities for teens and adults should also spur growth, particularly for hobbies and craft kits. Product shipments of toys are estimated at $2.4 billion in 1980. The slower average annual growth of 4.5 percent reflects increases in processing and assembly performed for U.S. firms in foreign countries. Overall growth in imports is expected to continue, and exports should also expand in response to special promotional efforts by industry groups to stimulate sales in foreign markets.—*Mary A. Chorba, Office of Business Research and Analysis.*

SPORTING AND ATHLETIC GOODS INDUSTRY

Manufacturers' shipments of sporting and athletic goods in 1973 are expected to rise to $1.19 billion, 4 percent over estimated 1972 shipments of $1.14 billion.

Product shipments of fishing tackle in 1973 are projected at $153 million, golf equipment at $244 million, and other sporting and athletic goods (excluding shoes, apparel, and textile items) at $793 million. All rates of increase are approximately 4 percent.

Export Sales Boost Output

Some reduction in institutional purchases, shifts of consumer attention from one sport to another, and adverse weather conditions inhibited 1972 growth in some sectors of the sporting goods industry. However, booming exports, particularly to Japan, helped to offset negative influences on the market.

Some of the most notable gains in the industry were registered in bowling, which has become increasingly popular with the youth of the Nation. Bowling is also popular in Japan, and a large increase in equipment exports to that country was also responsible for U.S. gains in production. However, installation of bowling alleys in Japan has probably reached its peak and construction of manufacturing facilities in Japan for automatic pinspotting equipment, bowling balls, and pins will undoubtedly reduce the market for U.S. made bowling products in the Far East in 1973.

While bowling manufacturers were enjoying a banner year in 1972, sales of billiard tables and supplies also moved upward. Increased purchases for home use, clubs, and community recreation

Sporting and Athletic Goods: Trends and Projections, 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971	1972[1]	Percent increase 1971-2	1973[1]	Percent increase 1972-73
INDUSTRY[2]								
Value of shipments	853.3	1,008.0	949.5	P 1,072.1	1,150.0	7	1,210	5
Total employment (thousands)	47.5	52.6	50.1	50.9	54.2	6		
Production workers (thousands)	38.5	42.8	40.2	41.5	44.5	7		
Value added	469.5	536.7	507.9	P 612.4	NA	NA		
PRODUCT[3]								
Value of shipments, total	836.4	1,018.1	962.9	[1] 1,067.0	1,145.0	7	1,190	4
Fishing tackle and equipment	111.1	131.7	141.7	[1] 140.0	147.0	5	153	4
Golf equipment	158.6	228.2	198.2	[1] 220.0	235.0	7	244	4
Other sporting and athletic goods	470.3	590.9	572.3	[1] 707.0 (combined)	763.0 (combined)	8 (combined)	793 (combined)	4 (combined)
Sporting and athletic goods n.s.k	96.4	67.3	50.7					
Foreign value of imports, total	70.5	122.9	162.9	180.0	225.0	25	259	15
Fishing tackle and equipment	22.2	31.1	33.9	37.8	51.7	37	60	15
Golf equipment	4.0	6.6	7.8	9.5	12.0	27	13	8
Other sporting and athletic goods	44.3	85.2	121.2	132.7	161.3	21	186	16
Value of exports, total	37.1	50.7	66.4	117.6	225.0	91	225	
Fishing tackle and equipment	4.4	5.8	5.9	5.7	6.3	11	7	10
Golf equipment	32.7 (combined)	8.5	14.6	16.4	22.2	35	28	26
Other sporting and athletic goods		36.4	45.9	95.5	196.5	106	190	-3
Wholesale price index	100.0	104.6	107.9	110.6	111.4	1		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the sporting and athletic goods industry (SIC-3949).
[3] Includes value of shipments of sporting and athletic goods made by all industries.
P Preliminary.
n.s.k. Not specified by kind.
NOTE.—NA = Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, and Bureau of Domestic Commerce.

centers for golden age and youth groups played a role in raising shipments.

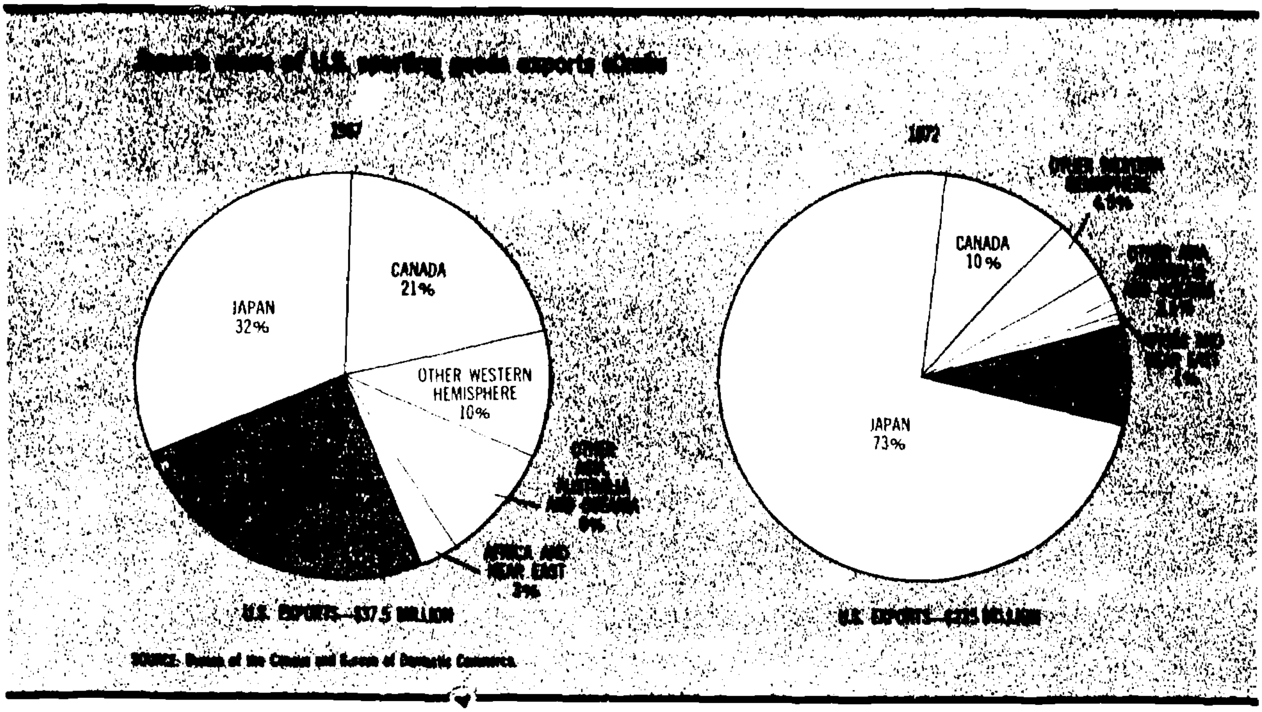
Tennis also continued its upward swing, benefiting from increased construction of indoor tennis courts that makes it a year-round sport. Such youthful stars as Chris Evert and Evonne Goolagong have also generated more interest on the part of youngsters. Higher sales of table tennis equipment also reflect steady growth of its popularity.

Increased participation in archery has been stimulated by its inclusion in the 1972 Olympics and the two gold medals won by the Americans. Ice hockey and field and street hockey are rapidly gaining favor as youth activities. Waterskiing is another sport whose popularity is increasing.

After many years of phenomenal growth, golf has been less successful in attracting and holding new participants in the seventies, and growth of equipment sales has been curtailed. The large investment of time and money in learning and playing the game has probably taken its toll, and overcrowded courses also have served as a deterrent to growth. Design and greater availability of shorter courses may create renewed interest in the sport.

Problems of the ski industry have revolved primarily around the effect of unfavorable weather conditions in the early months of 1972 in many areas of the country. However, rising costs at resorts and other facilities, together with equipment and travel costs, have somewhat inhibited growth of the sport. Encouraging aspects for the future are the introduction of shorter skis, originally used as a learning technique but now influencing equipment purchases by experienced skiers, and growing enthusiasm for cross country skiing. Several U.S. manufacturers now make cross country and touring skis, formerly available only from foreign suppliers. Reduction of inventories at both the manufacturing and retail levels should also clear the way for increased sales of new equipment.

Fishing has continued to grow as a sport, but imported fishing tackle and equipment that can be made at less cost in foreign countries is gaining an increasing share of the U.S. market.



Color and Variety Add Zip to Products

Sporting goods of many types have recently appeared in a wide range of colors. Tennis balls, basketballs, bowling balls and bags, baseball mitts and gloves, bats, skis, fishing reels, and other types of auxilliary equipment and accessories are produced in a variety of colors. Colors are an aid to improved visibility during the course of a game or activity, and have an esthetic appeal to purchasers. The taste appeal of mint flavoring has also been introduced to some types of protective mouthguards used in contact sports.

A range of weights, lengths, and materials is available in cross country and touring skis as well as alpine skis. Magnesium bats have been introduced for Little League and youth baseball and softball. Although the bats will not replace wood bats for the professional or sophisticated ballplayer, they offer an additional choice to the aluminum bats now being marketed for youth activity.

Specification and design changes in archery bows, particularly in respect to weight, have played a prominent role in meeting the needs of women archers. Some arrows now feature convertible point adapters which make it possible to unscrew the arrow points for replacement by a new point or for interchangeability from a field point to a blunt or hunting head.

Other new products include a solid core baseball, a diving board featuring a polyurethane foam core wrapped and bonded with fiberglass, and a head weight device to assist in the strengthening of neck and shoulder muscles to avoid injury. An innovation in body protective equipment is an inflatable insert for football shoulder pads.

Industry Making Headway on Product Safety

The National Operating Committee on Standards for Athletic Equipment, funded by various industry and educational associations, released the first part of a study on football helmets made by

1972 Profile

Sporting and Athletic Goods

SIC Code	3949
Value of product shipments (millions)	$1, 145
Number of establishments	1, 366
Total employment (thousands)	54. 2
Exports as a percent of product shipments	19. 7
Imports as a percent of apparent consumption	25. 0
Compound annual average rate of growth 1967–72 (percent):	
Value of products shipments (current dollars)	6. 4
Value of exports (current dollars)	43. 4
Value of imports (current dollars)	26. 1
Employment	2. 7
Major producing areas	East North Central, Middle Atlantic, New England, and Pacific areas

U.S. Exports of Sporting and Athletic Goods, 1971-72

[Value in millions of dollars]

Country of destination	1971 Fishing tackle	1971 Golf equipment	1971 Other sporting and athletic goods	1971 Total	Estimated 1972 total	Percent change
Total U.S. exports	5.7	16.4	95.5	117.6	225.0	91
Japan	0.6	9.7	71.1	81.4	165.0	103
Canada	1.9	3.0	8.5	13.4	21.0	57
United Kingdom	0.5	0.8	2.3	3.6	4.5	25
West Germany	0.1	0.2	1.5	1.8	4.0	122
Haiti	(1)	(1)	[2] 2.0	[2] 2.0	[2] 3.7	85
Venezuela	0.1	0.1	1.0	1.2	1.7	41
Mexico	0.1	0.2	0.9	1.2	1.6	33
Taiwan	0.1	(1)	0.3	0.4	1.3	225
France	0.1	0.1	0.6	0.8	1.0	25
Sweden	0.1	0.1	0.5	0.7	0.9	28
Australia	0.2	0.2	0.4	0.8	0.9	12
Switzerland	(1)	0.1	0.4	0.5	0.8	60
Hong Kong	(1)	0.4	0.3	0.7	0.8	14
Ireland	(1)	(1)	0.6	0.6	0.6	----------
Republic of South Africa	0.3	0.3	0.2	0.8	0.6	−25
Other countries	1.6	1.2	4.9	7.7	16.6	115

[1] Under $50,000; included in "other."
[2] Consists almost entirely of components for assembly or processing and reimportation into United States under Section 807.00.

Source: Bureau of the Census and Bureau of Domestic Commerce.

staff members of Wayne University's Department of Neurosurgery. The study covered drop testing of football helmets using metal head forms, development and testing of a new head form of synthetic materials which more closely simulates characteristics of the human head, and football helmet impact testing. More extensive testing and study are required to develop standards by which the safety level of football helmets can be established. Nevertheless, preliminary findings are of assistance to helmet manufacturers and schools in their continuing efforts to develop better test measurements and improved equipment.

A Task Force on Skiing Safety of the American Society for Testing and Materials (ASTM) has met a number of times with ski industry representatives, the medical profession, other testing groups, and the Food and Drug Administration's Bureau of Product Safety to plan for coordinated effort toward greater ski safety. A number of subcommittees were organized to study different aspects of the problem relating to bindings, skis, boots, straps, and other accessories. Part of ASTM's work has been funded by Ski Industries America, and the financial assistance of other groups has been sought to support the work required for investigation, testing, and establishment of minimum standards.

Exports Cure Trade Imbalance

For the first time in many years, U.S. exports and imports were in approximate balance in 1972. Estimated 1972 export sales of $225 million rose about 91 percent over $117.6 million in 1971. U.S. imports of $225 million (foreign value in U.S. dollars) were an estimated 25 percent higher than 1971's total of $180 million. Japan accounted for about $165 million, or 73 percent of U.S. exports—more than double her share of $81.4 million in 1971. Japan's extraordinary demand for bowling equipment and supplies boosted the volume of exports, while currency realignments in relation to the U.S. dollar made our products more competitive in that and other world markets. Purchases in preparation for the 1972 Olympic Games probably also contributed to stepped-up exports.

Exports of all major categories of sporting and athletic goods increased in 1972. Fishing tackle gained an estimated 11 percent; golf, 35 percent; track, field, gymnasium, and exercise equipment,

U.S. Imports of Sporting and Athletic Goods, 1971-72

[Foreign value in millions of dollars]

Country of origin	1971 Fishing tackle	1971 Other sporting and athletic goods	1971 Total	Estimated 1972 Fishing tackle	Estimated 1972 Other sporting and athletic goods	Estimated 1972 Total	Percent change
Total U.S. imports	37.8	142.2	180.0	51.7	173.3	225.0	25
Japan	16.0	42.9	58.9	20.8	54.2	75.0	27
Canada	0.1	20.3	20.4	0.2	23.0	23.2	13
France	8.0	8.9	16.9	10.4	12.6	23.0	36
Taiwan	1.5	9.7	11.2	3.4	13.1	16.5	47
Austria		13.5	13.5		10.4	10.4	-23
United Kingdom	0.4	8.3	8.7	0.5	9.3	9.8	13
Sweden	4.5	1.4	5.9	7.4	1.6	9.0	52
Italy	0.4	5.0	5.4	0.3	7.2	7.5	39
Haiti		[1] 3.7	[1] 3.7		7.5	7.5	102
West Germany	1.2	7.0	8.2	1.8	4.7	6.5	-21
Norway	1.9	1.5	3.4	2.3	4.3	6.6	94
Hong Kong	0.7	3.1	3.8	0.8	4.7	5.5	45
Belgium-Luxembourg		3.7	3.7		5.3	5.3	43
Republic of Korea	0.6	2.0	2.6	0.9	3.5	4.4	69
Other countries	2.5	11.2	13.7	2.9	11.9	14.8	8

[1] About 80 percent of total consists of products assembled or processed in Haiti under Section 807.00 of Tariff Schedules of United States and reimported into United States by U.S. firms.

Source: Bureau of the Census and Bureau of Domestic Commerce.

65 percent; water sports equipment, 50 percent; tables for games, about 60 percent; and other sporting and athletic goods, about 110 percent.

After Japan, principal foreign country markets in 1972 were Canada, the United Kingdom, and West Germany. Between 1967 and 1972, Japan's importance as an export market has been heightened, as her take of U.S. sports equipment exports rose from 31.5 percent in 1967 to approximately 73 percent of the total in 1972. At the same time, Canada's share of U.S. exports dwindled from a 21 percent share in 1967 to about 10 percent in 1972. Exports to other world areas also declined as a percentage of total U.S. exports.

Imports Gain in U.S. Market

While U.S. export trade expanded, imported sporting and athletic goods took an increasing share of the U.S. market. Imports increased from a 21 percent share of U.S. consumption in 1971 to an estimated 25 percent in 1972.

Fishing tackle and equipment, which accounted for a large measure of the growth in imports, increased $13.9 million, or 37 percent. Tennis rackets, balls, and other equipment rose to about $15 million, an increase of $4 million, or 40 percent. Baseball and softball equipment approximated $28 million, a gain of $7 million, or 33 percent, substantially in gloves and mitts and baseballs. Probably 80 percent of baseball imports are U.S.-made products assembled in the Caribbean and reimported by U.S. firms under Section 807.00 of the U.S. Tariff Schedules, with duty assessed only on the value added in the assembly process.

Estimated 1972 imports in other product categories and gains over 1971 were: skis and snowshoes, $29 million (14 percent); hockey equipment other than ice skates, $15 million (25 percent); golf equipment, $12 million (27 percent); ice skates and parts, about $11 million (4 percent); billiard balls, tables, and other equipment, $8 million (19 percent); badminton equipment, $4 million (22 percent); boxing and other sports gloves, $2.6 million (126 percent); football, soccer, and polo equipment, $1.6 million (54 percent); miscellaneous balls, $6.6 million (50 percent); table tennis equipment, $2 million (110 percent). Miscellaneous winter sports equipment remained at approximately the 1971 level of $19.8 million.

Nine countries accounted for approximately 80 percent of 1972 sporting goods imports, with seven of the suppliers gaining substantially over 1971, including Japan, 27 percent; Canada, 13 percent; France, 36 percent; Taiwan, 47 percent; the United Kingdom, 13 percent; Sweden, 52 percent; Italy, 39 percent. Imports from West Germany declined again, by approximately 21 percent, and imports from Austria dropped about 23 percent. The higher cost of German goods resulting from currency realignments was undoubtedly the biggest factor affecting that country's trade with the United States.

Industry Optimistic About Future

Although some firms have discontinued manufacture of products which cannot meet the price competition of imported items, a number have increased overall manufacturing capacity to meet increased demand for other sporting goods, including tennis balls, bowling balls, and golf, archery, and billiard products.

The trend toward greater industry concentration continued in 1972, with companies merging to acquire greater diversity, new geographic bases or retail outlets for market expansion, and an opportunity for greater profitability arising from savings in administrative, advertising, and sales costs.

The Athletic Institute and the Sports Foundation embarked on a new program in 1972—COM PASS (Competitive Athletics in Service to Society)—to draw attention to the constructive aspects of competitive athletics and to give guidance and counsel to communities needing assistance in their athletic programs.

Improved economic conditions should boost individual and institutional purchases of sporting goods in the domestic market. Rising incomes and growing interest in sports in other countries, as well as greater competitiveness of U.S. products in world markets, will also spur industry growth in the seventies. At an average annual growth rate of at least 4.7 percent, manufacturers' shipments of sporting and athletic goods should reach or surpass $1.65 billion in 1980.—*Mary A. Chorba, Office of Business Research and Analysis.*

CHAPTER 13

Leather and Leather Products

Value of shipments of the leather and leather products industries totaled $5.1 billion in 1972, an increase of 7 percent over 1971 shipments of $4.8 billion.

Shipments of shoes and slippers of $3.2 billion represent 63 percent of the leather and leather products shipped in 1972, with leather tanning and finishing shipments totaling an estimated $1 billion; luggage about $290 million; handbags and purses approximately $280 million; small leather goods around $250 million; and leather gloves and mittens, $90 million. Together these subgroups account for about 90 percent of all shipments by leather and leather products industries.

The U.S. foreign trade deficit in leather and leather products continued to widen in 1972, increasing from $834 million in 1971 to $1 billion. U.S. imports of leather and leather products—23 percent of domestic shipments—were estimated at $1.1 billion, 23 percent above 1971 imports valued at $898 million. U.S. exports of leather and leather products also rose 28 percent over 1971 levels. However, the $82 million in exports were only 2 percent of domestic industry shipments.

Estimates of shipments for 1973 and 1980 for the leather tanning and finishing and footwear industries are not included because of uncertainty of near future developments regarding cattlehide exports and footwear imports.

Shipments of leather gloves and mittens, luggage, handbags and purses, and small leather goods are expected to grow an average of 4 percent to $948 million in 1973 and at a yearly rate of 4.9 percent to $1.3 billion in 1980.—*Myrtis L. Byrnes, Office of Business Research and Analysis.*

LEATHER TANNING AND FINISHING

Prospects for the U.S. leather tanning and finishing industry are improved with an increased domestic supply of cattlehides, the industry's most important raw material, expected in 1973 and the fact that consumers apparently want products made of genuine leather and are willing to pay for them.

Cattle on feedlots increased a sharp 10 percent in the last months of 1972. Those animals must soon be released to slaughterhouses. The inventory

Leather and Leather Products: Projections 1972–80 [1]

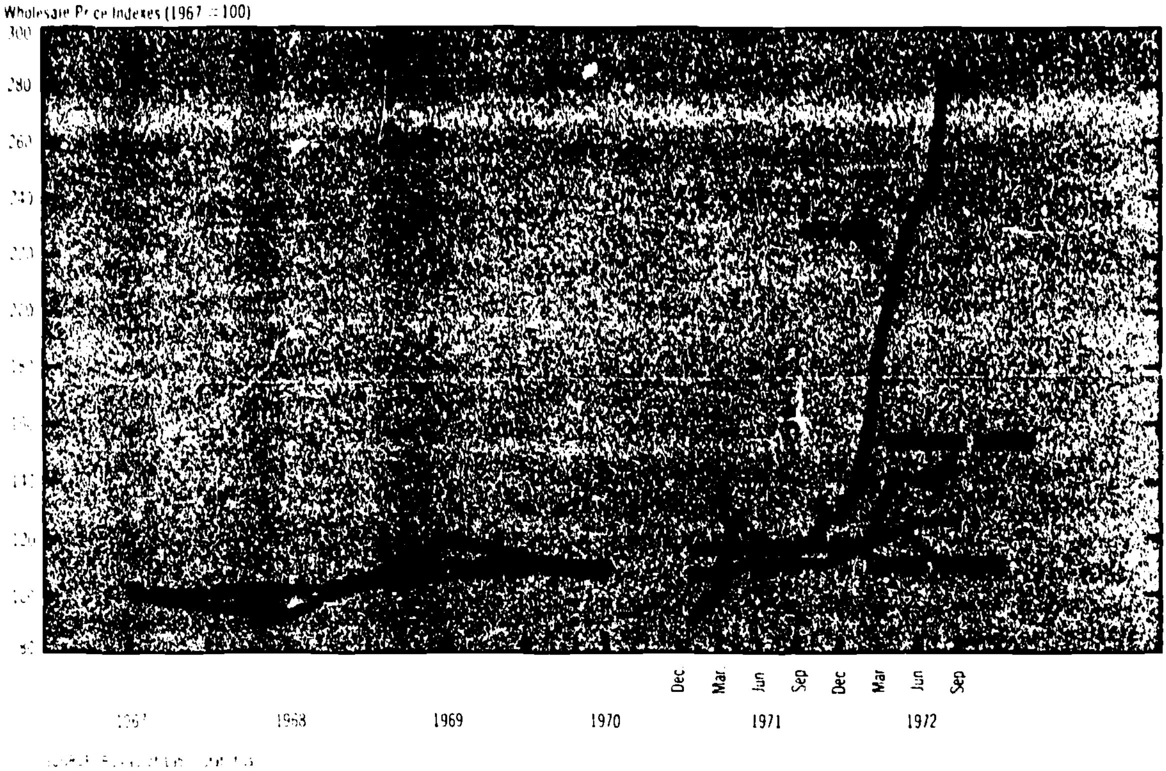
[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
3151	Leather gloves and mittens	91	3	94	3	115	3.4
3161	Luggage	291	3	306	5	432	5.8
3171	Handbags and purses	279	3	287	3	353	3.4
3172	Small leather goods	250	5	261	5	368	5.7

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

Cattlehide prices point to higher leather and shoe prices



of cattle on farms is up; some share of those increased numbers will be sent to the feedlots, and the hides will ultimately reach the tanning vats.

The value of 1972 product shipments was estimated at $1 billion, 21 percent over 1971 levels. Increased raw material costs accounted for the growth; volume actually declined.

U.S. production of the more important types of leather—cattle, calf, sheep and lamb, goat and kid, kangaroo, equine, and cabretta—was 24 million equivalent hides in 1972, 4 percent below 1971. Foreign buyers considered U.S. leathers a real bargain; exports jumped an estimated 40 percent, from $43 million in 1971 to $60 million in 1972. Imports climed even higher—by 57 percent—from $84 million to $130 million.

Problems Remain Unsolved

Problems of cattlehide shortages and soaring prices intensified sharply as 1972 progressed. There was a brief lessening of tension at midyear when the Secretary of Commerce established an export control program for cattlehides. Congressional action terminated the export controls only 6 weeks after their imposition.

Throughout most of the year, U.S. cattlehide production did not reach expected levels. An increasing share of the supply was earmarked for the export market through long-term contracts at premium prices, sharply reducing the supply available in the open market. Hide prices soared and the tanning industry, joined by producers and retailers of footwear and other leather products as well as labor unions, began an intensive campaign for reimposition of export controls.

Expected Hide Supply Did Not Appear

Although cattle slaughter increased in the final quarter of 1972, only a moderate rise of about 1 percent was realized for the entire year. Cattlehide production in 1972 was estimated at 37.8 million, compared to 37.4 million a year earlier.

Domestic calf and sheep slaughter continued downward in 1972. Calfskin production dropped about 15 percent, from 3.7 million to 3.1 million skins. Sheepskin output fell an estimated 5 percent, from 11.7 million to 11.5 million skins.

Except for cattlehides, the United States depends on imports for a major share of its requirements of hides and skins. Foreign supplies are becoming increasingly difficult to obtain, especially from some of the developing countries, which are attempting to earn more foreign exchange by exporting partially tanned or tanned leather rather than the unprocessed product.

Supply Shift Cuts U.S. Tanning

The world supply of cattlehides was not sufficient to meet increased world demand for cattlehide leather in 1972. Argentina, which had limited exports of salted hides in 1971, placed a total embargo on exports of unprocessed hides in 1972. Brazil took similar action, although both countries permitted leather exports. At the same time foreign demand for U.S. hides picked up sharply. In the latter half of 1972 the entire hide production of an increasing number of meat packing plants was purchased at premium prices on long-term contracts, reportedly destined mainly for Japan. As the supply situation became more critical, some large domestic tanners made similar contract arrangements. With a reduced supply of hides on the open market, prices soared.

Rising Prices and Export Controls

U.S. cattlehide prices began to rise early in 1971 when Argentina restricted hide exports. Price rises gained momentum during Phase I of the New Economic Program, then rose more sharply after Argentina and Brazil banned all exports of raw hides. The composite price of three representative types of cattlehides (heavy native steerhides, light native steerhides, and butt branded steerhides) averaged 14.33 cents per pound during phase I of the price freeze (August 15–November 15, 1971) and rose to an average of 29.75 cents on July 14. 1972.

To cut down inflationary pressures on prices of shoes and other leather goods, Secretary of Commerce Peter G. Peterson announced establishment of an export control program for cattlehides, effective July 16, 1972, maintaining cattlehide exports for the balance of the year at the 1971 level of 16 million hides. Cattlemen, renderers, meat packers, exporters, and Members of Congress representing agricultural States opposed the limitation.

On August 29, 1972, the President signed the amended Export Administration Act (Public Law 92–412), terminating cattlehide export controls. First in anticipation and then after the fact of termination, hide prices rose steadily to unprecedented levels.

The Wholesale Price Index (1967=100) for all hides and skins averaged 115.1 for the year 1971; the January–September 1972 average was 194.6. For cattlehides, the 1971 WPI averaged 113.4; for January–September 1972, it was 216.8.

Leather Tanning and Finishing: Trends and Projections 1967–72

[In millions of dollars except as noted]

	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72
Industry: [2]						
Value of shipments	870	854	793	829	1,000	21
Total employment (thousands)	31	29	24	24	23	−4
Production workers (thousands)	26	24	20	20		
Value added	319	331	318	331		
Value added per production worker man-hour	$6.05	$6.99	$8.00	$8.28		
Product: [3]						
Value of shipments	846	831	767	[1] 804	970	
Value of imports	68	86	87	83	130	57
Value of exports	42	42	37	43	60	40
Wholesale price indexes (1967=100):						
Hides and skins	100	124.1	104.3	115.1	[4] 194.6	
Leather	100	108.7	107.7	112.5	[4] 134.0	

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the Leather Tanning and Finishing industry (SIC 3111).
[3] Includes value of shipments of leather tanning and finishing by all industries.
[4] January-September average.
[P] Preliminary.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

The Wholesale Price Index for leather averaged 112.5 in 1971 and 134.0 in January–September 1972. The WPI for *cattlehide leather* averaged 109.6 in 1971 and 134.7 in January–September 1972.

Leather Production Falls

Cattlehides were available at high prices during the first 7 months of 1972 when cattlehide leather production was running slightly ahead of 1971. Thereafter, the supply situation became more critical and cattlehide leather production dropped from 20.5 million equivalent hides in 1971 to an estimated 20 million in 1972.

The world shortage of calfskins persists, although U.S. 1972 production of calf leather was expected to approximate the 1971 level of 1.6 million equivalent skins. Sharply increased imports of goatskins account for an estimated 10 percent rise in kid leather production in 1972 to 3.4 million skins from 3.1 million in 1971.

Largely because of a drop in glove and garment types, sheep leather production was believed to have fallen 5 percent in 1972, from 21.4 million to 20.3 million skins. Increased use of cattlehide garment leather is largely responsible for reduced demand for sheep garment leather.

Earnings Rise, Employment Drops

Weekly earnings in 1972 increased 4 percent to an average of $3.42 per hour from $3.27 in 1971. Employment, mostly of production workers, dropped to 23,000, a decrease of 4 percent from the 1971 level of 24,000.

LIA Promotes "The Real Thing"

The rising world demand for leather shoes has brought forth an array of man-made materials, many of which look and feel like genuine leather. The Leather Industries of America, in promoting "The Real Thing," advises the consumer to "look for the label." Federal Trade Commission regulations require that synthetic shoe materials be identified. Only genuine leather components are exempt from Federal labeling rules.

The footwear industry is still the principal outlet for leather. Production of shoes with leather and part-leather uppers account for two-thirds of footwear. Output of footwear with leather soles during the first half of 1972 was running about 3 percent above the comparable 1971 period. However, the tight supply and price situation for cattlehides, plus the shutdown of one of the largest domestic sole leather tanneries, indicates that production of shoes with leather soles may have dropped in 1972 below 15 percent of total output, for the first time.

1972 Profile

Leather Tanning and Finishing

SIC code	3111
Value of industry shipments (millions)	$1,000
Number of establishments	494
Employment (thousands)	23
Exports as a percent of product shipments	6.0
Imports as a percent of apparent consumption	13.0
Compound annual rates of growth 1967–72 (percent):	
Value of shipments (current dollars)	2.8
Value of imports (current dollars)	13.9
Employment	5.7
Major producing areas	New England; East North-Central and Middle Atlantic States

Indicative of the rising demand for leather products is the 55 percent increase from 1967 to 1971 in manufacturers' shipments of leather garments—from $99 million to $154 million. Although the most spectacular rise in leather's use has been in apparel, there has also been a significant rise in demand for upholstery leather for furniture and automobiles.

EPA Effluent Limitations

The Environmental Protection Agency recently completed additional comprehensive studies of waste-water technology in the tanning industry for use as a guide in developing effluent limitation guidelines. Major emphasis was placed on the collection of available data concerning waste water involved, existing control and treatment technology, and achievable effluent levels. Leather tanning and finishing producers whose plants do not discharge into municipal systems doubt that EPA guidelines for reaching zero discharge will be attained by 1976 as required, even though the appropriate technology is available.

The industry will probably achieve the goals set under the Federal Water Pollution Control Act of 1972. Tannery wastes are amenable to treatment by various combinations of standard procedures. Plants able to discharge treated effluent into a municipal system have a considerable advantage over plants requiring installation of a complete treatment system in order to discharge waste directly into watercourses or streams.

Newly announced EPA regulations are focusing tanning industry attention on air pollution control. In addition, the industry must concern itself with meeting the requirements of the Occupational Safety and Health Act of 1970, administered by the Department of Labor.

Leather Exports at All-Time High

Foreign buyers are finding American leather a better bargain than their domestic leathers, even at currently high U.S. prices. Exports of U.S. produced leather in 1972 are estimated at $60 million, a record level 40 percent above the $43 million exported in 1971.

Canada and Western European countries each purchase about one-third of U.S. exports, with the rest going to about 40 other countries. All types, except calf leather, gained substantially. Sheep and lamb leather accounted for almost 40 percent of the total value of exports. Cattlehide leather exports, second in importance with 30 percent of the total, increased about 65 percent over 1971 levels. Goat and kid leather exports showed the largest precentage rise. They are small compared to sheep and cattle leathers, because of the limited availability of raw skins. Calf leather exports were expected to decline by 50 percent in 1972 for lack of skins to process.

Increases in exports indicate that U.S. leather is competitive in both price and quality in spite of border, turnover and other taxes in foreign countries. However such quota restrictions as the stringent limitation Japan applies to imports of bovine and other finished leathers are impossible to penetrate.

Leather Imports Grow

There was a sharp rise in imports of foreign leathers into the United States in 1972. Such imports were estimated at $130 million, more than 55 percent above the level in 1971. The 1972 imports consisted of about 45 percent cattlehide leather; 25 percent calf, 15 percent kid, 10 percent sheep, and 5 percent miscellaneous types.

Imports of cattlehide leather in 1972 reached an estimated 160 million square feet, about 4 million equivalent hides. Imports of this type totaled 108 million square feet a year earlier, or 2.7 million equivalent hides. Supplied primarily by Argentina and Brazil, almost half of cattlehide leather imports are only partly tanned and require finishing in U.S. tanneries.

Imports from Argentina of finished cattlehide leather also increased significantly in 1972. The increase in finished leather from Brazil was less spectacular, because Brazil's emphasis has been on exporting finished leather products, particularly footwear.—*Myrtis L. Byrnes, Office of Business Research and Analysis.*

SHOES AND SLIPPERS

Skyrocketing costs of leather—the industry's most important raw material—compounded the shoe industry's problems in 1972. Shoe manufacturers were already alarmed by increasing imports of foreign-made footwear. The value of product shipments of the nonrubber shoe and slipper industry was estimated at $3 billion in 1972, an increase of 4 percent over 1971 shipments of $2.9 billion. However, the quantity of shoes and slippers shipped declined 1 percent to 545 million pairs from 552 million pairs in 1971. U.S. manufacturers produced an estimated 530 million pairs of shoes and slippers in 1972, 1 percent below the 536 million pairs produced in 1971.

Domestic consumption of footwear increased to 828 million pairs in 1972 from 742 million in 1967, an annual average increase of 2.2 percent. The entire growth of the domestic market was more than absorbed by imports. Domestic production of shoes declined at an average annual rate of 2.4 percent during those years, while imports increased at an annual rate of 16.5 percent.

Department of Defense procurement of 3.8 million pairs of military boots and shoes in the first 10 months of 1972 was 7 percent above the 3.5 million pairs purchased in the first 10 months of 1971. Total purchases during 1971 amounted to 4.6 million pairs, compared with 4.8 million pairs in 1970.

Factory Decline Continues

Through the first 9 months of 1972, 19 factories started operations to produce footwear while 41 discontinued shoe production—a net loss of 22 establishments. New England and the mid-Atlantic States each experienced a net loss of 10 plants. Since 1967, the United States has suffered an estimated net loss of 190 shoe factories.

Shoes and Slippers: Trends and Projections 1967-72

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971-72
Industry: [2]						
Value of shipments	2, 952	3, 161	3, 148	3, 075	3, 200	4
Total employment (thousands)	212	210	193	180	180	
Production workers (thousands)	191	189	173	160	160	
Value added	1, 620	1, 793	1, 759	1, 723	NA	
Value added per production worker man-hour	$4. 59	$5. 26	$5. 56	$5. 88	NA	
Product: [3]						
Value of shipments, total	2, 829	3, 075	2, 943	2, 921	3, 040	4
Quantity shipped, total (million pairs)	611	584	569	552	545	-1
Value of imports	219	436	559	678	825	22
Quantity of imports (million pairs)	133	202	242	269	285	6
Value of exports	8	8	9	8	9	13
Quantity of exports (million pairs)	2	2	2	2	2	
Imports as percent of consumption:						
Value [5]	7	12	16	19	21	
Quantity, total [6]	18	25	30	34	34	
Leather shoes	12	19	24	27	29	
Nonleather shoes	31	39	41	44	43	
Wholesale price indexes (1967=100)	100	109. 1	110. 4	116. 8	[4] 123. 9	

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the Shoes and Slipper industry (SIC 3141, 42).
[3] Includes value of shipments of Nonrubber Footwear made by all industries.
[4] January-September 1972.
[5] Value of domestic shipments, plus imports, minus exports.
[6] Production plus imports minus exports (quantity of domestic shipments not shown by breakout of leather and nonleather.

NOTE.—NA = not available).

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

An estimated 550 firms operating about 850 establishments are producing nonrubber footwear in the United States. Pennsylvania continued to lead other States, with 14 percent of all domestic shoe production. Massachusetts produced 11 percent, Missouri and New York 10 percent each, Tennessee 8 percent, and Maine and New Hampshire, 6 percent each.

Employment in 1972 was estimated to be unchanged from 1971 at 180,000 workers.

A study of financial data of 15 of the largest diversified shoe manufacturing companies indicates a drop between 1967 and 1971 in after tax profits. Sales of those companies, which in addition to footwear included other products, were almost double their total assets.

Key Ratios of Shoe Industry

	Percent	
	1967	1971
Profits after taxes to sales	4. 1	3. 5
Profits after taxes to net worth	14. 5	11. 9
Capital expenditures to gross plant	12. 5	13. 7

Fashion Makes a Difference

Fashion was the name of the game in 1972 and, for many, fashion was fun. Women wore all sorts of costumes—long skirts, short skirts, cuffed flared pants, ruffled shirts with voluminous sleeves—and they bought shoes to complement the costume. Shoe bottoms were particularly important. The platform shoe—its sole from a half-inch to several inches high—replaced the boot as the leading fashion for women. Boots continued strong in men's shoe styles, but higher heels and platforms were also becoming popular.

Varied consumer preferences create problems for manufacturers and their suppliers. The clog, with its very lightweight, high, colorful platform, captured the eye of the young to such an unexpected degree that many manufacturers could not keep up with reorders. Suppliers were unable to deliver one or more of the necessary components on short notice.

Fashion Demands Quick Action

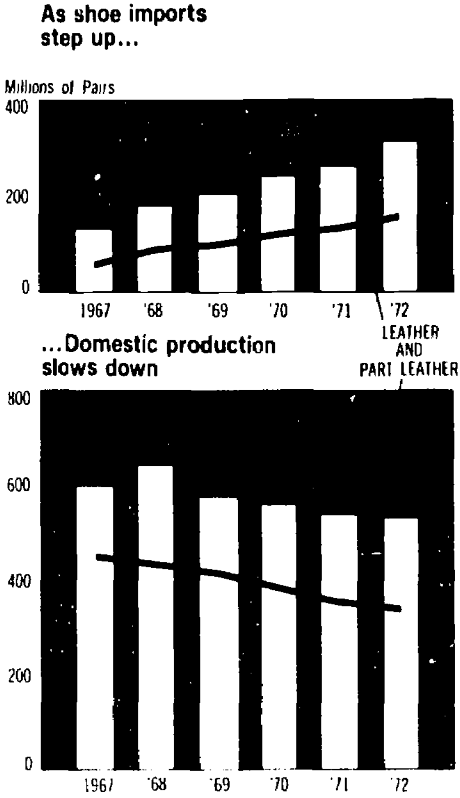
In the current style revolution, shoe manufacturers must be alert to new style trends. The American shoe manufacturer knows he can no longer produce only basic shoes for two seasons—spring/summer, fall/winter. Increased productivity and speed of response to meet style changes and market demand is needed to compete effectively.

To assist the U.S. footwear industry in improving its competitive position in the domestic economy and in world markets, the Department of Commerce has under consideration several proposals for technical aid, submitted to it by the American Footwear Industries Association and shoe machinery manufacturers.

The projects have four aims: Acceleration of a program already under way, combining development of standards and proportional last grading with an educational program on their application to manufacturing operations and new techniques; development of a systems approach to shoe production, providing for accelerated development and introduction of new machinery and techniques; extension of computer technology for more automated shoe making; development of an overall plan for coordinating and implementing the program to improve the productivity of the U.S. footwear industry in domestic and world markets.

"Pathway to Greater Productivity" was the theme at the October 1972 Factory Management Conference and Exhibition sponsored by the American Footwear Industries Association. Topics discussed included "Upper Material Technology," "Automated Systems," "Shoe Design," and "Lasting." A seminar on "Time Means Money," stressed that shoe manufacturers should search for technical solutions to the manufacture of marketable items, rather than seek applications for new technology. With fashion demanding more and more variety, the shoe manufacturer was warned, he must produce and deliver new styles faster to the retailer.

Since all shoes are manufactured over lasts, proportional grading of lasts with standards is the most logical place to start to get the shoes to the market place faster. Some of the larger manufacturers are successfully using proportionally graded lasts. General adoption of proportionally graded lasts with standards would enable last producers and suppliers of components to improve their products and speed their service. Accuracy of fit of the finished shoe is another important consideration. Savings in time to design, produce and deliver shoes are vital to the shoe manufacturer.



SOURCE: Bureau of the Census and Bureau of Domestic Commerce

Prices Rising

The wholesale price index for leather footwear rose at an average annual rate of 3.1 percent from 1967 to 1971. For the first 9 months of 1972, the index averaged 123.3 (1967–100) compared with 116.7 for the like period of 1971, an increase of almost 6 percent. The index rose by more than 8 percent from September 1971, to September 1972—from 117.1 to 126.8. Further increases can be expected because of the continuing upward spiral in prices of cattlehide leather.

Shoes with leather upper were believed to have fallen in 1972 to about 66 percent of production. Shoes with leather soles were less than 15 percent of production. Shoe manufacturers prefer leather for shoes, if costs allow the shoe lines to be competitively priced with imports.

Because leather prices have increased in line with hide prices, some manufacturers have changed certain lines to man-made materials. Most manufacturers, especially those producing men's

1972 Profile

Shoes and Slippers

SIC codes	3141 and 3142
Value of industry shipments (millions).	$3,200
Number of establishments	850
Employment (thousands)	180
Exports as percent of product shipments (value).	0.3
Imports as percent of apparent consumption:	
Value	21.0
Quantity	34.0
Compound annual rates of growth 1967-72 (percent):	
Value of shipments (current dollars).	1.6
Value of imports (current dollars).	32.0
Employment	−3.2
Major producing areas	Middle Atlantic and New England States

shoes and high grade women's and children's shoes, are expected to continue using leather.

Leather Costs Raise Prices

In 1972 the Price Commission, to minimize the effect of higher leather prices on shoe prices, issued Order No. 6, limiting footwear and other leather goods manufacturers to a pass through of actual increased leather costs. Cost increases for other materials, labor and operations were not affected by the special order; they are considered separately under the general Price Commission Regulations which allow profit margin maintenance.

No Let-Up in Imports

Foreign shoes continue to find favor in the United States. Imports increased an estimated 6 percent in 1972 to 285 million pairs from 269 million pairs imported in 1971. Reflecting increased foreign production costs and a higher proportion of leather shoes among imports, the value of imports rose 20 percent in 1972 to $825 million, from $678 million in 1971.

Imports of leather shoes in 1972 were estimated at 140 million pairs valued at $650 million, up from 130 million pairs valued at $510 million the previous year. Leather footwear amounted to almost 50 percent of the total quantity imported, and almost 80 percent of the total value. Average wholesale price per imported pair increased to $4.60 from $3.91 in 1971.

Italy continued to be the leading supplier of leather shoes to the United States, although her share dropped to about 49 percent of all leather shoe imports in 1972 from 53 percent in 1971. Spain's share rose to 23 percent from 21 percent; and Brazil's share increased to 7 percent from 6 percent. Shoes from Spain were higher priced, averaging $4.69 per pair imported, compared with $4.64 for Italian shoes and $3.72 for Brazilian.

Footwear with supported vinyl uppers amounted to 130 million pairs valued at $165 million in 1972, or 46 percent of the total quantity imported and 21 percent of the total value of imports. Taiwan supplied 64 percent of all vinyl imports, up from 45 percent in 1971. Japan's 17 percent was down sharply from 45 percent in 1971. U.S. imports of vinyl footwear from Italy and Spain increased about 25 percent in quantity in 1972 over 1971.

Tariff Quotas Sought

The American footwear industry has requested that the administration establish quotas for footwear, based on current import figures, and increase duties on all shoe imports in excess of those quota levels. Decision on the Tariff Commission's evenly divided report on the escape clause investigation was delayed during discussions with other countries on the footwear problem. A "visa system" established by Italy on shoe exports resulted in a decline of 3.4 percent in the 1971 quantity of shoes imported into the United States from Italy. This decline continued in 1972, with imports from Italy in the first 9 months down almost 4 percent from the comparable 1971 period.

Trade Adjustment Assistance

Worker groups and firms continue to petition the Tariff Commission for adjustment assistance under the provisions of the Trade Expansion Act of 1962. By September 1972, worker groups at 78 shoe plants had applied for adjustment assistance. Twenty-four of these groups were declared eligible to apply to the Department of Labor for trade readjustment allowances, relocation allowances, and retraining. Four shoe companies have been declared to be eligible for adjustment assistance—two in 1971 and two in 1972. Three of the firms are being provided technical and financial aid and the fourth is developing its proposal.—*Myrtis L. Byrnes, Office of Business Research and Analysis.*

LUGGAGE AND PERSONAL LEATHER GOODS

Manufacturers' shipments of luggage and personal leather goods are expected to amount to $950 million in 1973, a 4 percent increase over 1972, and perhaps reclaim some of the losses sustained when consumers' tendency to tighten pursestrings against rising prices prevailed at the beginning of the decade. Included in the gains over 1972 are shipments of luggage of $297 million, up 5 percent; handbags and purses, $274 million, up 3 percent; all leather gloves and mittens, $75 million, also up 3 percent; and small leather goods, $296 million, up 6 percent.

Imports of luggage and personal leather goods are expected to amount to $158 million in 1973, or 13 percent of U.S. consumption. With exports estimated at only $13 million, the net trade deficit will be $145 million.

Environment for Growth

The relaxed attitude about fashion that prevails today, together with expanding consumer disposable income and the increasingly young population create an environment for growth in the leather goods industry. A multitude of styles, fabrics, and colors available in the marketplace caters to the mood of versatile casualness promoted by the young and endorsed by their elders of all income levels.

In the United States, fashion changes are frequent. Yesterday's "outs" are today's "ins" with the return to the classic clothes, the donning of gloves, narrow belt, classic handbag, et cetera. Luggage, once relegated to the attic between infrequent trips, is big on the fashion scene and an integral part of the wardrobe to be housed within easy reach, especially since the trend is toward softside luggage suitable for airplane carry-on. Women like variety even for that most utilitarian of accessories, the handbag, and many materials and colors are often combined and/or decorated to add special appeal to the shoulderstrap, the tote, the clutch, pouch and envelope. Whether the "man bag"—a newcomer to the marketplace of the seventies—becomes as essential an item in the gentleman's wardrobe is unknown, but it is purchasable. Handcrafted items, particularly of suede leather, are very popular with the young, who often make their own or order them from high fashion boutiques.

Shipments Gain in 1972

The 1972 value of shipments of leather products rose 4 percent over 1971 to an estimated $903 million. Shipments of luggage—including briefcases, musical instrument cases, sample cases, camera cases, shoe kits, et cetera—are estimated at $283 million, an increase of 3 percent over 1971. For handbags and purses, 1972 shipments rose only 3

Luggage and Personal Leather Goods: Trends and Projections 1967–73

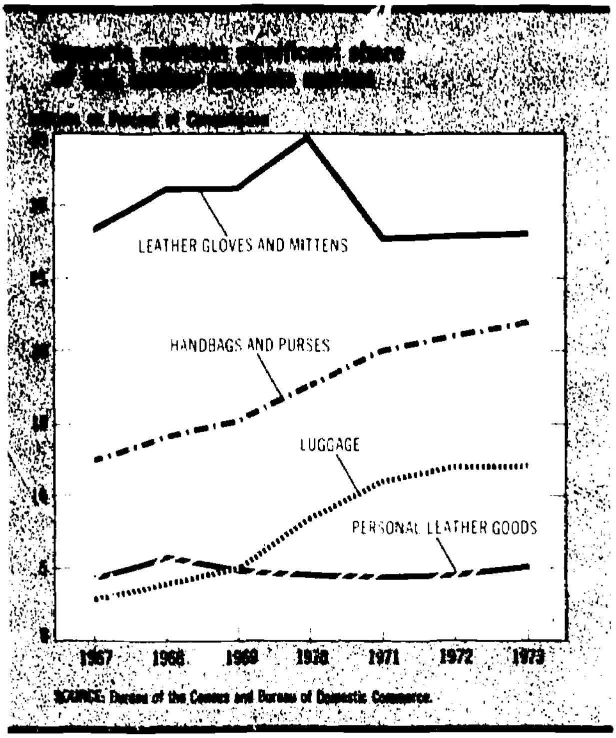
[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	934	1,028	924	880	910	3	950	4
Total empolyment (thousands)	64	66	57	53	55	4		
Production workers (thousands)	57	58	51	44	47	7		
Value added	501	572	522	492	NA			
Value added per production worker man-hour ($)	4.65	5.19	5.94	6.18	NA			
Product: [3]								
Value of shipments, total	883	952	909	[1] 867	903	4	947	5
SIC 3151 Leather gloves and mittens	72	76	69	71	73	3	75	3
SIC 3161 Luggage	320	343	303	275	283	3	297	5
SIC 3171 Handbags and purses	312	328	275	258	266	3	274	3
SIC 3172 Small personal leather goods	179	205	262	263	280	6	296	6
Value of imports	90	118	133	137	147	7	158	7
Value of exports	9	12	13	13	13	0	13	
Wholesale price indexes (1967=100)	100.0	113.9	116.7	106.8	108.4			

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the luggage and personal leather goods industry (SIC 3151,-61,71,72).
[3] Includes value of shipments of leather gloves, handbags, luggage and small personal leather goods.

P Preliminary.

NOTE.—NA=Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.



percent over the previous year, reaching $266 million; leather gloves and mittens gained approximately 3 percent to $73 million; and small personal leather goods shipments increased to approximately $280 million, or 6 percent over 1971.

Small Companies Predominate

Many small establishments produce luggage and personal leather goods and the concentration ratio, or percentage of value of shipments produced by the largest companies, varies among the industries. Each year many are being absorbed through mergers and acquisitions to improve the industry's competitive position at home and abroad.

An important consumer of products of the leather tanning industry and, to a lesser degree, of the chemical, textile and hardware industries, industry products are primarily for the consumer market.

Barriers to Greater Growth

Difficult problems in the personal leather goods industry prevent greater growth. The small manufacturers who make up the industry have little capital for research and development and cannot afford the risk involved in introducing new fabrics and styles. With costs of materials and labor climbing, the domestic manufacturer must compete with lower-priced foreign-produced items more profitable to the retailer. Much higher leather costs in 1972 may cause greater shifts to man-made materials, especially in handbags and small personal leather goods.

Employment Falls

It is difficult to attract younger workers to an industry that is largely a craft industry and the average age of workers in the leather goods industry is high. Except for small personal leather goods, total employment in these industries dropped sharply at the opening of the decade. Last year total employment averaged 55,000, including 16,000 in luggage; handbags and purses, 21,000; leather gloves and mittens, 5,000; and small personal leather goods, 14,000.

For the first 7 months of 1972, average hourly earnings for production workers in luggage was $2.75, a 9.1 percent increase over the $2.52 in 1971. Average hourly earnings for production workers in handbags and small personal leather goods for the first 7 months was $2.59, a 5.3 percent increase over the $2.46 in 1971.

Imports High in 1972

When imports of leather gloves and mittens declined in 1971 to $26 million, or 26 percent from the 1970 imports of $35 million, it was a reversal of the pattern of trade that dominated the sixties. However, glove imports in 1972 rose 4 percent above 1971 to $27 million, with the major part of the increase in gloves of cowhide leather. Under item 807 of the U.S. Tariff Schedules, U.S. glove

Proportion of Leather Products Shipments by Largest Companies, 1967

	Luggage	Handbags and purses	Leather gloves and mittens	Small personal leather goods
Number of companies	328	488	136	293
Number of establishments	333	496	147	296
Concentration ratio:				
4 largest companies	34	10	30	33
20 largest companies	59	40	65	60

1972 Profile
Luggage and Personal Leather Goods

SIC Codes	3151	3161	3171	3172
Value of industry shipments (millions)	$91	$291	$279	$250
Number of establishments	147	333	496	296
Total employment (thousands)	5	16	21	14
Exports as percent of product shipments	3	2.3	0.3	0.3
Imports as a percent of apparent consumption.	28	12	21	4.5
Compound annual average rates of growth 1967–72 (percent):				
Value of product shipments (current dollars).	0.3	−2.4	−3.1	9.4
Value of exports (current dollars)	24.0	9.9	−13.0	
Value of imports (current dollars)	−0.7	32.0	9.2	10.2
Employment	−3.6	−5.3	−2.6	1.5
Major producing areas	New York, East North Central States.	New England, Middle and South Atlantic States.	New York City	Middle Atlantic, North Central, New England States

manufacturers in 1971 employed foreign labor to assemble 326,631 dozen pairs of gloves worth $5.1 million, of which $1.3 million was the value added by assembling. In 1970, imports under this category were 253,651 dozen pairs worth $5.6 million, of which $1.4 million was the value added by assembling.

For the other three segments of the industry, imports in 1972 also increased—7 percent for luggage, to $37 million; 9 percent for handbags and purses, to $70 million; 9 percent for small personal leather goods, to $13 million. Major suppliers of foreign leather goods are Italy, France, Spain, the United Kingdom, the Federal Republic of Germany, and Japan. Hong Kong, Morocco, Mexico, Taiwan, Colombia, Lebanon, Yugoslavia and Israel are among the developing countries regularly exporting leather goods to the United States.

Exports of luggage in 1972 increased by 2 percent and small personal leather goods exports grew slightly, whereas exports of handbags and purses and leather gloves and mittens declined. Exports of luggage to the developing countries continue to grow. Among the major foreign markets for U. S. luggage and personal leather goods products are Australia, the Bahamas, Brazil, Ethiopia, Israel, Kuwait, Lybia, and Mexico.

Imports to Grow/Exports Static

In 1973, imports of luggage and personal leather goods are expected to amount to $158 million with increases of 7 percent to $40 million in luggage imports; 9 percent to $76 million in handbags and purses; 4 percent to $28 million for leather gloves and mittens; and 9 percent to $14 million for small personal leather goods. Exports of luggage and personal leather goods in 1973 are not expected to increase over the 1972 value of $13 million.

Shape-up for 1980

Shipments of the personal leather goods industry for the remaining years of the decade are expected to maintain the model for growth of the opening years—a 4 percent annual increase to reach almost $1.3 billion in 1980. Material and labor costs are espected to climb. A modest 3 percent growth for exports is projected and imports more than likely will continue to grow at about 7 percent each year.

Competitiveness for an industry so vulnerable to the vagaries of fashion depends on the development of new technology to improve productivity thereby accelerating responsiveness to change in style and on the use, development and promotion of man-made materials. The combination of space age technology and industry innovativeness can bring about radical changes in the luggage and personal leather goods industry.

For example, automated luggage is on the drawing board—luggage that with the help of built-in directional signal and control will follow its owner through a terminal. The development could be an aid to handicapped people who are confined to wheel chairs. Also, space age concepts for using new colors and fabrics are on the horizon.—*Helen Bush, Office of Business Research and Analysis.*

CHAPTER 14

Textile Mill Products

In 1972, the textile industry began to recover from the low ebb of activity which existed early in 1971. Prospects are reasonably good for continued advances in 1973. Industry sales of $12.3 billion in the first half of 1972 were 10 percent ahead of the 1971 period. For all of 1971, textile industry sales totaled $22.9 billion.

Strong consumer demand for selected apparel products and for household and industrial items using textiles, plus limited growth of imports under bilateral agreements, were responsible for 1972's upturn.

Most of the 1972 gain was accounted for by growth in the knitting sector, recovery in production of carpets and household furnishings and increased demand for industrial textile products, especially from the automobile industry. There also were improvements in individual fabric sectors such as denims and corduroys. Despite overall improvement, however, certain sectors of the industry continued to experience depressed market conditions.

Costs Rise—Prices Mixed

Wage rates and machinery, power, most raw materials and building costs continued upwards. Expenditures for environmental controls likewise added to the industry's costs.

Hourly earnings for production workers in 1971 averaged $2.57, 5 percent ahead of 1970. The rate for January–October 1972 was $2.72, which is 6 percent above the year earlier period. Textile machinery prices also rose 5 percent in 1971. However, for the first 10 months of 1972, the wholesale price index for the textile industry was only 2 percent over the comparable period in 1971.

Fiber prices were mixed but were higher overall in 1972 than in 1971. Raw wool prices increased sharply during 1972 from very low 1971 levels, while cotton prices rose through May 1972, then declined during the remainder of the year. Except for polyester staple and feeder yarns, man-made fiber prices gained moderately. Polyester staple and feeder yarn prices dropped early in 1972 and then stabilized.

The Wholesale Price Index for textiles reached 111 in 1972 compared with 104 in 1971.

Profits Increasing Slowly

With higher production and prices, profits on sales rose 12 percent during the first half of 1972

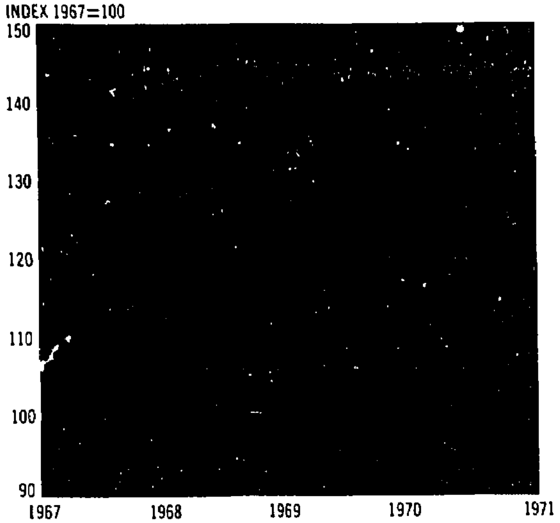
Textile Mill Products: Trends 1967–71

[In millions of dollars except where noted]

	1967	1968	1969	1970	1971
Value of shipments	19, 815	21, 969	22, 978	22, 339	24, 167
Value added	8, 153	9, 184	9, 605	9, 251	10, 096
Value of exports	377	351	418	461	465
Value of imports	803	934	970	1, 058	1, 248
Employment (thousands)	958. 5	993. 9	998. 7	977. 6	961. 9
Wholesale price index (1967=100)	100. 0	104. 1	104. 6	103. 2	103. 6

Source: Bureau of the Census, Office of Textiles, Bureau of Labor Statistics.

Carpeting and knits set pace in textile production



SOURCE: Federal Reserve Board.

despite advancing costs. The index of industrial production during the first 8 months of 1972 rose 5 percent. The ratio of after-tax profits to sales in 1971 and the first half of 1972 was 2.4 percent, compared to 1.9 percent in 1970. These ratios are substantially below those for all manufacturing.

Labor, Capital Spending Up

Capital expenditures for new plant and equipment during 1971 amounted to $610 million, up 9 percent from 1970, while 1972 expenditures estimated at $750 million were 23 percent above 1971. A substantial part of the increased spending was to meet environmental requirements.

The textile industry's payroll outlays expanded about 5 percent in 1971 as a decline of almost 16,000 in employment was offset by higher wages and a longer workweek. Employment rose over a year earlier by 3 percent for the January-October 1972 period and average weekly hours by 2 percent.

Consumer Demand Up

The textile industry's recovery has been primarily effected by renewed strength in consumer demand for textile products and renewed confidence in the near term future resulting from comprehensive wool and man-made fiber bilateral agreements signed with the leading Far Eastern exporters of these textile products to the United States. Personal consumption expenditures for clothing and shoes—the main component of textile demand—exceeded 1970 levels by more than 9 percent in 1971, compared with 4 percent growth in 1970. Improved consumer demand for automobiles and for furniture and household equipment also contributed to the strengthened demand for textiles. The increase in personal consumption expenditures for furniture and household equipment in 1971 was 8 percent, up from 5 percent in 1970. From a 7-percent decline in 1970 spending on autos shifted to a 25-percent increase in 1971. Expenditures for apparel, household items and automobiles continued strong in 1972.

Imports Restrained

In January 1972, the United States and the four largest Far Eastern exporters to this country signed comprehensive wool and man-made fiber bilateral textile agreements designed to slow import growth. Imports during 1972 continued to increase, but at a slower rate than in 1971 when they rose 18 percent from 1970 to $1.25 billion. These agreements, coupled with existing agreements covering imports of cotton textiles, are expected to continue to moderate growth in 1973.

Asian countries supplied the bulk of U.S. imports of textile products. Japan, the largest exporter, led in supplying processed filament yarns, broadwoven fabrics, and knitted fabrics. Hong Kong, Taiwan and Korea were other major sources of U.S. imports of man-made fiber textiles. India and Pakistan provided most of the jute carpet backing.

Textile exports edged up slightly in 1971 to $465 million, an increase of 1 percent. However, in the first three quarters of 1972, exports rose 14 percent above the comparable 1971 period.

Industry Primary Fiber Consumer

An important consumer as well as producer, the textile industry, is virtually the sole customer of 200,000 wool growers; chief customer of 300,000 cotton farmers; principal customer of man-made fiber producers; primary customer of textile machinery, and a major customer for U.S. produced plastics, synthetic materials, dyestuffs, and chemicals.

In recent years, textile industry purchases of man-made fiber have been at the expense of natural fibers. In 1971, man-made fibers rose to 61 percent of total mill consumption. Basic reasons for the trend to man-made fibers are consumer preferences, availability of supply, relative price stability, performance advantages over the natural fibers in particular end uses, and high promotional outlays.

While the textile industry's primary customer is the domestic apparel industry, it is also a manufacturer of such consumer products as knit apparel and carpets. The industry also is a significant supplier to the auto and furniture industries.

Textiles Pacesetter in Southeast

The textile industry and the economy of the southeast have been developing together for many years, especially in small communities. In 1971, 69 percent of textile industry employment was in six Southeastern States—North Carolina, South Carolina, Georgia, Virginia, Alabama, and Tennessee. Although other industries have become more important in this region in recent years, the textile industry is still the leading manufacturing employer in the Carolinas, Georgia, and Virginia, the third in Alabama and the fifth largest in Tennessee. An estimated 70 percent of these workers—including a substantial number of unskilled, semiskilled, youthful and minority group workers—are employed in nonmetropolitan areas where job opportunities are relatively scarce.

Product Mix Shifts

The industry's product mix changed significantly from 1967–71. The share of industry output of the three broadwoven fabric sectors, as a group, declined as did the shares of woven carpets and scoured and combed wool sectors.

The broadwoven fabric sectors suffered market inroads from a rapidly growing demand for knitted fabrics. Production of cotton and woolen fabrics declined steadily from 1967 while man-made fiber fabric production increased from 1967–69 but declined from 1969–71. During the 1967–72 period, the trend was away from woven carpets to tufted and needlepunched carpets. Man-made fiber yarns, especially textured polyester yarn, captured a larger market share at the expense of wool yarn.

Company Consolidation Continues

Consolidation in the textile industry is still proceeding, although at a slower rate. By 1967, the number of companies had declined to 5,557 and was probably down to near 5,000 at the end of 1972. The number of establishments primarily producing textiles has likewise been declining—6,964 in 1971, 129 fewer than in 1967. From 1967 to 1971, establishments employing less than 20 workers fell 6 percent while the number with employment from 100–499 rose 5 percent.

Most of the decline in textile companies since 1967 has been among the small, single industry oriented concerns of less than 100 employees. Many were producers of staple fabrics that were subjected to intense competition from imports.

Sales concentration ratios for the textile industry have been constant since 1967. The top four and eight firms accounted for 16 and 23 percent, respectively, of industry sales in 1971. Profit concentration ratios for the top eight textile companies ranged from 27 to 31 percent during the 1967–70 period. However, the profits of these eight concerns were only 19 percent of total profits in 1971 and information for the first half of 1972 indicates that the low rate continued.

Lack of change in sales concentration ratios is partially explained by the slowdown in merger activity. To increase industry concentration significantly, the largest companies would have had to utilize this route extensively. However, 1968 and 1969 were the only years of strong merger activity.

Industry Remains Labor Intensive

When compared with foreign textiles industries, the domestic textile industry is capital intensive. However, it is labor intensive in comparison with other U.S. manufacturing industries. In 1970, gross book value of fixed assets per employee for the textile industry was $10,506, only 72 percent of the value for all manufacturing. Relatively low profits of the industry and concomitant scarcity of accessible capital contribute to the low level of fixed assets.

Government Acts on Flammability

Four product standards have been issued since the 1967 amendment of the Flammable Fabrics Act authorized the Secretary of Commerce to issue flammability standards and expanded coverage to include interior furnishings as well as wearing apparel. Two standards for carpets and rugs were promulgated in 1970, the standard for children's sleepwear in 1971, and the standard for mattresses in 1972. The Commerce Department in 1972 published announcements concerning possible need for standards in upholstered furniture, blankets, larger sizes of children's sleepwear, and children's wearing apparel. Despite technological and marketing problems, the industry is gearing its facilities to manufacture products which will meet the proposed standards.

SPUN YARNS

Production of spun yarns of cotton, wool and man-made fibers—primary products of wool yarn mills and yarn mills, except wool—was 6.1 billion pounds in 1971, up slightly from 1970. The sharp decline in wool yarn production was offset by growth in cotton and spun man-made fiber yarn production.

Employment in 1971 was 97,900 compared with 98,900 in 1970 and 89,100 in 1967. Prices of spun man-made fiber and cotton yarns began to recover in late 1971 as market demand strengthened and cotton prices increased. Prices continued strong through most of 1972 but showed signs of weakening when it appeared that raw cotton prices would decline in the fall.

Wool yarn prices decreased along with raw wool prices in 1971. Although they improved in 1972, increases for yarn were not as large as for raw wool. Uncertainty as to raw material prices for 1973 slowed demand for spun yarn late in 1972 but the market basically is strong for sales yarn.

The cotton and man-made fiber sector dominated the industry in 1971, constituting 85 percent of both spun yarn value added and employment. Spun yarns account for 8 percent of textile industry value added and 11 percent of its employment.

1973 Promising

Consumer demand for textile products should produce a healthy demand for spun sales yarn, a raw material for most textiles. The new import agreements also are creating favorable economic conditions for the industry. In addition, the new cotton crop promises to ease the tight supply situation and result in lower raw material prices.

Foreign Trade Steady

Spun yarn imports and exports remained unchanged from 1970 to 1971. Exports of spun yarn were $18 million in 1971, of which more than 95 percent were cotton and man-made fibers. Canada was the largest purchaser of these yarns, buying $7 million. Imports of spun yarn amounted to $38

1971 Profile

Yarn Mills, Except Wool

SIC Code	2281
Value of industry shipments (millions).	$1,910
Number of establishments	394
Total employment (thousands).	83.1
Exports as a percent of product shipments.	0.9
Compound annual average rate of growth 1967–71 (percent):	
Value of shipments (current dollars).	7.6
Value of exports (current dollars).	26.6
Value of imports (current dollars).	1.1
Employment	3.2
Major producing areas	North Carolina

1971 Profile

Wool Yarn Mills

SIC Code	2283
Value of industry shipments (millions).	$316
Number of establishments	127
Tota lemployment (thousands).	14.8
Exports as a percent of product shipments.	0.3
Compound annual average rate of growth 1967–71 (percent):	
Value of shipments (current dollars).	−3.3
Value of exports (current dollars).	−2.8
Value of imports (current dollars).	−8.5
Employment	−1.8
Major producing areas	South Atlantic—North Carolina, South Carolina, and Georgia

Spun Yarns: Trends 1967–71

[In millions of dollars except where noted]

	1967	1968	1969	1970	1971
Value of shipments	1,784	2,012	2,080	2,010	2,226
Value added	674	777	789	761	857
Value of exports	8	8	36	20	18
Value of imports	43	53	38	35	38
Employment (thousands)	89.1	96.8	100.2	98.9	97.9
Wholesale price index (1967=100)	100.0	103.0	101.5	98.7	98.9

Source: Bureau of the Census, Office of Textiles, Bureau of Labor Statistics.

million in 1971. Cotton and wool spun yarn imports were $14 million each and man-made fiber spun yarn, $10 million.

Southeast Industry Center

More than four-fifths of all industry employment is located in four Southeastern states. The number of plants, at 521 in 1971, was up 5 percent from 1967 while employment increased by 10 percent. No significant changes have taken place since 1967 in the size distribution of spun yarn establishments.

BROADWOVEN FABRICS

Demand for broadwoven fabric—principal product of cotton and man-made fiber weaving mills and wool weaving and finishing mills—improved somewhat in 1972, but not enough to halt the downward trend in recent years in production of cotton and wool fabrics. Man-made fiber broadwoven fabric production in 1972 recovered somewhat to exceed the 4.9 billion yards produced in 1971. However, production was below the 5.4 billion peak level of 1969. Selected cotton fabrics, such as denims and corduroys and polyester-cotton blends, experienced strong market demand and growth in 1972.

Production in the broadwoven fabric industry fell off for the second year in 1971 to 11.15 billion linear yards, down 3 percent from 1970 and 5 percent from 1967. Production of cotton and wool broadwoven fabrics have trended downward for a number of years while that for man-made fiber fabrics declined from 1969 to 1971.

Employment in the broadwoven fabric industry averaged 311,100 in 1971 compared with 359,800 in 1967. Employment expanded slightly in 1972.

Wholesale prices for wool and man-made fiber broadwoven fabrics declined by 2 to 3 percent in 1971 while cotton fabric prices increased 4 percent. The wholesale price index (1967=100) in 1971 averaged 99.8 for wool broadwoven fabrics, 101.5 for man-made fiber, and 110.6 for cotton. In October 1972, these WPI's were 103.6, 118.3, and 125.2, respectively.

Number of Establishments Declining

In 1971, there were 1,112 broadwoven fabric establishments compared with 1,167 in 1967. However, trends among the sectors vary. The number of cotton and man-made fiber broadwoven fabric plants increased slightly to 470 and 386 in 1971, compared with 463 and 374 in 1967. Wool broadwoven fabric plants dropped to 256 in 1971, or 22 percent. Since 1967, the number of small- and medium-size plants remained unchanged while the number of large plants declined.

Five Southeastern States accounted for 84 percent of broadwoven fabric industry employment in 1971. South Carolina and North Carolina had more than half of the industry's work force. The three other States with sizeable broadwoven fabric industries are Georgia, Virginia, and Alabama.

Subdued Market Dampens Imports

For the first time since 1967, U.S. imports of broadwoven fabric declined in 1971. At $397 million in 1971, they were off 6 percent from the prior year. Slow domestic demand for textile products and market penetration by knitted fabrics contributed to the drop. Approximately 90 percent of broadwoven fabric imports are cotton and man-made fiber fabrics and more than 60 percent originate in Asian countries.

Exports advanced 9 percent in 1971 to $256 million, virtually all cotton and man-made fiber fabrics. About 40 percent were shipped to Western Hemisphere nations and about 30 percent to West European nations.

Man-Made Fiber Sector Expands

Because of rapid expansion of man-made fiber fabric demand and contraction in the cotton and wool market, man-made fiber fabrics have attained

Broadwoven Fabric: Trends 1967–71

[In millions of dollars except where noted]

	1967	1968	1969	1970	1971
Value of shipments	6, 707	7, 134	6, 926	6, 456	6, 410
Value added	2, 974	3, 133	3, 110	2, 942	2, 962
Value of exports	225	208	230	234	256
Value of imports	321	371	411	421	397
Employment (thousands)	359. 8	351. 6	349. 9	336. 1	311. 1
Wholesale price index (1967=100)	100. 0	105. 9	107. 5	104. 9	105. 7

Source: Bureau of the Census, Office of Textiles, Bureau of Labor Statistics.

coleadership with cotton fabrics. According to the latest data, 47 percent of value added and 34 percent of broadwoven fabric employment are attributable to the man-made fiber sector. Comparable percentages for the cotton sector are 45 and 57, respectively.

Weaving Finally Challenged

During the past decade, challenges have arisen to weaving's total domination of fabric production. Knitting an historic method of fabric production, and the *nonwoven processes* new forms of production utilizing fibers instead of yarns as the raw material stepped forward as serious competitors to weaving. The broadwoven fabric industry in 1967 was 36 percent of textile industry value added. In 1971, it was only 29 percent.

Decline in the relative importance of weaving has not resulted from an absence of technological advancement in the textile industry. In traditional weaving, looms operate with yarn-carrying shuttles propelled back and forth across the loom that each time interlace filling yarn among the warp yarns that run perpendicular to it. In recent years, three major types of shuttleless looms the rapier, the air jet and the water jet have been developed.

Traditional shuttle looms have the advantage of being lower priced and capable of weaving all types of fabrics. Primary advantages of shuttleless looms are higher production speeds and less noise. Furthermore, significant *technological* advances in recent years have expanded the shuttleless loom's versatility.

1971 Profile

Wool Weaving and Finishing Mills

SIC Code	2231
Value of industry shipments (millions).	$550
Number of establishments	256
Total employment (thousands).	29.9
Exports as a percent of product shipments.	0.2
Compound annual average rate of growth 1967-71 (percent):	
Value of shipments (current dollars).	-15.7
Value of exports (current dollars).	5.9
Value of imports (current dollars).	18.9
Employment	8.1
Major producing areas	South Atlantic, Northeast

1973 Prospects

After experiencing some recovery in 1972, prospects are mixed for the broadwoven fabric industry in 1973. Cotton and wool continue to face sharp competition from man-made fibers while all are in competition with the rapidly growing knitting fabric industry and from nonwoven fabrics. The industry can reasonably expect a more favorable raw material price situation in 1973 than 1972, overall demand for textiles should remain good, and demand for household and industrial textiles, which are largely broadwoven, should increase.—*Don R. Foote, Office of Textiles.*

1971 Profile

Cotton Weaving Mills

SIC Code	2211
Value of industry shipments (millions).	$2,732
Number of establishments	470
Total employment thousands.	176.1
Exports as a percent of product shipments.	5.0
Compound annual average rate of growth 1967-71 (percent):	
Value of shipments (current dollars).	4.8
Value of exports (current dollars).	5.9
Value of imports (current dollars).	5.7
Employment	5.6
Major producing areas	South Atlantic North Carolina, South Carolina, and Georgia

1971 Profile

Synthetic Weaving Mills

SIC Code	2221
Value of industry shipments (millions).	$3,128
Number of establishments	386
Total employment (thousands).	105.2
Exports as a percent of product shipments.	3.7
Compound annual average rate of growth 1967-71 (percent):	
Value of shipments (current dollars).	8.1
Value of exports (current dollars).	0.7
Value of imports (current dollars).	18.8
Employment	2.3
Major producing areas	South Atlantic— North Carolina and South Carolina

CHAPTER 15

Man-made Fibers

Production of man-made fibers increased 16 percent in 1972 and a further gain of 7 percent is expected in 1973 as general economic activity increases. Capacity utilization rose approximately 10 percent during 1972 to an operating rate of about 90 percent, and producers expect an equal or better performance during 1973. Sales and profits are also expected to continue upward during 1973.

Productive capacity for all man-made fibers increased 8 percent in 1972, while that of cellulosics remained unchanged. Capacity is expected to increase about 7 percent in 1973, again because of increases in noncellulosic facilities.

Textile mills remain the major market for man-made fibers. The increase in man-made fiber production has easily surpassed that of textile mill production which improved only slightly in 1972 from the low 1971 levels. The price stabilization program, expanding production capacity, and international agreements limiting growth of man-made fiber product imports will continue to maintain demand for domestic man-made fiber goods.

Prices Aid Competitive Position

Activity levels in the domestic textile industry largely determine the health of the man-made fibers industry. By improving its competitive position vis-a-vis other fibers, the man-made fiber industry has enjoyed expanding markets even during periods when there was no significant increase in textile mill activity.

Man-made Fibers: Trends 1967–72

[In millions of dollars except as noted]

	1967	1968	1969	1970	1971[P]	1972[1]	Percent increase 1971-72
Industry:[2]							
Value of shipments, total	2,931	3,602	3,585	3,507	3,904	4,630	18
Cellulosic	903	1,017	872	685	662	675	2
Noncellulosic	2,028	2,585	2,713	2,822	3,242	3,955	22
Total employment (thousands)	102.0	110.2	116.4	112.1	109.2	114.4	3
Value added, total	1,754	2,330	2,203	2,035	2,211	2,620	18
Cellulosic	507	593	499	339	350	355	5
Noncellulosic	1,247	1,737	1,704	1,696	1,861	2,265	22
Value of imports	71	105	81	103	153	NA	NA
Value of exports	124	148	164	151	152	NA	NA
Wholesale price indexes (1967=100)							
Cellulosic yarns and fibers	100.0	101.3	101.7	100.9	103.4	108.8	5
Noncellulosic yarns and fibers	100.0	98.0	98.0	97.6	95.7	95.2	−1

[1] Estimated by Office of Textiles.

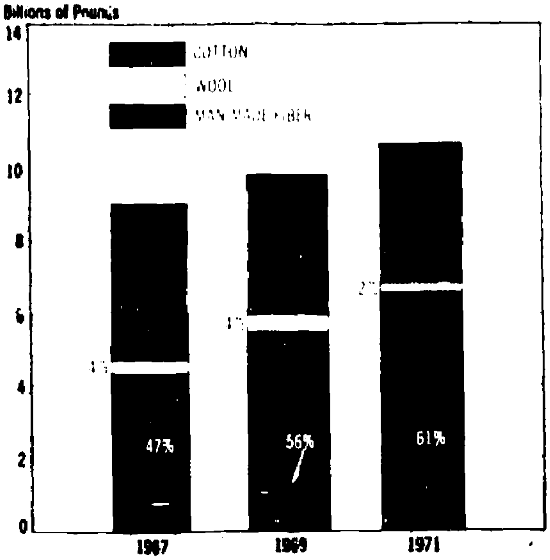
[2] Includes value of all products and services sold by the man-made fiber industry (SIC 2823, 2824).

[P] Preliminary.

NOTE.—NA=not available.

Source: Bureau of the Census, Bureau of Labor Statistics.

Manmades grow to 61% of fiber consumption



SOURCE: Textile Organon, Textile Economics Bureau, Inc.

Price control regulations effective through April 1973 do not apply to cotton and wool. Cotton prices began rising sharply in late 1971 and reached a peak in May 1972 of 38 percent above a year earlier. During the remainder of the year cotton prices receded. Wool prices also rebounded sharply in 1972 from depressed levels in 1971.

In contrast, prices for man-made fibers and yarns were controlled during late 1971 and in 1972 and therefore were more competitive. Since prices of some noncellulosic fibers, especially polyester staple, were extremely low in 1972, a higher percentage of noncellulosics was used in yarn and fabric blends with cotton and wool.

Production Geared to Demand

The man-made fiber industry's ability to match production to demand at stable prices provides it with a substantial competitive advantage. Because supplies of natural fibers are influenced to some extent by climatic conditions, their prices tend to fluctuate.

Plant capacity may be expanded if market research indicates rising future demand, although such capacity may not be fully utilized at once. Capacity expansion continued in 1972 while capacity utilization reached only 90 percent.

The ability of producers to expand output quickly discourages entry of competitors into the field by preventing a buildup of unmet fiber demands. Because of large capital requirements, a successful new competitor is usually a manufacturer from the chemical or a related industry who recognizes the need for heavy research spending before sales and profits can be expected. In 1970, spending for research was about 4 percent of sales.

Noncellulosic fiber production capacity increased more than 8 percent in 1972 and is expected to grow at a similar rate in 1973. Overcapacity of certain noncellulosic fibers resulted in lower prices that were attractive to textile mills. Some American noncellulosic fiber manufacturers, following European trends, have begun texturizing their own filament yarns or have started to supply partially drawn yarns. This new competition, together with ample supplies from traditional texturizers, depressed yarn prices.

Gross plant investment was $39,000 per employee in 1970, and new capital expenditures in 1971 were almost $4,000 per employee. Capital spending has decreased in recent years. Expenditures for 1972 were estimated at $430 million, 17 percent below the 1967 record high of $515 million.

Markets Expand

Man-made fibers' share of the total fiber market increased 14 percentage points from 1967 to 1971, with man-made fiber mill consumption increasing 54 percent. This trend continued in 1972. Man-made fiber consumption was 33 pounds per capita in 1971, also an increase of 54 percent over 1967.

The home furnishings market is the single largest user of man-made fibers, accounting for 30 percent of production. Industrial uses account for 23 percent; women's and children's apparel, 21 percent; men's and boys' wear, 13 percent; and other consumer uses, 13 percent.

Men's apparel is a new growth sector for man-made fibers. After becoming accustomed to man-made fibers in sportswear, men are now buying dresswear made of the new fibers in both knits and wovens. Women's apparel made with woven textured polyester yarns will continue to dominate the market, but the share of men's apparel will continue to rise.

Man-made fiber yarn's use in knit production rose 66 percent from 1967–71, with further increases in 1972.

Profile of an Industry

The man-made fiber industry, considered part of the chemical industry because chemical processes are used to produce the fibers, was composed of 86 establishments in 1972. Over half of those establishments employed more than 500 workers each. Larger establishments are located outside metropolitan areas.

Many man-made fiber producers make both cellulosic and noncellulosic types. The industry is highly concentrated, with the four largest firms in each category accounting for more than 80 percent of that type shipments. Temporary protection by patents, high minimum capital requirements, and output levels, unused capacity, and the extensive and costly advertising required to establish a brand name are barriers to new entrants.

Improved Worker Productivity

Man-made fiber production increased at an 11 percent annual rate from 1967–71, while employment grew at an average rate of only 6 percent, largely because of improved productivity and new capital investment. From 1967–71, output per man-hour increased 9 percent annually. Unit labor requirements decreased while annual wage and salary payments increased 6 percent. Wages are relatively higher than those paid by other manufacturers in nonmetropolitan areas. The average hourly pay for man-made fiber workers was $3.76 in 1972.

Trade Patterns

The U.S. man-made fiber industry's share of total world production has remained stable in recent years. It was 28 percent in 1971. The U.S. share of total world consumption remained at 36 percent from 1967 to 1971 despite a 13-percent annual increase of imports to the United States during these years. Actual poundage imported increased 63 percent in the 5 years. The U.S. share of world imports was approximately 11 percent during this period. In 1971, imports accounted for 5 percent of domestic consumption.

Man-made fiber industry sales are also considerably influenced by imports of man-made fiber textiles and apparel. These imports had been growing rapidly and registered an annual average increase of 29 percent from 1967–71. Agreements with 5 Asian countries signed in late 1971 and early 1972 should help to moderate this growth. U.S. exports are about 5 percent of domestic production.

CELLULOSIC MAN-MADE FIBERS

The first man-made fibers were produced from cellulose, the fibrous substance of all plant life. Cellulosics—rayon and acetate—accounted for 22 percent of man-made fiber production in 1971, when production increased fractionally to 1.4 billion pounds, reversing the downward trend. Rayon accounted for 66 percent of 1971 cellulosic man-made fiber shipments.

Acetate use in bonded fabrics has suffered recently from the switch to double knits. Continuous filament and yarn amounted to 54 percent of cellulosic shipments in 1971, while staple and tow accounted for the remainder.

Employment in the 25 cellulosic establishments averages about 1,100. In recent years, capacity, the number of producers and production have been relatively constant.

In 1971 consumption of wood pulp and cotton linters by the rayon and acetate industry equalled 1967 levels. This was also true of consumption of cellulosic fibers by the textile mills. Draperies, upholstery, slipcovers, and dresses are major end uses. Industrial use of cellulosic man-made fiber declined 18 percent in recent years, partly because of a switch to noncellulosic fibers in manufacturing tire cord. Cellulosics now account for only 20 percent of fiber used in tires, compared with 28 percent in 1967.

Trade Balance Favorable

Cellulosic man-made fiber exports totaled $33 million in 1971 compared with $14 million in 1967.

1972 Profile

Cellulosic Man-made Fibers

SIC Code	2823
Value of industry shipments 1971 (millions)	$662
Number of establishments	25
Employment (thousands)	28
Exports as a percent of 1971 production	6
Imports as a percent of 1971 apparent consumption	6
Compound annual growth rates 1967–71 (percent):	
Value of shipments (current dollars)	−7
Value of exports (current dollars)	14
Value of imports (current dollars)	−1
Employment (1967–72)	−4
Major producing areas	Eastern States

Imports amounted to $22 million in 1971, down almost 5 percent from $23 million in 1967 but up 10 percent from 1970. Staple and tow accounted for 72 percent of cellulosic import value and 39 percent of exports in 1971, with yarn and monofilaments making up the remainder.

NONCELLULOSIC FIBERS

There are 61 establishments producing noncellulosic fibers synthesized from chemicals. Average employment per establishment is 1,300. Total employment increased about 10 percent in 1972 over year-earlier levels.

Noncellulosic production has surpassed cellulosic for several years and now accounts for 78 percent of total U.S. man-made fiber production. The noncellulosic fiber share of markets for women's and children's clothes, men's and boys' wear and other consumer uses increased in 1971 to 19, 15, and 10 percent, respectively. New washable silk-like fabrics made from noncellulosic fibers are gaining in acceptance among consumers and manufacturers of better dresses.

Noncellulosics accounted for 32 percent of all fibers used in homefurnishings, the largest market for these fibers. Use of noncellulosic fibers in carpets increased 63 percent from 1967–70, with shipments of noncellulosics further aided by the increase in U.S. carpet production in 1971 and 1972. But noncellulosic fiber share of the total industrial market is falling. Noncellulosics now comprise 80 percent of tire cord fabric.

Trade Surplus Declines

The U.S. noncellulosic fiber international trade surplus decreased 20 percent annually from 1967–71. Value of imports has grown dramatically during the same period, increasing 28 percent a year to $131 million in 1971. During 1971 alone, imports rose 60 percent. In contrast, exports grew only 10 percent annually from 1967–71. Nylon staple, tow,

1972 Profile

Noncellulosic Man-made Fibers

SIC Code	2824
Value of industry shipments 1971 (millions)	$3, 241
Number of establishments	61
Employment (thousand)	86
Exports as a percent of 1971 production	5
Imports as a percent of 1971 apparent consumption	5
Compound annual growth rates 1967–71 (percent):	
Value of shipments (current dollars)	12
Value of exports (current dollars)	10
Value of imports (current dollars)	28
Employment (1967–72)	4
Major producing areas	Southeastern States

and yarn were 44 percent of the value of noncellulosic exports in 1971 while polyester staple and tow were 11 percent.

TEXTILE GLASS FIBERS

Although textile glass fibers are made by the glass industry, they are classed as noncellulosic fibers. There are now about 10 U.S. producers with 16 establishments.

Textile glass fiber production increased 11 percent annually from 1967–71, reaching 470 million pounds. For 1972, shipments rose an estimated 30 percent. Principal markets for glass fibers are in draperies and other home furnishings, and industrial uses.

The foreign trade balance for textile glass fibers is favorable. Imports amounted to only about $250,000 in 1971 while exports totaled more than $7 million. Exports have increased at a 16 percent annual rate since 1967. Glass fiber yarn, roving, and strand accounted for 80 percent of exports.—*Mary Burke, Office of Textiles.*

CHAPTER 16

Apparel

Production and sales of apparel started upward during the latter part of 1971 and improved further in 1972, following depressed levels in early 1971. Increased consumer spending on apparel and a slowing of import expansion as restraints negotiated with the largest foreign competitors became effective contributed to the improved performance in 1972. Industry sales are estimated to have gained 7 percent in 1972 over 1971 levels, while profits remained relatively stable. Sales growth in 1973 is expected to be more moderate.

Production gained only an estimated 4 percent in 1972. Output may outstrip sales in 1973 and equal the previous year's gains if apparel inventories are built up in response to the improved trading climate. Since clothing fashions are trending to the more traditional and less risky styles, consumers and retailers may return to rational buying practices. The prospect for a more orderly import growth is also a plus factor for 1973.

Apparel wholesale prices increased only about 2 percent in 1972, following an average annual gain of 3 percent between 1967 and 1971, as price controls became effective and the market became less fashion oriented. Price increases accounted for the 3.8 percent average annual growth in dollar shipments from 1967 to 1971 since apparel production declined during this period. At the same time, hourly wages for production workers increased. Although price controls appeared to be effective in 1972, they were difficult to administer because of the large number of firms, the multitude of unique and constantly changing product lines, and the tendency of the industry to compete through variations of quality as well as on the basis of price.

Apparel spending in 1972, at about $52 billion, amounted to 7 percent of total consumer expenditures. It is expected that 1973 apparel expenditures will retain the 7 percent share of consumer expenditures.

Consumer Protection Regulations

During 1972, the apparel industry was required by the Federal Trade Commission to provide permanent care labels on practically all garments produced. Many producers had provided this information by either permanently affixed labels or by hang tags. Thus manufacturers were able to comply with the regulations with minimum disruption of production. Also, the Department of Commerce last year adopted a flammability standard for children's sleepwear sizes 0 to 6x. Although children's sleepwear manufacturers have had to change to new and unfamiliar fiber types or produce less comfortable, chemically treated garments to meet this standard, this experience should make it easier for the apparel industry to adapt to future standards as they are promulgated.

Industry Among Nation's Biggest

The apparel industry consists of establishments which cut and sew clothing from purchased fabric. National income originating in the apparel industry averaged 4.4-percent growth from 1967 to 1971, reaching $9 billion, or 4 percent of all manufacturing income.

Industry employment in 1972 averaged about 1.33 million—7 percent of all manufacturing employment. Eighty-one percent of the work force are women. A high proportion of the workers are members of disadvantaged minority groups with educational levels considerably below the national average.

Thirty-six percent of employment is now concentrated in the middle Atlantic region compared with 40 percent in 1967. New York and Pennsylvania are the first and second largest States in terms of apparel employment. Attracted by a lower regional wage structure and proximity of textile supplies, the apparel industry continues to follow the textile industry to the South. Southern States currently employ 36 percent of the Nation's apparel workers compared with 31 percent in 1967. The "border States" and California employ most of the remainder.

Average hourly earnings at $2.61 in 1972 were 32 percent below the overall manufacturing average. Payroll costs amount to 54 percent of apparel industry value-added in this labor intensive industry.

Highly Competitive Industry

Employment in the 23,350 establishments of this highly competitive industry averages 57. The top four firms accounted for only 7 percent of 1971 industry sales while the top eight accounted for 13 percent. Increasing import penetration and unprofitable operations have forced the industry to consolidate its fragmented structure, with the number of establishments down 9 percent since 1967. Only establishments with 250 to 500 employees increased in number during this period. Firms employing 500 or more declined 15 percent. The largest diversified firms were not necessarily the most profitable—the top four and eight firms with 13 and 17 percent of industry assets accounted for 7 and 17 percent of industry profits in 1971.

Although merger activity is less than in the 1960's, apparel manufacturers continue to reduce risks by diversifying into other apparel products. Also, vertical integration backward into textile production (especially knitwear) and forward into apparel retailing is occurring.

Capital and other entry barriers remain low. Gross plant and equipment equal $2,335 per apparel worker compared with $24,245 for all manufacturing. Capital expenditures in 1971 were less than a fifth the all-manufacturing average per worker. A weak financial base, labor intensive production, and small firm size explain the industry's low $12 million annual R. & D. expenditures. Until its 1972 demise, the Apparel Research Foundation had sponsored and disseminated research concerning the application of technological advances for improving apparel productivity and product quality.

Industry Profits Rise Slowly

Apparel profits rose to approximately $600 million in 1972 compared with $559 million in 1971. Profit to sales margins rose slightly to 2.4 percent in 1972 from 2.3 percent in 1971. Profits on equity in 1972 were 12 percent compared with 11 percent in 1971.

Despite rising profits and easier credit during the first 6 months of 1972, bankruptcies of 121 firms with $43 million in liabilities surpassed the 1970–71 annual average of 220 failing firms and a record high $64 million in liabilities.

Apparel: Trends 1967–71

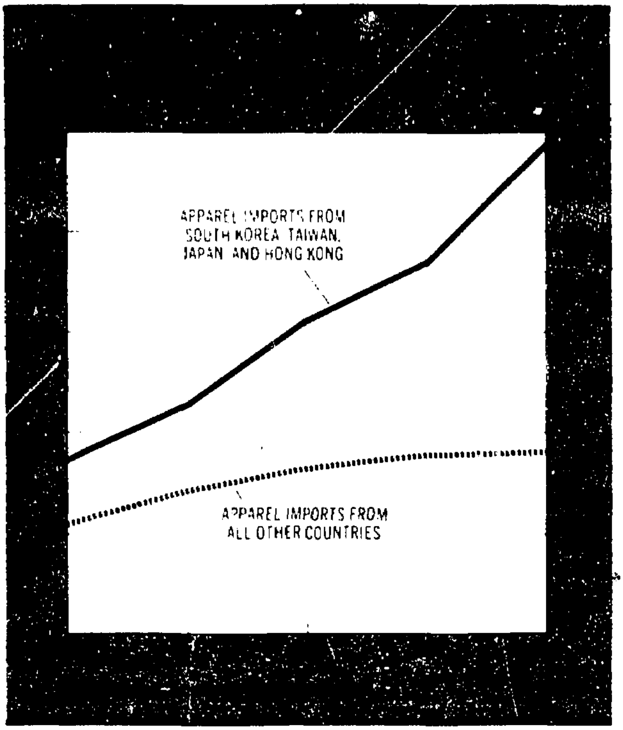
[In millions of dollars except as noted]

	1967	1968	1969	1970	1971
Industry:[1]					
Value of shipments	21, 327	22, 649	24, 283	23, 485	24, 749
Total employment (thousands)	1, 398	1, 406	1, 409	1, 372	1, 362
Production workers (thousands)	1, 237	1, 240	1, 238	1, 203	1, 191
Value added	10, 064	10, 881	11, 571	11, 601	12, 224
Value added per production worker per year	$8, 136	$8, 775	$9, 401	$9, 643	$10, 264
Product:[2]					
Value of imports	692. 1	900. 4	1, 148. 7	1, 286	1, 573. 5
Value of exports	206. 8	220. 2	242	250. 4	258. 3
Wholesale price index (1967=100)	100	103. 6	107. 2	111. 0	112. 9
FRB apparel production index	100	101. 6	102. 5	97. 8	97. 8

[1] Includes value of all products and services sold by the apparel industry (SIC 23).

[2] Includes value of shipments of apparel products made by all industries.

Source: Bureau of the Census, Bureau of Labor Statistics, Office of Textiles.



More Productivity Gains Needed

While estimates are that industry productivity rose slightly in 1972, long-run productivity gains require investment in labor saving automated machinery associated with fabric laser cutting, ultrasonic sewing, seam fusing, automatic profile, and chain stitching, and contour seam sewing equipment.

Investment spending in the apparel industry amounted to $337 million in 1971, up 7 percent from a year earlier. Larger apparel firms are more capital intensive and more likely to invest in labor saving equipment. Higher profits encourage greater capital spending since 35 to 45 percent of apparel profits are reinvested.

Employment Stable in 1972

The short-run apparel employment situation appears to be tightening. Increased 1972 job opportunities in other higher wage industries have reduced the apparel industry labor supply. Demand for apparel workers stopped declining and stabilized last year because of increased production for inventory rebuilding, slower import growth, and large 1973 "Spring Season" orders. Apparel unemployment rates fell, averaging 7.3 percent in 1972 compared with 9.7 percent a year earlier. Although 1972 employment averaged around 1971 levels, average hours worked increased 1 percent to 36 per week.

Imports Growth Slows

Imports of cotton, wool, and man-made fiber apparel from all countries increased an average 24 percent annually from 1967 to 1971, reaching 2,098-million-square-yard equivalents. These imports totaled 2,247 million square yards in the year ending October 1972—a growth of 7 percent. The reduced rate of growth is a consequence of the man-made fiber and wool textile and apparel trade agreements negotiated in 1971.

These agreements, negotiated with the five countries—Japan, Taiwan, Hong Kong, Korea, and Malaysia—that provide 84 percent of U.S. apparel imports, resulted in imports from these countries increasing only 5 percent in the year ending August 1972 after averaging 30 percent annual growth in 1967–71. More orderly import growth rates provided by the restraints should assist the domestic industry in better planning of investment and marketing programs.

Within the apparel group, greatest import gains were in the man-made fiber sector and increasing import value largely reflected quantity growth rather than higher import prices. The annual growth of 46 percent in man-made fiber apparel imports in 1967–71 slowed substantially in 1972. Cotton apparel imports increased moderately in 1972 after only a 1 percent annual growth between 1967–71. Wool apparel imports were stable in 1972 after annual 1967–71 gains of 2 percent.

Exports increased 5.7 percent annually between 1967–71 to $248 million but gained more than 10 percent in 1972. After increasing from $458 million to $1.3 billion between 1967–71, the apparel trade deficit increased to more than $1.4 billion in 1972.

MEN'S AND BOYS' OUTERWEAR

The men's and boys' outerwear industry includes establishments whose primary products are coats, suits, shirts, nightwear, separate trousers, and work clothing. Shipments of these products totaled $8 billion in 1971, accounting for 32 percent of total apparel industry shipments.

The men's and boys' outerwear industry—consisting of 3,513 establishments with an average employment of 127—achieves greater economies of scale than the overall apparel industry. Almost half of its workers are in establishments employing more than 250 compared with only 31 percent for the apparel industry.

More than a third of industry employment is in the South. Industry concentration and entry barriers are low. The top four and eight companies account for 22 and 33 percent, respectively, of total shipments. Annual capital expenditures of less than $200 per employee indicate that production still utilizes labor intensive methods.

First half 1972 bankruptcies totaled 12 with $20 million liabilities, compared with annual 1971 levels of 28 failures involving $28 million in liabilities.

Output Recovers, Price Gains Slow

The value of shipments increased 13 percent in 1971, after a 2-percent decline from 1969 to 1970. Production of suits, coats, nightwear, sweaters, sport shirts, and work pants recovered in 1972, after their output decreased in 1969–71. Dress and sport trousers, including dungarees, and dress and work shirts showed further 1972 production gains on top of increased output during 1969–1971.

Men's and boys' apparel spending grew nearly 10 percent in 1972 to $18 billion, after averaging 6-percent annual growth in 1969–71. Higher spending led to greater output since men's and boys' outerwear wholesale prices rose only 2 percent in 1972 after averaging 3.7 percent between 1967–71.

Because of faster rising unit labor costs, tailored suit and coat prices rose faster than nontailored sportswear. Suit and coat workers received 7-percent wage increases in 1972, an average of $3.26 per hour compared with wage increases of 5 percent in other men's outerwear industries to $2.28. Sportswear production is more mechanized with newer technologies, reducing the need for hand tailoring.

Suit and coat industry employment fell 1 percent to 107,000 in 1972, despite an increase in production. Men's furnishings industry employment gained 2 percent, reaching 385,000 in 1972 and output gained 3 percent due to sportswear growth. Consumers have traded down or replaced tailored suits and coats with less expensive but fashionable sportswear. Suit and coat employment decreased 16 percent from 1967 to 1971 and output declined 24 percent. In contrast, furnishings employment grew 3 percent from 1967 to 1971 as sportswear output grew 10 percent. Increased 1972 demand in both industries caused average hours worked to increase fractionally to 36.6 hours per week.

Men's and boys' outerwear imports, after averaging 25-percent growth a year between 1967–71, showed significantly slower 1972 growth. Import growth patterns in 1972 reflected consumer prefer-

1971 Profile

Men's and Boys' Shirts and Nightwear

SIC code	2321
Value of shipments (millions)	$1,816
Number of establishments	692
Employment (thousands)	119
Compound annual average rate of growth, 1967–71 (percent):	
Value of shipments (current dollars)	5
Employment	−1
Exports (current dollars).	−2
Imports (current dollars).	26
Major producing areas	Southeastern States

1971 Profile

Men's and Boys' Separate Trousers

SIC code	2327
Value of shipments (millions)	$1,858
Number of establishments	647
Employment (thousands)	85
Compound annual average rate of growth, 1967–71 (percent):	
Value of shipments (current dollars).	13
Employment	3
Exports (current dollars).	−20
Imports (current dollars).	14
Major producing areas	Eastern States

1971 Profile

Men's and Boys' Outerwear, n.e.c.

SIC code	2329
Value of shipments (millions).	$735
Number of establishments	547
Employment (thousands)	41
Compound annual average rate of growth, 1967–71 (percent):	
Value of shipments (current dollars).	2
Employment	−1
Major producing areas	Eastern States

Men's and Boys' Outerwear Trends 1967–71

[In millions of dollars except as noted]

SIC code	Industry and economic indicator	1967	1968	1969	1970	1971
231	Men's and boys' outerwear:					
232	Value of shipments, industry	6,325	6,832	7,229	7,055	7,995
	Total employment (thousands)	495	495	500	496	494
	Value added	3,076	3,420	3,566	3,532	4,134
	FRB production index (1967=100)	100	103.2	107.4	100.2	98.7
	Value of imports	161.5	216.7	283.2	346.3	392.6
	Value of exports	48.1	54.7	78.3	67.6	72.2
	Wholesale price index (1967=100)	100	103.6	108.1	112.5	115.5
2311	Men's and boys' suits and coats:					
	Value of shipments, industry	1,912	2,146	2,252	1,912	1,876
	Total employment (thousands)	128	131	132	119	109
	Value added	1,047	1,196	1,241	1,034	1,026
	Value of shipments, product	1,485	1,601	1,652	1,518	1,460
	FRB production index (1967=100)	100	105.2	107.2	80.6	76.3
	Value of imports	25.9	43.7	64.1	87	84.2
	Value of exports	5.2	4	6	4.1	4.3
	Wholesale price index (1967=100)	100	106.3	115	122.4	129.2
2321	Men's and boys' shirts and nightwear:					
	Value of shipments, industry	1,488	1,511	1,631	1,679	1,816
	Total employment (thousands)	123	120	116	121	119
	Value added	704	734	782	810	958
	Value of shipments, product	1,274	1,364	1,315	1,379	1,519
	Value of imports	98.6	126.5	161.1	192.4	249.0
	Value of exports	16	15.4	15.3	14.4	15.7
	Wholesale price index (1967=100)	100	102	106.1	109.2	110.6
2327	Men's and boys' separate trousers:					
	Value of shipments, industry	1,132	1,237	1,367	1,447	1,858
	Total employment	77	80	82	83	85
	Value added	542	611	642	729	912
	Value of shipments, product [1]	927	1,034	1,121	1,181	1,375
	Value of imports	34.1	42.7	52.8	59.6	56.3
	Value of exports	24.4	10.9	14.2	13.6	19.6
	Wholesale price index (1967=100)	100	101.9	104.5	106.2	109.7
2328	Men's and boys' work clothing:					
	Value of shipments, industry	1,155	1,230	1,294	1,368	1,237
	Total employment (thousands)	84	81	83	83	86
	Value added	465	549	576	636	607
	Value of shipments, product	830	882	921	1,028	1,499
	Value of imports	.6	1.2	1	1.2	1.6
	Value of exports	1.8	23.6	42.2	34.9	31.8
	Wholesale price index (1967=100)	100	103.2	106.3	111.3	114.3
2329	Men's and boys' clothing, not elsewhere classified:					
	Value of shipments, industry	678	708	685	649	735
	Total employment (thousands)	43	40	40	40	41
	Value added	318	330	325	323	362
	Value of shipments, product	414	453	454	444	434

[1] Includes only SIC 23271, dress and sport trousers.

Source: Bureau of the Census, Bureau of Labor Statistics, and Office of Textiles.

ences for knits and a limited recovery of cottons. Man-made fiber imports of knit shirts and coats gained; nightwear, woven suits, and trousers declined. Imports of cotton knit shirts, woven shirts, trousers, and sweaters increased.

Outerwear exports rose 7 percent annually between 1967 and 1971 even though most menswear exports declined over the period. Work clothing exports increased 115 percent annually during this period as increasing quantities of cut apparel fabric were shipped abroad for sewing and assembly. Completed products were returned to the United States with duty paid only on foreign labor added. Such foreign sewing operations are increasing for many apparel products to reduce labor costs.

Imports of men's outerwear totaled $399.2 million in 1971, compared with $72.2 million in exports. The balance-of-trade deficit grew from $113.4 to $327.0 million between 1967–71 but slowed in 1972.

Knits' Rapid Growth

Man-made fiber knit fabric properties such as elasticity, wrinkle recovery, ease of care, and diversity of surface textures have combined with rapid knitting technological advances to increase knit fabric consumption in male outerwear. With the emphasis on informal manmade fiber apparel, knitwear captured 35 to 40 percent of the men's outerwear market.

Although double knit fabric consumption dominated male outerwear knits in 1971, the market share is currently falling in favor of faster growing warp knits. Textured polyester yarn is the dominant men's wear knitting yarn. Increasing popularity of polyester knits, along with other man-made fiber knitting yarns, may further increase the man-made fiber share of the male outerwear market.

1971 Profile

Men's and Boys' Suits and Coats

SIC code	2311
Value of shipments (millions)	$1,876
Number of establishments	865
Employment (thousands)	109
Compound annual average rate of growth, 1967–71 (percent):	
Value of shipments (current dollars).	−0.5
Employment	−4.0
Exports (current dollars)	−17.0
Imports (current dollars)	34.0
Major producing areas	Middle Atlantic States

1971 Profile

Men's and Boys' Work Cothing

SIC Code	2328
Value of shipments (millions)	$1,237
Number of establishments	457
Employment (thousands)	86
Compound annual average rate of growth, 1967–71 (percent):	
Value of shipments (current dollars)	2
Employment	1
Exports (current dollars)	115
Imports (current dollars)	30

WOMEN'S AND MISSES' OUTERWEAR

Shipments of the women's and misses' outerwear industry, whose chief products are blouses, dresses, suits, coats, slacks, and skirts, were $7.7 billion in 1971, or 31 percent of all apparel industry shipments.

The dress sector accounts for 50 percent of industry value added; blouses, 13 percent; and suits, skirts, and coats combined, 21 percent.

Small Establishments Numerous

The industry consists of 8,246 establishments with an average employment of 50. Industry consolidation continued in 1972 resulting in 450 fewer establishments than a year earlier. Middle Atlantic region establishments account for approximately 50 percent of employment. Industry employment of 391,000 in 1972 was 5 percent below the previous year and 7 percent below 1967. Employment declines in 1972 were partially offset by a small increase in average weekly hours to 33.8.

New entries frequently come into the industry with little capital. Approximately 70 percent of the establishments employ fewer than 50 people and annual capital spending currently represents $170 per employee. Intense competition with regard to price, fashion, and quality largely reflects the industry's low concentration ratios of 11 and 17 percent, respectively, for the largest four and eight concerns. Competition often results in changing products rather than price to keep costs in line with constant "popular price points."

Highly dependent on fashion, the industry historically has a high failure rate. There were 78 bankruptcies with liabilities totaling $15 million during the first half of 1972, a somewhat higher rate than in the full year of 1971 when 118 failed with $26 million in liabilities.

Output Increases Outpace Price Gains

Increased shipments of women's outerwear in 1972 largely represented production gains contrasted with the annual "price" gains of 4 percent from 1967 to 1971. Women's outerwear production increased in 1972, following declines in the previous 3 years.

Production increases in 1972 resulted from slower import growth and increased consumer spending on women's and children's apparel.

Average industry price increases of 2.5 percent annually from 1967 to 1971 slowed to less than 2 percent in 1972. Wholesale prices for women's blouses, coats, and suits in 1972 were stable after an average annual growth of 4 to 6 percent from 1967 to 1971, while prices of sportswear and dresses in 1972 maintained the 2 percent 1967–71 average annual growth.

Hourly earnings in 1972 increased 4 percent to $2.77, slightly below the 5 percent gains in 1967–71. Higher wage costs were partially offset by productivity gains in 1972.

Slower Import Gain

Imports of women's and misses' outerwear totaled $255.2 million in 1971 compared with only $20.1 million in exports. The 25-percent average annual import growth from 1967–71 was mainly responsible for the increase in the trade deficit from $89.6 million in 1967 to $235.1 million in 1971.

In 1972, import growth of man-made fiber ladies' apparel was slowed by the bilateral agreements. Knit imports rose and woven apparel declined. Cotton imports showed only a small increase.

Manmades and Knits Grow

Fabric consumption rose in 1972 because of increased output and longer dress lengths. Knit consumption in 1972 increased rapidly due to rising popularity of informal and leisure clothing.

Following a 27-percent growth in 1967–71, manmade fiber consumption is expected to further increase its current 65 percent market share. Consumption growth of textured polyester and nylon knit yarn is anticipated. Cotton's share of women's outerwear fiber consumption dropped to 29 percent of the total following a 16-percent decline in cotton consumption from 1967 to 1971.

Women's, Misses', and Juniors' Outerwear Trends 1967–71

[In millions of dollars except as noted]

SIC Code	Industry and economic indicator	1967	1968	1969	1970	1971
233	Women's, misses', and juniors' outerwear:					
	Value of shipments, industry	6, 534	6, 802	7, 234	7, 157	7, 692
	Total employment (thousands)	421	425	434	430	428
	Value added	3, 182	3, 371	3, 589	3, 593	3, 808
	FRB women's outerwear production index	100	97. 2	95. 8	91. 3	93. 3
	Value of imports [1]	105. 0	124. 7	167. 1	210. 4	257. 3
	Value of exports	15. 4	18. 1	21. 9	22. 3	20. 1
	Wholesale price index (1967=100)	100. 0	102. 8	106. 0	109. 1	110. 0
2331	Women's, misses', and juniors' blouses:					
	Value of shipments, industry	727	821	948	930	964
	Total employment (thousands)	53	52	51	48	45
	Value added	384	424	477	441	420
	Value of shipments, product	578	615	641	677	709
	Value of imports	74. 9	85. 3	119. 0	153. 0	183. 3
	Value of exports	1. 4	1. 5	3. 3	3. 2	2. 0
	Wholesale price index—blouses, chiefly manmade fibers (1967=100).	100. 0	106. 3	118. 6	122. 4	118. 3
2335	Women's misses', and juniors' dresses:					
	Value of shipments, industry	3, 086	2, 316	3, 472	3, 366	3, 850
	Total employment (thousands)	199	203	204	207	208
	Value added	1, 588	1, 686	1, 784	1, 731	1, 960
	Value of shipments, product	2, 010	2, 147	2, 172	2, 101	2, 312
	Wholesale price index—dresses, chiefly manmade fiber (1967=100).	100. 0	104. 2	108. 7	115. 5	111. 4
2337	Women's misses', and juniors' suits, skirts, and coats:					
	Value of shipments, industry	1, 776	1, 759	1, 749	1, 605	1, 586
	Total employment (thousands)	89	87	85	80	79
	Value added	787	789	824	809	772
	Value of shipments, product	1, 257	1, 284	1, 295	1, 371	1, 317
	Value of imports	30. 1	39. 4	48. 1	57. 4	74. 0
	Value of exports	3. 0	3. 6	3. 7	3. 2	3. 7
	Wholesale price index—coats and suits (1967=100).	100. 0	103. 0	109. 7	116. 8	127. 4
2339	Women's, misses', and juniors' outerwear, not elsewhere classified:					
	Value of shipments, industry	944	1, 006	1, 065	1, 257	1, 292
	Total employment (thousands)	80	84	91	95	96
	Value added	423	471	504	613	657
	Value of shipments, product	612	666	673	725	850

[1] Includes only SIC 2331 and 2337.

Sources: Bureau of the Census, Bureau of Labor Statistics, and Office of Textiles.

1971 Profile

Women's, Misses' and Juniors' Outerwear, n.e.c.

SIC Code	2339
Value of shipments (millions)	$1,292
Number of establishments	1095
Employment (thousands)	96
Compound annual average rate of growth, 1967–71 (percent):	
Value of shipments (current dollars).	8
Employment	5
Major producing areas	Eastern States

1971 Profile

Women's, Misses' and Juniors' Dresses

SIC Code	2335
Value of shipments (millions).	$3,850
Number of establishments	4567
Employment (thousands)	208
Compound annual average rate of growth, 1967–71 (percent):	
Value of shipments (current dollars).	6
Employment	1
Major producing areas	Middle Atlantic States

1971 Profile

Women's, Misses' and Juniors' Blouses

SIC code	2331
Value of shipments (millions).	$964
Number of establishments	809
Employment (thousands)	45
Compound annual average rate of growth, 1967–71 (percent):	
Value of shipments (current dollars).	7
Employment	−4
Exports (current dollars).	9
Imports (current dollars).	25
Major producing areas	Middle Atlantic States

GIRLS' AND CHILDREN'S OUTERWEAR

The girls' and children's outerwear industry produces dresses, blouses, suits, skirts, playclothes, and coats. Shipments in 1972 remained near the 1971 level of $1.2 billion, accounting for 5 percent of all apparel industry shipments. Annual growth

1971 Profile

Women's, Misses' and Juniors' Suits, Skirts and Coats

SIC Code	2337
Value of shipments (millions).	$1,586
Number of establishments	1639
Employment (thousands)	79
Compound annual average rate of growth, 1967–71 (percent):	
Value of shipments (current dollars).	−3
Employment	−3
Exports (current dollars).	5
Imports (current dollars).	25
Major producing areas	Middle Atlantic States

of 1 percent since 1967 has been entirely due to price increases.

Establishments in the girls' and children's outerwear industry declined 7 percent from 1970 to 1972 to 1,130, with an average employment of 68. Sixty-eight percent of establishments have between eight and 100 employees. The highest failure rate is among the smallest establishments.

Total industry employment in 1972 declined slightly from 1971's level of 76,000 or 3 percent below the high of 78,400 in 1967.

Overall industry concentration is low despite some high product concentration ratios. The four and eight largest companies account for 17 and 25 percent, respectively, of industry shipments.

Shipments Mixed

From 1967 to 1971, shipments of girls' and children's blouses and shirts, dresses, coats, skirts, slacks, and jeans gained. However, shipments of sweaters, swimsuits, playsuits, and other play garments declined. Traditional children's styles appear to be losing markets to multiuse, informal children's wear adaptable to leisure activities.

More children's wear firms will probably shift production to the preteen and older markets unless fertility rates rise in the next several years.

Price Gains Slowed

Children's outerwear wholesale prices increased only 1 percent in 1972, compared with the average 5.2 percent annual gain from 1967 to 1971. The principal element in the 1967–71 price increases was the slow growth in productivity, primarily

1971 Profile

Girls', Children's and Infants' Dresses and Blouses

SIC code	2361
Value of shipments (millions)	$510
Number of establishments	534
Employment (thousands)	32
Compound annual average rate of growth, 1967-71 (percent):	
Value of shipments (current dollars).	0.7
Employment	-2.0
Major producing areas	Middle Atlantic States

1971 Profile

Girls', Children's and Infants' Coats and Suits

SIC code	2363
Value of shipments (millions).	$178
Number of Establishments	171
Employment (thousands)	10
Compound annual average rate of growth, 1967-71 (percent):	
Value of shipments (current dollars).	0.4
Employment	-2.0
Major producing areas	Middle Atlantic States

because of a lack of investment in new labor saving technology. Higher wages also were important in an industry where payrolls represent 55 percent of value added. Average industry hourly wages maintained the 1967-71 annual growth of 5.6 percent in 1972 to reach $2.43 per hour.

Imports totaling $596 million in 1971 dwarfed $30 million in exports. Imports averaged an annual 26-percent growth between 1967-71, spiraling the trade deficit from $226 million in 1967 to $566 million in 1971.—*D. F. Scott, Office of Textiles.*

1971 Profile

Girls', Children's and Infants' Outerwear n.e.c.

SIC code	2369
Value of shipments (millions)	$495
Number of establishments	414
Employment (thousands)	34
Compound annual average rate of growth, 1967-71 (percent):	
Value of shipments (current dollars).	2
Employment	2
Major producing areas	Eastern States

Girls', Children's, and Infants' Outerwear Trends 1967-71

SIC Code	Industry and economic indicator	1967	1968	1969	1970	1971
236	Girls', children's and infants' outerwear:					
	Value of shipments, industry	1, 128	1, 238	1, 291	1, 127	1, 184
	Value added	538	586	587	576	594
	Total employment (thousands)	78	79	77	75	76
	Value of shipments, product	1, 440	1, 493	1, 541	1, 521	NA
	Value of imports [1]	239. 7	330. 5	424. 1	440. 6	599. 0
	Value of exports	13. 2	15. 3	19. 3	21. 5	29. 9
	Wholesale price index (1967=100)	100. 0	103. 6	111. 3	119. 2	122. 4
2361	Girls', children's, and infants' dresses and blouses:					
	Value of shipments, industry	496	529	573	487	510
	Total employment (thousands)	34	35	34	34	32
	Value added	242	266	277	250	249
	Value of shipments, product	422	452	472	473	500
2363	Girls', children's and infants' coats and suits:					
	Value of shipments, industry	175	197	203	164	178
	Total employment (thousands)	11	11	10	9	10
	Value added	78	88	88	74	86
	Value of shipments, product	168	169	196	179	168
2369	Girls', children's and infants' outerwear not elsewhere classified:					
	Value of shipments, industry	456	512	515	477	495
	Total employment (thousands)	32	32	30	29	34
	Value added	217	233	222	252	259
	Value of imports [2]	239. 7	330. 5	424. 1	440. 6	599. 0
	Value of exports [2]	11. 2	12. 8	16. 6	19. 6	28. 0
	Value of shipments, product	429	420	401	378	395

[1] Includes only SIC 2369.

[2] Includes some men's and women's sweaters and miscellaneous wearing apparel.

NOTE.—NA = not available.

Source: Bureau of the Census, Bureau of Labor Statistics, and Office of Textiles.

CHAPTER 17

Chemicals and Allied Products

Shipments of $60 billion, an increase of more than 6 percent over 1972, are projected for chemicals and allied products in 1973. Growth during 1973 will equal the average annual growth of the industry in the last several years, but will be below the outstanding increase registered for 1972.

Chemical shipments in 1972 reached $56.4 billion, a 10-percent increase over 1971 and the best showing for this industry since 1968. Shipments of industrial chemicals, both organic and inorganic, were higher in volume and value. While drugs and plastics had a stellar year, improvement in soaps and detergents was more modest.

Industry volume has risen even faster than value of shipments. In 1972, the production index stood at about 145 (1967=100), 15 percent higher than at year-end 1971. Output in 1973 will continue to rise at a faster pace than the value of shipments, especially if price controls remain in effect.

Capital Expenditures High

Investment in new plant and equipment in 1972 totaled about $3.4 billion, about equal to 1971, with about 10 percent going into pollution control. Trade sources estimate that the value of environmental management facilities through 1971 was almost $1.4 billion. Estimates are that total investment by the chemicals industry in pollution control during the 1972-75 period will be about $600 million. This does not include the costs of maintenance of pollution control facilities, or costs of research and development for anti-pollution purposes. Research and development expenditures in 1972 will total about $2 billion—about $1.8 billion

Chemicals and Allied Products: Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Industry: [2]								
Value of shipments	42,148	48,270	49,253	51,409	56,400	10	60,000	6
Total employment (thousands)	841	883	878	845	870	3		
Production workers (thousands)	541	566	554	525	550	5		
Value added	23,550	27,453	27,946	29,050	NA			
Value added per production worker man-hour	$21.68	$23.85	$25.04	$27.58	NA			
Value of imports	958	1,231	1,444	1,612	1,980	23		
Value of exports	2,803	3,383	3,826	3,836	4,032	5		
Net favorable trade balance	1,845	2,152	2,382	2,224	2,052	−8		
Wholesale price indexes (1967=100)	100	100	102	104	104	0		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by Chemical and Allied Products Industry (SIC 28).

NOTE.—NA = not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Chemicals and Allied Products: Projections 1972–80[1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973[1]	Percent increase 1972–73	1980[1]	Percent increase 1972–80[2]
2812	Alkalies and chlorine	$800	8	$850	6	$1,000	2.9
2813	Industrial gases	715	4	760	6	1,270	7.4
2815	Cyclic intermediates	2,200	9	2,380	8	3,600	6.3
2816	Inorganic pigments	718	9	775	8	1,220	6.9
2818	Industrial organic chemicals, not elsewhere classified	8,800	11	9,800	11	16,300	8.0
2819	Industrial inorganic chemicals, not elsewhere classified	4,785	5	5,070	6	7,030	4.9
2821	Plastics materials and resin	4,875	10	5,330	9	8,720	7.5
2831, 2833, 2834	Pharmaceutical preparations	7,140	9	7,775	9	14,120	8.9
2841	Soaps and detergents	3,250	5	3,410	5	4,900	5.3
2844	Cosmetics and toilet preparations	3,860	8	4,170	8	7,100	8.0
2851	Paints and allied products	3,592	9	3,930	9	6,225	7.1

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

funded by chemical firms and $200 million from Federal grants.

Total employment in the chemicals industries decreased in 1971 and continued downward through the first part of 1972, recovering at year's end to about 870,000. Average weekly earnings of production workers rose less than 3 percent in 1972—among the lowest year-to-year increases—in part reflecting the effect of wage controls.

Trade Balance Grows Smaller

For the second successive year, the net favorable balance of exports of the chemical and allied industries shrank. Imports and exports both increased, but the import increase was much larger. The U.S. is slowly losing its share of the world chemical market. The net export balance, $2.22 billion in 1971 and $2.05 billion in 1972, is expected to fall to $2 billion in 1973, with the projected increase in imports three times that of exports.

Shipments of chemicals and allied products will reach $90 billion by 1980, with an average annual growth of about 6 percent, although rates of growth in the various chemical sectors will vary widely.—*T. P. Gillett, Office of Business Research and Analysis.*

INDUSTRIAL INORGANIC CHEMICALS

Shipments of inorganic chemicals in 1973 will advance 6 percent to $7.5 billion in continuing recovery from the slow performances of the 1969–71 period. Recovery in 1972 was of a similar magnitude. In growth industrial inorganics is the least dynamic segment of the major chemical industry sectors.

Chlor-Alkalis Turn-Around

Industry shipments of chlor-alkalis are expected to reach $850 million in 1973, a 6-percent gain over 1972 and a turn-around from the 1970–71 lows. Advances in the general economy in 1972 raised production and consumption for all products of the industry.

Until 1970, average growth in the industry's chlorine and caustic soda volume was over 9 percent per year (chlorine and caustic soda are coproducts from salt or brine). From 1965 to 1970, the chlorine output rate consistently exceeded 95 percent of capacity. Production and value of shipments for most products were down in 1970 and 1971. In the first 6 months of 1971, chlorine output declined to 86 percent of capacity. During that year, value of shipments for nearly all products declined. However, the price of caustic soda rose so high as a result of the decreased production that the value of shipments for the entire industry increased.

Chlorine Demand Surges

In 1972, chlorine output was 92 percent of capacity. Demand surged for its use in vinyl chloride as well as in the chlorinated hydrocarbons, titanium dioxide, and pulp and paper production. At the same time the use of chlorine for pesticide production declined. Caustic soda continued in short supply, even though output rose with chlorine production. The tight supply of caustic soda boosted shipments of soda ash, which can be substituted for caustic for some uses.

Despite the push from caustic soda, shipments of total soda ash and calcium chloride declined because of the shutdowns of Solvay-process plants. To offset the drop in soda ash manufacture, production of natural or mined sodium bicarbonate and soda ash was increased. Soda ash production from natural sources has been rapidly growing, with two additional plants commencing operations in 1972 and several additions expected in 1973. Expansion of mined soda ash, which is not included in this industry, and greater caustic soda output may ultimately ease the caustic soda shortage. The caustic soda supply must keep pace with alumina and aluminum production, a major user.

The chlor-alkali industry is highly competitive. Producers try to keep output high. There is little excess capacity. When the general economic up-

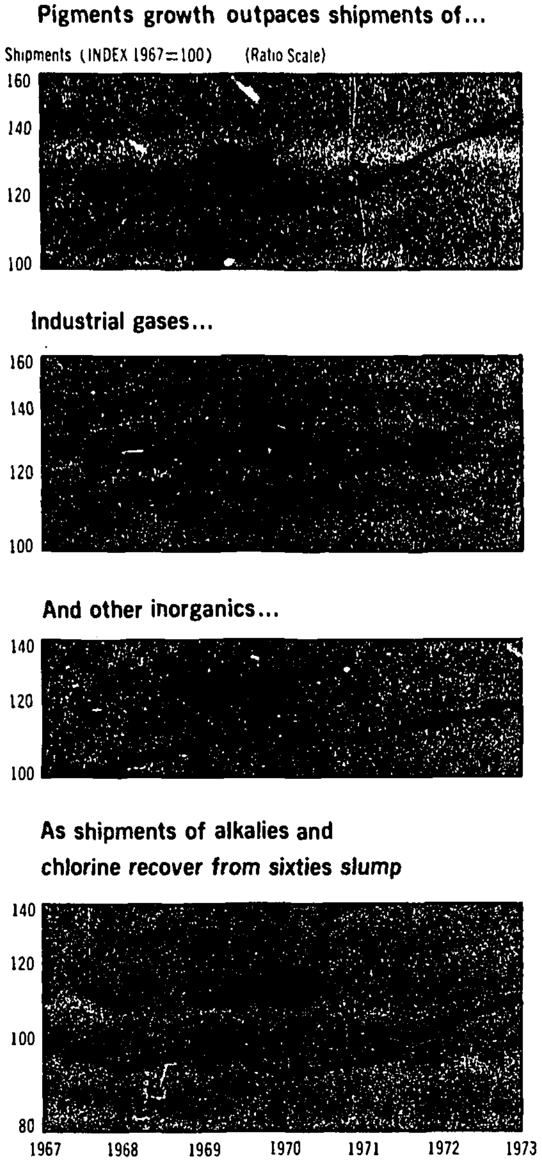
Industrial Inorganic Chemicals: Trends 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industrial inorganic chemicals, total:								
Value of industry shipments	6, 106	6, 076	6, 729	6, 591	7, 018	6	7, 455	6
Total employment (thousands)	123	125	120	112	110	−2		
Production workers (thousands)	79	80	77	71	75	6		
Value added	3, 432	3, 756	3, 786	3, 662	NA			
Value of imports	199	286	376	403	474	18	528	11
Value of exports	457	579	640	748	725	−3	724	
Wholesale price index (1967=100)	100	105	105	108				
Alkalis and chlorine, SIC 2812:								
Value of industry shipments	720	688	660	740	800	8	850	6
Total employment (thousands)	19	16	15	14	14	0		
Production workers (thousands)	13	11	11	10	10	0		
Value added	419	378	360	360	NA			
Value added per production worker man-hour	$16. 44	$16. 43	$16. 83	$18. 38	NA			
Value of imports	6	4	5	7	9	29	9	
Value of exports	36	40	55	74	85	15	90	6
Industrial gases, SIC 2813:								
Value of industry shipments	589	679	665	683	715	4	760	6
Total employment (thousands)	10	10	8	9	9	0		
Production workers (thousands)	5	5	5	5	5	0		
Value added	401	500	485	496	NA			
Value added per production worker man-hour	$36. 12	$47. 63	$52. 18	$53. 33	NA			
Value of exports	4	5	5	6	7	17	8	14
Inorganic pigments, SIC 2816:								
Value of industry shipments	549	658	635	666	718	9	775	8
Total employment (thousands)	13	13	13	13	13	0		
Production workers (thousands)	9	10	9	9	9	0		
Value added	316	367	333	335	NA			
Value added per production worker man-hour	$17. 85	$18. 91	$17. 43	$17. 42	NA			
Value of imports	34	45	54	43	65	51	69	6
Value of exports	29	34	38	38	33	−13	36	9
Inorganic chemicals, not elsewhere classified, SIC 2819:								
Value of industry shipments	4, 248	4, 663	4, 769	4, 566	4, 785	5	5, 070	6
Total employment (thousands)	81	86	84	76	74	−3		
Production workers (thousands)	52	54	52	48	47	−2		
Value added	2, 295	2, 511	2, 608	2, 471	NA			
Value added per production worker man-hour	$21. 61	$22. 80	$24. 72	$25. 60	NA			
Value of imports	159	237	317	354	400	13	450	12
Value of exports	388	500	541	630	600	−5	590	−2

[1] Estimated.

NOTE.—NA=not available.



SOURCE Bureau of the Census and Bureau of Domestic Commerce

turn in 1972 strengthened prices and profits somewhat, producers' actual prices moved toward their listed price levels as discounts were eliminated. Controls have limited price increases, but the greater volume of sales has improved profits.

Pollution Problems

Like many others, this industry has had to face a number of environmental and pollution problems. Mercury-cell chlorine-caustic plants are complying with water and air pollution controls as well as with health and safety regulations for employees. A number of Solvay-process soda ash and calcium chloride plants have been closed. To reduce mercury pollution a number of other chlor-alkali plants are operating at less than optimum levels. Those mercury-cell plants are gradually being replaced with diaphragm-cell plants. The industry is also replacing graphite anodes with dimensionally stable metallic anodes in both mercury-cell and diaphragm-cell plants. Metallic anodes make operations more efficient and reduce power needs.

Production of more solid bead-form caustic rather than flake or solid forms is foreseen. Beads are easier to handle, store, and use. More chlorine will be produced from magnesium/magnesium chloride without the co-product caustic soda. Two plants for that process have recently been built, but production in one has been delayed because of low demand for magnesium. Chlorine consumers are also adding facilities to recycle chlorine, producing it from hydrochloric acid, in a new type plant by the Kel-chlor process. While production of large volumes of coproduct soda ash from oil-shale is being considered, this development is a number of years away.

Imports of chlor-alkalis are small. Exports to Latin America and Australia of liquid caustic soda for use in production of alumina continue at a relatively high rate. Solid caustic soda is also exported to lesser developed countries.

Industrial Gases Rise

Led by argon and nitrogen sales, shipments of

1972 Profile

Inorganic Chemicals

SIC code	2819
Value of industry shipments (million).	$4,785
Number of establishments	718
Total employment (thousands).	74
Exports as a percent of product shipments.	12.5
Imports as a percent of apparent consumption.	8.7
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	2.4
Value of exports (current dollars).	9.1
Value of imports (current dollars).	20.0
Employment	1.8
Major producing areas	North Central, South Atlantic, and West region

industrial gases in 1973 will increase to $760 million, 6 percent over 1972.

New uses for industrial gases, particularly in the pollution area, have not been accompanied by significant sales increases. The increased consumption of its established uses is responsible for the gains in shipments. Use of oxygen in municipal or industrial discharge treatment is not yet widespread. Pumping oxygen into rivers and streams to speed bacterial cleansing has not contributed substantially to sales, and the recent experiment of inflating passenger tires with nitrogen instead of air was a commercial blowout. Oxygen use for metal processing increased with the rise in steel and other metal production.

Nitrogen sales are increasing in the food freezing and food transportation fields. Argon sales for light bulbs and as a welding atmosphere are gaining. Instead of declining, as expected, use of carbon dioxide by the beverage, food freezing, and transportation industries has risen sharply. Sales of acetylene decreased in 1972, in contrast to overall industry performance.

Continued growth in volume and value of shipments is expected in 1973, except possibly for acetylene. Sales of hydrogen, used mainly for military and aerospace purpose, will probably not change appreciably.

A major new use for argon and oxygen involves their simultaneous injection into a refining vessel separate from the arc furnace for the manufacture of stainless steel. The process is reported to increase production and cut raw materials costs, and many stainless steel plants have converted to it.

Employment in this industry has decreased slightly over the past 5 years as volume of shipments has increased, indicating productivity gains.

There are no imports of industrial gases and exports are minimal.

Inorganic Pigment Sales

Shipments of the inorganic pigments industry are expected to reach about $775 million in 1973, up 8 percent from 1972.

Inorganic pigments are natural or synthetic powders, principally used in paints to provide hiding and color, increase durability of coatings and inhibit corrosion or control gloss properties. There are extender pigments which do not provide hiding but are used in part to reduce cost and in part because of other advantages, such as viscosity control and greater abrasion resistance. Some pigments are utilized for purposes other than as paint ingredients.

While about 50 percent of the zinc oxide sold is consumed in the manufacture of rubber, other important uses include photocopying, pharmaceuticals and cosmetics, agriculture and ceramics. Shipments of zinc oxide in 1971 amounted to 235,000 short tons, 7 percent higher than 1970. Because of increased demand and a strike at a major plant, zinc oxide was in short supply in 1972.

Among the pigments with nonpaint applications are litharge and red lead, consumed in large

1972 Profile

Alkalies and Chlorine

SIC code	2812
Value of industry shipments (million).	$800
Number of establishments	44
Total employment (thousands).	14
Exports as a percent of product shipments.	10.6
Imports as a percent of apparent consumption.	1.2
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	2.1
Value of exports (current dollars).	18.7
Value of imports (current dollars).	8.4
Employment	6.0
Major producing areas	North Central, South Atlantic, and West region

1972 Profile

Industrial Gases

SIC Code	2813
Value of industry shipments (million).	$715
Number of establishments	507
Total employment (thousands).	9
Exports as a percent of product shipments.	1.0
Imports as a percent of apparent consumption.	-------------------
Compound annual average rate of growth 1967–1972 rent (percent):	
Value of shipments (current dollars).	3.8
Value of exports (current dollars).	11.8
Employment	1.8
Major producing areas	North Central, South Atlantic, and West region

amounts for storage batteries. Synthetic iron oxides are sold for ferrites used in the manufacture of electronic equipment, and antimony oxide is used for its flame-retardant properties.

TiO_2 Still Leader

Titanium dioxide (TiO_2) remains the leading product of the inorganic pigments industry, accounting for over 50 percent of the industry's sales. Over half the annual supplies of TiO_2 go into coatings. Other important uses are in paper, plastics, rubber, textiles and printing inks. In 1972, supplies of TiO_2 were inadequate to meet demand, reversing the abundance and lower prices prevailing the previous year. Demand is expected to remain strong in 1973.

Research and development to improve pigment properties is a continuing project for the firms in this industry. In addition, efforts are being directed to disposal of wastes generated in producing pigments.

Miscellaneous Inorganics

The value of industry shipments of miscellaneous inorganic chemicals is projected to reach a record high of approximately $5.1 billion in 1973, a 6-percent increase over 1972.

Inorganic building block chemicals—sulfuric acid, phosphoric acid, phosphorus, ammonia, nitric acid, hydrochloric acid, alumina, and intermediates used for producing other products—continue to grow in volume with the general economy. Industry output and sales were generally strong throughout 1972, as construction activity, auto output and agricultural production increased.

Operating rates for most products are expected to move well above 85 percent of capacity in 1973. Product categories that are expected to show substantial gains are anhydrous ammonia and the nitrogen compounds; inorganic acids, particularly sulfuric, phosphoric, nitric and hydrochloric (hydrofluoric will show some decline due to reduced demands for fluorocarbon and aluminum use and because of imports from Canada); inorganic catalysts and radioactive compounds. Continued declines are expected for phosphorus and some of the industrial phosphates, especially those used for detergents and petroleum. Declines are also expected for sodium metal and bromine, used for gasoline additives, and for some of the metal salts. Sulfur recovered from byproduct sources continues to grow faster in output and use than mined sulfur, mainly because it is cheaper.

1972 Profile

Inorganic Pigments

SIC code	2816
Value of industry shipments (million).	$718
Number of establishments	100
Total employment (thousands).	13
Exports as a percent of product shipments.	4.5
Imports as a percent of apparent consumption.	8.7
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	5.5
Value of exports (current dollars).	2.6
Value of imports (current dollars).	13.8
Employment	0
Major producing areas	South, Middle Atlantic, and North Central

Profits Rising

Profit margins of the industry increased in 1972 and are expected to do likewise in 1973. Some prices increased because of term-limited pricing (TLP) agreements made by a number of large firms with the Price Commission.

The historical problems of excess capacity and price cutting have caused a reluctance to expand in some product areas. Much capital spending by this industry is going for environmental cleanup rather than capacity expansion. Nevertheless, supply and demand are expected to be in better balance in 1973. Where profit margins have been improving, future expansions will be possible.

Foreign Trade Trend Deceptive

Export and import trade for inorganic chemicals accounts for more than 10 percent of the total value of industry shipments. Because of their nature, many products do not move in foreign trade. Shipment of low-cost bulky items with high freight costs or susceptibility to corrosion is impracticable.

For many of the miscellaneous inorganic chemicals, tonnage volume exports have trended downward.

The value of imports is increasing twice as fast as exports. Since this trend is likely to continue, the favorable trade balance in inorganic chemicals will disappear. While overall exports are estimated to have declined in value in 1972, increases probably occurred in exports of catalysts and radioactive substances. In those, the United States has been an innovator and major supplier. Export demand for some products has been reduced because foreign countries are now manufacturing their own supplies. In some cases, U.S. firms wanting to continue operations must establish plants overseas.

Imports will probably continue to increase. Shipping inorganic chemical materials from nearby countries to some areas of the United States often costs less than moving them domestically. Examples are anhydrous ammonia, alumina, hydrofluoric acid, sulfur, potash, and potassium compounds.

Growth Prospects Good

By 1980, overall shipments of all industrial inorganic chemicals should reach $10.6 billion. The value of shipments of chlor-alkalis will increase at a 2.9-percent average annual rate, but growth in volume of shipments will be only 2.5 percent.

Industrial gases will enjoy an average growth of 7.4 percent yearly to $1.3 billion, with oxygen, nitrogen and argon sales leading the way.

Industry shipments of inorganic pigments are expected to exceed $1.2 billion in 1980, advancing at an average annual rate of 7 percent. The demand for coloring materials should continue to increase, and very likely will place strains on supplies of raw materials.

Miscellaneous inorganic chemicals should match the country's general growth. The value of industry shipments and product shipments are projected to exceed $7 and $6 billion, respectively, with growth averaging 4.9 and 5.0 percent a year between 1972 and 1980. For this mature industry, growth in value and tonnage has declined because more and more inorganic chemicals are produced and used captively.—*T. P. Gillett, Office of Business Research and Analysis.*

INDUSTRIAL ORGANIC CHEMICALS

Shipments of industrial organic chemicals industries should exceed $12.2 billion in 1973, compared with $11 billion in 1972, growing more than 10 percent for the second consecutive year. These chemicals are made from raw materials such as petroleum, coal tar, fats and oils, cellulose, and agricultural products. They embrace two industry groups: Cyclic intermediates, or dyes, organic pigments, and coal tar crudes, and acyclic intermediates, or miscellaneous industrial organic chemicals.

Cyclic Intermediates' Growth Mixed

Reflecting strong demand for chemical building blocks for manmade fibers, plastics and other products, and moderate demand for intermediate chemicals used for dyes as well as dyes and toners, shipments of cyclic intermediates will increase 8 percent over 1972 to $2.4 billion in 1973.

The industry's products consist largely of hundreds of intricate intermediate chemicals derived from benzene, toluene, xylene and other cyclics, which it uses to make dyes and pigments. Also produced are other large volume bulk cyclic chemicals such as styrene monomer, phenol, phthalic anhy-

Industrial Organic Chemicals, n.e.c.: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971[P]	1972[1]	Percent increase 1971–72	1973[1]	Percent increase 1972–73
Industry:[2]								
Value of shipments	6, 378	7, 253	7, 374	7, 953	8, 800	11	9,.800	11
Total employment (thousands)	95	102	102	102	104	2		
Production workers (thousands)	62	66	65	64				
Value added	3, 575	3, 977	3, 975	4, 298	NA			
Value added per production worker man-hour	$28. 29	$28. 94	$29. 89	$33. 3	NA			
Product:[3]								
Value of shipments	5, 539	6, 356	6, 397	6, 900[1]	7, 700	12	8, 600	12
Value of imports	125. 8	151. 5	153. 7	141	165	17	180	10
Value of exports	530. 5	664. 7	759. 6	721	800	11	880	10

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the industrial organic chemicals, n.e.c. industry (SIC 2818).
[3] Includes value of shipments of industrial organic chemicals made by all industries.
[P] Preliminary.
NOTE.—NA = not available.
n.e.c. = not elsewhere classified.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Cyclic Intermediates: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	1,597	1,800	1,792	2,030	2,200	8	2,380	8
Total employment (thousands)	30	31	30	30	31	3		
Production workers (thousands)	20	21	20	20	20	0		
Value added	730	841	860	992	NA			
Value added per production worker man-hour	$17.49	$19.19	$20.77	$23.60	NA			
Product: [3]								
Value of shipments	1,654	1,896	1,942	2,050 [1]	2,240	9	2,430	8
Value of imports	100.1	166.0	180.0	255	280	10	330	10
Value of exports	181.7	238.1	294.1	238	255	7	270	6

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the cyclic intermediates industry (SIC 2815).
[3] Includes value of shipments of cyclic intermediates made by all industries.
P Preliminary.

NOTE.—NA=not available

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

dride—used to manufacture plastics—man-made fibers, detergents and a large number of specialty chemical products such as rubber processing chemicals, plasticizers, medicinals, surface-active agents, resins, flavor and perfume chemicals, and pesticides and related products.

Growth in demand for dyes has resulted from increased textile fiber consumption, although larger imports of dye intermediates and dyes have limited the growth of domestic production. Advances in manmade fiber technology have encouraged development of new dyestuffs, especially modified basic dyes, fiber-reactive dyes, and optical brighteners. The U.S. consumer may now select fabrics in bright colors from dye combinations never before available.

1972 Profile

Cyclic Intermediates, Dyes, Organic Pigments (Lakes and Toners), and Cyclic (Coal Tar) Crudes

SIC Code	2815
Value of industry shipments (million).	$2,200
Number of establishments	200
Total employment (thousands)	31
Exports as a percent of product shipments.	11.3
Imports as a percent of apparent consumption.	14.1
Compound average rates of annual growth 1967–72 (percent):	
Value of shipments (current dollars).	6.2
Value of exports (current dollars).	7.0
Value of imports (current dollars).	22.9
Employment	0.7
Major producing areas	New Jersey, Louisiana-Texas

Employment in the cyclic intermediates industry has remained relatively stable in recent years—between 30,000 and 31,000. With increased capacity utilization, value added per production worker man-hour has increased at an average annual rate of 6.2 percent since 1967. However, gains in value added per production worker man-hour are below those of other chemical industries, because of the labor-intensive operations of dye production.

Continuing the rapid increases in imports following the Kennedy Round tariff reductions which began in 1968, cyclic intermediate imports are expected to advance 10 percent in 1973 from 1972 levels. While exports will probably increase about 6 percent to $270 million in 1973, they will still remain below the 1970 total of $294 million.

The unfavorable trade balance in cyclic intermediates, which first appeared in 1971, is expected to continue past 1973. Exports have slowed because of industry expansion abroad, which is meeting overseas demand for basic large volume chemical building blocks. Exports of specialty chemicals continue to grow.

Acyclic Intermediates Growing Rapidly

Shipments of acyclic intermediates are expected to increase to $9.8 billion in 1973, 11 percent over 1972 levels.

This industry segment includes the large-volume acyclic building blocks—ethylene, propylene, and butadiene—used for production of thermoplastic materials and synthetic rubber, and miscellaneous chemicals used in household and industrial products such as cleaners, paints, toilet preparations, cosmetics, process chemicals, solvents, and other specialties.

Miscellaneous chemical product groups include alcohols, glycols, ketones, glycerin and other polyhydric chemicals, nitrogenous chemicals, halogenated hydrocarbons, organic acids and derivatives, lubricating oil additives, gasoline additives, synthetic tanning materials, and cellulose derivatives. Other products manufactured by the industry are flavor and perfume materials, rubber processing chemicals and plasticizers.

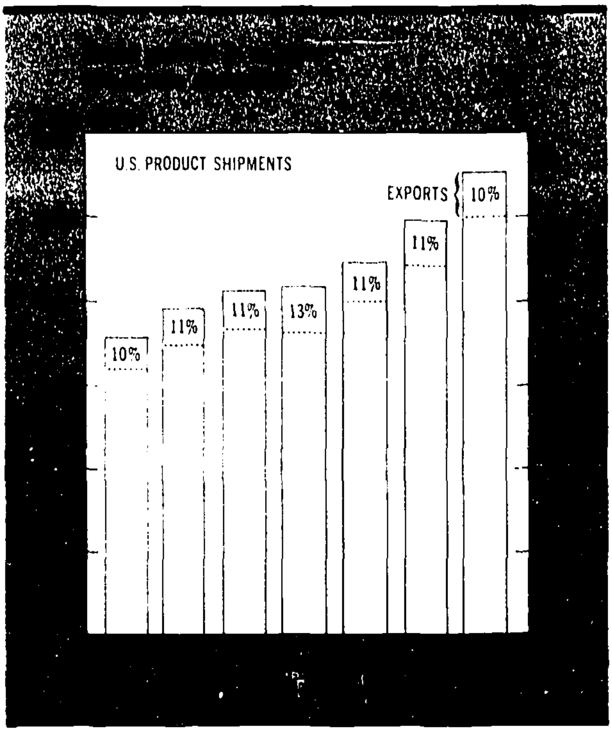
Miscellaneous organic chemicals industry shipments rose sharply in 1972 and are expected to continue upward in 1973, because of strong demand from such major consuming industries as textiles, home construction, and motor vehicles. Other significant markets for miscellaneous organic chemicals are manufacturers of cleaning preparations, drugs and pharmaceuticals, and personal care items such as soaps, perfumes, and hairsprays.

Significant increases occurred in 1972 in the production of such acyclic chemicals as butadiene, ethyl acetate, formaldehyde, methanol, pentaerythritol, propylene oxide, and vinyl acetate. Principal consuming industries for those chemicals are textiles, plastics, automobiles, homebuilding, maintenance services, metal and wood product fabrication, and the chemical industry itself. Plant capacity increased in 1972 following considerable

1972 Profile

Industrial Organic Chemicals, Acyclics

SIC code	2818
Value of industry shipments (millions).	$8,800
Number of establishments	500
Total employment (thousands).	104
Exports as a percent of product shipments.	10.4
Imports as a percent of apparent consumption.	2.4
Compound annual average rates of growth 1967–72 (percent):	
Value of shipments (current dollars).	6.8
Value of exports (current dollars).	8.5
Value of imports (current dollars).	5.6
Employment	1.8
Major producing areas	Texas, West Virginia, New Jersey



plant modernization and some construction of new plants. Prices for acyclic chemicals remained at about the 1967 level. Following modest gains from 1967 to 1970, value added per production manhour rose 11.5 percent from 1970 to 1971, reflecting higher operating levels and increased production efficiency.

Imports of acyclic intermediates are expected to grow 10 percent in 1973 over 1972, to $180 million. Exports will probably rise about 11 percent over 1972 and total about $880 million in 1973, reflecting a slight increase in the industry's continuing favorable trade balance. Despite some slight decline in prices, earnings have improved in the past 2 years. Higher sales have meant a higher ratio of use to capacity for acyclic chemicals companies.

Chemical manufacturers have made heavy foreign investments in pursuit of expanding overseas markets. Exports to American subsidiaries now account for over 20 percent of organic chemical sales of major chemical companies.

Raw Materials Problems

Raw material supplies, needed to meet projected growth in demand exceeding 10 percent a year, are of major concern to the organic chemicals industry. In the past, raw materials from natural gas and refinery operations have been surplus above energy needs, thus available at favorable prices.

Those materials include ethane and gas liquids from natural gas operations, as well as refinery gases, naphtha, gas oils, and other petroleum refinery products. During 1973, requirements of the organic chemicals industry will be about 6 percent of total petroleum demand.

Large supplies of natural gas liquids and petroleum byproducts in the United States in past years offered the chemical industry raw material cost advantages over foreign chemical industry. However, current natural gas shortages, and competitive demand for petroleum products for energy purpose, have led to price increases for the chemicals industry and reduced supplies of low-cost raw materials.

To enable the U.S. organic chemical industry to remain competitive in world markets, arrangements have been established to permit imports of raw material (petroleum stocks) at prices comparable to those paid by their foreign competitors.

Shipments—$20 Billion in 1980

Industrial organic chemical industry shipments of cyclic and acyclic intermediates are expected to grow at an average annual rate of 7.7 percent from $11 billion in 1972 to $20 billion in 1980. Major growth items will be intermediate chemicals for plastics and manmade fibers. A growing dependence on imports will result in a relatively slow growth for dye intermediates and dyes—*F. S. Magnusson, Office of Business Research and Analysis.*

PLASTICS MATERIALS AND RESINS

A record year is expected for the plastics materials industry in 1973, with shipments amounting to about $5.3 billion, a 9-percent increase over the $4.9 billion of 1972. Increased demand from all major markets—automobiles, housing, appliances and other durable goods—contributed to the high level of sales in 1972.

Varied Uses for Plastics

The industry consists of about 800 establishments producing plastic materials by chemical processing. A large portion of those materials is converted into plastic products by such mechanical operations as molding.

The versatility of plastic materials has brought the industry its rapid growth. Other materials long in use have been gradually replaced by plastics which offer better performance, frequently at lower cost. Plastics can be produced with the physical and chemical properties to meet the requirements of a specific use. Because of the special properties of plastics and the development of high-output processing methods, plastics are used by practically all industries. They compete with metal, wood, paper, glass, and one another.

The principal synthetic resins consumed are polyvinyl chloride, polystyrene, polyethylene, polypropylene, and phenolics. Other resins include alkyds, polyester, epoxy, polyurethane, silicones, acrylic, and polyvinyl acetate. In 1972, polyethyl-

Plastics Materials and Resins: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 p	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	3,473.9	4,199.1	4,286.3	4,446.5	4,875	10	5,330	9
Total employment (thousands)	70.6	74.6	77.6	73.2	72.9	0		
Production workers (thousands)	46.8	48.7	50.8	47.7				
Value added	1,635.1	2,063.6	2,146.3	2,115.2	NA			
Value added per production worker man-hour	$17.10	$20.35	$20.50	$21.52	NA			
Product: [3]								
Value of shipments	3,693.3	4,439.9	4,472.4	4,635 [1]	5,125	11	5,595	9
Quantity produced (million pounds)	13,793	18,676	19,210	19,800 [1]	22,525	14	24,100	7
Value of imports	61	99	123	132	160	21	170	6
Value of exports	473	590	653	657	660	1	715	8
Wholesale price indexes (1967=100)	100	90.7	90.7	88.9	88.9	0		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the plastic materials, synthetic resins and non-vulcanizable elastomers industry (SIC 2821).
[3] Includes value of shipments of plastic materials, synthetic resins and non-vulcanizable elastomers made by all industries.
p = Preliminary.

NOTE.—NA = not available.

Source: Bureau of the Census, Tariff Commission Bureau of Labor Statistics, Bureau of Domestic Commerce.

ene production amounted to more than 7 billion pounds; the other commodity resins—polystyrene and polyvinyl chloride—exceeded 3 billion pounds each, and polypropylene and phenolics production exceeded a billion pounds each.

Major industry markets for synthetic resins include packaging, construction, furniture, transportation, appliances, toys, and housewares. Resins are used as molding compounds, films, sheets, coatings, rods, tubes and adhesives.

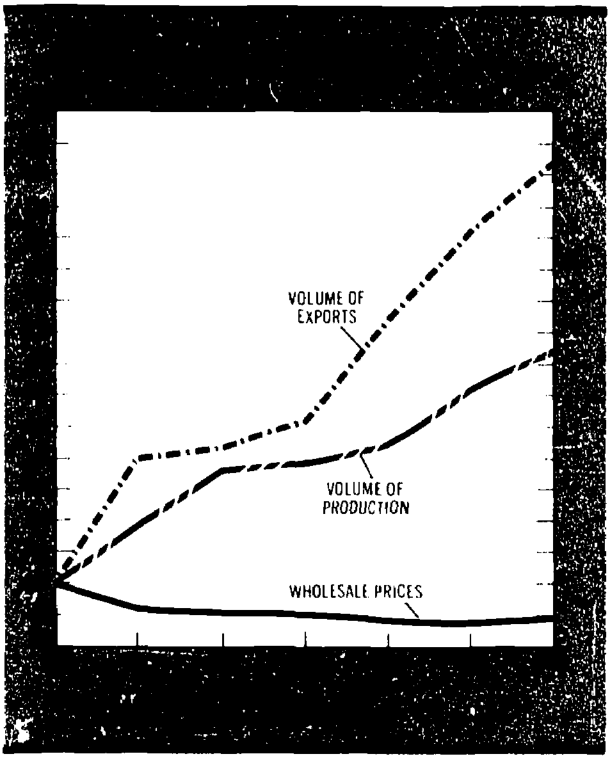
Supply Keeps Pace

Production of plastic materials has kept pace with rising demand. About 22.5 billion pounds of plastic materials were produced in 1972, 14 percent over 1971 levels. In 1973, production is expected to total 24 billion pounds. While production capacity for some of the volume resins may not be sufficient to meet future demand, capacity expansion is cautious, because of past experience with oversupply and price declines. Prices and profits began to improve during 1972.

Investment Return Low

Employment dropped 6 percent in 1971 to about 73,000, and remained at that level in 1972. The number of production workers increased slightly, and average hourly wages increased to $4.36 in 1972 from $4.09 in 1971.

Some prices increased in 1972 but overall price levels remained stable. Wholesale prices for plastic materials in 1972 were more than 10 percent below 1967 levels. Concern about low return on investment has discouraged spending on additional productive capacity.



1972 Profile

Plastic Materials, Synthetic Resins and Nonvulcanizable Elastomers

SIC code	2821
Value of industry shipments (million).	$4,875
Number of establishments	795
Total employment (thousands).	73
Exports as a percent of product shipments.	13
Imports as a percent of apparent consumption.	3.7
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	7.0
Value of exports (current dollars).	6.9
Value of imports (current dollars).	21
Employment	0.6
Major producing areas	South and West, Middle Atlantic, East North Central, and New England

Plastics Growth Sustained by R. & D.

Substantial sums are spent annually by the industry on research and development. Innovations are needed to increase the competitive edge of plastics against other materials. Although the introduction of new synthetic resins is slow, considerable effort is expended in formulating improved properties into existing plastics and finding new applications. Sales of plastic materials are usually supported by technical service.

Federal and State regulations raising ecological standards will place additional responsibilities on research in the years ahead. Concern about safety has given an impetus to the development of resins with such properties as flame retardance, low smoke generation, and high temperature resistance. Acrylics and polycarbonates are going into shatterproof windows. The transportation industry will purchase more plastics in 1973 to further automotive safety.

Research and development efforts have led to greater use of plastics in furniture for upholstery and for molded shapes, which can be produced more economically with plastics than with wood. More localities are accepting plastic piping for drains, waste, and vent systems. Foamed polyurethanes and other resins are increasingly used for insulation and similar applications.

Solving Environmental Problems

The many uses of plastics generate a conspicuous amount of refuse in such forms as discarded products and packaging materials. Although plastic products now contribute only about 2 percent of solid municipal wastes, their share is expected to rise. Various approaches are being taken to solve this problem. Current investigations center on development of biodegradable and photodegradable plastics, on incineration techniques, and recycling. Growth in plastics use could be hampered, especially in packaging applications, unless disposal problems are solved.

Rising costs to meet environmental regulations will probably affect the choice of raw materials, maintenance costs and length of service, life of operating plants. The competitive position of U.S. products in world trade may suffer unless all countries adopt pollution control standards.

Export Competition Is Keen

U.S. exports of plastic materials in 1972 were valued at $660 million. They are expected to increase 8 percent to about $715 million in 1973. Future gains may be at a slower pace as competition with European and Japanese producers for export markets becomes keener. Additional production capacity is being established in those areas and in developing countries.

Production of plastic materials in the European OECD countries (the non-socialist countries) increased by 13 percent from 10.2 million metric tons in 1969 to 11.6 million metric tons in 1970, with West Germany accounting for 37 percent of the total.

The United States remains the world leader in plastic materials production but ranked second behind West Germany in 1970 in exports. West Germany's exports amounted to $956 million in 1970 compared with $653 million for the United States, and $427 million for Japan. Other leading exporters were the Netherlands, United Kingdom, and France. Exports by the European OECD member countries amounted to $2.8 billion.

Imports of plastic materials by the European OECD countries totaled $2.5 billion in 1970, with West Germany's share amounting to $446 million, United Kingdom $266 million, the Netherlands $224 million, and France $306 million. Imports by the United States during the same year amounted to $123 million.

About 40 percent of U.S. exports are sold to European OECD member countries—approximately 30 percent to nonmembers, 20 percent to Canada, and 7 percent to Japan. U.S. participation in the plastic industries abroad has been substantial for many years through licensing arrangements, erection of plants and investments in affiliated companies.

Prospects for increasing U.S. exports remain favorable as the world's per capita consumption of plastic materials expands. Much of the growth for U.S. products is expected to come from sales of the specialty engineering resins.

Robust Expansion by 1980

Sales of the industry's products will be close to $9 billion by 1980, reflecting an average annual growth rate of about 7.5 percent per year. Increased residential housing, with corresponding demands for furniture, appliances and other home equipment will further stimulate sales of plastic materials. Automobiles will probably contain greater amounts of plastic. With increasing new applications for plastic materials, production of synthetic resins by 1980 will probably exceed 38 billion pounds. Raw material shortages may develop in the next several years, however, as petroleum reserves dwindle and competitive demands on petroleum increase—*David G. Rosse, Office of Business Research and Analysis.*

DRUGS AND PHARMACEUTICALS

With demand for medical care services escalating, drug industry shipments in 1973 are expected to soar to a record high of $8.7 billion. Expanding public and private health insurance programs combined with increases in the aged population and growing consumer awareness of medical advances should continue to stimulate strong demand for drug products and produce satisfactory profits from increased sales volumes.

Prescription Prices Being Posted

Although wholesale prices for drugs and phar-

Drugs and Pharmaceuticals: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	5, 302	6, 273	6, 793	7, 290	7, 946	9	8, 660	9
Pharmaceutical preparations [3]	4, 696	5, 566	6, 028	6, 371	6, 938	9	7, 555	9
Local employment (thousands)	118	125	131	135	132	−1		
Production workers (thousands)	66	70	72	69	71	3		
Value added	4, 073	4, 863	5, 204	5, 544	NA			
Value added per production worker man-hour	$31. 77	$34. 88	$36. 09	$40. 14	NA			
Value of imports	72	84	87	119	150	26	157	4
Value of exports	288	363	420	396	455	15	486	7
Wholesale price indexes (1967=100)	100. 0	99. 8	101. 1	102. 4	102. 6	0		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the drugs and pharmaceuticals industry (SIC 283).
[3] Includes value of shipments of pharmaceutical preparations only (SIC 2834).

[P] Preliminary.
NOTE.—NA = Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

maceuticals have remained relatively stable for the past several years, there is a likelihood that prices of many important drug products will decline under the impact of growing generic drug competition. In general, demand for prescription drugs is not influenced by price changes, for drugs prescribed by physicians are purchased regardless of price. However, the Price Commission's ruling in December 1971 calling for the mandatory posting of prices in retail pharmacies of the most frequently prescribed drugs now gives price-conscious consumers the opportunity to do comparison shopping and to have their prescriptions filled where prices are the lowest.

Mandatory price posting of frequently prescribed drugs also has been legislated in a number of States, and similar action is contemplated by other States as a measure calculated to lead to lower prices.

With mounting concern over the safety and efficacy of drugs, the Food and Drug Administration was instructed by a Federal District Court last October to remove from the market more than 100 drugs that have been found ineffective. In an effort to speed up the agency's work in carrying out the drug effectiveness requirements adopted by Congress in 1962, the FDA was also ordered to complete action on its review of the effectiveness of 3,600 prescription drugs within 4 years.

Profits High

With new product outflow slowed, the life of existing products has been prolonged, obviating the need for large marketing expenditures generally required to launch new products. As a result, profit margins have improved in some instances. Also, with fewer new products marketed than in the high output era of the fifties and sixties, medical practitioners rely on older specialties which produced acceptable results for them in the past.

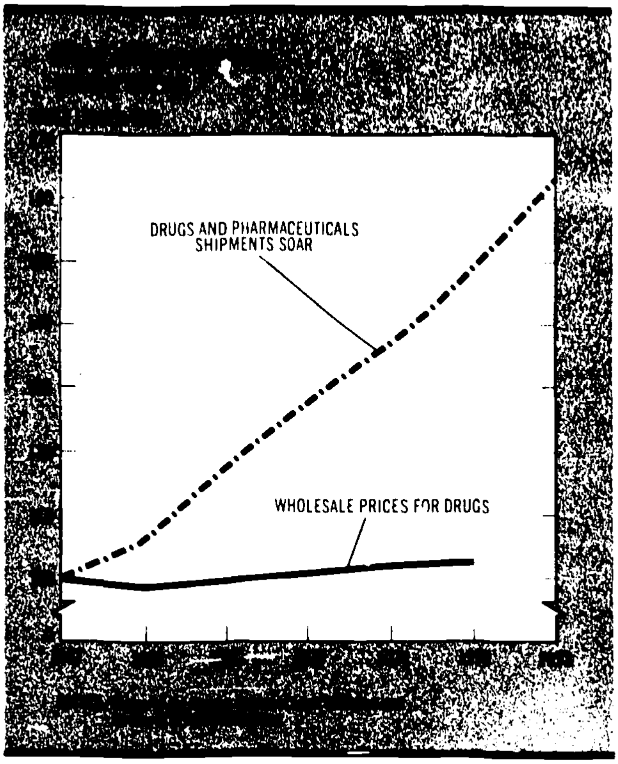
Although profit margins have declined to some extent since the late sixties, partly because a number of major drug patents have expired and partly because of increasing generic drug marketing, the industry's profit performance has been reassuring. In 1971, after-tax profits averaged 9.5 percent of sales, fractionally above a year earlier. In contrast, after-tax profits of all manufacturing averaged 4.1 percent of sales in 1971.

As a percentage of net worth, in 1971 the industry's after-tax profits averaged 20.4 percent, over 3 percent above the preceding year's average and more than double the 9.5 percent average for all manufacturing.

In 1972, aft r-tax profits will probably have averaged close to 10 percent of sales, based on the first-half earnings of a number of major drug concerns. This will be an improvement over 1971 and will graphically reflect the vibrant health of the industry whose after-tax profits in the decade of the sixties averaged 10.2 percent of sales.

R. & D. Expenditures Rising

Industry appropriations for research and development rose sharply all through the sixties, in-



creasing at an average annual rate of 10 percent during the decade. While the growth rate may not continue as high in the present decade, record R. & D. spending is expected.

In 1971, industry-financed R. & D. expenditures totaled $674 million, compared with $611 million a year earlier. Such expenditures were expected to total at least $730 million in 1972, and may advance to $765 million in 1973.

Reflecting the high level of spending on R. & D., many effective new drug products have been marketed in the last 2 years. In 1971, 15 new single chemical entities emerged from industry research laboratories. Among these are such agents as spectinomycin, an antibiotic found to be especially effective against stubborn strains of gonorrhea, whose rising incidence makes it a drug of special merit; minocycline, a semisynthetic derivative of tetracycline, whose principal value stems from its effectiveness in low doses against a broad range of infectious diseases; and cephalexin, a cephalosporin derivative indicated for severe respiratory and urinary tract infections.

In 1972, some notable new products included pyrantel pamoate, an anthelmintic; flucytosine, an anti-fungal agent; and megestrol acetate, a progestin used in endometrial carcinoma.

Industry research activity will continue strong in order to develop new drugs to treat a variety of illnesses. Recalcitrant diseases for which existing agents are palliative rather than curative include cancer, cardiovascular disorders, arthritis, virus diseases and diabetes. Major scientific breakthroughs in any of these problem areas could provide bonanzas for the innovating firms.

Balance of Trade Favorable

Although revenues of overseas subsidiaries of U.S. drug firms far exceed the value of domestic drug exports, drug exports continue to rise, maintaining levels at least three times those of imports. In 1972, drug exports were estimated at $455 million, and will probably reach $486 million in 1973 when the full impact of dollar devaluation—intended to strengthen the price competitiveness of U.S. products—should be evident. In 1971, exports dropped sharply only because of the prolonged dock strike which halted shipments.

Western European countries, which have purchased over 30 percent of U.S. drug exports in recent years, should continue as major customers, followed by western hemisphere countries, especially Canada and Mexico. Continuation of improved relations with the People's Republic of China, the U.S.S.R., and Poland may result in these countries becoming customers for U.S. drug exports.

In recent years, U.S. drug imports have been rising steadily, reaching an estimated $150 million in 1972, about 26 percent above year earlier levels. Only a modest rise to $157 million is anticipated in 1973, since dollar devaluation normally tends to limit imports.

Industry Prospects For 1980

Drug industry shipments are expected to soar to an estimated $15.8 billion in 1980, rising at an annual rate of 9 percent under the stimulus generated by a growing population and increased government participation in health care programs. Many legislators anticipate a broad restructuring of health care delivery designed to provide every American with comprehensive health maintenance and treatment benefits by the end of the decade. Since public funding of health care spending will probably increase in the next several years, a close watch on drug prices designed to limit increases in health costs is certain to trigger changes in marketing strategies, including intensified generic drug competition.

Drug firms probably will direct their major marketing thrust towards hospitals and nursing homes where most of the drugs under health insurance are likely to be dispensed. Steadily increasing sales to hospitals, nursing homes and the growing number of health maintenance organizations (group medical practices supplying comprehensive health care services for a fixed, prepaid fee) will result in more volume drug purchases at discounted prices. Such price concessions are not expected to undermine industry profitability since volume business will probably generate greater profits, even at reduced prices. As drug companies increase sales volumes, many fixed costs can be spread over a larger quantity of production, resulting in lower costs and higher profit margins.

Because people are living longer, the number of persons 65 years and over is expected to increase 14 percent by 1980. Since older persons generally are more susceptible to chronic ailments, spending on drugs for the senior citizenry will rise accordingly.

R. & D. for Curatives

In all likelihood, single new drugs coming out of industry research laboratories in the late seventies will be of greater therapeutic significance than those developed in the past several years. Emphasis is expected to be on the development of curative chemotherapeutic agents rather than on drugs that simply bring temporary relief or arrest disease symptoms. With the growing volume of business stemming from expanded private and public health insurance, the industry will be able to allocate greater resources for research and development. By 1980, spending for such purposes may well top the $1 billion mark.

World Markets Will Expand

Multinational U.S. drug firms are expanding their overseas operations in order to keep pace with expanding marketing opportunities. Revenues from overseas operations, currently estimated at 30 to 35 percent of the revenues of these firms, may rise to 50 percent by 1980.

U.S. exports should climb to $764 million by 1980 with growing worldwide demand for drug products.

Drug imports are expected to increase at an average annual rate of 4.4 percent, reaching $212 million by 1980. Major suppliers are expected to be West Germany, the United Kingdom and Switzerland. China and the U.S.S.R. may be significant customer and/or supplier countries by the end of the decade.—*J. A. Buck, Office of Business Research and Analysis.*

1972 Profile

Drugs and Pharmaceuticals

SIC Codes	2831,2833,2834
Value of industry shipments SIC 283 (millions).	$7,946
Number of establishments	1,300
Total employment (thousands).	132
Exports as a percent of industry shipments.	5.7
Imports as a percent of apparent consumption.	2.0
Net profits as a percent of net worth.	18.5
Compound annual average growth 1967–72 (percent):	
Value of shipments (SIC 283) (current dollars).	8.4
Value of exports (current dollars).	9.6
Value of imports (current dollars).	15.8
Employment	2.3
Major producing areas	Middle Atlantic and East-North Central States

SOAPS, DETERGENTS, AND CLEANING COMPOUNDS

Shipments by manufacturers in the soap and detergent industry are estimated to reach $3.3 billion in 1973, 5 percent above the previous year's $3.17 billion.

The value of product shipments, which include alkaline detergents and cleaners, household and nonhousehold soaps and synthetic detergents and scouring preparations is also expected to increase 5 percent, to more than $2.9 billion.

Employment, which had dropped to 30,000 in 1971, rebounded in 1972 to 32,000, a gain of nearly 7 percent. Production workers gained relatively more of the jobs, increasing 11 percent to 21,000 from 19,000 in 1971.

Profitability, measured by the ratio of net income to sales for a group of representative companies, increased fractionally to 4.9 percent in 1972 from 4.6 percent in 1971.

Synthetic Detergents Still Lead

Synthetic organic detergents continue to constitute the major portion of the industry's production, amounting to 62 percent of sales and surpassing soaps 2 to 1. There has been no major breakthrough in new detergent ingredients. However, the long list of surface-active agents produced by many manufacturers permits the detergent industry to formulate a wide variety of cleaning products.

About 5 billion pounds of household laundry detergent is produced each year. Commercial laundries use more synthetic detergents as demand for greater capacity makes the use of soap with specially softened water obsolete or uneconomical. Other detergent uses include institutional cleaning, building maintenance, cleaning of metal and metal products, cleaning of airplanes, buses, cars, and cleaning and sanitizing of dairies, food processing plants and equipment. Substantial quantities of detergents are exported.

Little Change in Soap Usage

Soap use has not increased significantly, despite environmentalists' attacks on phosphate-based detergents. Soap production continues to increase at a steady rate of 5 to 6 percent a year. Soap products formulated with "lime-soap dispersants" are not yet of commercial importance. World supplies of fats and oils are inadequate to support a very large increase in soap use. Existing waste-disposal facilities would be overburdened to process increased soap effluents, which require longer inplant retention time for biodegradation.

Industry Suppliers

Since most production involves only formulation operations, the industry is dependent on industrial chemical producers for its basic raw materials and on the glass, metal, paper, and plastics industries for packaging materials. Outlays for television network and spot advertising, to promote consumer items in highly competitive markets, continue high.

About half of this industry's production originates in the North Central region, although production establishments are located throughout the Nation.

Alkaline Detergents Grow Slowly

Home laundry detergents based on soda ash (washing soda) which were developed to replace phosphate-based detergents, have failed to gain the market share they were expected to take. Despite legislation banning phosphate-type detergents in a number of localities, soda ash laundry detergents now account for only 7 percent of this market instead of the hoped-for 15 percent.

Soaps and Other Detergents: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	2,593	2,889	2,989	3,021	3,170	5	3,330	5
Total employment (thousands)	30	31	31	30	32	7		
Production workers (thousands)	20	21	20	19	21	11		
Value added	1,404	1,543	1,660	1,728	NA			
Value added per production worker man-hour	$35.00	$38.09	$41.60	$41.60	NA			
Product: [3]								
Value of shipments, total	2,200.8	2,432.1	2,517	2,640 [1]	2,780	5	2,920	5
Alkaline detergents	319.4	367.4	438.5	482	510	6	540	6
Soaps:								
Nonhousehold	51.9	80.4	84.7	89	95	5	100	5
Household	332.0	364.7	1,353.5	371	390	5	410	5
Synthetic detergents:								
Household	1,235.4	1,366.9	1,362.8	1,458	1,530	5	1,600	5
Nonhousehold	140.8	164.8	171.9	184	195	6	205	5
Soap and other detergents not specified by kind	73.2	43.5	56.2	56	60	7	65	5
Value of imports	2.5	2.5	2.2	2.4	2.5	5	2.6	5
Value of exports	30.2	33.0	35.8	38.6	42	9	45	8
Wholesale price indexes (1967=100)	100.0	103.9	105.4	110.6	110.6			

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the soaps and other detergents industry (SIC 2841).
[3] Includes value of shipments of soaps and other detergents made by all industries.
[P] Preliminary.

NOTE.—NA = not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

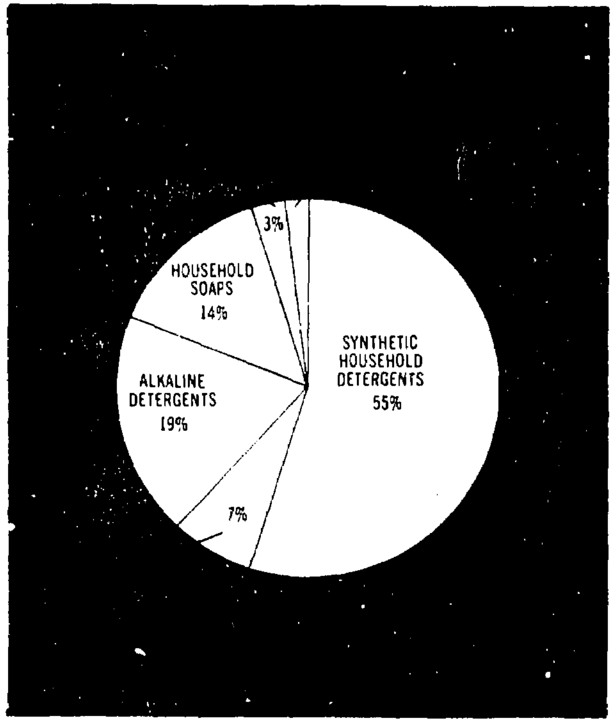
Soda ash detergents—as well as soap-based products—damage the flame-retardant finish required for small children's sleepwear under the Flammable Fabrics Act. The act requires that these garments withstand 50 washings without loss of flame retardance. Soda ash detergents and soap-based products build up deposits on and in the fabric after a few washings. The deposits reduce the retardant effect. Phosphate-based detergents allow flammability standards to be met.

Enzyme detergents are no longer considered a health hazard, but have not regained their popularity among consumers. While several presoak products containing enzymes continue to be sold, only a few detergents with enzyme content are found on market shelves.

Phosphate Controversy Cools

The role of detergent phosphates in eutrophication of certain waterways is no longer being stressed by environmentalists, although detergents contribute about half the phosphate loading of waste-water effluents. Most manufacturers have reduced the phosphate content of products to the arbitrary 8.7-percent limit established by a number of ordinances. They have substituted nonphosphate products where complete bans have been legislated.

The phosphate use controversy centers in the Chicago metropolitan area, where a ban on phosphate laundry detergents became effective on July 1, 1972. Some leading manufacturers and the industry's trade association are challenging the ban in the courts.



Modern technology makes it feasible to remove nearly all phosphates from waste waters. That may prove to be the best method to retard eutrophication.

Although a sharp drop in detergent retail sales has been reported in areas where bans have been instituted, housewives are shopping in neighboring areas to purchase their favorite brands of phosphate-based detergents.

The Food and Drug Administration ruled recently that nitrilo-triacetic acid (NTA) remains unacceptable as a detergent ingredient, despite new toxicological data on NTA offered by industry representatives. Many other substitutes for phosphates have been investigated and proposed for use, but none has yet reached the commercial formulation stage. The search continues.

Exports Growing

Exports of soaps and other detergents totaled more than $38 million in 1971, an increase of 8 percent over the previous year. Exports rose an estimated 9 percent in 1972 to $42 million, and are expected to increase further to about $45 million in 1973.

Imports, consisting primarily of high priced

1972 Profile

Soaps, Detergents, and Cleaning Compounds

SIC Code	2841
Value of industry shipments (millions).	$3,170
Number of establishments	700
Employment (thousands)	32
Exports as a percent of product shipments.	1.5
Imports as a percent of product shipments.	0.1
Net profits as a percent of net worth.	15
Annual growth rates 1967–72 (percent):	
Value of shipments (current dollars).	4.6
Value of exports (current dollars).	6.8
Value of imports (current dollars).	0.0
Employment	1.3
Major Producing Areas	East, North Central, and Middle Atlantic States

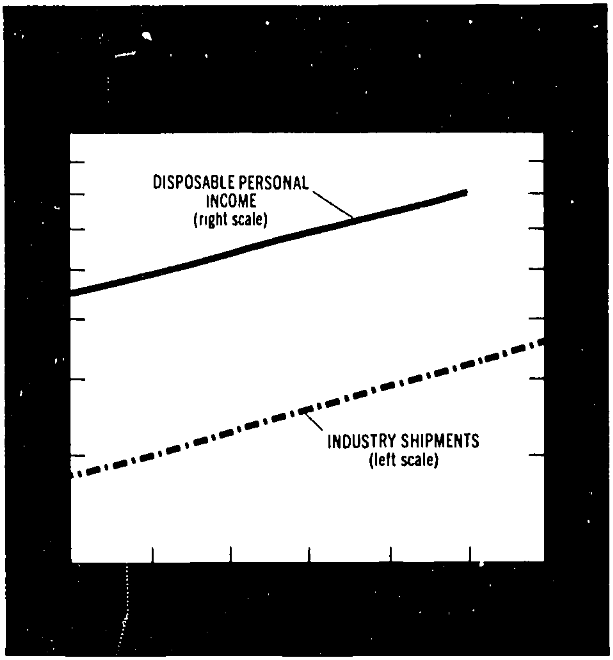
luxury toilet soaps, continue to rise at an annual rate of about 5 percent. In 1971, imports totaled $2.4 million. They are estimated at $2.5 million in 1972 and $2.6 million in 1973.

Outlook for 1980

Industry shipments are expected to increase at an annual rate of about 5.3 percent from 1972 on, and should reach or perhaps exceed $5 billion by 1980.

Environmental problems—water pollution and waste disposal—will continue to influence research and development in the soap and detergent industry. Further checking to establish the safety of NTA is underway.—*W. W. Sunderland, Office of Business Research and Analysis.*

PERFUMES, COSMETICS AND OTHER TOILET PREPARATIONS



Shipments by the perfume, cosmetic, and other toilet preparations industry rose by 8 percent in 1972, amounting to about $3.9 billion. They are expected to increase by another 8 percent in 1973 to reach $4.2 billion. Growth in this consumer-oriented industry tends to parallel that of disposable personal income.

Since the industry's products are, in general, consumer items, marketing is largely through normal retail channels, with drugstores providing about a third of the sales. Door-to-door distribution probably accounts for another 25 percent. The soap and detergent industry is also an important customer.

The ratio of net income to sales varied widely in the industry in 1971. For a representative group of manufacturers it was about 9 percent, down fractionally from the previous year, and about 1.5 percent below the 1967 high for the decade of 10.5 percent.

The ratio of the cost of goods sold to total sales for the same representative group has averaged 37.5 percent over the past decade, varying between a low of 36.9 percent in 1969 to a high of 38.4 percent in 1965. In 1971, it was 37.2 percent.

Consumer Demand Changes

While overall growth for the industry was roughly 8 percent in 1971, consumer demand for certain products resulted in much greater increases in some areas. Largest gain—111 percent—was in sales of feminine hygiene sprays. Sales of blush makeup rose 10 percent, eye makeup 13 percent, and eye shadow 22 percent. Aerosol colognes advanced 11 percent, while men's colognes rose 10 percent. Preshave products increased by nearly 12 percent. External personal deodorants were up by 13 percent, with aerosol types up 31 percent.

Public interest was pronounced in "natural" products—those formulated with natural ingredients such as herbs, vegetable juices and various animal oils, and perfumed with the odors of common

1972 Profile

Cosmetics and Toilet Preparations

SIC code	2844
Value of industry shipments (millions).	$3,860
Number of establishments	650
Employment (thousands)	46.5
Exports as a percent of product shipments.	1.2
Imports as a percent of product shipments.	0.5
Net profits as a percent of net worth.	14.7
Compound annual rates of growth 1967–72 (percent):	
Value of shipments (current dollars).	8.9
Value of exports (current dollars.	7.4
Value of imports (current dollars).	9.1
Employment	2.1
Major producing areas	Northeast and Northcentral regions

Perfumes, Cosmetics, and Other Toilet Preparations: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [p]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	2, 516	3, 163	3, 461	3, 570	3, 860	8	4, 170	8
Total employment (thousands)	42	47	50	45. 6	46. 5	2		
Production workers (thousands)	26	29	31	27. 3	24. 8	−9		
Value added	1, 731	2, 308	2, 434	2, 450	NA	NA		
Value added per production worker man-hour	$34. 47	$40. 35	$40. 04	$45. 20	NA	NA		
Product: [3]								
Value of shipments, total	2, 794. 2	3, 462. 4	3, 797. 2	3, 900 [1]	4, 200	8	4, 540	8
Shaving preparations	178. 7	242. 4	261. 4	270	300	11	320	7
Perfumery	394. 9	508. 6	534. 0	580	630	9	680	8
Hair preparations	771. 6	925. 6	1, 044. 4	1, 050	1, 130	8	1, 230	9
Dentifrices	323. 1	401. 8	468. 3	430	460	7	500	9
Other cosmetics	1, 045. 7	1, 326. 3	1, 428. 8	1, 500	1, 615	8	1, 740	8
Toilet preparations, not specified by kind	80. 2	57. 7	60. 3	60	65	8	70	8
Value of imports	12. 3	14. 3	17. 3	19. 7	19	−4	20	6
Value of exports	36. 4	41. 8	44. 9	45. 0	52	16	55	6
Wholesale price indexes (1967 = 100)	100. 0	105. 9	107. 7	110. 7	110. 6			

[1] Estimated by Bureau of Domestic Commerce.

[2] Includes value of all products and services sold by the cosmetics and other toilet preparations industry (SIC 2844).

[3] Includes value of shipments of cosmetics and other toilet preparations made by all industries.

[p] Preliminary Census data.

NOTE.—NA = not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

plant products. Demand heightened for odors based on or simulating musk oil.

Development and Promotional Costs High

Since the industry's market is almost exclusively the consumer, expenditures for research and development of new products and updating older products—always large items in company budgets—are estimated to have increased nearly tenfold over the past decade. Promotional costs are also high. According to a recent survey, over a half billion dollars was spent in 1971 to promote the 10 top items in each of 17 categories of toiletries and related items. More than half of this amount was spent in network TV advertising alone. Capital expenditures as a proportion of gross plant value were about 12.5 percent in 1971, somewhat below spending in the 1960's.

Employment Down

In 1971, total employment averaged 45,000, including 27,300 production workers. Whereas total employment rose slightly in 1972 to an estimated 46,500, production workers declined 9 percent to 25,800.

Balance of Trade Improves

U.S. cosmetics and toiletries continue to find a ready market abroad. Exports in 1972 amounted to $52 million, an increase of 16 percent from $45 million in 1971. Imports dropped by 4 percent to $19 million, and while they are expected to resume a 6-percent growth in 1973, they still represent only about 0.5 percent of total industry shipments. Imports consist chiefly of specialty products and prestige perfumes and fragrances, especially French.

Outlook for 1980

Industry shipments should continue to grow at about the 8 percent annual rate established in recent years, reaching or exceeding $7 billion in 1980.

Pressure continues for legislation to give the Food and Drug Administration greater control over cosmetics and toiletries, and such control may ultimately be imposed. This may lead to greater costs to manufacturers, who have already volunteered to file confidential statements of ingredients with the FDA. Pressure from consumer groups has also led some manufacturers to include a partial listing of ingredients on labels.

Men's toiletries are expected to continue their rapid growth, with colognes, pre- and after-shave preparations and hair control products taking a prominent lead. Growth leaders in women's toiletries will probably include hair care preparations such as coloring shampoos and rinses, eye makeup, and personal deodorants.

Imports and exports should continue to grow at least 6 percent in the near future, but they will remain an insignificant part of total production. American participation in world markets can be expected to remain high as new developments and technology are exported to foreign subsidiaries and licensees for use in local production of established products.—*W. W. Sunderland, Office of Business Research and Analysis.*

PAINT AND ALLIED PRODUCTS

Continuing the strong pace of 1972, paint industry shipments will probably reach a value of $4 billion in 1973. This growth of 7 percent will largely reflect increased demand for products requiring coatings. Factory sales of paints, varnishes and lacquers (excluding putty, caulking and other miscellaneous products of the industry) amounted to about $3.1 billion in 1972, with output bordering on the 965 million gallon mark, a 10 percent gain over 1971.

Demand for Paint Continues Up

Industry products are classified under two broad groups—trade sales products and industrial finishes. Trade sales products are sold through wholesalers and retailers to the general public and professional painters. Industrial finishes, also known as chemical coatings, are specialized paints produced to meet color and performance standards and applied at the factory to production items. While the number of articles coated at industrial plants has been increasing in recent years, consumption of industrial paint has not yet surpassed trade sales.

Demand for both product types has been expanding and neither factory applied finishes nor substitute materials have made significant inroads into markets for trade sales paints. The high rate of housing starts in the past 2 years has contributed significantly to increased consumption of trade sales paints.

Sales of industrial finishes are rising with increased sales of autos, appliances and other durable goods. In 1973 sales of industrial finishes are expected to reach $1.6 billion compared with $1.2 billion 3 years earlier.

In Praise of Paint

Development of water-thinned products illustrates the industry's concern with both consumer needs and pollution control. Industrial users of paint have found that water-based coatings have the additional advantage of reducing fire hazards.

Trade sales products have been in greater demand also because of increased consumer acceptance of water-based paints. The "do-it-yourselfer" appreciates the convenience of applying interior

Paints and Allied Products: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	2,911.4	3,189.8	3,407.8	3,486.2	3,774	8	4,032	7
Total employment (thousands)	66.1	66.7	66.0	62.9	63.1	0		
Production workers (thousands)	36.3	37.3	37.3	35.0	NA			
Value added	1,318.5	1,472.7	1,611.7	1,596.2	NA			
Value added per production worker man-hour	$18.04	$19.79	$21.15	$22.84	NA			
Product: [3]								
Value of shipments	2,703.8	2,868.2	3,095.0	[1] 3,170	3,430	8	3,665	7
Value of imports	0.4	1	0.9	1.1	1.2	9	1.3	8
Value of exports	51.5	60.8	65.3	66.1	72.6	10	77	6
Wholesale price indexes (1967=100) prepared paints	100.0	109.1	112.4	115.6	117.0			

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the paints and allied products industry (SIC 2851).
[3] Includes value of shipments of paints and allied products made by all industries.

[P] Preliminary.

NOTE.—NA=Not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

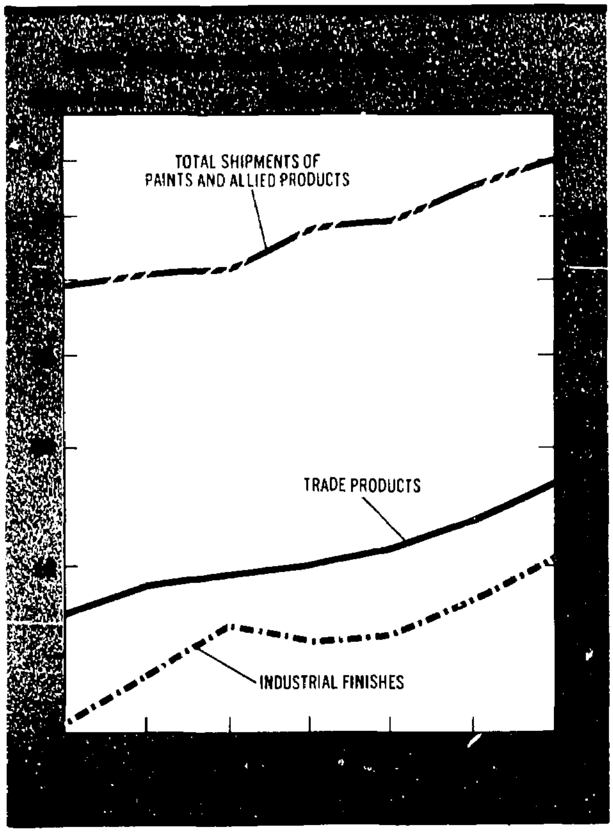
and exterior fast drying paints characterized by durability, ease of cleanup, and lack of solvent odors. As a result, consumption of oil-based coatings declined as indicated by the reduced use of oils (tung, linseed, etc.) for paints and varnishes from 810 million pounds in 1966 to only 542 million pounds in 1971.

Benefits derived from the use of paints in establishing a cleaner, more attractive environment have recently been obscured by criticisms of paints containing lead. The problem of lead paints stems largely from paints highly loaded with lead pigments applied about 30 to 40 years ago and now harming children living in old, deteriorated housing. Nontoxic titanium dioxide pigments in modern paints have replaced white lead. The National Paint and Coatings Association, to help establish limits in the use of lead, has funded a research program to determine the toxi levels of lead and other metal compounds used by the paint industry.

Painting Processes Speed Production

Powder coatings, a departure from traditional coating technology, consist of resins in powder form applied to a surface primarily by means of fluidized bed and electrostatic spray gun techniques. Because no solvents are used, these products are nonpolluting. Furthermore, powder coatings are economical since the powder overspray can be reused, is adaptable to high speed production, and easy to store. Another advantage is that the desired film thickness can be obtained in one application. Development work to surmount some limitations of the process is under way. The powder and application equipment are developed as a system. Powder coatings are currently used for appliances, pipes, wire goods, metal furniture, and electrical equipment. The process is also being explored for coating cans and automobiles. Trade sources estimate a market of $200 million by 1976.

Coil coating—a system involving the continuous application of a decorative or protective finish on metal as it is unwound from rolls—is a large and fast operation, since coating in excess of 500 feet per minute is possible. After curing in ovens, the strip is cooled and rewound into coils. Depending on final use, the coated metal must be capable of being formed, stamped, drilled, or embossed and able to withstand these stresses without flaking, cracking, or peeling during fabrication or service life. Building products account for the greatest use of pre-coated metal. Other uses include appliances, transportation equipment, and packaging. About 1.3 million pounds of aluminum and 1.6 million pounds of steel were precoated in 1971.



1972 Profile

Paints and Allied Products

SIC Code	2851
Value of industry shipments (million).	$3,774
Number of establishments	1,700
Total employment (thousands).	63.1
Exports as a percent of product shipments.	2.1
Imports as a percent of apparent consumption less than.	0.1
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	5.3
Value of exports (current dollars).	7.1
Value of imports (current dollars).	25.0
Employment	−0.9.
Major producing areas	Middle Atlantic, North Central, and West

1972—A Good Year

During 1972, renewed economic activity favorably affected production and shipments of the coatings industry. Increased demand from such important paint industry customers as the home and industrial maintenance sector, construction, fabricated metal products, auto repairs, and lumber and allied products stimulated paint industry purchases of chemicals, synthetic resins, vegetable oils, solvents and pigments.

Increased production of coatings placed pressure on some raw materials supplies. Titanium dioxide became scarce and zinc oxide and zinc dust were limited because of heightened demand. Although the supply of alkyd resins was weak, no actual shortages occurred. The 1972 average price index for these and other more abundant ingredients needed to produce coatings (including solvents, pigments, and resins) remained unchanged at 102.0 (1967=100) but wholesale prices for prepared paints averaged higher at 117.0.

Employment and Wages Up

Industry employment increased slightly in 1972, with average weekly earnings of production workers estimated at $160.68, 7.3 percent higher than the $149.78 averaged in 1971. According to the Price Commission, the average annual rate of productivity gain by the paint industry was 2.6 percent between 1958 and 1969. An ascending trend in investments may result in improved productivity. Capital expenditures for new facilities increased from $69.5 million in 1969 to $102.2 million in 1970 compared with an average of $55 million annually between 1962 and 1968.

World Markets Expanding

The U.S. ranks after West Germany as the leading world exporter of paints. U.S. exports of coatings in 1972 were estimated at $72.6 million, a 10 percent increase over 1971. Such exports accounted for about 2 percent of industry sales during the year. Coatings exports will probably rise in 1973, reaching a value of $77 million.

Paint consumption in many countries of the world has been increasing. Between 1967 and 1970, estimated per capita paint consumption in kilograms for West Germany increased from 14.3 to 18.7; United Kingdom, from 8.9 to 9.8; and Italy, from 5.1 to 8.8. Average per capita consumption of OECD European countries was 8.8 kg. in 1967 and 10.6 kg. in 1970. Per capita consumption in the United States during 1970 averaged 18.4 kg. While world markets for paint appear to be expanding, many foreign producers are more active in export markets than U.S. companies. In 1970, West Germany's paint exports amounted to 7 percent of apparent domestic consumption, the Netherlands' ratio was 40 percent, and the United Kingdom's, 10 percent. For the U.S., exports were 2.1 percent of shipments in 1972.

Trade barriers and lower foreign production costs have contributed to a slower rate of growth for U.S. coatings exports. While quality products and innovative marketing techniques have assisted U.S. producers to retain foreign markets, their costs of meeting U.S. environmental regulations may give foreign competitors an additional price advantage.

Lively Years Anticipated

Paint industry shipments will probably advance at an annual rate of 6.8 percent to about $6.4 billion in 1980 to meet demands from many sectors of the economy—toys, construction, transportation equipment, and other products requiring decorative and protective coatings. Paint production will keep pace with demand and new materials and processes will probably emerge with lower costs and longer service life. At the same time, industry growth may be moderated by competition from new products not requiring paint, and improvements in paint quality that reduce the amount of paint per application and frequency of repainting.

Success of the paint industry will continue to depend on the development of better products. By the end of this decade, coatings will probably be formulated from different ingredients and applied in unique ways. Organic solvents will have a declining role in coatings because of developments in powder and water-based paints and antipollution regulations. With more prefinished products marketed, sales of industrial finishes are expected to expand. Such techniques as coil coatings and powders will probably be standard processes and coatings with such functional properties as fire-resistance will be popular. Hopefully, disposal problems of liquid and solid plant wastes will be resolved and coating products will be fully in tune with ecological goals by 1980.—*David G. Rosse, Office of Business Research and Analysis.*

CHAPTER 18

Rubber and Plastics Products

Strong demand for rubber and plastics products in 1973 should raise shipments of the six industry groups to $21 billion from an estimated $19.5 billion in 1972. However, work stoppages at labor contract renewal time during April and May may disrupt supplies, and labor negotiations in other major industries could result in temporary losses of markets.

Half Million Workers

During the latter part of 1972, the number of production workers in the rubber and plastic industries exceeded 500,000 for the first time. Growth of production worker employment was rapid during 1972, following minimal increases from 1969 to 1971. For several years increases in production worker employment were confined to the plastics products industry. Recent employment gains are more broad based, and include workers on tires and other rubber products.

More Machine-Made Footwear

U.S. footwear manufacturers are turning to more efficient production methods to meet import competition. Imports account for almost half of U.S. waterproof shoe consumption, and almost a third of fabric/rubber footwear consumption. More rubber sole/fabric upper footwear is machine-made instead of being manufactured by the historic method of hand built/autoclave curing. Waterproof footwear manufacturers are using such capital-intensive methods as slush molding, thus increasing output per manhour.

Rubber and plastics footwear markets continue sluggish, affected by rising imports. Saturation in the leisure markets (currently more than one pair per person per year) and stable or declining industrial and commercial markets have also adversely affected footwear shipments.

Demand Low for Reclaimed Rubber

Production and sales of reclaimed rubber have been declining for several years, because of lower

Rubber and Plastics Products: Projections 1972–80 [1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
	Total	19, 530	9	20, 980	7	33, 930	7. 1
2822	Synthetic rubber	1, 125	8	1, 170	4	1, 800	6. 0
3011	Tires and inner tubes	5, 625	9	6, 050	8	10, 000	7. 4
3021	Rubber footwear	525	1	530	1	600	1. 7
3031	Reclaimed rubber	30	−7	30	0	30	0. 0
3069	Rubber products, not elsewhere classified	3, 800	9	4, 000	5	6, 500	6. 9
3079	Plastics products, not elsewhere classified	8, 400	10	9, 200	10	15, 000	7. 5

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

prices for new rubber and the limited uses of reclaimed rubber. Reclaim production has been the major method of disposing of scrap tires. With its decline and rising automobile numbers, scrap tires are accumulating at an increasing rate. A technological or marketing breakthrough could assist in solid waste disposal as well as benefit the industry.

Miscellaneous Sales Up

Sales of miscellaneous rubber and plastics products should increase by about $1 billion to $13 billion in 1973. Included in these industries are thousands of products including hose, belting, foam goods, floor and wall coverings, mechanical goods, shoe heels and soles, drug sundries, film and sheeting, laminated products, packaging and containers, industrial products, construction products and dinnerware. One major market, motor vehicles, consumes over 200 pounds of rubber and plastics products in each passenger car, excluding tires. For example, increased emphasis on safety padding and more widespread use of foam seating in cars has doubled urethane foam consumption in the last 5 years.

Financial Ratios Up in 1972

The rubber and plastics products industries are dominated by a relatively small group of multiproduct, highly diversified corporations. Individual industries and product lines vary considerably from about 13 tire manufacturers to thousands of plants producing a variety of industrial and consumer rubber and plastics products. Financial data are available on a corporate basis only, and therefore reflect not only rubber and plastics but chemicals and metal products activities as well. Several large companies include the results of substantial foreign operations in their financial reports and some include retailing. Recently some companies have started to provide information on sales and profits for major product areas, such as tires and tire products.

Corporate profits after taxes, for companies classified in the rubber and plastics products industries, rose from $456 million in 1970 to $664 million in 1971 and to almost $900 million in 1972. Profits in 1970 were exceptionally low; ratios of profits to sales and to capital investment returned in 1972 to 4 : 5 and 7 : 5, about the levels of the mid-1960's.

Capital Expenditures Jump

Because of the poor financial returns in 1970 and early 1971, new capital expenditures for plant and equipment dropped from $857 million in 1969 to $812 million in 1970 and to $726 million in 1971. Rising sales and improved operating ratios in 1972 resulted in a 33 percent increase in new capital expenditures to $970 million, the largest one-year increase ever recorded for the rubber and plastics industries. Most of the capital spending was for new tire plants to meet increasing demand for tires in general and radial tires in particular, plus new facilities for the rapidly growing plastic products industry.

Growth to 1980

Growth is forecast for most of rubber and plastics products, paced by plastics products and tires. Expected average annual growth from 1972 to 1980 for the combined industries is 7.1 percent to almost $34 billion.

Demand for rubber and plastics products is expected to rise during the next several years, with the value of shipments increasing at a faster rate than volume because of both price increases and changes in product mix. The cost of materials—

Rubber and Plastics Products: Financial Ratios 1967–72

[Percent]

	1967	1968	1969	1970	1971	First Half 1971	First Half 1972
Ratios:							
Profit after taxes/sales	4.0	4.5	3.8	2.8	3.6	3.5	4.1
Profit after taxes/investment	7.5	8.5	6.9	4.6	5.9	6.1	7.4
New capital expenditures/gross plant	8.7	10.3	9.7	8.2	6.6	NA	NA
Depreciation/gross plant	6.8	6.2	5.8	6.0	5.8	6.1	6.2
Depreciation/sales	3.4	3.2	3.1	3.6	3.5	3.5	3.4
Sales/total assets	140	136	133	123	120	126	130

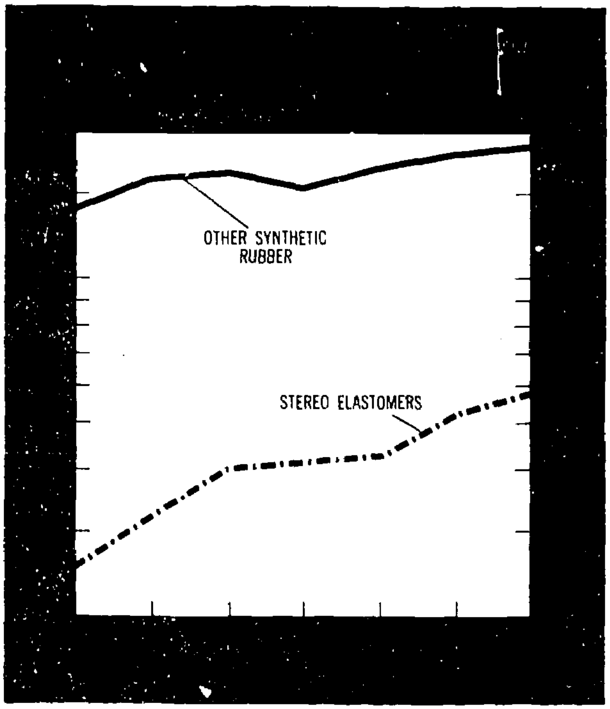
NOTE.—NA = not available.

Source: Federal Trade Commission, Securities and Exchange Commission, and Bureau of the Census.

primarily petroleum derivatives—is dependent upon supply conditions in the petroleum and petrochemical industries. In addition, Government regulations to improve motor vehicle safety and reduce air pollution will require material changes, which will also contribute to demand for higher-cost rubber and plastics products—*David H. Blank, Office of Business Research and Analysis.*

SYNTHETIC RUBBER

Product shipments of synthetic rubber will probably total \$1.3 billion in 1973, with industry shipments approaching \$1.2 billion. Despite continual loss of markets to plastics materials, the quantity of synthetic rubber shipped will increase to 5.9 billion pounds, 4 percent over 1972 levels. Customers for synthetic rubber consist largely of manufacturers of components for transportation equipment. While such markets have been expanding, synthetic rubber shipments are rising only moderately because of depressed prices and substitution of plastics for rubber in nontire uses.



Shipments Rise Sharply in 1972

Following a year of sluggish sales, the quantity of synthetic rubber shipments rose 10 percent in 1972. In 1971, production increased only 2 percent, a slower rate than consumption growth. With sharply increased imports and high inventory accumulations that amounted to 515,000 tons at the start of the year and were reduced to 488,000 tons by the year's end, ample supplies of synthetic rubber were available to meet increased demands. During 1972, production rebounded as imports declined, consumption continued to grow, and inventory accumulation resumed.

Prices Down

Because most synthetic rubber is produced in captive plants of the rubber and petroleum indus-

Synthetic Rubber: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	927	1,046	992	1,043 [1]	1,125	8	1,170	4
Total employment (thousands)	13	13	13	12	13	4		
Production workers (thousands)	9	9	9	8	NA			
Value added	405	492	448	477	NA			
Value added per production worker man-hour	\$24.10	\$28.96	\$25.75	\$28.73	NA			
Product: [3]								
Value of shipments	1,005	1,158	1,105	1,150	1,250 [1]	9	1,300	4
Quantity shipped (million pounds)	4,365	5,135	5,025	5,125	5,650	10	5,900	4
Value of imports	21	38	42	57	52	−9		
Value of exports	172	140	176	176	166	−6		
Wholesale price indexes (1967=100)	100.0	100.6	100.7	100.7	100.7			

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the synthetic rubber industry (SIC 2822).
[3] Includes value of shipments of synthetic rubber made by all industries.
P Preliminary.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

tries, price data are not generally available. However, a good indicator of price movement is the unit export value of styrene-butadiene rubber (SBR) which has declined steadily from 18.2 cents per pound in 1969 to 17.1 cents per pound in 1972 in order to compete with natural rubber and plastics.

Tire Proportion Grows

The proportion of synthetic rubber used for tires has grown from 60 percent prior to 1967 to 65 percent of output since. While markets for other industrial and mechanical goods have also been growing rapidly, increased substitution of plastics for rubber in such products as foam goods, belting, hose, and other mechanical goods has slowed growth in consumption of synthetic rubber for these nontire uses.

Rubber vs. Plastics

Distinction between rubber and plastics has become nebulous in many instances and the continued development of new polymers will accentuate this problem. Many products made of rubber or plastics are indistinguishable in appearance and performance.

Synthetic rubber is usually sold in the form of bales, with some variation depending upon the type of rubber. However, development of synthetic rubbers capable of being processed like plastics. e.g. injection molding, is leading to increased production of synthetic rubber in the form of liquid or powders. These newer forms of synthetic rubber are added to plastics to give them desired properties as well as to increase output of rubber products with plastics production equipment. Development of exceptionally fast curing systems has permitted use of rubber in fast production systems such as injection molding. Markets for these special forms of rubber are expected to grow rapidly.

Severe International Competition

Sluggish growth in synthetic rubber consumption by Western Europe and Japan has led to severe international competition and a decline in U.S. exports. During the past 2 years, synthetic rubber output in noncommunist countries was about 70 percent of potential. Between 1970 and 1972 production and consumption in Western Europe and Japan grew only 3 to 5 percent annually compared with a 13 percent yearly growth during the preceding decade. Consequently, demand was down in markets which normally take two-thirds of U.S. exports. Exports from producing countries in those areas rose 7 percent in 1971 and 4 percent in 1972, cutting U.S. exports.

1972 Profile

Synthetic Rubber

SIC Code	2822
Value of industry shipments (million)	$1,125
Number of establishments	50
Total employment (thousands)	13
Exports as percent of product shipments.	12.8
Imports as percent of apparent consumption.	4.6
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	3.9
Value of exports (current dollars)	−0.7
Value of imports (current dollars)	19.9
Employment	0.0
Major producing areas	South

Ecology has its Affects

Since synthetic rubber plants are located near or are part of petrochemical complexes, many of their environmental problems of air and water quality relate to the more involved problems of pollution from petroleum and petrochemical manufacturing. Production problems notwithstanding, synthetic rubber makers will probably benefit from pollution abatement regulations for automobiles. Antipollution devices and safety requirements for motor vehicles will require more rubber products—hoses and rubber products which can withstand such severe operating conditions as very high temperatures—creating demand for more costly products, particularly for non-tire uses. There will also be intense competition with plastics materials manufacturers for these markets. Materials with a particularly promising future are the polyurethanes, which may be used extensively both inside and outside of future automobiles.

$2 Billion by 1980

Shipments of synthetic rubber are expected to increase at an annual rate of 6 percent and reach at least $2 billion by 1980, depending largely on the cost of synthetic rubber required to meet high temperatures and pressures and the availability of substitute plastics. Polyurethanes are expected to be one of the fastest growing materials in the next several years. However, by 1980, the polyurethanes may be considered either rubber or plastics or simply as organic polymers, encompassing both synthetic rubber and plastics. A meaningful look at the markets for synthetic rubber in 1980 requires an analysis of competitive and compatible existing and yet to be developed plastics materials.—*David H. Blank, Office of Business Research and Analysis.*

TIRES AND INNER TUBES

Increasing numbers of motor vehicles, coupled with high personal income, point to 1973 as another record year for the tire industry. The growth rate for replacement tires may slow down in units but because sales of original equipment and higher value tires are strong, industry shipments should rise to $6 billion, close to 8 percent gain over 1972.

New Cars Help

Rising business activity and high new car sales have been providing impetus to the growth of tire shipments. Original equipment tires on new cars jumped from a sluggish 38 million in 1970 to 49 million in 1971 and 54 million in 1972. Replacement tires have grown from 129 million in 1969 to 135 million in 1971 and 142 million in 1972. The slower growth rate in replacement tires of 3.5 percent a year reflects a combination of factors, including (1) the comparatively poor year for original equipment tires in 1970 led to a smaller market for replacements in 1972 and 1973, (2) longer lasting tires which are extending the historic 2-year replacement cycle, and (3) the lack of growth in snow tire shipments.

Radials Use Growing

Consumer acceptance of radial tires seems to be stronger than the current ability of U.S. suppliers to provide these tires. Radial tires last considerably longer than bias-ply or bias-belted tires. About 7 percent of total demand, or about 14 million tires, are passenger car radial tires while U.S. output of radials is estimated at 8 million tires, or about 4 percent. The difference is made up through imports which are heavily oriented towards radial construction. In truck tires, the trend toward radials seems to be slower, although a significant share of imports of truck tires are of radial construction.

Snow Tire Importance Declines

Since snow tires first became available in appreciable quantities in the late 1950's and many motorists purchased these tires in addition to their

Tires and Inner Tubes: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	3,734	4,717	4,587	5,204	5,625	8	6,050	8
Total employment (thousands)	93	103	103	105	115	6		
Production workers (thousands)	71	80	79	81				
Value added	1,823	2,300	2,365	2,720	N.A.			
Value added per production worker man-hour ($)	13.35	13.82	15.88	17.19	N.A.			
Product: [3]								
Value of shipments, total	3,133	4,014	3,902	[1] 4,450	4,780	7	5,150	8
Passenger car tires	1,714	2,322	2,295	2,610	2,800	7	3,025	8
Truck and bus tires	829	1,074	1,027	1,175	1,270	8	1,370	8
Other	590	618	580	665	710	7	755	6
Quantity shipped (thousands):								
Passenger car tires	146,200	177,200	168,600	185,200	194,000	5	202,000	4
Truck and bus tires	19,900	27,400	25,700	29,000	31,000	7	33,000	7
Value of imports	88	147	208	253	420	66		
Value of exports	70	87	78	88	96	9		
Wholesale price indexes (1967=100)	100.0	102.3	109.0	111.0	111.0	0		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the tire and inner tube industry (SIC 3011).
[3] Includes value of shipments of tires and tire products made by all industries.
P Preliminary.

NOTE.—NA = Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

regular tires, they were important to the growth of replacement tire shipments. Snow tires represented 4 million of the 57 million total replacement tires in 1957, or 7 percent. By 1967, snow tires had increased to 16 million of the 108 million total replacement tires, or 15 percent. However, after 1967, snow tires have grown slowly to reach 18 million in 1971, when they had declined to 13 percent of total replacement tires. The winter of 1971–72 was unseasonably warm in many areas of the United States, which undoubtedly affected sales. Nonetheless, a plateau appears to be developing in the demand for snow tires inasmuch as shipments have grown only 12 percent during the past 5 years, with most of this growth occurring between 1967 and 1969.

Productivity Pace Changes

Rapid growth in productivity which characterized the tire industry from 1955 to 1965 has given way to a slower pace in more recent years. From 116,000 workers producing 91 million tires in 1947, output rose to 138 million tires while employment declined to 85,000 in 1963. In 1968, 98,000 employees produced 199 million passenger, truck and bus tires; in 1972, employment had returned to 115,000 with a tire production of 225 million.

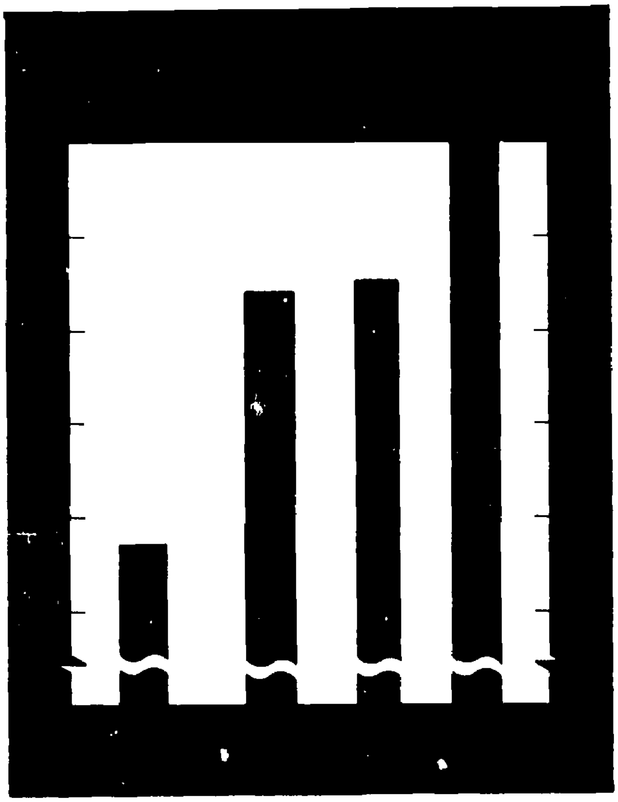
Costly Variables

One factor that distinguishes the U.S. tire market from most other countries is the wide range of styles and types of tires of tires available. Included

1972 Profile

Tires and Inner Tubes

SIC Code	3011
Value of industry shipments (millions).	$5,625
Number of establishments	200
Total employment (thousands).	115
Exports as a percent of product shipments.	2.0
Imports as a percent of apparent consumption.	8.2
Compound annual average rates of growth 1967–72 (percent):	
Value of shipments (current dollars).	8.6
Value of exports (current dollars).	6.5
Value of imports (current dollars).	36.8
Employment	4.3
Major producing areas	East North-Central, South



are such variables as: (1) profile or aspect ratio (the relationship of height to width) which results in 78 series, 70 series, 60 series; (2) one white sidewall, two white stripes, three white stripes, red stripes, blue stripes; (3) construction differences such as bias ply-bias-belted, and radial; and (4) price lines which range from premium to third line. All of these variables result in shorter, more costly, production runs; increased capital expenditures for new equipment; and higher inventory and distribution costs.

Crucial Decisions

The rapid worldwide growth in demand for radial tires and the projected growth in the U.S. market present problems for tire makers. Whether the trend toward radial tires in the United States is evolutionary or revolutionary depends mainly on the automotive manufacturers. In any event, the cost of converting to radial production is substantial and decisions concerning processes and equipment can have a profound effect on the future of individual companies.

Radial tires are normally built on two stage equipment, different from the one stage equipment currently used to make bias and bias-belted tires.

In addition, radial tires require new or modified equipment for material preparation and curing—both adding to the cost of the tire, plus requiring additional labor input. Considerable effort is being expended to determine alternative production processes wherein current equipment might be wholly or partially used to make radials.

Estimates of the cost of conversion to radial tires exceed $500 million. In addition, the industry may need $500 million to deal with environmental problems of clear air, clean water, and soil waste disposal. In an industry with currently high debt ratios, these additional financial requirements entail crucial decisions.

Imports Increase

U.S. rubber companies have extensive interests in tire plants throughout much of the world. Despite these large international holdings, foreign independent manufacturers have been zeroing in on the large U.S. market, and are pacing the remarkable U.S. 40 percent annual growth in imports. Imports increased from $45 million in 1965 to $253 million in 1971, and to over $400 million in 1972. Growth in tire imports followed the rapid growth in imports of foreign made cars. In addition, many of the foreign tire companies are expanding their lines to include tires for standard U.S. produced cars.

Solid Waste Avalanche

Scrap tires are accumulating at a rate of over 200 million per year, or about seven every second. While disposal of scrap tires is not necessarily the responsibility of tire manufacturers, they must assume leadership in developing disposal methods.

Suggestions for use of scrap tires include: (1) reclaimed rubber, (2) fish havens, (3) fuel, (4) soil conditioners, (5) road surface filler, (6) destructive distillation into chemicals, (7) controlled burning into carbon black, and (8) various small quantity uses such as dock bumpers. An interesting and potentially beneficial disposal system is the use of tires as fuel. A smokeless, odorless boiler using scrap tires as fuel was recently placed in operation at a tire plant. In addition to conserving fossil fuels, the furnace will consume about one million scrap tires annually.

$10 Billion in 1980

By 1980, 150 million registered motor vehicles will require about 300 million tires a year. While output will include much larger proportions of higher priced radial tires, cost increases may be held in check by economies of scale and improved production techniques. Estimates of radial production in 1980 range from 20 percent to 90 percent of total shipments, depending on decisions of automobile manufacturers and consumer acceptance. Most observers suggest about 40 percent of the output will be for passenger car tires and 15 percent for truck and bus tires. Some foreign tire manufacturers believe that the potential for radial tires is much greater, especially truck tires, and they are trying for increased shares of the U.S. market.

The higher value 300 million tires in 1980 should result in product shipments of $8.75 billion and industry shipments approaching $10 billion. Average annual growth from 1972 should be 7.9 percent for product shipments and 7.4 percent for industry shipments—*David H. Blank, Office of Business Research and Analysis.*

CHAPTER 19

Primary Metals

Stimulated by greater demand from major consuming industries—construction, automotive, and transportation—the primary metals industry achieved significant production increases during 1972. Estimated increases in the value of product shipments ranged from 10 to 12 percent in four primary metals industries—aluminum, steel, copper, and ferrous castings. Shipments are expected to increase at a slower rate in 1973, with projected growth rates ranging from 5 to 10 percent. The volume of shipments will probably rise only 3 to 8 percent in 1973, compared with 6 to 11 percent in 1972.

Trade Balance Improving

While imports are still three times as great as exports, the deficit in the trade balance shrank some in 1972 over a year earlier, largely because of a significant decline in steel mill product imports. The estimated decrease in imports reflects the success of the 3-year extended voluntary restraint arrangement on steel exports to the United States from Japan, the United Kingdom, and the European Economic Community.

Imports of all primary metal industries increased an estimated 1 percent in 1972 to about $3.2 billion, while exports rose nearly 9 percent to an estimated $1.1 billion. Both imports and exports are expected to increase further in 1973. The United States will continue as a large net importer of primary metals. Imports of steel mill products and aluminum and brass mills products will exceed exports; exports of copper wire and ferrous castings will exceed imports.

Mixed Employment Trends

Production worker employment in the overall primary metals industries was an estimated

Primary Metals: Projections 1972–80

[Value of product shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
3312, 3315, 3316, 3317	Steel mill products	19,200	12	20,100	5	30,600	6.0
3321, 3322, 3323	Ferrous castings	5,295	11	5,670	7	7,645	4.7
3334, 3352, 3361	Aluminum	5,900	11	6,500	10	11,000	8.1
3351	Brass mills	3,000	10	3,270	9	6,050	9.2
3357	Copper wire mills	3,800	10	4,045	6	6,765	7.5

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

986,000 in 1972, unchanged from 1971 but below the 1.1 million reached in 1970. The work force of the basic steel producers—the largest group—declined 2 percent from 1971 levels. In contrast, aluminum industry employment rose 1 percent and employment in ferrous castings over 3 percent. Employment in brass mills increased 8 percent, but copper wire mills merely maintained their 1971 level. Since most labor contracts will not expire until 1974, no major work stoppages are anticipated in the coming year.

Capital Spending Up

Capital spending by primary metals industries, estimated at $2.8 billion in 1972, was for plant modernization, pollution abatement equipment, and improved equipment needed to comply with the Occupational Safety and Health Act (OSHA). In the steel industry, expenditures for plant modernization declined while spending on pollution abatement increased.

Technological advances continue. For example, plans are underway in the steel industry for a plant to develop an improved process for making coke pellets. American primary aluminum producers have negotiated to purchase Russian technology for the electromagnetic casting of aluminum, a cost-saving process.

Mounting concern regarding dwindling natural resources and the need to improve the environment have focussed attention on the scrap processing industry. Ferrous and nonferrous metal scrap processors were particularly interested in the variety of 1972 legislative proposals for economic incentives to industries using recyclable waste. Although no such legislation was enacted, the issue will probably be considered anew in 1973.

Future Prospects

Increased demand for copper products is anticipated in 1973. New smelter facilities have been planned. Control of air pollution resulting from sulfur emissions from copper smelters will continue to be a major problem.

Continued growth in markets for aluminum is anticipated in 1973. Steel companies, foundries, and aluminum producers have budgeted a greater share of capital expenditures for air and water quality control facilities in the next several years.—*Diana B. Friedman, Office of Business Research and Analysis.*

1972 Profile

Ferrous Castings

SIC Codes	3321, 3322, 3323
Value of shipments (millions)	$5,295
Number of establishments	1,364
Employment (thousands)	218
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments	4.0
Value of imports	16.0
Value of exports	16.0
Major producing areas	Middle Atlantic, East North Central

FERROUS CASTINGS

Shipments of ferrous castings in 1973 are expected to rise 3 percent from 18 million tons estimated for 1972 to 18.7 million tons, reflecting continuing growth of the overall economy and especially among the main customer industries for ferrous castings—automobiles, construction, railroad equipment, and steel. Shipments in 1972 were 11 percent above the previous year, when volume was recovering from its 8-year low in 1971. Estimated value of product shipments rose 11 percent to nearly $5.3 billion in 1972, compared with the 7 percent gain to $5.7 billion expected in 1973.

Ferrous Castings Shipments To Rise

Shipments of gray iron castings, which have historically accounted for about 84 percent of all ferrous castings shipments, are expected to increase 3 percent in 1973 to 16 million tons from an estimated 15.5 million tons in 1972. Value of shipments is expected to rise to $3.7 billion, 6 percent over the estimated value of $3.5 billion in 1972. Miscellaneous castings account for about 58 percent of total gray iron casting shipments, ingot molds for about 23 percent, and cast iron pressure and soil pipe for the balance. The automotive industry is the largest consumer of miscellaneous gray iron castings.

Malleable iron castings shipments are expected to increase to 980,000 tons in 1973, 4 percent over the 945,000 tons estimated in 1972. Anticipated value of shipments is $575 million in 1973, up 7 percent from the estimated value of $535 million in 1972. Malleable iron castings, the smallest segment of this industry, account for about 6 percent of ferrous castings industry shipments. Automotive uses account for over 60 percent of malleable iron castings.

Shipments of steel castings—about 10 percent of ferrous castings—are expected to increase 6 percent in 1973 to 1.7 million tons from an estimated 1.6 million tons last year. Value is expected to reach $1.4 billion, a rise of 9 percent over 1972. Railway rolling stock and railway specialty castings account for about 37 percent of all steel casting shipments.

Imports and Exports Grow

Both imports and exports are expected to increase by approximately 10 percent in 1973. Excluding steel castings, imports should reach $41 million in 1973 compared with 1972 estimated imports of $37 million. Major countries shipping to the United States are Canada, Japan, France, and West Germany.

During the period 1967–71, growth of imports averaged 13 percent a year, while exports grew at an average rate of 18 percent. The favorable trade balance has widened from $35 million in 1967 to $75 million in 1971.

While imports of ferrous castings are relatively minor compared to total U.S. production, a considerable volume of castings is imported and exported as parts or components of motor vehicles and other equipment. The net impact of this foreign trade on U.S. castings production is unknown, since identification of origin of the castings contained in the imports and exports of such equipment is not always possible.

Exports, including steel castings, are expected to increase to $120 million in 1973 from the estimated $109 million in 1972. Canada is the principal market for U.S. ferrous castings.

Industry Modernization Efforts

Compliance with air pollution codes continues as a major problem of the ferrous castings industry, requiring large expenditures for control equipment. In addition, compliance with regulations promulgated under the Occupational Safety and Health Act calls for sizable outlays of capital.

Ferrous Castings—Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	4, 289	5, 007	4, 694	4, 976	5, 460	10		
Total employment (thousands)	233	237	225	211	218	3		
Production workers (thousands)	198	202	190	177	NA			
Value added	2, 631	3, 177	2, 845	3, 021	NA			
Value added per production worker man-hour	$6. 54	$7. 64	$7. 54	$8. 61	NA			
Product [3]								
Value of shipments	4, 367	4, 978	4, 601	4, 755 [1]	5, 295	11	5, 670	7
Gray, including ductile iron	2, 740	3, 237	2, 926	3, 080	3, 520	14	3, 740	6
Malleable, including pearlitic iron	417	487	446	490	535	9	575	7
Steel, including high alloy	1, 210	1, 254	1, 229	1, 185	1, 240	4	1, 355	9
Quantity shipped, total [4] (thousands of short tons)	17, 227	19, 002	16, 521	16, 308	18, 065	11	18, 665	3
Gray, including ductile iron	14, 329	15, 933	13, 945	13, 839	15, 500	12	15, 965	3
Malleable, including pearlitic iron	1, 041	1, 172	852	882	945	7	980	4
Steel, including high alloy	1, 857	1, 897	1, 724	1, 587	1, 620	2	1, 720	6
Value of imports	18	30	30	29	37	28	41	10
Value of exports	53	68	90	104	109	5	120	10
Wholesale price indexes (1967 = 100):								
Gray iron castings	100	104. 5	111. 9	118. 5	121. 1	2		
Steel Castings	100	113. 4	119. 5	125. 3	128. 1	2		

[1] Estimated by Bureau of Domestic Commerce.

[2] Value of shipments for establishments classified in 4 digit SIC industries 3321, 3322, and 3323. Does not include castings produced and consumed in same plant.

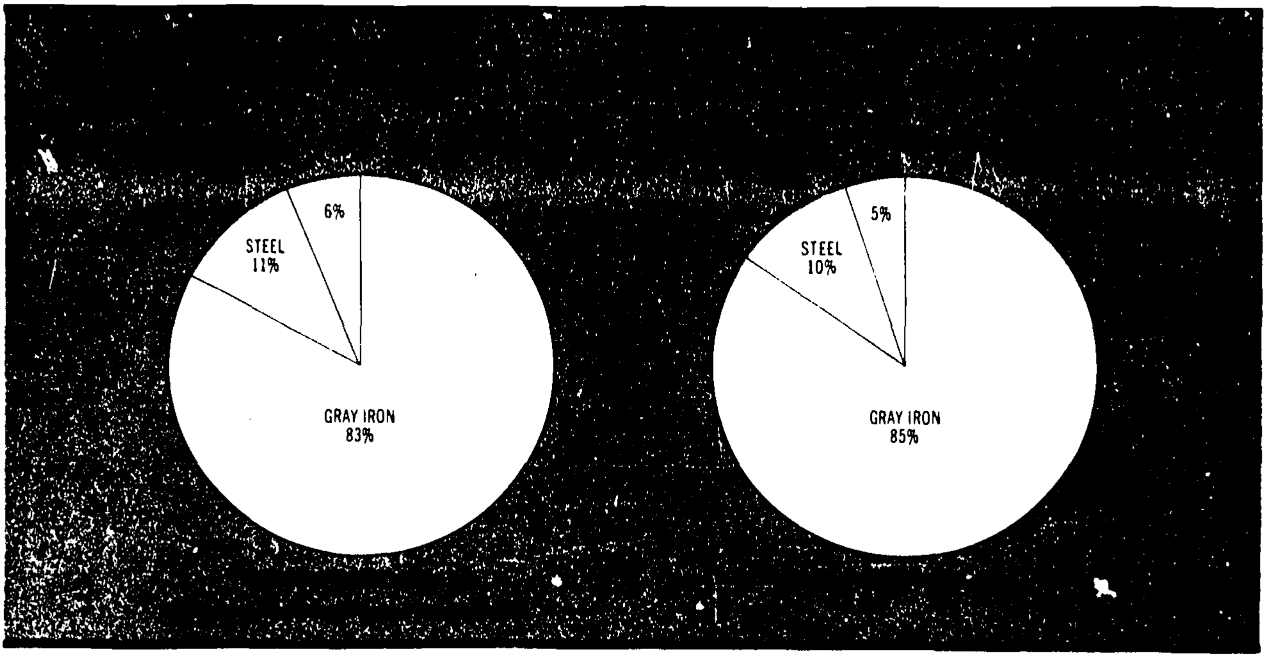
[3] Value of shipments for all castings shipped regardless of classification of manufacturing establishment. Does not include castings produced and consumed in same plant.

[4] Includes ferrous castings shipments of all manufacturing industries including those produced and consumed in same plant.

P Preliminary.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Note.—NA = not available.



Another area of major concern is lagging industry productivity. According to the U.S. Department of Labor, output per man-hour of production workers in the gray iron foundry industry gained an average of 2.3 percent per year from 1957–70, among the lowest of 38 industries studied. This is probably representative of productivity in the malleable iron and steel foundry industries also. Many foundries are completely modernizing their facilities while installing air pollution control equipment. Hopefully this trend will spread throughout the industry and result in improved productivitiy in the future.

Future Promising

Growth in the tonnage of ferrous castings shipped is expected to average 2 percent annually from 1972 and reach 21 million tons in 1980. The value is expected to reach $7.8 billion in 1980, an average annual increase of 5 percent.

Decline in the number of foundries by attrition is expected to continue through the seventies, primarily because smaller iron foundries lack the necessary capital to modernize and mechanize as well as to make the improvements needed for pollution control. The remaining foundries will be larger, more efficient, and better able to cope with the competitive pressures of the future.—*M. L. Davis, Office of Business Research and Analysis.*

STEEL

Continued high spending for construction and anticipated increases in expenditures for capital goods contribute to an improved outlook for the steel industry. With prospects in both the domestic and international steel markets bright, the industry could increase its shipments 3 percent in 1973 over the 1972 level to set an all time high of 95 million tons. Raw steel production is also expected to rise nearly 3 percent to 137 million tons in 1973, approaching the 1969 record. With no measurable stockpiling during 1972 and no work stoppages anticipated, production should remain relatively steady throughout 1973.

Production High in 1972

With a near record performance during the last quarter, steel mill products shipments during 1972 increased nearly 6 percent over 1971's level of 87 million tons to an estimated 92 million tons.

Raw steel production rose significantly during 1972, achieving a level of approximately 133 million tons. This was 11 percent greater than 1971's output of 120.4 million tons but still considerably less than the 1969 record of 141.3 million tons.

Strong early production schedules for the 1973 automobiles were a primary reason that the 1972 fourth quarter was a particularly prosperous period. The construction industry also contributed greatly to the demand for steel throughout 1972.

These two industries account for roughly half of domestic steel consumption.

Imports Fall Sharply in 1972

Imports during 1972 totaled approximately 17 million tons, considerably below the 1971 level of 18.3 million tons when imports surged under the impetus of hedge buying in anticipation of a strike of domestic mills. During 1972 imports accounted for about 16 percent of domestic consumption of steel. Exports increased slightly over 1971's level to about 2.9 million tons. Consequently, the trade deficit for steel mill products of 15.5 million tons in 1971 was reduced to approximately 14.1 million tons in 1972.

Restraints Defined

The new voluntary restraint arrangement on exports to the United States, announced in May of 1972 but retroactive to January 1 of that year, revises and extends the previous 3-year arrangement. The arrangement now includes the steel producers of the United Kingdom (which was to become a member of the EEC on January 1, 1973) in addition to Japan and the six European Community Countries. The current arrangement, which runs through 1974, provides for a 2.5 percent annual growth in imports as opposed to the 5 percent annual rate of the preceding arrangement. The 1972 level of exports from the participating producers to the United States was not to exceed 14,511,800 tons, or approximately 6 percent less than 1971 exports from the same countries. The 1973 and 1974 exports from these eight countries, which accounted for about 85 percent of U.S. imports in 1971, are not to exceed 14,753,900 tons and 15,122,400 tons respectively, reflecting the 2.5 percent annual growth rate. The Voluntary Restraint Arrangement (VRA) has been challenged in court by Consumers Union. Hearings were scheduled for late December.

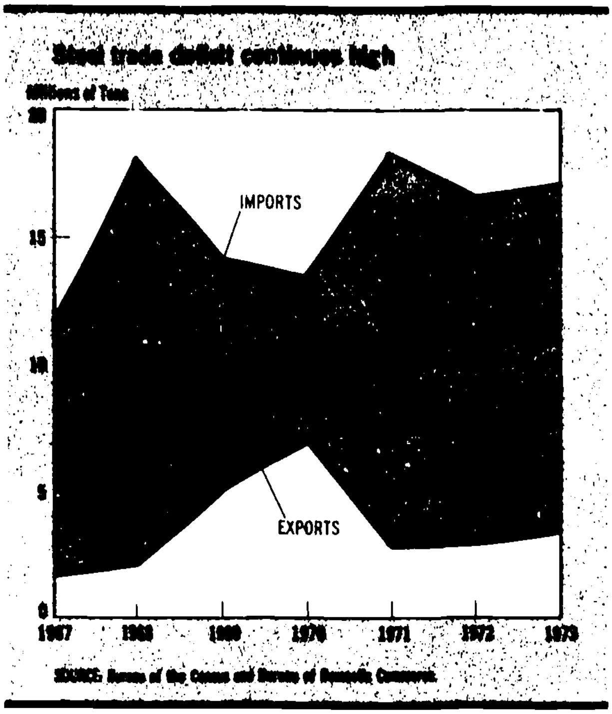
The new arrangement provides more specific commitments with respect to the product mix and geographic distribution of imports. Specialty steels, fabricated structural steels and cold finished

Steel: Trends and Projections 1967–73

	1967	1968	1969	1970	1971	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Raw steel production (millions net tons)	127.2	131.5	141.3	131.5	120.4	133.0	11	137.0	3
Steel mill products:									
Industry shipments: [2]									
Quantity (millions net tons)	83.9	91.9	93.9	[4] 90.8	87.0	92.0	6	95.0	3
Value (millions) [3]	$15,250	$16,700	$17,350	$17,150	$17,225	$19,200	12	$20,100	5
Exports:									
Quantity (millions net tons)	1.7	2.2	5.2	7.1	2.8	2.9	4	3.2	10
Value (millions) [5]	$415	$444	$796	$1,019	$576	$600	4	$700	17
Imports:									
Quantity (millions net tons)	11.5	18.0	14.0	13.4	18.3	17.0	−7	17.5	3
Value (millions) [6]	$1,292	$1,976	$1,742	$1,967	$2,636	$2,500	−1	$2,800	12
Apparent domestic steel consumption (millions net tons)	93.7	107.6	102.7	97.1	102.5	106.4	−4	109.3	3
Imports as percent of apparent consumption (quantity)	12.2	16.7	13.7	13.8	17.9	16.0	----------	16.0	----------
Exports as percent of industry shipments (quantity)	2.0	2.4	5.6	7.8	3.2	3.1	----------	3.4	----------
Total employment (thousands)	555	552	544	531	487	475	−2	480	1
Production workers (thousands)	424	421	415	403	367	361	−2	366	1
Average wholesale price index of steel mill products (1967=100)	100.0	102.5	107.4	114.3	123.0	130.3	6	----------	----------

[1] Estimated by Bureau of Domestic Commerce.
[2] Including exports from mills.
[3] Estimates based on the Bureau of Census value of shipments (SIC 3312, 3315, 3316, 3317).
[4] 1970 and later shipments are not exactly comparable with those for earlier years because they include companies which did not report before 1970. These companies shipped an estimated 1.8 million tons in 1970.
[5] Value at point of export.
[6] Foreign value (excluding ocean freight, insurance and U.S. import duty).

Sources: American Iron and Steel Institute, Bureau of the Census, and Bureau of Labor Statistics.



steel bars have been earmarked for special attention. Specific tonnage limitations have been set for the specialty steels; the shipment levels for 1972 and 1973 of stainless and alloy steels other than tool represent a reduction from the 1971 shipment levels. Specific tonnage levels were set for both cold finished steel bars and fabricated structural steel.

Of concern to the industry during the last few years has been the rapid increase of imports from countries whose producers are not participants to the voluntary arrangement. Currently, nonparticipants account for about 20 percent of U.S. imports compared with 15 percent in 1971. While imports from VRA sources declined by about 17 percent in 1972 (first 9 months), imports from nonparticipants increased by about 10 percent.

Trade Deficit Still Rising

Assuming compliance with the VRA, total U.S. imports of steel mill products in 1973 would increase to approximately 17.5 million tons, compared with the estimated level of 17 million tons in 1972. This estimate includes an increase in imports from the nonparticipants.

With exports expected to increase about 10 percent from 2.9 million tons in 1972 to 3.2 million tons in 1973, the trade deficit for steel mill products would increase only slightly to 14.3 million tons—only a 1.4 percent increase over the steel trade deficit of 1972. On a value basis the deficit would amount to $2 billion, about the same as in 1971 and 1972 as a result of increases in steel prices and the importation of higher value products.

Some Prices May Rise Moderately

Steel mill product prices showed little fluctuation in the last half of 1972 since steel companies had announced early in the year that prices would not be raised before January 1973. Later in the year announcements were made that prices would be held on tin mill products until February 15, 1973 and on sheet, strip, and galvanized products until April 1, 1973. As a result of these price freezes the industry has absorbed the August 1, 1972 wage increase granted under the three-year labor contract negotiated in 1971.

In November 1972, major steel producers announced price increases on most steel products except sheet, strip, and galvanized products. Increases on some products of some producers were slightly lower, but increases for products affected averaged about 4 percent. Higher prices for semifinished steel, plates, structurals, rails, bars, and certain rods, wire, and tubular products are effective January 1, 1973 and for tin mill products, February 16. The companies raised prices under authority previously granted by the Price Commission. However, at least one company must seek authorization for increases announced for tin mill products.

1972 Profile

Steel

SIC codes	3312, 3315, 3316, and 3317.
Value of industry shipments (millions).	$19,200
Number of establishments	827
Total employment (thousands).	475
Exports as a percent of product shipments.	3.1
Imports as a percent of apparent consumption.	16.0
Net profits as a percent of net worth.	4.3
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	4.7
Value of exports (current dollars).	9.4
Value of imports (current dollars).	15.0
Employment	3.3
Major producing acreas	East North Central States

According to the Bureau of Labor Statistics, the wholesale price index (1967=100) for steel mill products rose from a 1971 average of 123.0 to an estimated 130.3 for 1972.

Employment Declines Slightly, Wages Rise

Despite a slight increase in early 1972, industry employment for the year decreased slightly from the year earlier, falling from 487,000 in 1971 to an estimated 475,000 in 1972. The bulk of the reduction continues to be among production workers whose numbers dropped from an average of 384,000 in the first 9 months of 1971 to 361,000 during the same period of 1972. Supervisory or salary worker employment dropped from an average of 122,000 to 114,000 over the same period.

The current labor contract, signed in 1971 and effective until August 1, 1974, provided for a 50 cents-per-hour pay boost on August 1, 1971 and a 12½ cents-per-hour in 1972 and in 1973 plus a cost-of-living escalator of at least 12½ cents-per-hour in 1972 and in 1973. The total wage increase over the contract period, estimated at about 30 percent over the 1970 wage level, will amount to an additional 75 cents-per-hour in wages and at least 25 cents-per-hour in cost-of-living increases. Also included were such improved fringe benefits as increased retirement and health benefits.

Industry Financial Picture Improves

Despite wage increases and capital expenditures associated with the addition of pollution abatement equipment, steel industry profits after taxes are estimated to have increased in 1972 and should continue rising in 1973. With a "streamlining" of the work force and uninterrupted production, estimates are that profits in 1972 were considerably higher than the $566.2 million of 1971. In the first half of 1972, profits were $383 million, $57 million below the 1971 period, but second half 1972 profits were expected to rise considerably.

Pollution Control Expenditures Climb

According to a recent survey by the American Iron and Steel Institute, U.S. steel companies have budgeted $320 million for air and water quality control facilities scheduled to go into operation in 1972 and later. Expenditures for these purposes in 1971 totaled $162 million. The National Industrial Pollution Control Council estimates that the steel industry will need to spend a total of $2.5 billion to comply with national air standards plus another $1.0 billion to meet water standards.

An example of the pollution abatement efforts of the industry are the announced plans by a group of steel companies to build a $37 million plant to process 500 tons of coke pellets daily through an improved coke making process that will control gas and dust emissions commonly associated with such plants. The plant is to be located in the Baltimore harbor at Sparrows Point.

Modernization of Facilities Continues

While expenditures for pollution abatement equipment rise, allocations for new plant and equipment have declined to $1.4 billion in 1971, or 39 percent from the 1968 level of $2.3 billion. Much of new plant and equipment expenditures have gone toward modernizing furnaces, specifically to eliminate open hearth furnaces in favor of

Steel: Selected Financial Data

[In millions of dollars]

	1967	1968	1969	1970	1971	January to September 1971	January to September 1972	Percent increase 1971–72
Value of sales [1]	16,880.4	18,679.6	19,231.0	19,269.5	20,126.2	15,999.1		1
Profits after taxes	829.8	992.2	879.4	531.6	566.2	522.7		23
Profits as percent of sales	4.9	5.3	4.6	2.8	2.8	3.3		
Depreciation and depletion [2]	1,202.4	965.8	1,042.4	1,044.3	1,075.4	876.7		4
Capital expenditures	2,145.7	2,307.3	2,046.6	1,736.2	1,406.1	NA	NA	
Stockholders equity	12,168.5	12,617.5	12,836.0	12,966.6	13,135.8	NA	NA	
Profits as percent of equity	6.8	7.9	6.9	4.1	4.3			

[1] Net billing value of products shipped and other services, interest and other income; includes nonsteelmaking activities for some companies which report on a consolidated basis. Data included companies accounting for about 90 percent of raw steel output, and more than 80 percent of finished steel shipments.

[2] Many of the companies changed their depreciation accounting methods from an accelerated to a straight line basis in 1968.

NOTE.—NA = not available.

Source: American Iron and Steel Institute.

electric and basic oxygen furnaces. New continuous casting and high speed rolling mills have also been installed.

Continued Growth Expected

Production of raw steel (allowing for the growth of continuous casting which reduces the tonnage of raw steel produced) is expected to increase about 2.7 percent a year to reach 166 million tons by 1980. Assuming that imports will decline somewhat in the future, steel shipments by domestic mills should grow at an annual rate of about 3 percent and reach 118 million tons, and consumption 130 million tons, by the end of this decade.—*John T. Hardisty, Office of Business Research and Analysis.*

ALUMINUM

Following a sharp rise of 11 percent in 1972, shipments of aluminum ingot and mill products to consuming industries in 1973 are expected to advance approximately 8 percent to 12.5 billion pounds. Value of shipments will probably increase by 10 percent to $6.5 billion in 1973, up from an estimated $5.9 billion the previous year.

Major Markets

Heightened economic activity will be reflected in continued strength in aluminum consuming markets in 1973.

Distribution of aluminum shipments to major consuming industries in 1971 was: Building and construction, 27 percent; transportation equipment, 17 percent; containers and packaging, 15 percent; electrical, 14 percent; consumer durables, 9 percent; machinery and equipment, 6 percent; and others, 7 percent. About 5 percent of shipments was exported. The consumption pattern in 1972 was about the same as in 1971.

During the first half of 1972, the largest quantity increases in shipments were of sheet and plate, extruded products, and castings.

Primary Production at Record

Primary aluminum production in 1972 reached an all-time high, exceeding 8 billion pounds. The operating rate for primary aluminum production increased from 82 percent of capacity in January to 90 percent at the beginning of the October–December quarter, 1972. No new capacity was added during the year; production capacity is about 9.3 billion pounds.

Stockpile Sales Negligible

By the end of September 1972, 1.2 billion pounds of surplus aluminum had been purchased from the Federal Government by producers under the aluminum disposal program which became effec-

Aluminum: Trends and Projections 1967–73

[In million of dollars except as noted]

	1967	1969	1970	1971	1972[1]	Percent increase 1971–72	1973[1]	Percent increase 1972–73
Value of shipments[1,2]	4, 300	5, 400	5, 200	5, 300	5, 900	11	6, 500	10
Quantity shipped (million pounds):[2]								
Total	8, 946	10, 825	10, 112	10, 419	11, 600	11	12, 500	8
Exports	657	1, 007	1, 161	570	520	−9	550	6
Other	8, 289	9, 818	8, 951	9, 849	11, 080	12	11, 950	8
Total employment (thousands)[1]	185	204	192	181	183	1		
Value added (SIC 3334, 3352, 3361)[3]	2, 267	2, 574	2, 076	2, 341	NA	NA		
Value added per production worker man-hour (SIC 3334, 3352, 3361)	$10. 39	$10. 78	$9. 49	$11. 49	NA	NA		
Value of imports[4]	244	264	239	322	361	12	382	6
Value of exports	208	304	365	208	194	−7	205	6
Wholesale price indexes (1967 = 100):								
Primary aluminum ingot[5]	100	108. 9	113. 2	101. 4	97. 0	−4		
Aluminum mill shapes[5]	100	106. 3	109. 8	109. 5	110. 2	1		

[1] Estimated by Bureau of Domestic Commerce.

[2] Represents shipments to consuming industries and exports; includes shipments of aluminum products made by all industries as well as imports.

[3] Total for three SIC industries only; not comparable with value of shipments estimated in the first line of the table.

[4] Beginning with 1970, imports of mill products are not strictly comparable with preceding years.

[5] Price indexes are based on list prices for mill shapes, and for ingot for period 1967 to mid-1970. In mid-1970 the Bureau of Labor Statistics converted the aluminum ingot index to buyers' price so as to adequately reflect market price movements.

NOTE.—NA = not available.

Source: Bureau of the Census; Bureau of Labor Statistics; Bureau of Domestic Commerce.

Aluminum Shipments January–June 1971–72

[Amounts in millions of pounds]

	January-June 1971	January-June 1972	Percent change
Total shipments to consumers (including imports and exports)	5, 552	5, 955	7
Mill products (excluding imports), total	4, 087	4, 578	12
Sheet and plate	2, 098	2, 375	13
Extruded products and drawn tube	952	1, 106	16
Foil	309	318	3
Cable, bare	267	239	−11
Insulated and covered wire and cable	154	180	17
Rod, bar and bare wire	102	134	31
Powder and paste	90	100	11
Forgings and impacts	53	63	18
Welded tube	62	63	2
Ingot for other than mill products [1]	1, 378	1, 285	−7
Castings, total	804	948	18
Sand	98	114	17
Permanent mold	170	214	26
Die	531	614	15
Other	5	6	20

[1] Includes ingot for castings, destructive uses, and exports.

NOTE.—Calculations are based on original figures in thousands of pounds.

Source: Bureau of the Census and Bureau of Domestic Commerce. Data are preliminary.

tive November 23, 1965. Only 12.3 million pounds were purchased during the 9-month period ending September 1972, when 1.65 billion pounds remained for disposal through purchase by aluminum producers under the 1965 contract agreements. Those agreements provided that the second 4-year contract balancing period will end in December 1973. Since very little had been purchased by the end of 1972, a substantial commitment for producer purchases remains in 1973 unless present contracts are modified. The aluminum stockpile objective late in 1972 remained at 900 million pounds, as established in 1963.

Prices-Profits Continue Low

In May 1972, the base list price for unalloyed primary aluminum ingot was reduced from 29 to 25 cents a pound. Similar adjustments were made in list prices of mill products. Those price changes brought published prices closer to actual transaction prices.

Even though sales increased in 1972, prices continued low. For the first 9 months of 1972, profits of three large primary companies were 2.6 percent of sales, the same as during the comparable period of 1971. In the full year of 1971 their profits were $79 million, equivalent to 2.3 percent of sales and 3 percent of average net worth.

Aluminum: Financial Data for Three Large Producers

[In millions of dollars except as noted]

	1967	1968	1969	1970	1971	January-September 1971	January-September 1972
Sales	$2, 988	$3, 102	$3, 550	$3, 510	$3, 497	$2, 629	$2, 920
Profits after taxes	$215	$185	$250	$193	$79	$70	$75
Ratio profits after taxes/sales (percent)	7. 2	6. 0	7. 0	5. 5	2. 3	2. 6	2. 6
Ratio profits after taxes/net worth (percent) [1]	10. 4	8. 4	7. 0	5. 5	2. 3	NA	NA

[1] Based on average net worth. These companies have large amounts of long-term debt; the ratio of return on total invested capital is significantly less than the ratio of profits to net worth.

NOTE.—NA = Not available.

U.S. Producers Buy Russian Technology

American primary producers announced agreements with the Soviet Union to use Russian technology for casting ingot electromagnetically. The process is said to eliminate the need for scalping ingots and may result in cost savings of as much as one cent per pound of aluminum.

Pollution and Recycling

The aluminum industry is cooperating in efforts to combat air, water, and solid waste pollution. Approximately 1.5 billion aluminum beverage cans were recycled in 1972, double the rate of 1971. Can redemption centers have been set up for the public in most States. Secondary smelters also reclaim metal from scrap.

Import Balance Continues

As in 1971, imports exceeded exports in 1972. The value of exports dropped 7 percent while imports increased 12 percent, an excess of imports of \$167 million.

Ingot imports were valued at about \$290 million and semifabricated product imports at about \$70 million. Major countries of origin for imported ingot, in 1972, were Canada, about 75 percent; Norway, 10 percent; United Kingdom, 5 percent; Ghana, 5 percent; and France about 3 percent. Belgium was the source of about 37 percent of semifabricated product imports; France, about 21 percent; Japan, 10 percent; West Germany, 8 percent; and Yugoslavia about 7 percent.

Exports of ingot for 1972 were estimated at about \$46 million, with semifabricated product exports at about \$148 million. Major countries of destination for ingot were Canada, about 19 percent; Belgium, 18 percent; Japan, 9 percent; West Germany, 8 percent; and Thailand about 5 percent. About 59 percent of semifabricated product exports went to Canada; 7 percent to the United Kingdom; 5 percent each to Mexico and Brazil; and about 3 percent to West Germany.

1972 Profile

Aluminum

SIC codes	3334, 3352, 3361 and parts of 3341, 3357, 3392, and 3399
Value of industry shipments (millions).	\$5,900
Number of establishments	30 primary aluminum and about 84 secondary aluminum plants. Several hundred produce mill products and several thousand make castings
Employment (thousands)	183
Exports as a percent of shipments (value).	3.3
Imports as a percent of shipments (value).	6.1
Net profits as a percent of net worth 1971 (3 large companies.)	3.0
Compound annual rates of growth 1967-72 (percent):	
Value of shipments (current dollars).	6.5
Value of exports (current dollars).	−4.5
Employment	−0.2

Alumina Imports Increasing

Imports of bauxite in 1972 were expected to remain at the level of 1971—12-million long tons (dried equivalent), not including some bauxite imported into the Virgin Islands. As in 1971, Jamaica accounted for about 62 percent of bauxite imports, Surinam for 23 percent, Dominican Republic for 7 percent, and Haiti, Guyana, and Australia for the remainder. U.S. mine production of bauxite in the past 3 years was estimated at 2-million long tons (dried equivalent). About 90 percent of domestic production comes from Arkansas, the rest from Alabama and Georgia.

Alumina imports in 1972 were estimated at 2.9-million short tons, about 21 percent above the 2.4-million short tons imported in 1971. Major countries of origin continue to be Australia, Jamaica, and Surinam. Australia accounted for about 44 percent of alumina imports.

Future Growth Assured

The long range outlook for aluminum is favorable. Shipments are expected to rise to 20 billion pounds by 1980, reflecting an annual growth rate averaging 7 percent from 1972. Value of shipments should show an average growth of 8.1 percent a year, to \$11 billion in 1980. Future increased aluminum usage will be stimulated by growth in structural areas and new types of containers, and in the transportation field. New markets may emerge from developments in processing, handling and storing of liquefied natural gas. Greater application of aluminum in the automotive field may be prompted to offset the increasing weight of autos.—*Marie Z. Harris, Office of Business Research and Analysis.*

COPPER

The copper industry is expected to prosper in 1973 with demand for copper products increasing as the economy continues to expand. Ample supplies of copper should be available both domestically and in foreign-producing countries. Four firms have announced plans for the construction of new smelter facilities, mainly in Western States. No major labor problems are anticipated since labor contracts signed in 1971 are in effect until 1974. However, work stoppages in any major copper consuming industry could affect production. U.S. firms are continuing to press their claims for compensation and insurance payments due because of Chile's nationalization of U.S. copper holdings about 2 years ago. Control of air pollution resulting from sulfur emissions from copper smelters will continue to be a major problem. Shipments, costs, and profits should again increase in the copper industry. Refined copper production should be up 6 percent. Value of shipment for the brass mill industry may be $3.4 billion—the highest ever, and wire mill shipments up to $4.5 billion, another new record.

Refined Production Continues Up

Except for strike years, refined copper production from domestic ores increases every year. Output in 1972 was substantially higher than 1971's strike-reduced level and in 1973 is expected to increase 6 percent to 1,750,000 tons, or about a third of the free world's output. U.S. production from foreign ores is declining following the expropriation of major U.S. holdings in Chile. Because of increased production from domestic ores and decreased net imports of copper raw materials, the foreign contribution to new supply in 1972 was about 5 percent, the lowest in over a decade.

Brass mill shipments rose for the second straight year in 1972 and are expected to increase 5 percent further in 1973 to 3 billion pounds, the third best year on record in terms of volume. Imports continue to make inroads in the domestic market.

U.S. Copper Supply and Distribution 1967–73

[In thousands of tons, copper content]

Type of material and activity refined copper	1967	1968	1969	1970	1971	1972 [1]	Percent change 1971–72	1973 [1]	Percent change 1972–73
New supply	2,029	2,260	2,340	2,374	2,123	2,400	13	2,550	6
Production	1,524	1,838	2,208	2,242	1,961	2,240	14		
From domestic ores	847	1,161	1,469	1,522	1,412	1,650	17	1,750	6
From foreign ores	286	276	274	246	178	190	7		
From scrap	391	401	465	474	371	400	8	800	7
Imports	329	400	132	13	162	160	−1		
Government stockpile [2]	176	22							
Distribution	2,107	2,130	2,358	2,263	2,203	2,420	11	2,550	5
Consumption	1,947	1,879	2,142	2,042	2,016	2,200	11	2,300	4
Exports	160	251	216	221	187	220	18	250	14
Apparent inventory change	−78	130	−18	111	−80	−20			
SCRAP									
New supply (receipts)	939	1,000	1,072	957	1,002	1,100	9	1,155	5
Distribution	925	1,026	1,075	967	1,005	1,050	4	1,155	5
Consumption	869	938	1,021	885	937	1,000	7	1,085	8
Exports	56	88	54	82	68	50	−26	70	40
Apparent inventory change	14	−26	−3	−10	−3	50			
ALL COPPER									
New supply	2,968	3,260	3,412	3,331	3,125	3,500	12	3,705	6
Distribution	3,032	3,155	3,433	3,230	3,208	3,470	8	3,705	7
Consumption	2,816	2,816	3,163	2,927	2,953	3,200	8	3,385	6
Exports	216	339	270	303	255	270	6	320	18
Apparent inventory change	−64	104	−21	101	−83	30			

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes releases from the Mint.

NOTE.—Rate of growth—1971–72 for new supply are abnormally high because of the 1971 industry strike.

Source: Bureau of Census, Bureau of Mines, Bureau of Domestic Commerce.

Last year's imports in quantity terms were about 25 percent higher than the previous year, with Canada, West Germany, and Japan supplying two-thirds of all imports. Foreign companies have been especially successful in marketing seamless tubing in the United States, contributing to the closing of some domestic tube making facilities.

Wire Mills Production Jumps

Wire mill production jumped a healthy 9 percent in 1972 to nearly 2.6 billion pounds, a record level. Wire mills shipments are estimated at over 2.7 billion pounds in 1973 for another banner year. Shipments of communication wire and cable are increasing each year. Although other insulated wire and cable continue to be the industry's mainstay, since 1967 sales of communication wire and cable have grown at an annual rate of almost 7 percent.

Domestic production of wire and cable continues to be competitive with foreign output. Although foreign trade accounts for only a small share of domestic shipments, exports generally exceed imports. In 1972 exports were $60 million and imports totaled $40 million.

Defense Shipments

Consumption of copper for defense purposes during the Viet Nam period has declined from a peak of 238,000 tons copper content in 1967 to about 100,000 tons in 1972 and is estimated to be in the 100,000 ton range in 1973 also.

Copper Price

The U.S. domestic producers' price for electrolytic copper wirebar was reduced by 2 cents per pound in mid-1972 to 50½ to 50¾ cents. Principal pressure came from the London Metal Exchange (LME) "world price" which at times was as much as 6 cents below the U.S. price. It appears that the dominant variable affecting the 1973 price will be on the demand side, namely the recovery of demand in Europe and Japan. On the supply side stocks and production levels seem to be ample.

Brass Mills: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1968	1969	1970	1971[P]	1972[1]	Percent change 1971–72	1973[1]	Percent change 1972–73
Industry:[2]									
Value of shipments	2, 391	2, 588	3, 032	2, 921	2, 784	3, 150	10	3, 370	10
Total employment (thousands)	40	40	41	39	40				
Production workers (thousands)	32	32	33	30	29				
Value added	704	751	793	690	684				
Value added per production workers man-hour (dollars)	$10. 9	$11. 7	$11. 7	$11. 6	NA				
Product:[3]									
Value of shipments, total	2, 196	2, 525	2, 885	2, 775	2, 730[1]	3, 000	10	3, 270	9
Quantity shipped, total (million of pounds, metal weight)	2, 596	2, 756	3, 110	2, 513	2, 709	2, 900	7	3, 050	5
Unalloyed rod	130	140	161	129	151	160	6	165	3
Unalloyed sheet	220	178	235	176	220	220		250	14
Unalloyed tube	641	660	778	667	707	760	7	790	4
Alloyed rod	651	761	880	675	730	800	10	825	3
Alloyed sheet	787	856	888	707	744	800	8	850	6
Alloyed tube	167	162	169	159	157	160	2	170	6
Value of imports	119	178	112	125	150	180		190	6
Value of exports	17	18	26	33	30	34		36	7
Wholesale price indexes (1967=100)[4]	100	108	119	129	118	124			

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the copper rolling and drawing industry SIC 3351.
[3] Includes value of shipments of brass mill products made by all industries.
[4] 1972 Average first two quarters.
P = preliminary.

NOTE.—NA = not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Copper Wire Mills: Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1968	1969	1970	1971[p]	1972[1]	Percent change 1971-72	1973[1]	Percent change 1972-73
Industry:									
Value of shipments[2]	3,591	3,380	3,748	4,144	3,801	4,200	10	4,500	7
Total employment (thousands)	72	66	68	69	70				
Production workers (thousands)	55	50	52	52	53.0				
Value added	1,330	1,148	1,205	1,392	1,265				
Value added per production worker man-hour (dollars)	$11.4	$10.8	$11.0	$12.8	NA				
Product:									
Value of shipments, total[3]	2,983	2,784	3,117	3,485	[1] 3,436	3,800	10	4,045	6
Bare copper	373	371	420	405	400	460	16	500	9
Magnet wire[4]	420	387	468	509	446	500	12	520	4
Communication wire and cable[4]	863	814	960	1,157	1,138	1,300	14	1,410	8
Appliance wire and cord[4]	184	179	192	195	215	260	4	270	4
Power wire and cable[4]	407	359	383	444	397	430	8	445	3
Other insulated wire and cable	736	674	694	775	805	850	6	900	6
Quantity shipped, total (millions of pounds)	2,356	2,214	2,524	2,329	2,354	2,560	9	2,725	6
Bare wire	235	242	245	226	218	255	17	275	8
Communication wire and cable	543	535	716	700	672	755	12	790	6
Other insulated wire and cable	1,578	1,437	1,563	1,403	1,464	1,550	6	1,660	7
Value of imports	35	36	34	83	40	40		45	12
Value of exports	44	44	52	50	47	60	28	60	
Wholesale price index of copper wire and cable (1967=100)[5]	100	102	109	128	118	115			

[1] Estimated by Bureau of Domestic Commerce.
[2] Value of all products and services sold by the nonferrous wire drawing and insulating industry (SIC 3357).
[3] Estimated value of shipments of copper wire mill products made by all industries, including insulated aluminum wire and cable.
[4] Includes aluminum wire and cable.
[5] 1972 Index average of first two quarters.
[p] Preliminary.

NOTE.—NA=Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

No Labor Disputes in 1973

The copper industry should continue free of major work stoppages in 1973. Following a brief strike most of the current labor contracts were signed in 1971 with producers and fabricators and these 3-year agreements continue in effect until 1974. However, labor costs will rise this year because the agreements contain a provision for a 92 cents per hour increase spread over 3 years. Consequently, wages will rise about $12 per week in 1973, bringing average weekly earnings, including overtime, to about $200 for production workers. Labor stoppages in any consumer industry could, of course, reduce copper consumption and in turn, production.

The issue of compensation raised by Chile's nationalization of U.S. investor owned copper holdings in 1971 remains unresolved a year and a half after Chile took over complete control of the properties. Claims by Anaconda and Kennecott for compensation were rejected by the Chilean Government on grounds both companies owed Chile compensation for excess profits in previous years. Last August a special Chilean tribunal ruled the tribunals had no authority to review President Allende's excess profit determination. Both Anaconda and Kennecott declared they would pursue their claims elsewhere. Negotiations have continued between Chile and Cerro Corporation over the nationalization of the Rio Blanco operation.

Meanwhile, the Overseas Private Investment Corp. (OPIC) authorized payment to Anaconda of $11.9 million for losses from Chile's expropriation of the Exotica mine. OPIC rejected Anaconda's claim for the loss of Chuquicamata and El Salvador because these mines were not insured at the time of expropriation. OPIC had not yet ruled on Kennecott's claim for the expropriated El Teniente mine in late 1972.

In a move that may set the pattern for further U.S. participation in external copper resources, Anaconda signed an agreement in 1972 with the Government of Iran to provide training and technical assistance on a fee basis for the development of the Sar Cheshmeh copper deposits.

Smelter Pollution Abatement

The copper smelter industry's efforts to control sulfur emissions moved forward on several fronts in 1972. Early in the year, the major copper producers appeared before the Senate Subcommittee on Air and Water Pollution to present their arguments on the degree of emissions control needed to meet ambient air quality standards, capabilities of available technology to achieve these standards, and costs of applying such technology.

During the year, the Environmental Protection Agency (EPA) approved State implementation plans submitted by Texas and Washington and rejected those submitted by Arizona, Montana, Nevada, New Mexico, and Utah. The plans, designed to meet primary ambient air quality standards (public health), were rejected principally because the use of intermittent controls to limit operations during periods of predicted adverse meteorology would be permitted. The EPA proposals require permanent systems which would achieve a degree of control varying from 60 percent in New Mexico and Nevada to 96.5 percent at Hayden, Ariz. In several instances, EPA granted 2-year extensions in compliance schedules to July 1977. EPA also postponed its requirements for attaining the secondary ambient air quality standards (public welfare) for 18 months. Regional hearings were held on the proposed regulations.

Some copper companies initiated legal actions against EPA regulations applying to smelters in Arizona and Montana. Congress is considering legislation which includes provisions for a tax on sulfur oxide emissions to be applied where national air standards are not being met and funding for 30-year, 3-percent loans for pollution abatement equipment.

1972 Profile

Primary Smelting and Refining of Copper

SIC Code	3331
Value of shipments (millions)	$2,700
Number of establishments	16 refineries, 17 smelters
Total employment (thousands).	18.0
Exports as a percent of product shipments.	9.8
Net Imports as a percent of apparent consumption.	5.9
Compound annual average rate of growth 1967-72 (percent):	
Value of shipments	18.0
Value of exports	8.0
Value of imports	11.0
Major producing areas	Arizona, Maryland, Michigan, Montana, Nevada, New Jersey, New Mexico, New York, Texas, Utah, and Washington.

Financial Data for Seven Copper Companies [1]

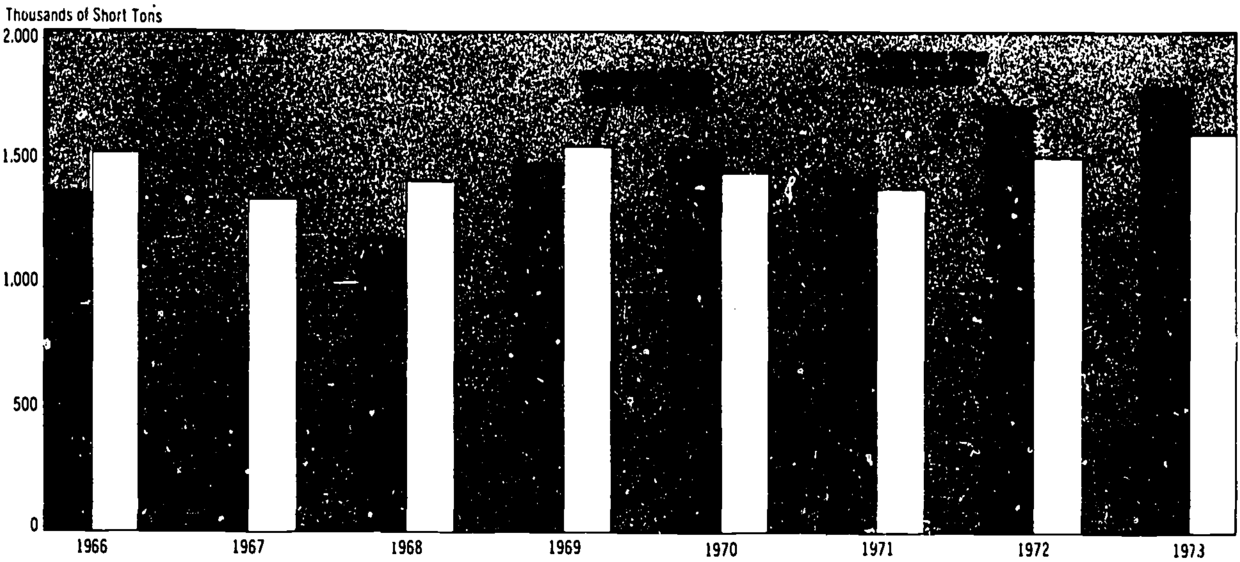
[In millions of dollars]

	1967	1968	1969	1970	1971	1971 first half	1972 first half
Sales	3,490	4,031	5,237	5,016	4,631	2,530	2,628
Net income	365	439	579	564	278		
Capital expenditures	532	555	481	564	595		
Total assets	5,010	6,100	6,690	7,022	7,156		
Ratios (percent):							
Income, sales	10.4	10.8	11.0	11.2	6.0		
Net income, net worth	9.6	10.6	12.8	11.9	6.2		
Capital expenditures, gross plant	11.5	10.2	9.2	10.0	9.1		
Sales, total assets	69.6	66.0	78.2	71.4	64.7		

[1] American Metal Climax, American Smelting and Refining Co., Anaconda Co., Cerro Corp., Phelps Dodge Corp., Copper Range Co., Kennecott Copper Corp.

Source: Standard & Poor's, Moody's.

Recycled materials rival ore in copper production



SOURCE: Bureau of Mines and Bureau of Domestic Commerce.

Copper Scrap Recycling

While general concern over the effect of industrial waste materials on the environment is relatively recent, the copper industry has been recycling copper scrap for centuries. Copper does not rust and literally lasts forever. These features combined with favorable price levels and other important properties make copper scrap economically feasible to collect and reuse. As a result an entire secondary copper industry—the largest of the nonferrous metals—gathers and processes copper scrap. In 1972, about 400,000 tons of refined copper were made from scrap by primary and secondary plants. Another one million tons were remelted and used without further refining by brass mills, ingot makers and foundries.

1972 Profile

Copper Wire and Cable

SIC Code	3357 (includes aluminum wire)
Value of shipments (millions)	$4,200
Number of establishments	348
Exports as a percent of product shipments.	2.6
Imports as a percent of apparent consumption.	1.1
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	3.2
Value of exports (current dollars).	6.4
Value of imports (current dollars).	2.7
Major producing areas	New England, North-Central, and Pacific States.

1972 Profile

Brass Mills

SIC Code	3351
Value of industry shipments (millions).	$3,150
Number of establishments	125
Total employment (000)	40,000
Exports as a percent of product shipments.	1.0
Imports as a percent of apparent consumption.	8.0
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	5.7
Value of exports (current dollars).	14.9
Value of imports (current dollars).	8.6
Major producing areas	New England, Middle Atlantic, and East North-Central States

The contribution of scrap to total new annual copper supply closely approximates production from domestic ores and, in some recent years, has actually exceeded primary production. The importance of copper scrap is further highlighted by demand from other countries. The United States is both the largest producer and consumer of copper scrap. In periods of tight supply, controls have been imposed on exports of scrap.

Copper Industry to Continue to Grow

The copper industry—producers and fabricators—is expected to continue to grow in this decade. By 1980 refinery production from domestic ore should increase at a compound rate of about 5 percent, to 2.4 million tons. Brass mill shipments are projected to grow to 4.8 billion pounds, while wire mill shipments are forecast at about 4 billion pounds. The industry has survived a major blow to its financial structure and copper resources with the expropriation of its large foreign holdings, and is coping with pollution problems as well as expanding capacity with the announcement of plans for new smelters. The secondary copper industry may benefit from added incentives for recycled materials.—*Michele C. Bozzelli, Office of Business Research and Analysis.*

CHAPTER 20

Metalworking Machinery and Tooling

Shipments of the metalworking machinery industries—cutting and metal forming machine tools; perishable cutting tools; dies, jigs and fixtures; and welding equipment—are expected to share in healthy levels of business activity in 1973.

Metal cutting and metal forming machine tool shipments are expected to advance 25 percent above 1972 to $1.5 billion in 1973. Present trends for investment in machine tools indicates that 1974 will equal or exceed shipments for 1973. Demand to increase productivity and modernize facilities is expected to produce a banner year for the machine tool industry in 1973. In 1980, estimates are for machine tool shipments to reach $2.6 billion, averaging 10.2 percent growth annually from 1972.

Shipments of tools and dies industry in 1973 are expected to reach $2.75 billion, about 10 percent above shipments estimated for 1972. Activity in the major tool and die markets have been slow the past several years and present recovery is progressing slowly, but the industry is actively pursuing new markets, especially export trade. Tool and die product shipments are expected to grow at a moderate pace of 3.2 percent annually over 1972 levels to about $3.6 billion in 1980.

Perishable cutting tool shipments in 1972 increased 16 percent over 1971 levels and should increase another 13 percent in 1973. This steady growth in cutting tool usage reverses the low levels of activity for the industry during 1970 and 1971. Shipments of perishable tools in 1980 are estimated at $1.7 billion, an annual increase of 11.9 percent over 1972 activity.

Electric and gas welding and cutting equipment shipments are expected to reach $730 million in 1973, about 12 percent over 1972 levels. Shipments of welding equipment in 1980 are projected at more than $1.2 billion, an annual growth rate of 8.2 percent over 1972.—*Robert J. Hunsberger, Office of Business Research and Analysis.*

Metalworking Machinery and Tooling: Projections 1972-80[1]

[Value of product shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80[2]
3541	Metal cutting types	825	15	1, 050	27	1, 900	11. 0
3542	Metal forming types	375	9	450	20	700	8. 2
	Machine tools, total	1, 200	13	1, 500	25	2, 600	10. 2
3544	Special tools and dies	2, 500	10	2, 750	10	3, 600	3. 2
35451	Perishable cutting tools	690	16	780	13	1, 700	11. 9
3623	Electric welding equipment	550	14	620	13	1, 040	8. 3
35483	Gas welding and cutting	105	7	110	5	185	7. 4
	Welding equipment, total	655	13	730	12	1, 225	8. 2

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

MACHINE TOOLS

Machine tool industry orders and shipments were at healthy recovery levels in 1972 and improvement should continue throughout 1973. Capital spending plans for machine tools necessary to increase productivity and modernize facilities should continue strong during the year. An aura of good business for most metalworking industries provides the climate for resumption of growth by the machine tool industry from seriously low levels of activity during 1970 and 1971.

Orders and Shipments Rise

Orders for the industry rose about 50 percent during 1972 to surpass 1971 levels by the fourth quarter. Increases of 56 percent for metal cutting machines and 41 percent for the metal forming sector were significantly higher than 1971's low level of orders.

The machine tool industry's order backlog continued to increase sharply during 1972. From $569 million for both metal cutting and metal forming machines at the beginning of 1972, the backlog by the end of the third quarter of 1972 amounted to $812 million and is estimated to pass $1.2 billion at the end of the year.

Shipments of the basic or primary products of the industry—metal cutting and metal forming machine tools—are estimated at $1.5 billion in 1973, 25 percent over 1972 shipments of $1.2 bil-

Machine Tools: Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Total industry (SIC 3541-3542) [2]								
Value of all shipments [2]	2,841	2,835	2,589	1,964 P	2,215	13	2,625	19
Total employment (thousands)	116	111	100	75	78	4	NA	
Production workers (thousands)	82	74	67	47	49	4		
Value added	1,828	1,895	1,564	1,157	NA			
Value added per production worker man-hour	$10.01	$11.56	$11.29	$12.16	NA			
Metal cutting type machine tools (SIC 3541) [2]								
Value of all shipments [2]	2,127	2,108	1,829	1,309 P	1,485	13	1,775	20
Total employment (thousands)	87	83	71	55	57	4	NA	
Production workers (thousands)	61	55	47	35	37	6		
Value added	1,391	1,442	1,106	815	NA			
Value added per production worker man-hour	$10.56	$12.43	$11.85	$12.75	NA			
Metal forming type machines (SIC 3542) [2]								
Value of all shipments [2]	714	727	760	655 P	730	11	850	16
Total employment (thousands)	29	28	29	20	21	5	NA	
Production workers (thousands)	21	19	20	12	12	0		
Value added	437	453	458	342	NA			
Value added per production worker man-hour	$9.46	$10.69	$10.73	$10.96	NA			
Total primary products [3] (machine tools only)								
Value of shipments	1,826	1,693	1,552	1,058	1,200	13	1,500	25
Value of imports	177	156	132	90	107	19		
Value of exports	232	248	297	258	250	−3		
Metal cutting machine tools only [3] (SIC 3541)								
Value of shipments	1,373	1,243	1,098	715	825	15	1,050	27
Value of imports	153	133	105	71	85	20		
Value of exports	161	159	213	163	158	−3		
Metal forming machines only [3] (SIC 3542)								
Value of shipments	453	450	454	343	375	9	450	20
Value of imports	24	23	27	19	22	16		
Value of exports	71	89	84	95	92	−3		

[1] Estimated by BDC.
[2] Includes total activity of the industry: Value of primary products (machine tools) and secondary products (parts, accessories, rebuilding, purchases, services and other products).
[3] Includes only value of primary products (machine tools, SIC 3541 and/or 3542).

P Bureau of the Census—Preliminary.

NOTE.—NA = not available.

Source: Bureau of the Census and Bureau of Domestic Commerce.

lion. Metal cutting machine tool shipments in 1973 will probably increase 27 percent to approximately $1.05 billion, while shipments of metal forming machinery are expected to rise 20 percent to reach $450 million.

The total of all shipments of the machine tool industry including basic machine tools, accessories, parts, rebuilt machines, secondary products, purchased items and service, is estimated at $2.6 billion in 1973, up 19 percent from $2.2 billion in 1972. The metal cutting machine tool sector of the total industry is expected to ship nearly $1.8 billion of all products in 1973, a 20 percent gain over 1972, while the metal forming machine sector is expected to reach $850 million, up 16 percent from 1972.

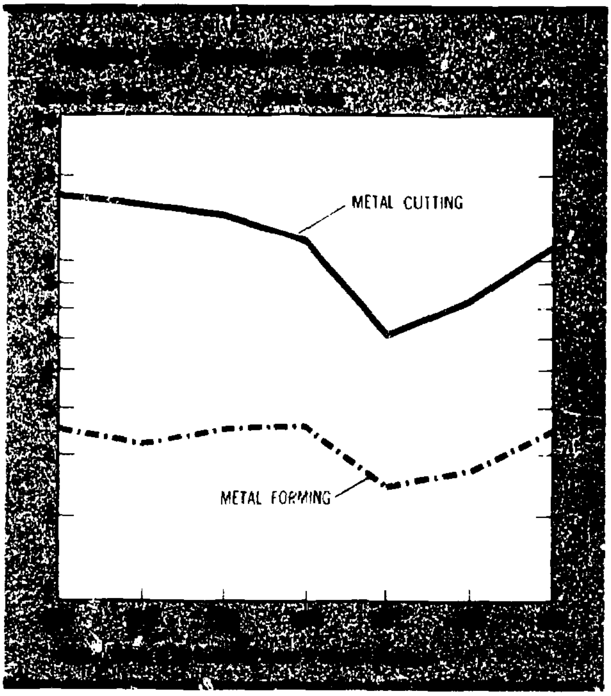
Demand High

Demand for machine tools in 1973 and 1974 is expected to remain high as metal working industries strive to modernize facilities through more productive cost reducing manufacturing systems. Growth has been stimulated by incentives to modernize, such as the investment tax credit and asset depreciation guidelines for capital equipment.

All indicators point to an increase in 1973 for expenditures for machinery and equipment by metalworking industries, despite the costs for borrowing capital and the need for funds for environmental and safety equipment.

Machinery Improvements

The first international machine tool show, held in Chicago in September 1972, provided an excellent opportunity for world producers of machine tools to exhibit the latest in machine developments. American machine tool exhibitors stressed productivity and performance at low investment costs rather than the heavy emphasis on direct numerical control manufacturing systems as was the case in the 1970 machine tool show, before the event



1972 Profile

Metal Forming Machine Tools

SIC Code	3542
Value of shipments (millions).	$375
Number of establishments	145
Employment (thousands)	21
Exports as a percent of shipments.	25
Imports as a percent of apparent consumption	7
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	−3.5
Value of exports (current dollars).	5.3
Value of imports (current dollars).	−2.0
Employment	−8.0
Major producing areas	Midwest, North Central, Middle Atlantic, New England

1972 Profile

Metal Cutting Machine Tools

SIC Code	3541
Value of industry shipments (millions)	$825
Number of establishments	260
Total employment (thousands).	57
Exports as a percent of product shipments.	19
Imports as a percent of apparent consumption	11
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars)	−9.5
Value of exports (current dollars)	−0.5
Value of imports (current dollars)	−11.0
Employment	−8.0
Major producing areas	Midwest, Middle Atlantic, North Central, New England

became international in scope. Low-cost numerically controlled (NC) machine tools played a more dominant role than in the 1970 show. Turning machines, machining centers, and milling machines with numerical controls played a prominent role. Other machine tools of high interest included grinding machines, gear generating equipment, milling machines, and electrical discharge machining equipment.

In the metal forming area, numerically controlled combination turret punch presses, press brakes, and various types of high-speed presses were in evidence. In the field of machine controls, major exhibits included computer numerical control, or soft wired NC systems, and programmable controllers. Direct numerical control and computer numerical control are expected to play major roles in the future advancement of machine tool technology during the 1970's. Orders for NC machine tools, which were slowed by economic conditions prevalent during 1970 and 1971, were recovering significantly during 1972 and are expected to increase in 1973.

Exports Steady

Overseas demand for U.S. machine tools in 1972 declined slightly from 1971 levels. Exports of machine tools amounted to $250 million, a decrease of 3 percent from 1971 in both metal cutting and metal forming categories. Exports of metal cutting machine tools in 1972 amounted to an estimated $158 million as compared to $163 million in 1971, a drop of 3 percent. Metal forming machinery exports totaled about $92 million, also a decrease of 3 percent from 1971.

Declining European and Japanese demand for machine tools is effectively slowing U.S. exports as economic conditions currently prevailing in those markets are not conducive to plant expansion. However, U.S. companies with oversea facilities appear to be most interested in modernization rather than expansion of facilities as labor and material costs continue to rise in those markets.

A favorable balance of trade for U.S. machine tools should continue at least through 1973. Current efforts to realign European tariff boundaries are expected to have a depressing effect thereafter on U.S. exports of machine tools. A treaty among 16 European nations to create a free trade zone commencing in 1973 would reduce the competitiveness of U.S. manufacturers in EEC and EFTA (European Free Trade Area) markets as their products would continue to be subject to existing tariffs. Within 4 years, or in 1977, signatories to the free-trade zone agreement could trade among themselves without paying import tariffs. However, multinational firms manufacturing within the zone should benefit from declining tariffs on materials imported thus increasing profit margins or lowering their export prices.

Imports Rising

Imports of machine tools amounted to an estimated $107 million in 1972, 19 percent above 1971. Metal cutting machine tool imports amounted to $85 million, an increase of 20 percent over 1971, while metal forming machinery imports amounted to $22 million, a rise of 16 percent from 1971 levels.

Growth in demand for imported machine tools has accompanied the general recovery of the U.S. economy. Foreign prices range anywhere from 15 to as much as 50 percent below U.S. standard general purpose tool prices, depending upon quality and features offered. The level of technology in some types of foreign products is competitive with similar U.S. machine tools.

Employment Rising—Profits Low

Employment of production workers in the machine tool industry is recovering in all regions of the United States. With backlogs of orders increasing at encouraging rates, companies are rehiring former employees to maintain deliveries at reasonable levels. However, producers are experiencing difficulties rehiring skilled machinists and operators who found employment in other industries after being laid off in 1970 or 1971. Total employment in the machine tool industry in 1972 was an estimated 78,000, 4 percent above 1971. Production worker employment in 1972 numbered 49,000, but is expected to rise appreciably in 1973.

Profits in the machine tool industry have been at a very low level for the past several years. Established companies have weathered such stormy periods in the past and there is every indication that they will recover from the forced retrenchment of 1970–71. Orders and shipments are rising at healthy rates, and indications are that the industry will be operating near full capacity in 1973 or 1974. As profits rise, funds will become available to restore research and development programs that necessarily were curtailed during 1970 and 1971. The industry is well aware of the need for such programs to improve their lines and maintain their competitive edge with new product development.

Strength Depends on Economic Growth

Historically the first industry affected by reductions in capital goods spending, the machine tool industry is usually one of the first to experience recovery. Whatever affects the health of the economy will also influence growth of the machine tool industry in the 1970's. A strong order and shipments pace is expected to continue through 1974, and possibly 1975. New technologies such as direct and computer numerical control of machine tools are expected to generate growth of machine tool shipments in the latter stages of the decade.

Shipments of metal cutting and metal forming machine tools in 1980 are projected at nearly $2.6 billion, based on annual increments of about 10 percent from 1972 as metalworking user industries invest at higher levels in the most advanced machine tools and manufacturing systems to increase productivity and meet competition.—*R. J. Hunsberger, Office of Business Research and Analysis.*

METAL-CUTTING TOOLS

1972 Profile

Metal-Cutting Tools

SIC Code	35451
Value of shipments (millions)	$690
Number of establishments	365
Employment (thousands)	33
Exports as percent of shipments.	3.2
Imports as percent of consumption.	2.2
Compound annual rates of growth (1967–72) percent:	
Value of shipments (current dollars).	−2.2
Value of exports (current dollars).	'2.2
Value of imports (current dollars).	6.7
Employment	−4.1
Major producing areas	East North Central and New England States.

Shipments of metal-cutting tools are expected to reach $780 million in 1973, 13 percent above 1972 shipments of $690 million, but still 5 percent below 1969's record figure of $822 million.

Makers of automobiles, trucks, and off-the-highway earthmoving and construction equipment continue as major users of metal-cutting tools. All industries that fabricate metal products, and many manufacturers of nonmetallic products, are customers of the 365 plants that produce the small, precise, expendable tools used on machine tools.

The 1970–71 slowdown in metal-cutting tool consumption ended in 1972, when shipments rose 16 percent from the year-earlier level. New orders had begun to increase late in 1971, and are still gaining. Sales of metal-cutting tools are a good barometer of the general level of manufacturing, so the upturn in all metalworking industries is expected to continue.

Exports Dip

Exports of metal-cutting tools totaled an estimated $22 million in 1972, down fractionally from the year earlier. The decline was due partly to a slowdown in industrial activity in Western Europe and Japan in 1972.

Of the 88 countries importing metal-cutting tools in 1972, Canada continues to be our chief market, followed by West Germany, United King-

Metal-Cutting Tools: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Product: [2]								
Value of shipments, total	771	822	680	596	690	16	780	13
Carbide tooling [1]	232	355	325	280	315	13	350	11
High-speed steel and other material tools [1]	539	467	355	316	375	19	430	15
Value of imports	10.7	14.0	16.6	12.2	14.8	21		
Value of exports	19.0	24.0	24.6	22.2	22.0	−1		
Wholesale price indexes (1967=100)	100.0	110.3	114.6	110.3	110.8	1		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of shipments of metal-cutting tools made by all industries (SIC 35451).

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

dom and Japan. Other significant customers include Italy, Mexico, France and The Netherlands. Together, those 8 countries purchase about 70 percent of U.S. exports of metal-cutting tools.

Imports Rise

Value of imports of metal-cutting tools were estimated at $14.8 million for 1972, 21 percent over the 1971 value of $12.2 million. This increase partly resulted from the lower prices on imported tools. While 33 countries shipped to the U.S. in 1972, Japan, Sweden, West Germany and the United Kingdom accounted for about 60 percent of total imports.

Prices Rise Slightly

Following a sharp drop in prices of domestic metal-cutting tools in 1971—as much as 40 percent for some types—prices started to increase the following year. While prices of some tools rose as high as 5 percent, the wholesale price index of the Bureau of Labor Statistics measured the overall increase at less than ½ of 1 percent, compared with a 4.6 annual rate of increase from 1967 to 1970.

Legislation to convert the United States to the metric system has been under consideration by Congress, and manufacturers of metal-cutting tools are developing conversion methods in anticipation of its possible adoption.

Prospects Good for 1980

The outlook for the metal-cutting tool industry for the balance of the decade is favorable. By 1980, the value of shipments of metal-cutting tools is expected to reach $1.7 billion, reflecting an average annual increase of 11.9 percent—*Paul Sacharov, Office of Business Research and Analysis.*

TOOL AND DIE PRODUCTS

Bolstered by the upswing in the domestic economy, the independent or contract special tool and die industry recovered from the severe setback of 1971 and registered sales of $2.4 billion in 1972, an increase of 10 percent over 1971 sales of $2.2 billion but still below the 1970 record of $2.5 billion. The uptrend is expected to continue in 1973 with sales estimated to reach $2.6 billion.

The independent or contract special tool and die industry consists of over 5,000 manufacturers who account for about 65 percent of total primary product shipments. Precision machining operations and other products utilizing open time on their production equipment constitute the balance of their activity.

Total sales of tools, dies, jigs, fixtures, and molds manufactured by all industries, including those with captive tool and die shops, amounted to $2.5 billion in 1972, up 10 percent from $2.3 billion in 1971. In 1973, sales by all producers are anticipated at $2.8 billion, a rise of 11 percent.

Recovery Varies Geographically

Geographic areas differed markedly in 1972 sales, with the North Central States leading the recovery. The New England and Pacific Coast States were still depressed, as the electronics and aerospace industries were deterring overall growth in sales of tool and die products. In the Michigan

Tool and Die Products: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	2,202	2,388	2,479	2,150	2,360	10	2,640	12
Total employment (thousands)	114	115	113	97	102	5		
Production workers (thousands)	96	95	93	80	86	8		
Value added	1,647	1,776	1,815	1,600	NA			
Value added per production worker man-hour (dollars).	$7.67	$8.34	$9.18	$9.67	NA			
Product [3]								
value of shipments	2,520	2,610	2,705	[1] 2,300	2,600	10	2,750	11

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the tool and die industry (SIC 3544).
[3] Includes value of shipments of tool and die products made by all industries.

P = Preliminary.

NOTE.—NA = Mot available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

area, where the industry is almost exclusively dependent on the automotive market. improvement began in mid-1972 with placement of tooling for the 1974 model changeover. Initial tooling orders for the Wankel engine further assisted the recovery in the Michigan area.

In some areas recovery has been hindered by a scarcity of skilled labor. Many workers who were laid off during the decline of 1970 are reluctant to return to the tool and die work, having found suitable employment in other industries.

Imports-Exports on Increase

Several trends in foreign trade are emerging which will influence the domestic special tool and die industry. On the import side, heavy competition in certain types of dies and molds is being felt from European manufacturers. Also, Canada has become a major supplier to the automotive industry and is receiving a good share of the market.

The export potential of the tool and die industry is good and foreign sales should rise at a more rapid pace than imports and domestic sales. The industry is only now beginning to explore foreign markets, particularly Eastern Europe, and has already negotiated large contracts with the Soviet Union for tooling to produce flatwear and cutlery.

Trend to Secondary Products Continues

Diminishing demand caused by increasing numbers of captive shops, the move to use of more plastic parts by many industries, and the cutback in automotive tooling requirements because of fewer model changes have caused more independent tool and die shops to shift to production of secondary products. Because of the sophisticated equipment used in the industry and the highly refined skills of the tool and die maker, these products tend toward precision machinery and parts rather than straight production run items. Output of large segments of the industry now consist primarily of secondary products and services rather than traditional tool and die items.

In a move toward more diversification, tool and die shops recently have begun to use their engineering skills by participating in the design of entire production lines and systems. This trend promises a wider range of activity for the industry and could be an important factor in future years.

Outlook Good

In its present makeup, the outlook for the tool and die industry is for continued slow growth at about 3.1 percent a year throughout the remainder of the seventies. Some of the negative factors facing the industry today should be offset by tooling orders for the Wankel engine as Detroit goes into full production, and by a revival of the industry on the Pacific Coast due to increased spending by NASA for the space shuttle program. By 1980 shipments of the independent tool and die shops should approximate $3 billion, while sales of tool and die products manufactured by all industries are anticipated at $3.6 billion.—*Robert A. Ricciuti, Office of Business Research and Analysis.*

1972 Profile
Tool and Die Products

SIC Code	3544
Value of industry shipments (millions).	$2,360
Total primary product shipments by all industries (millions).	$2,500
Number of industry establishments.	5,000
Employment (thousands)	102
Major producing areas	East-North Central States
Compound annual average rate of growth 1967–72 (percent):	
Value of industry shipments.	1.4
Value of total primary products.	0
Employment	3.1

WELDING EQUIPMENT

With continuing economic expansion, the welding equipment industry in 1973 should have one of the best years in its history. Manufacturers' shipments to consumer industries are expected to reach $730 million, a rise of 12 percent over 1972 volume. The recovery is widespread throughout the industry, with only minor exceptions.

After slumping badly in 1970–71, welding equipment shipments have climbed back to exceed the previous record of 1969, when domestic shipments amounted to $623 million. Shipments in 1972 are estimated at $655 million, 13 percent over the $580 million of 1971. The 1970 to 1971 gain was under 3 percent.

The most impressive gain in 1972 was in electrode shipments, which increased $33 million or 16 percent from 1971 volume to $238 million. Electrodes accounted for 36 percent of total welding shipments. Arc welding machine shipments

Welding Machines and Equipment: Trends and Projections 1967–73

(In millions of dollars except as noted)

	1967	1969	1970	1971[1]	1972[1]	Percent increase, 1971–72	1973[1]	Percent increase, 1972–73
Product:[2]								
Value of shipments, total	502.5	622.8	566.1	580	655	13	730	12
Gas welding and cutting	69.6	88.7	97.6	98	105	7	110	5
Electric welding apparatus	432.9	534.1	468.5	482	550	14	620	13
Arc welding machines	140.7	205.0	168.6	185	205	11	233	14
Arc welding electrodes	166.3	215.6	190.7	205	238	16	270	13
Resistance welders	88.0	100.8	106.5	90	105	17	115	10
Electric welding, n.s.k	37.9	12.7	2.7	2	2	0	2	0
Value of imports								
Gas welding and cutting	2.5	3.6	2.3	1.5	2.4	60		
Electric welding apparatus	4.2	4.4	7.1	7.8	7.4	−5		
Value of exports								
Gas welding and cutting	12.0	15.1	15.5	14.7	15.2	3		
Electric welding apparatus	59.0	58.4	64.9	57.9	65.9	14		
Wholesale price index (1967=100)	100.0	104.9	110.6	114.9	120.7	5		

[1] Estimated by Bureau of Domestic Commerce.

[2] Include value of shipments of welding machines and equipment made by all industries.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

n.s.k. = not specified by kind.

amounted to $205 million, surpassing the 1971 figure by 11 percent to equal 1967 shipments. Although shipments of gas welding apparatus increased only 7 percent over 1971, they reached another all-time high of $105 million. After a lethargic performance in 1971, resistance welding is back on track, with sales in 1972 amounting to $105 million, up $15 million, or 17 percent. Shipments were 17 percent of 1972's shipment of all types of welding equipment.

Exports and Imports Increase

Exports of welding equipment for 1972 were $81.1 million, up 12 percent from the $72.6 million exported in 1971. The previous peak came in 1970 when exports reached $80.4 million. While dollar volume of exports should remain fairly high in years ahead, it is expected that the ratio of exports to total shipments will decline, as U.S. industrial output grows and foreign competition increases.

Major market areas include Canada, which purchases 23 percent of U.S. exports; North and Central European countries 25 percent; South America 20 percent, and Japan 3 percent. Together those areas take 71 percent of all U.S. welding equipment exports.

Imports of welding equipment, like exports, are

1972 Profile

Electric Welding Apparatus

SIC Code	3623
Value of shipments (millions)	$550
Number of establishments	170
Employment (thousands)	13.0
Exports as a percent of shipments.	12.0
Imports as a percent of apparent consumption.	1.2
Compound annual rates of growth, 1967–72 (percent):	
Value of shipments (current dollars).	4.9
Value of exports (current dollars).	2.2
Employment	−1.0
Major producing areas	East North Central States

1972 Profile

Gas Welding and Cutting Apparatus

SIC code	35483
Value of shipments (millions).	$105
Number of establishments	37
Employment (thousand)	2.7
Exports as a percent of shipments.	14.5
Imports as a percent of apparent consumption.	2.0
Compound annual growth rate, 1967–72 (percent):	
Value of shipments (current dollars).	8.5
Value of exports (current dollars).	4.8
Employment	−1.4
Major producing area	Middle Atlantic States

rising, but they amount to less than 2 percent of total consumption. Imports in 1972 are estimated at $9.8 million, an increase over 1971 of slightly more than 5 percent.

Almost a third of all imports in 1972 came from Canada, which took 15 percent of the U.S. market. West Germany had 13 percent. Other major suppliers were Austria and the United Kingdom with 5 percent each; and France, Japan, and Sweden, with around 3 percent each.

Improvement Preferred to Innovation

In 1972, welding equipment manufacturers continued to concentrate their efforts on refinement of processes rather than on innovation. No radically new processes have been introduced for several years. Current processes have been refined to increase productivity and to meet health and safety standards. Capital expenditures are being made to meet environmental needs and comply with Federal health and safety regulations, rather than to develop new technology.

Outlook for 1980

Despite temporary setbacks, the welding industry will grow in vigor and size in the years ahead. Demand by the automotive, construction, shipbuilding, and appliance industries will call for high welding equipment output.

Shipments of the industry are expected to grow by an average 8.2 percent a year from 1972, to exceed $1.2 billion by 1980.—*Paul Sacharov, Office of Business Research and Analysis.*

CHAPTER 21

Special Industry Machinery

Combined shipments of farm, construction, mining, oilfield, food, textile and printing machinery are expected to increase almost 6 percent in 1973 to over $15.7 billion, following a substantial gain of 9 percent in 1972 to $14.9 billion. Mining and oilfield machinery shipments are expected to lead in growth with increases of 10 and 8 percent, respectively. Anticipated construction, food and printing machinery sales will each advance 6 percent over 1972 levels followed by gains of 5 percent in textile machinery and 4 percent in farm machinery.

In 1972, all seven realized substantial gains with shipments of farm machinery and printing machinery rising most rapidly—12 and 10 percent, respectively.

Exports of special industrial machinery increased 9 percent in 1972, remaining three times as great as imports. Construction machinery accounted for about half of all exports in 1972, rising 5 percent above year-earlier levels. Mining and textile machinery exports actually declined in 1972. In contrast, exports of farm machinery jumped 25 percent and oilfield equipment exports increased 34 percent. In 1973, exports are expected to rise about 6 percent to $3.2 billion.

Imports of special industrial machinery rose 23 percent in 1972 to $1.1 billion and represented about 9.3 percent of apparent consumption. Accounting for most of the gain were imports of textile machinery which rose 34 percent to $460 million and farm machinery imports which increased 20 percent to $392 million. Imports are expected to rise only 2.5 percent in 1973 and the favorable balance of trade for special industrial machinery should continue.

An overall growth in shipments at an average of 4.4 percent a year from 1972 is expected in this group of industries to a total of $21.1 billion in 1980.—*William E. Fletcher, Office of Business Research and Analysis.*

Special Industry Machinery: Projections 1972–80 [1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
	Total	14, 876	9	15, 721	6	21, 133	4. 4
3522	Farm machinery and equipment	4, 965	9	5, 165	4	6. 400	4. 4
3531	Construction machinery and equipment	5, 292	9	5, 610	6	7, 408	4. 3
3532	Mining machinery and equipment	927	9	1, 020	10	1, 700	8. 1
3533	Oilfield machinery and equipment	1, 143	8	1, 234	8	1, 800	6. 1
3551	Food products machinery	965	5	1, 020	6	1, 565	6. 2
3552	Textile machinery	809	5	850	5	1, 025	3. 0
3555	Printing machinery	775	10	822	6	1, 235	6. 0

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

Farm Machinery and Equipment: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry:[2]								
Value of shipments	4,300	4,165	4,367	4,432	4,965	12	5,165	4
Total employment (thousands)	136	127	125	113	116	3		
Production workers (thousands)	104	94	93	83	85	3		
Value added	2,042	1,940	2,038	2,000	NA			
Value added per production worker man-hour (dollars)	10.05	10.66	11.36	12.36	NA			
Product:								
Value of shipments	4,077	3,962	4,041	4,101	4,595	12	4,780	4
Value of imports	315	311	310	327	392	20	410	4
Value of exports	445	417	358	359	450	25	470	4
Wholesale price indexes (1967=100)								

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the farm machinery and equipment industry (sic 3522).
[3] Includes value of shipments of farm machinery and equipment made by all industries.

P Preliminary.

NOTE.—NA=Not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

FARM MACHINERY

Pent-up demand for farm machinery, favorable interest rates, and improved economic conditions in the country led to sales increases far above expectations in 1972. Product shipments of all manufacturers of farm machinery reached 4.6 billion, surpassing the previous industry high of $4.1 billion in 1971. Favorable conditions expected in 1973 should raise product shipments 4 percent above 1972 to a record $4.8 billion.

Shipments by the farm machinery industry are expected to reach $5.2 billion in 1973, also an increase of 4 percent over 1972.

Sales of tractors, combines, balers, corn pickers, and forage harvesters in 1972 continued the increase started in the fall of 1971 and increased demand for these big ticket industry items mainly accounted for the substantial 12 percent increase in product shipments last year. The investment tax credit effective in August 1971 also helped to boost sales.

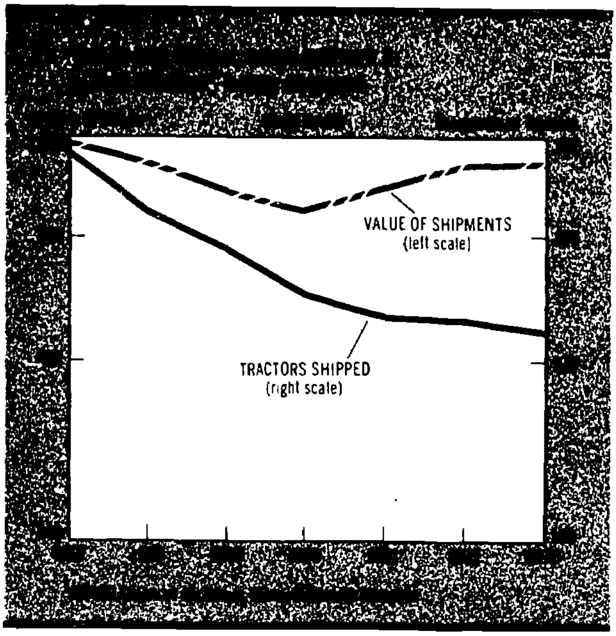
Industry employment declined in 1971 as shipments remained stagnant for most of the year. However, industry retained their most skilled labor in anticipation of improved economic activity which started in the last quarter of 1971. Employment increased 3 percent in 1972 as product shipments and sales of the industry rose.

Safety Apparent to Industry

Manufacturers became accutely aware of the Occupational Safety and Health Act (OSHA) during 1972 with major farm machinery associations continually advising their members to follow carefully its requirements. As a result, individual companies made strong efforts to comply with safety regulations and thereby increased both the safety and efficiency of working conditions within their plants. Efforts to improve finished industry products also continued. Improvements were made concerning noise level control, exhaust emission control, rotating shaft protection and ROPS. ROPS includes not only roll-over protection systems but complete safety cabs. The number of tractors with safety cabs increased to approximately 20 percent of shipments in 1972 compared with few units only some 3 years ago.

Efforts to improve industry products involved close cooperation with component suppliers. Basic product changes last year focused on larger and more efficient machines, requiring component suppliers to produce stronger and longer wearing parts and accessories. Results of such research and development are agricultural machines that permit farmers to produce more, at a lower cost per man hour and with greater safety, to help meet the ever-increasing demand for agricultural products to feed the world's growing population.

Industry representatives continued to work with technical committees of international organizations such as the Organization for Economic Cooperation and Development (OECD) and the International Standards Organization (ISO) in



various studies and projects involving agricultural related products. Efforts will continue to develop a system of harmonization of national safety regulations among industrialized nations and to develop standard testing codes for agricultural machinery.

Exports and Imports Set Records

Both imports and exports of farm machinery and equipment reached record levels in 1972. Imports of farm machinery and equipment were approximately $392 million, 20 percent above 1971. Components imported from U.S. subsidiaries abroad for assembly into finished products in the United States amounted to some 40 percent of all imports. Imports in 1973 are again expected to set a new record by reaching an estimated $410 million, a 4 percent increase over 1972 levels.

Reversing the downward trend started in 1968, exports are estimated to have reached a record $450 million in 1972, 25 percent higher than 1971 levels and surpassing the previous record set in 1967. This large gain stemmed partly from demand from developing nations for components to assemble or manufacture agricultural machinery within their borders. Thus, exports of components from the United States to foreign subsidiaries or associated companies increased sharply.

Exports for 1973 are expected to rise 4 percent to a new high of $470 million. This slowdown in export growth is related to a decline in the rate of U.S. foreign subsidiary expansion and greater production of components by foreign countries. However, the United States will continue to export large and special machines since most developing nations do not require sufficient quantities of such machinery to justify local production.

The great rise in farm production in Canada during 1972 considerably affected the U.S. import and export position with regard to farm machinery and equipment. Added purchases of farm machinery by Canadian farmers increased exports of both machinery and components to U.S. subsidiaries in Canada. Higher demand by U.S. farmers for more machinery increased imports from Canada of complete units such as combines, as well as components for United States final assembly. Canada accounted for approximately 57 percent of all U.S. exports and imports in 1972. Imports from Japan continued to increase, and consisted mainly of small tractors in the 15 to 28 horsepower sizes.

Large Farms Need Sophisticated Machines

Product shipments of farm machinery and equipment are expected to reach $6.5 billion in 1980 reflecting an annual growth rate of 4.4 percent. Industry shipments will probably increase to $7 billion by 1980, also reflecting a 4.4 percent growth rate. Affecting the industry in the years ahead is the continual decline in the number of farms and their replacement by large farms requir-

1972 Profile

Farm Machinery and Equipment

SIC Code	3522
Value of industry shipments (millions).	$4,965
Number of establishments	1, 473
Total employment (thousands).	116
Exports as a percent of product shipments.	10
Imports as a percent of apparent consumption.	9.0
Compound annual average rate of growth 1967–72 (percent):	2.9
Value of product shipments (current dollars).	2.9
Value of exports (current dollars).	0
Value of imports (current dollars).	2.8
Employment	−2.8
Major producing areas	Ohio, Indiana, Illinois, Iowa, Wisconsin, and Minnesota

ing bigger, more sophisticated, and efficient machines.

Imports, estimated to level off at $400 million in 1980 compared with $392 million in 1972, are expected to grow slowly at a rate of about 0.3 percent compounded annually. The larger, more complex machines of 1980 should require fewer imported components. Imports will consist mainly of equipment or sizes of machines not manufactured in the United States.

Exports will probably decline to $410 million by 1980 from $450 million in 1972, a decline averaging 1 percent a year probably resulting from increased production in types and sizes of equipment by foreign subsidiaries of U.S. companies as well as increased availability of components either through their own facilities or from local sources. The United States will continue to export large, complex, and sophisticated equipment as well as some components and replacement parts.

Uneven Growth Through 1980

An uneven growth rate through 1980 will result from farmers' buying patterns, purchasing machinery when they have a pent-up demand for new equipment and financing terms are favorable. In past years, purchases have been postponed except for essentials as was the case from 1967 through 1971 when product shipments remained even at $4.1 billion. In this decade much of the equipment purchased in 1972 and 1973 will be in excellent condition for several years. However, the late 1970's will be replacement time again for new and more efficient equipment.—*John A. Lien, Office of Business Research and Analysis.*

CONSTRUCTION MACHINERY

Shipments by all producers of construction machinery and equipment should reach a new high of $5.1 billion in 1973, approximately 6 percent above 1972. Shipments of products strictly classified as such machinery amounted to $4.8 billion in 1972, some 9 percent above 1971. Industry shipments may reach $5.6 billion in 1973, about 6 percent above the record level of 1972.

Factors accounting for the higher demand were continued growth in housing, municipal, and commercial building, the investment tax credit, such environmental projects as sewage treatment plants, and continued government support for highway projects and reclamation. Projects in all the areas listed require quantities of earthmoving and related equipment. Availability of credit contributed to increased sales.

Higher profits accompanied larger sales and significant gains in cost reduction. Also contributing to the better profit picture were the Job Development Investment Credit and the tax savings granted DISCS (Domestic International Sales Corporations.) Increased production brought a 4 percent increase in employment over 1971 levels.

Few Basic Design Changes

The hydraulic backhoe has largely replaced the mechanical shovel. Most mechanical shovels built

Construction Machinery and Equipment: Trends and Projections 1967–73

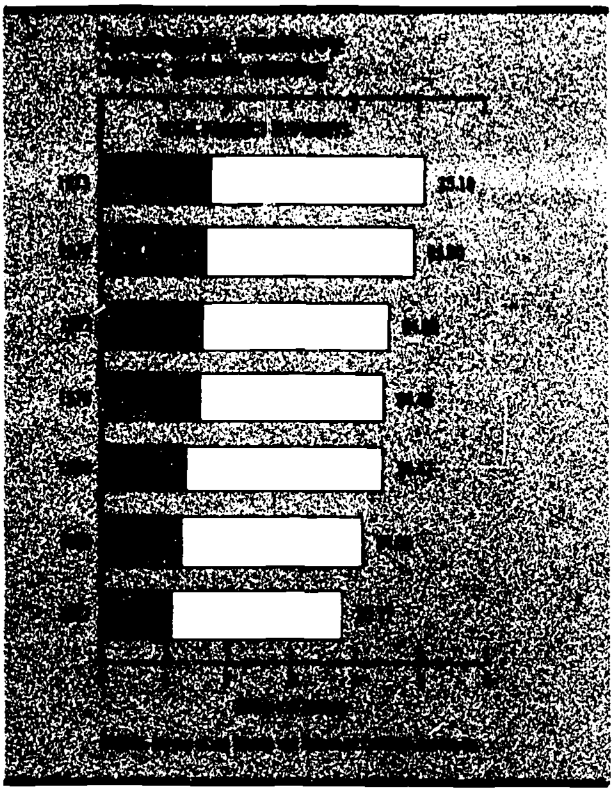
[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	4, 138	4, 883	4, 886	4, 855	5, 292	9	5, 610	6
Total employment (thousands)	133	138	131	122	127	4		
Production workers (thousands)	99	102	95	87				
Value added	2, 057	2, 455	2, 402	2, 416	NA			
Value added per production worker man-hour	$10. 61	$11. 95	$12. 80	$14. 22	NA			
Product: [3]								
Value of shipments	3, 767	4, 435	4, 454	4, 426	4, 824	9	5, 110	6
Value of imports	55	65	70	75	85	13	95	12
Value of exports	1, 107	1, 339	1, 594	1, 449	1, 541	5	1, 590	5
Wholesale price indexes (1967=100)	100	110	116	121	126			

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the construction machinery industry (SIC-3531).
[3] Includes value of shipments of construction machinery made by all industries.

P Preliminary.
NOTE.—NA=Not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.



today are of giant size for mining and removing overburden. The hydraulic backhoe is easier to operate and more adaptable.

Production of combination machines in many sizes continues to increase with more companies entering this field. Those machines in the small to medium sizes incorporate a backhoe with either a front-end loader or a bulldozer. Such adaptable machines are very useful to general contractors and builders and handlers of bulk material. Utilities use them for new work and maintenance.

Power shovels, hydraulic cranes, vibrating rollers, graders, and automated bin and batch plants continue to increase in size and gain in efficiency. The largest off-highway haulers remain in the 1,600 horsepower range. They use a power train in which a large diesel engine drives a generator, which in turn powers the electric drive wheels.

One of the largest manufacturers of off-highway haulers, who had stopped producing this line for a few years, reentered the market in 1972 with a line of completely new haulers ranging in capacity from 28 to 150 tons. This will provide increased competition to other manufacturers in the off-highway hauler market.

Exports Leveling Off

Exports—almost a third of product shipments—are expected to total about $1.6 billion in 1973, matching the former high level of 1970. This level of exports is expected to continue in the immediate years ahead with no appreciable change because increases in demand will be satisfied by increased production of additional sizes and models by U.S. subsidiaries abroad serving various parts of the world. The proportion of exports to production will probably decline slowly as foreign subsidiaries fulfill local demand. Availability of parts and service is the key to successful sales of heavy construction machinery. Foreign subsidiaries will increasingly be able to meet those requirements, reducing dependence on exports from the United States. More competition may be expected as European and Japanese manufacturers increase the size and variety of their products and improve their parts and service facilities.

Imports Rising

Although they will still account for less than 3 percent of apparent consumption, imports are expected to rise 12 percent to approximately $95 million in 1973. Many imports will come from U.S. subsidiaries, either as components or complete machines. There will be backhoes from Europe and crawler tractors from Japan.

The Industry Through 1980

Product shipments of construction machinery and equipment are expected to increase at an an-

1972 Profile

Construction Machinery and Equipment

SIC Code	3531
Value of industry shipments (millions).	$5,292
Number of establishments	624
Total employment (thousands).	127
Exports as a percent of product shipments.	32
Imports as a percent of apparent consumption.	2.6
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars)	5.1
Value of exports (current dollars)	6.6
Value of imports (current dollars).	9.1
Employment	−1.0
Major producing areas	Midwest States

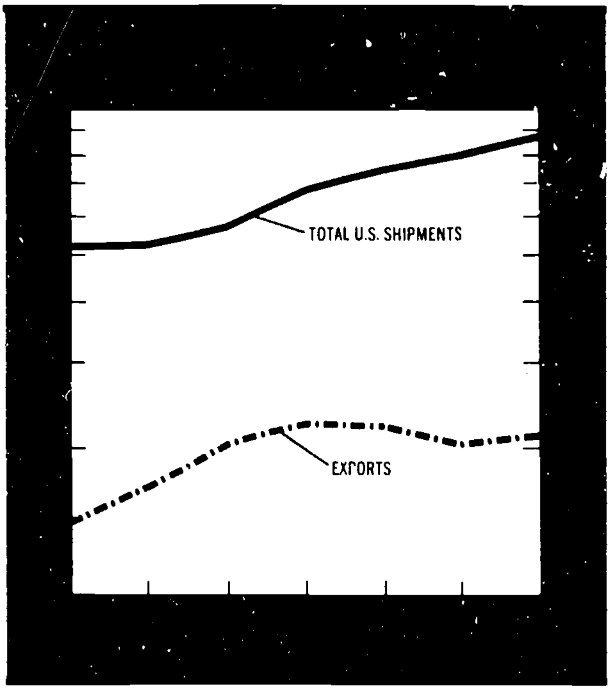
nual rate of 4.3 percent from 1972 to 1980, reaching $6.8 billion in 1980. U.S. markets will continue to be mainly supplied from domestic production.

Imports will continue to increase as U.S. companies bring in components and certain models from their foreign subsidiaries, and as foreign competitors seek to expand sales in the large U.S. market. Foreign companies' product sales will rise slowly, however, since parts and service distribution must be established in order to sell complete machines. Imports, including components, will probably increase from the current 3 percent of apparent consumption in 1972 to about 7 percent by 1980.

Exports, which amounted to 32 percent of product shipments in 1972, will slowly decline to 24 percent by 1980. Large and complex machines as well as components for repair, service and foreign assembly will continue as important export items.

Annual industry shipments may fluctuate in the years ahead. Government projects and funding programs and developing country economies directly affect sales of heavy construction machinery. During the remainder of this decade, there may be some years of slow growth, such as the 1969-1971 period, when product shipments actually declined.

The changing political and trade policy with the U.S.S.R., China, and Eastern Europe that started last year may open new markets for construction machinery sales both from the United States and from U.S. subsidiaries abroad. The industry will continue to produce new, larger and more efficient machines and should continue its leadership in construction machinery sales both domestically



and in world markets.—*John A. Lien, Office of Business Research and Analysis.*

MINING MACHINERY

Shipments by the mining machinery industry in 1973 are projected to $1 billion, an increase of 10 percent over the 1972 level of $927 million. Mining machinery product shipments by all manufacturers are expected to reach $864 million in 1973, exceeding 1972 product shipments by 8 percent. The design and sale of more powerful and

Mining Machinery and Equipment: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	622	594	689	850	927	9	1,020	10
Total employment (thousands)	21.7	21.5	22.2	23.1	23.6	2		
Production workers (thousands)	14.9	14.0	15.2	15.6	15.8	1		
Value added	308	300	349	433.9	NA			
Value added per production worker man-hour	$10.38	$10.97	$11.88	NA	NA			
Product: [3] Value of shipments	522	574	680	748	800	7	864	8
Value of imports	6.5	8.2	13.2	10.2	13.9	36	15.2	9
Value of exports	141	203	224	220	203	−8	211	4
Wholesale price indexes (1967=100)	100	106.3	110.5	113.8	116.7	3		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the mining machinery and equipment industry (SIC 3532).
[3] Includes value of shipments of mining machinery and equipment made by all industries.

P Preliminary.

NOTE.—NA = Not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

greater capacity equipment is an important factor in the growth of shipments.

The rise in the value of shipments is in part also due to advances in prices. From 1967 to 1972, prices increased 17 percent, or at an average annual rate of about 3.1 percent. This trend is expected to continue but at a slightly lower rate. Higher material and labor costs contribute to the price increases.

Mining machinery exports in 1972 dropped 8 percent from the 1971 level of $220 million. Improvement is expected in 1973, with exports projected to rise 4 percent to $211 million. In 1973 imports of mining machinery are expected to rise to $15.2 million or 9 percent over 1972. Imports remain relatively small in comparison to domestic shipments and exports.

The total work force in the mining machinery industry has gradually increased from 21,500 in 1969 to about 23,600 in 1972. The number of production workers similarly rose from 14,000 in 1969 to about 15,800 in 1972.

1972 Profile

Mining Machinery Industry

SIC Code	3532
Value of industry shipments (millions).	$927
Number of establishments	212
Total employment (thousands).	23.6
Exports as a percent of product shipments.	25.3
Imports as a percent of apparent consumption.	2.3
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	8.3
Value of exports (current dollars).	7.5
Value of imports (current dollars).	16.4
Employment	1.7
Major producing areas	Pennsylvania, Ohio, and Colorado

Mining Requires More Machinery

The level of U.S. mining is an important factor in determining sales of mining machinery. The total value of U.S. mineral production has climbed from $21.5 billion in 1965 to about $30.1 billion in 1971.

The necessity to mine increasingly lower grade ores to meet our growing consumption of metals and minerals also results in the demand for more mining machinery. Greater capacity extractive equipment is used to recover low grade ore bodies economically. Wider varieties of equipment are also needed to carry out the more complex beneficiation process required. Examples of extraction equipment include cutting machines, loading machines, shuttle cars, drills, and conveyors. Beneficiation equipment—used to transform the mined mineral into a marketable state—include rod and ball mills, crushers, classifiers, separators, and flotation equipment.

Industry Located in Mining Areas

Approximately 212 manufacturing establishments, well distributed geographically, are in the industry. No one producer makes a complete line of products, but most manufacturers could convert their facilities to produce some types they do not regularly make. Largest producing states based on value of shipments are Pennsylvania, Ohio, and Colorado. Because availability of parts and service for this equipment is an important selling factor, most manufacturers have established sales and service offices in the major mining areas.

The mining machinery industry's principal suppliers are iron and steel foundries, steel fabricators, machine tool builders and motor and generator producers.

Major customers are coal and metal mines, and mineral mines for chemical and fertilizer production. In 1970 coal production reached 603 million tons—the highest since 1947. A strike in the fall of 1971 brought output down to 552 million tons but 1972 coal production is estimated to have returned to approximately the 1970 level.

Research is now being conducted to convert coal into gas for energy purposes. If this process becomes economically feasible, the future market for coal and the resulting demand for machinery will be assured.

Industry Important to Mine Safety

The mining machinery industry plays a vital role in improving mine health and safety conditions. Continuous miners used at the working face are designed with liquid spray devices to suppress dust. Ventilating fans with more power and efficiency are now available to assist the mine operator in meeting Federal ventilating regulations. New and improved pocket size methane meters are available to alert the individual miner to dangerous concentrations of the gas. Methane monitoring systems for entire mines now available commercially continuously sample the air in strategic areas of mines, sounding an alarm should the methane gas reach a dangerous level in any section.

Securing of mine roofs is made easier and faster with the use of highly automated roof bolting machines. Mine dust can be greatly reduced with the use of modern rock dusting equipment.

Large Share of Output Exported

The United States is a leading supplier of mining machinery to the world, with about 25 percent of mining machinery product shipments being exported. Since 1969, exports have exceeded $200 million, with the record of $224 million being reached in 1970.

During 1972, U.S. mining machinery was exported to 138 countries. The 10 leading buying countries in order of importance were: Canada, Australia, Republic of South Africa, United Kingdom, France, Mexico, Chile, Brazil, Turkey, and West Germany. Combined exports to these countries represent about 60 percent of the total U.S. foreign market.

Mining machinery imports represent less than 3 percent of U.S. apparent consumption.

Outlook for 1980

Mining machinery industry shipments are projected to increase at an 8.1 percent compound annual rate from 1972 to about $1.7 billion in 1980. Product shipments are expected to increase at a compound annual rate of 6.9 percent from $800 million in 1972 to nearly $1.4 billion in 1980.

During the 1970's, changing needs of mine operators will be the greatest stimuli to product development. Traditional mining methods of blasting and rock drilling will be supplemented with electrical, fluid jet, and hydraulic power, where economically appropriate.

The expected future growth in tunneling activity should provide an important market for mining machines, particularly boring equipment. Growing urbanization has accelerated the need to build public transportation and utilities underground. Expected growth in domestic and world mining also assures continued increases in shipments by the industry.

During this decade, exports of mining machinery are expected to expand, reflecting increased foreign mining and tunneling activity and preference for U.S. equipment. U.S. manufacturers service their foreign customers effectively through sales and service offices located in all of the major mining areas throughout the world. Exports are expected to reach about $328 million in 1980, growing at an average annual rate of 6.2 percent from 1972.

Imports of mining machinery are expected to grow to about $15.9 million by 1980, a relatively small amount in comparison to U.S. shipments and exports of this machinery.—*Edward J. McDonald, General Industries Division.*

OILFIELD MACHINERY

Oilfield machinary industry shipments are expected to reach $1.2 billion in 1973, equalling the 8-percent gain achieved in 1972 over 1971. The value of oilfield machinery shipped by all industries is estimated at $1.1 billion in 1973, also an 8

Oilfield Machinery and Equipment: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	800	989	1,064	1,058	1,143	8	1,234	8
Total employment (thousands)	32.7	36.9	38.8	36.1	37.9	5		
Production workers (thousands)	21.7	24.7	26.1	24.2	25.4	5		
Value added	503	622	693	681	NA			
Value added per production worker man-hour	$10.91	$11.89	$12.74	NA	NA			
Product: [3]								
Value of shipments, total	661	813	904	967	1,054	9	1,138	8
Value of exports	174	187	228	242	324	34	382	18
Wholesale price indexes (1967=100)	100	112.5	118.4	122.6	126.5			

[1] Estimated by Bureau of Domestic Commerce.

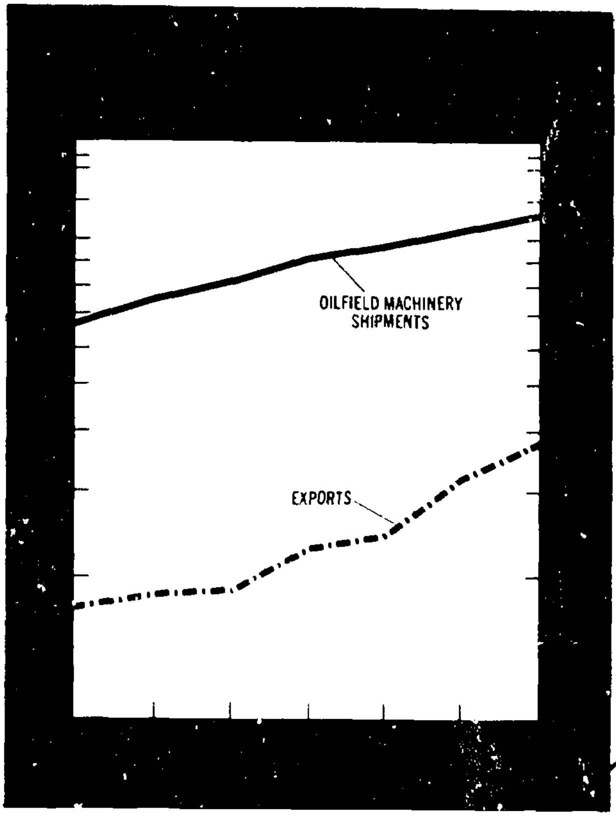
[2] Includes value of all products and services sold by the oilfield machinery and equipment industry (SIC 3533).

[3] Includes value of shipments of oilfield machinery and equipment made by all industries.

[P] Preliminary.

NOTE.—NA=Not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.



percent increase over $1 billion in 1972. Sales of more powerful and advanced equipment have contributed significantly to shipment growth. In addition, the continuing growth of petroleum production serves as a major stimulus for sales of oilfield machinery. World crude petroleum production reached 17.6 billion barrels in 1971, a 5.4 percent increase from 1970 levels of 16.7 billion. Production was 12.9 billion barrels in 1967.

Price increases account for a portion of higher shipments in recent years. From 1967 to 1972, oilfield machinery prices increased at an average annual rate of 4.8 percent. The price trend is expected to continue upward but at a lower rate. Higher material and labor costs contributed to rising prices.

Exports of oilfield machinery in 1972 reached a record level of $324 million, an increase of 34 percent over 1971. Growth in exports is expected to continue to climb in 1973, increasing by 18 percent to $382 million. Oilfield machinery imports are negligible.

The total work force in the oilfield machinery industry expanded from 32,700 in 1967 to about 37,900 in 1972. Likewise, production worker employment has increased steadily from 21,700 in 1967 to about 25,400 in 1972.

Two States Predominate

The oilfield machinery industry consists of about 360 manufacturing establishments located primarily in the southern and western regions of the United States. Texas and Oklahoma are the largest producing states on the basis of value of shipments. Oilfield equipment is marketed primarily through company (supplier) stores and warehouses conveniently located near major oil producing and exploration areas throughout the world.

Manufacturers have also built production facilities abroad and, and in some cases, formed foreign licensee agreements. Many producers provide servicing of their equipment at the well site, an important selling factor.

Drilling contractors, well servicing companies, and petroleum and gas companies are the principal customers for oilfield machinery and equipment. Exploration and production expenditures of the major petroleum and gas companies greatly affect sales of oilfield equipment.

Steel mills, iron and steel foundries and producers of pipe, valves and pipefittings, special dies and tools, and machine tool accessories are the major suppliers for the oilfield machinery industry.

Wide Range of Products

The industry produces a wide range of oilfield machinery and equipment. Delicate sensing devices are available to assist the driller in locating the most desirable drilling area. Logging and computer equipment have been developed to control and monitor drilling of wells. New and more pow-

1972 Profile

Oilfield Machinery Industry

SIC Code	3533
Value of industry shipments (millions).	$1,143
Number of establishments	360
Total employment (thousands).	37.9
Compound annual average rate of growth 1967-72 (percent):	
Value of shipments (current dollars).	7.4
Value of exports (current dollars).	13.2
Employment	3.0
Major producing areas	Texas and Oklahoma

erful rotary drilling equipment is available to meet the growing practice of drilling fewer but deeper wells. The improved design and metallic composition of drilling bits have helped to increase drilling efficiency. Improved pipe racking devices also speed the drilling operation.

Major Market Offshore

Offshore drilling is being undertaken next to virtually every continent and is becoming a major source of petroleum. Its continued growth and success have created an important market for equipment specifically designed for underwater operation. Some manufacturers specialize in such equipment and have made rapid technological advances. Complex underwater drilling and production systems as well as stationary and mobile surface platform rigs are available to the drilling contractor.

Export Market Strong

The United States is a leading exporter of oilfield machinery that is recognized throughout the world for high quality and advanced design. Currently about 31 percent of oilfield machinery product shipments are exported. Exports have climbed steadily from $174 million in 1967 to a record of $324 million in 1972.

Oilfield machinery is exported to 130 countries, with 10 countries accounting for 50 to 60 percent of all exports. These major country customers are: Canada, Mexico, Singapore, Indonesia, Saudi Arabia, Iran, Arabia Peninsula States, Venezuela, United Kingdom, and Trinidad.

Antipollution Efforts

Threats of offshore oil leaks have prompted manufacturers to improve automated blowout control equipment. Today, equipment is available to continuously monitor and control offshore drilling and production systems. In the event of an oil spill, devices and materials are available to lessen the impact of the spill, including skimming equipment, floating pumps, floating curtains, and chemical dispersants.

Growth Will Continue

Future growth in shipments of oilfield machinery is expected because of anticipated growth in domestic and world consumption of petroleum and gas. Increased drilling activity will be needed to assure that the supply of petroleum and gas products meets future demand.

Oilfield machinery industry shipments are expected to increase at a compound annual rate of 6.1 percent from $1.1 billion in 1972 to $1.8 billion in 1980. Product shipments are projected to reach $1.7 billion by 1980, growing at an average annual rate of 6.3 percent from 1972 level.

During the remainder of this decade, changes in oilfield machinery will be effected in response to advances in engineering and metallurgy as well as to changing needs of the drilling contractors. Lasers, electric arcs, and high pressure fluid jets are expected to be used in combination with the more conventional drilling methods.

U.S. exports of oilfield machinery are expected to rise during this decade, reflecting increased foreign drilling activity and a continued preference for U.S. made equipment. The U.S. oilfield machinery industry has already established sales and service offices in all of the major petroleum and gas fields. Exports of oilfield machinery are expected to increase an average 7.5 percent a year from 1972 and reach about $578 million in 1980. Imports are expected to remain relatively insignificant.—*Edward J. McDonald, Office of Business Research and Analysis.*

FOOD PRODUCTS MACHINERY

Many food processors who had deferred purchases of new food machinery in 1970 and 1971 began ordering new equipment to expand capacity in 1972. As a result, shipments by all makers of food products machinery are estimated to have reached a high of $850 million in 1972 and are expected to increase another 6 percent in 1973 to $900 million. Shipments by the food products machinery will probably reach $1 billion in 1973, exceeding 1972's record.

With sales expanding in 1972, employment rose approximately 3 percent over the year before. Aided by the investment tax credit and successful efforts to reduce costs, the industry's profit situation improved in 1972.

Processing equipment and packing machinery used by industrial food producers as well as some types of commercial food preparation machines are produced in this industry. It consists primarily of relatively small companies. Some three-fourths of establishments employ fewer than 50 workers. Each company's staff includes personnel with considerable technical skills in such fields as electrical and mechanical design, production methods, chemistry, and food technology.

Food Products Machinery: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	830	891	916	918	965	5	1,020	6
Total employment (thousands)	33	34	33	33	34	3		
Production workers (thousands)	22	22	22	21	NA			
Value added	503	550	550	547	NA			
Value added per production worker man-hour	$11.13	$11.93	$12.41	$13.00	NA			
Product: [3]								
Value of shipments	690	792	806	808 [1]	850	5	900	6
Value of imports	31	48	56	56	59	5	62	5
Value of exports	124	134	169	172	187	9	198	6
Wholesale price indexes (1967=100)	100	111	117	121	124			

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the food products machinery industry (SIC–3551).
[3] Includes value of shipments of food products machinery made by all industries.

P Preliminary.

NOTE.—NA not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Uneven Growth Within Industry

In 1972 demand was especially high for machinery for processing meats, beverages, fruits and vegetables as well as for equipment for processing and packaging convenience foods. Shipments of machinery for flour, grain and sugar processing and dairy and bakery products increased at a slower rate.

Research and Development Continues

A large share of research and development efforts have been centered on improving high speed and automated food processing equipment. Recent advances include microwave proofing of bakery dough, sanitizing systems, insect elimination systems, and quality control analysers. Industry efforts are also under way to develop machines which will effectively dispose of food scraps without further contributing to air or water pollution.

1972 Profile

Food Products Machinery Industry

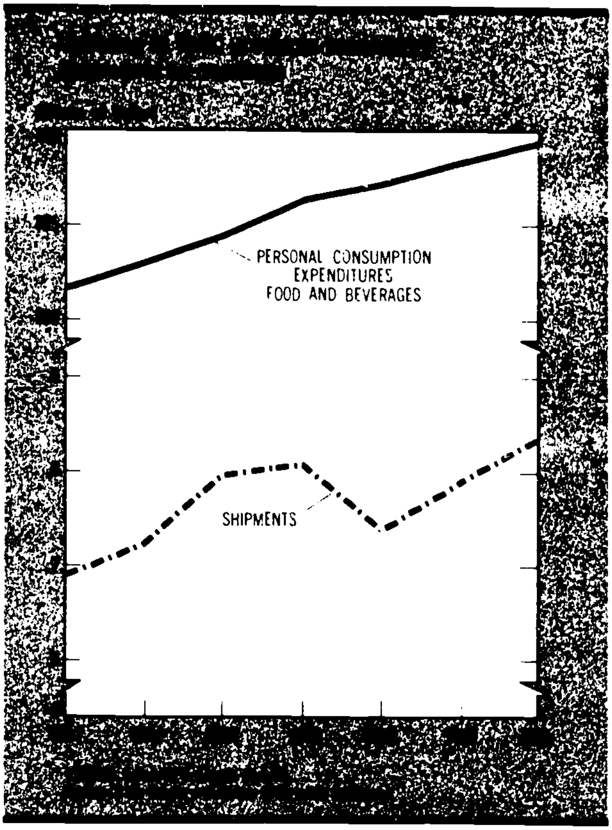
SIC Code	3551
Value of industry shipments (millions).	$965
Number of establishments	638
Total employment (thousands).	33
Exports as a percent of product shipments.	22
Imports as a percent of apparent consumption.	9
Compound annual average rate of growth 1967–72 (percent):	
Value of product shipments (current dollars).	4.3
Value of exports (current dollars).	8.6
Value of imports (current dollars).	13.7
Employment	0.6
Major producing areas	Mid- and South Atlantic, East and West North-Central and Western States

Favorable Trade Balance

In 1972, exports were three times as great as imports and accounted for 22 percent of shipments. Exports in 1973 are expected to reach almost $200 million, 6 percent over the record $187 million estimated for 1972. Rapid growth of supermarkets in developed nations as well as the introduction of grocery stores in many developing nations have created a growing market for all types of food products machinery, especially equipment related to such convenience foods as processed and fresh frozen products.

Although food machinery shipments are increasing to countries in all parts of the world, Canada and Mexico remain the largest foreign markets. Manufacturers will probably continue to expand participation in foreign trade shows and fairs in order to exhibit new products and make contact with potential foreign distributors. Realignment of international currencies has made U.S. equipment prices more competitive in world markets.

Imports are expected to reach $62 million in 1973, a 5 percent increase over 1972. The quality



of European and Japanese food products machinery continues to improve and imports of this equipment will probably continue upward, although foreign machinery must be designed to meet U.S. health and safety standards.

Continued Growth Through 1980

Product shipments are expected to reach $1.4 billion and industry shipments $1.6 billion by 1980, reflecting average annual increases from 1972 of 6.2 percent. Exports are expected to grow at an average annual rate of 7.3 percent in the next several years, reaching $330 million, or 24 percent of product shipments by 1980. Imports will also increase but a lower rate of about 6.3 percent to about $95 million by 1980.

Continued growth of the economy, personal income, and population in the coming years point to more spending on food. Food products machinery manufacturers will continue efforts to develop and produce efficient machinery to process and package new food products, thus enabling food processors to make their products available at lower cost to consumers.—*John A. Lien, Office of Business Research and Analysis.*

TEXTILE MACHINERY

Sales of textile machinery and parts and accessories are expected to rise about 5 percent from 1972 levels to $750 million in 1973—the highest since 1966.

Purchases of new knitting machines—both circular and warp—and related texturizing, heat setting and finishing equipment continued strong and probably accounted for at least 50 percent of total machinery purchases in 1972. A leveling off in purchases of double knit machines is expected in 1973 but the market for warp knitting and texturizing, heat setting, and dyeing and finishing equipment is expected to remain strong through 1973.

Manufacturers of spinning, twisting, and winding machinery reported sharp increases in orders in the third and last quarters of 1972 for delivery in late 1972 and 1973.

R & D Programs Pay Off

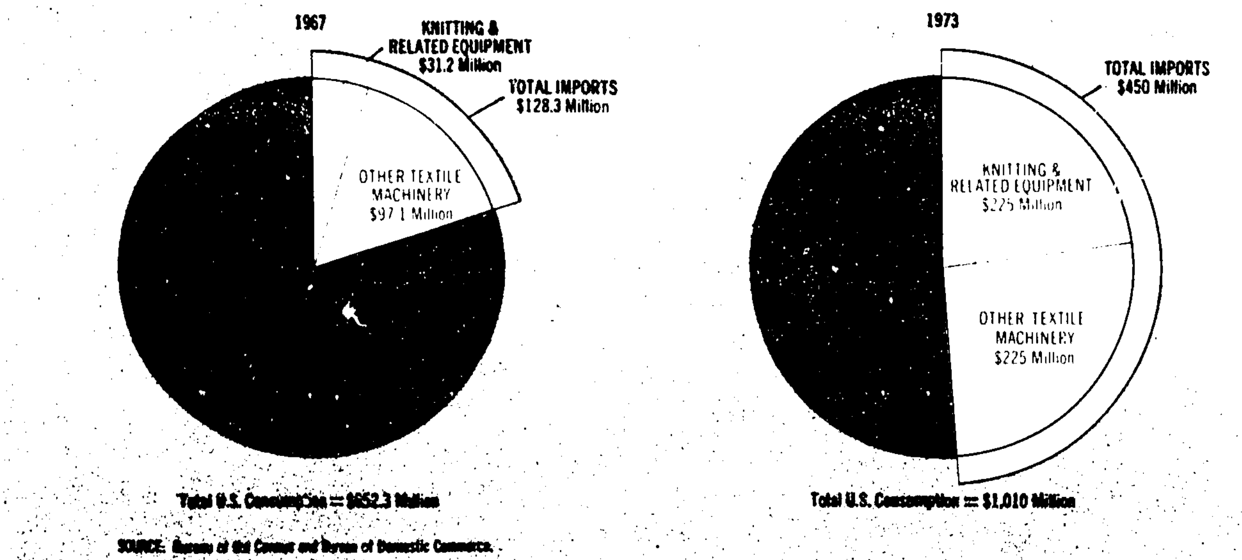
Indications are that U. S. machinery manufacturers are beginning to succeed in efforts to recapture the technological superiority they enjoyed through the early 1960's.

Recent research and development programs have resulted in improvements or new concepts in practically every area of textile machinery from opening and picking through finishing. Open end spinning, both warp and circular knitting, as well as shuttleless looms are prime example of new technological advances.

The automated high production equipment now being offered is in demand by countries with well developed textile industries. However, U.S. manufacturers are not losing sight of needs and requirements of lesser developed countries who are not in a position to utilize the more sophisticated systems and must rely on using equipment that is simpler to operate and maintain. Developments and improvements on this type of equipment are proceeding with the result that our markets in the developing countries will surely grow.

Achievements of U.S. machinery manufacturers research and development programs as well as those of our overseas competitors will be on display during the 10-day American International Textile Machinery Exhibition to be held October 1973 at Textile Hall in Greenville, S.C. This international exhibition, held every 4 years, always includes the latest technology from practically every

Imports' share of U.S. textile machinery market more than doubles



textile machinery manufacturing nation of the world. The more than 350 machinery exhibitors expect between 30,000 and 40,000 business visitors from more than 100 countries.

Industry Stable

The textile machinery industry is stablilized at about 560 establishments located principally along the eastern seaboard. Almost 400 are small to medium in size and could be classified as suppliers, manufacturing parts and accessories for existing foreign and domestic equipment in place in the U.S. textile industry. The remaining companies produce the bulk of all new equipment and also engage in supplying parts and accessories for this equipment in both foreign and domestic markets.

Major foreign machinery manufacturers are accelerating the establishment of U.S. subsidiaries to serve the domestic market better. Most initial installations have been assembly plants and storage facilities but it is to be expected that these

Textile Machinery: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	712	813	793	770	809	5	850	5
Total employment (thousands)	40	39	37	32	34	5		
Production workers (thousands)	29	28	27	23	24	5		
Value added	404	474	467	436	NA			
Value added per production worker man-hour	$6.47	$7.82	$8.50	$9.60	NA			
Product: [3]								
Value of shipments	653	728	705	[1] 680	714	5	750	5
Value of imports	128	169	231	343	460	34	450	−2
Value of exports	129	145	188	166	160	−4	190	19

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the textile machinery industry (SIC 3552).
[3] Includes value of shipments of textile machinery made by all industries.

P Preliminary.

NOTE.—NA, not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

operations will expand into basic manufacturing in the coming years.

Exports to Rise

Exports in 1972 declined about 4 percent to $160 million. However, since many companies report increases in orders on the books for delivery in 1973, exports should rise about 19 percent to about $190 million.

More U.S. machinery manufacturers are entering the export trade, while the others are trying to expand their exports. For example, more than 20 manufacturers have joined to form AMATEX—a company to operate overseas and offer complete "turn key" installations to the world markets.

Canada continues as the largest market for U.S. textile machinery, taking about 17 percent of U.S. exports in 1972. Mexico, Brazil, United Kingdom, and West Germany are also strong markets with a combined total of about 25 percent in 1972. The market in Turkey grew rapidly in 1972 to about 6 percent and its share of total U.S. exports is expected to be even larger in 1973.

Imports to Level Off

Imports of textile machinery, spearheaded by knitting and related equipment, rose 34 percent in 1972 to a total of $460 million, almost $120 more than in 1971. Over half of all imports in 1972 consisted of knitting machinery and related equipment. Imports of this type of equipment are expected to continue high in 1973 but will probably decline slightly from the all-time high reached in 1972.

Shipments of knitting machinery, particularly double knits, are expected to decline slightly. Proliferation of the establishment U.S. subsidiaries by foreign firms will also begin to affect imports as these subsidiaries manufacture additional parts and accessories in this country.

West Germany is by far our largest supplier with almost 50 percent, followed by United Kingdom, 14 percent; France, 11 percent; Switzerland, 10 percent; and Italy, 6 percent.

Growth in Prospect

World markets for textile machinery continue to grow, especially in the developing countries, and U.S. machinery manufacturers are attempting to regain a larger share of this growing market. Revaluation of the dollar has so far aided U.S. sales. In addition to the growing oversea markets, current textile agreements with foreign supplier nations will probably enable the U.S. textile industry to purchase additional new machinery either for expansion or replacement of obsolete equipment.

Shipments will probably rise at an average annual rate of about 3 percent to over $900 million by 1980. Expanded efforts will probably cause exports to rise at an average annual rate of about 6 percent and reach over $250 million by 1980.

Demand for air, water, and sound pollution abatement equipment continues to increase, and research and development programs of the textile machinery industry presently underway must find solutions if sales projections are to be attained.—*Thomas J. Jackson, Office of Business Research and Analysis.*

1972 Profile

Textile Machinery

SIC Code	3552
Value of industry shipments (millions).	$809
Number of establishments	557
Total employment (thousands).	34
Exports as a percent of product shipments.	22
Imports as a percent of apparent consumption.	45
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars)	1.8
Value of exports (current dollars).	4.4
Value of imports (current dollars).	29.0
Employment	−3.3
Major producing areas	24 States, North and South Carolina, Massachusetts, and Pennsylvania

PRINTING MACHINERY

Anticipated demand for printing machinery in 1973 should increase shipments by about 6 percent to $700 million. Continuation of the sharp rise in shipments that began in 1972 is expected to usher in a period of steady growth, similar to that of 1960–68.

Major segments of the printing industry in the United States are projected to grow at about a 7 to 10 percent rate in 1973. Other developed countries of the world will probably follow this same growth pattern. Such growth will depend upon highly sophisticated and productive printing equipment of all types.

Machinery that will be in great demand includes equipment for pre-press automation and for computerizing many operations that once called for skilled labor with years of training. The U.S. lead in research and development makes it a major supplier of such wares, here and abroad.

At the same time developing countries should offer good markets for the more basic and less sophisticated types of printing machinery adaptable to the publication of small newspapers with limited circulation.

Large Firms Dominate

The printing machinery industry consists of about 528 establishments located primarily in the Midwest and Northeast. A few large, highly diversified companies continue to dominate the industry and account for well over half of total shipments. In recent years, several of those large companies have sought, either by acquisitions or through their own research and development, to round out their line of printing machinery to be more nearly able to meet all requirements of potential customers. At the other end of the scale an increasing number of relatively small, well-managed companies, offering specialized items of equipment and accessories to satisfy specific needs, are becoming more important in the United States as well as in world markets.

1972 Profile

Printing Machinery

SIC Code	3555
Value of industry shipments (millions).	$775
Number of establishments	528
Total employment (thousands).	24
Exports as a percent of product shipments.	22.5
Imports as a percent of apparent consumption.	12.0
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	0.6
Value of exports (current dollars).	8.8
Value of imports (current dollars).	6.5
Major producing areas	Midwest and Northeast

R. & D. Spending Accelerates

R. & D. programs have brought U.S. technology to its present position of preeminence in such fields as phototypesetting, book making, and bindery equipment, as well as web offset presses for newspapers and other commercial printing.

Those programs are now being expanded, with promising results in the fields of electronic color separation, paper properties, drying ovens, and completely integrated pre-press systems, as well as many other advanced concepts for reducing labor and material costs—reductions vital to the continued healthy growth of their customer in-

Printing Machinery Industry: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	752	828	751	705	775	10	822	6
Total employment (thousands)	29	30	27	24	24	0		
Production workers (thousands)	20	21	18	15	15	0		
Value added	459	484	469	404	NA			
Value added per production worker man-hour	$10.87	$11.07	$12.81	$13.82	NA			
Product: [3]								
Value of shipments	656	701	654 [1]	601	661 [1]	10	700	6
Value of imports	51	65	61	67	70 [1]	4	75	7
Value of exports	98	124	144	136	149 [1]	10	165	11

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the printing machinery industry (SIC 3555).
[3] Includes value of shipments of printing machinery made by all industries.

[P] Preliminary.

NOTE: NA = Not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

dustries. In addition, careful attention is being given to improving working conditions and protecting the environment.

Trade Balance Improves

After a relatively poor year in 1971, U.S. exports of printing machinery in 1972 rose 10 percent to $149 million, far exceeding the 4 percent rise in imports to $70 million. Improved U.S. technology, coupled with more active selling efforts by U.S. manufacturers and an expected rise in total demand, should extend this large growth into 1973. Exports will probably rise about 11 percent to reach $165 million. Also, imports are expected to rise to $75 million, a 7-percent increase.

Major U.S. manufacturers continue to expand overseas operations in an effort to better serve their foreign markets. Despite the proliferation of overseas installations, exports are expected to continue to expand and account for over 22 percent of total shipments.

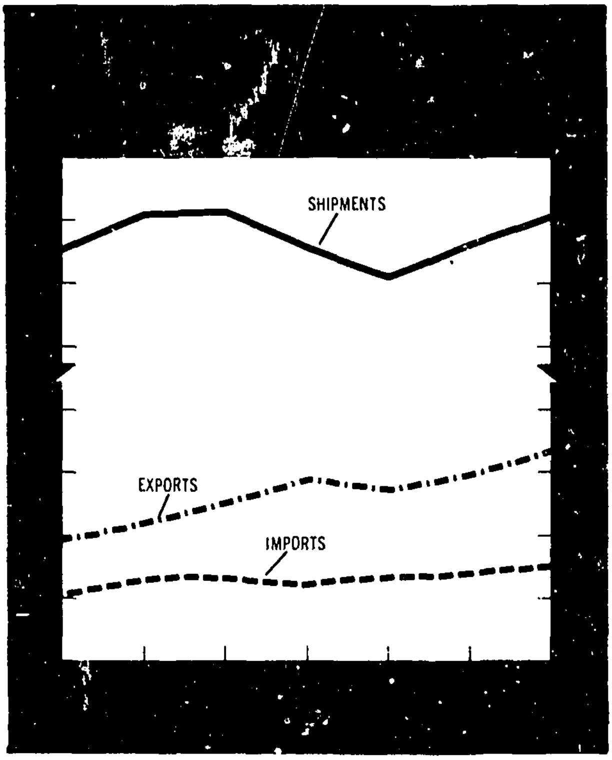
Canada, still our largest customer, accounts for almost 22 percent of U.S. exports. Other large customers include West Germany, Brazil, and Great Britain, accounting for 10 percent, 9 percent, and 7 percent of exports. U.S. printing machinery manufacturers ship to more than 113 countries. The most popular kinds of U.S. equipment exported are web-fed offset presses and typesetting equipment.

West Germany continues as our largest supplier, the source of well over half of our imports. Imports from Sweden and Japan are increasing, while those from the United Kingdom and Italy declined by half in 1972. Our major competition in overseas markets in coming years will probably come from West Germany, Japan, Sweden, Italy, Switzerland, and the United Kingdom.

Orders Highest in Years

There is still an oversupply of printing equipment in printing plants of all types. However, much of the equipment in place is relatively obsolete. The order position of major machinery manufacturers for sophisticated, high production labor-saving equipment is reported to be at the highest level recorded in recent years.

Pre-press automation is in great demand and webfed offset requirements remain strong. While letterpress demand is still growing, it is not expected to rise at the same rate as demand for offset printing. A new horse—gravure presses—has entered the race for the printers' expansion dollar.



New techniques of handling gravure printing and the resulting superior product are causing the commercial printer to reappraise his equipment requirements. The color work possible with this type of printing has had a profound impact in the advertising field, where demand for the gravure product has increased.

Healthy Growth to 1980

Shipments of all types of printing machinery are expected to grow at an average annual rate of 6 percent and be well over $1 billion by 1980. Despite increased activity by U.S. manufacturers in establishing overseas facilities, exports are expected to grow at about the same 6-percent annual rate to almost $240 million by 1980.

Expected sales of highly automated computerized printing systems, and other sophisticated processes still in the development stage, create a need for changes in the training of personnel to service and operate this equipment. Training programs are already in operation, and those will be expanded. The quality and quantity of sales and service personnel will affect equipment sales decisions, as customers increasingly rely on manufacturers to service the machinery they sell.—*Thomas J. Jackson, Office of Business Research and Analysis.*

CHAPTER 22

General Industrial Machinery

Shipments of general industrial machinery, including materials handling equipment, pumps and compressors, and air conditioning and refrigeration machinery, are expected to increase over 7 percent in 1973 to about $11.1 billion, following an 8-percent increase in 1972. Shipments of both the materials handling equipment and air conditioning and refrigeration equipment industries are expected to increase 8 percent in 1973 while pump and compressor industry shipments will rise about 5 percent.

During the last few years, exports have consistently represented about 11 percent of total product shipments of these industries. Foreign sales should reach $1.26 billion in 1973, almost 11 percent higher than in 1972. In 1972, exports increased an estimated 15 percent over 1971 levels to $1.4 billion.

Imports accounted for 3.5 percent of apparent consumption in 1972, a rise from only 1 percent in 1967, but the favorable balance of trade experienced by these industries in recent years is expected to continue. Imports are expected to increase about 18 percent to almost $410 million in 1973 following a 28-percent jump in 1972 to $345 million.

Between 1972 and 1980, these industries are expected to increase shipments an average of about 7 percent annually, reaching $17.7 billion by the end of the decade. Exports are expected to rise 7.8 percent annually to $2.1 billion by 1980 and continue to represent about 11 percent of total shipments. Imports should climb at an average annual rate of over 9 percent, totaling an estimated $700 million by 1980.—*William E. Fletcher, Office of Business Research and Analysis.*

MATERIALS HANDLING EQUIPMENT

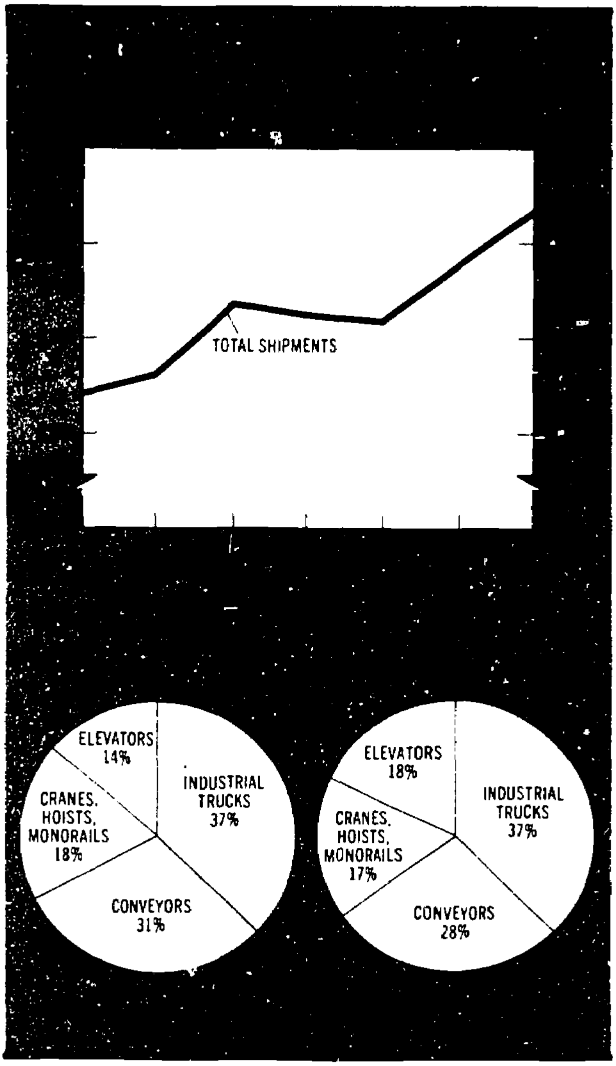
Shipments by all producers of materials handling equipment should reach a new high of $2.9 billion in 1973, approximately 8 percent above

General Industrial Machinery: Projections 1972-80 [1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
	Total	$10,345	8	$11,100	7	$17,700	7.0
3534, 3537	Materials handling equipment	2,965	10	3,200	8	5,690	8.5
3561	Industrial pumps and compressors	2,640	4	2,770	5	3,400	3.4
3585	Air conditioning and commercial and industrial refrigeration.	4,740	10	5,130	8	8,610	8.0

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth.



1972. Product shipments of $2.7 billion in 1972 were up 10 percent from 1971. Industry shipments may reach $3.2 billion in 1973, about 8 percent above the record levels of 1972, which in turn surpassed the previous high of $2.7 billion set in 1969.

The investment tax credit, improved economic conditions, construction of new plants and modernization of older ones are creating the increased demand for materials handling equipment.

Employment rose about 4 percent to 86,000 workers in 1972. Profits and sales are estimated to have gained.

Research and development expenditures increased in 1972, after cutbacks in 1971 because of low levels of activity.

All Sectors of Industry Up

Although overall shipments of the industry were up 10 percent in 1972, the growth was not evenly divided. Elevator shipments of $520 million were 6 percent above 1971, and are expected to increase another 6 percent in 1973 to $550 million. Conveyor shipments improved about 7 percent in 1972, to about $795 million. An increase of 6 percent to $845 million is forecast for 1973.

Shipments of hoists, cranes, and monorails gained 9 percent in 1972 to an estimated 450 million, still below the 1969 level of $460 million. The 8 percent advance expected in 1973 should bring shipments of these products to a new high of $485 million.

Shipments of industrial trucks, the largest segment of the materials handling industry, increased by 15 percent in 1972 to a total of $946 million, following declines from the high of $1 billion in 1969. Another favorable year is expected in 1973, with gains of 11 percent to $1.1 billion.

Exports and Imports Increase

Exports continued to rise in 1972 to $253 million, about 15 percent above 1971, and are expected to advance 13 percent in 1973 to about $285 million. Largest value of exports should be industrial trucks, expected to total $126 million in 1973, 11 percent above 1972. Although exports of elevators are expected to increase 18 percent in 1973, value will reach only $20 million. Exports of elevators are limited because most foreign markets are sup-

1972 Profile

Materials Handling Equipment

SIC codes	3534, 3535, 3536, 3537
Value of industry shipments (millions).	$2,965
Number of establishments	1,082
Total employment (thousands).	86
Exports as a percent of product shipments.	9.3
Imports as a percent of apparent consumption.	4.6
Compound annual average rate of growth 1967–72 (percent):	
Value of product shipments (current dollars).	5.1
Value of exports (current dollars).	12.8
Value of imports (current dollars).	22.9
Employment	0.2
Major producing areas	Middle Atlantic, North Central, and Western States

Materials Handling Equipment: Trends and projections 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [p]	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Industry: [2]								
Value of shipments	2,305	2,736	2,729	2,699	2,965	10	3,200	8
Total employment (thousands)	85	87	89	83	86	4		
Production workers (thousands)	56	56	56	52	54	4		
Value added	1,263	1,543	1,485	1,506	NA			
Value added per production worker man-hour	$11.11	$13.84	$13.66	$15.26	NA			
Product: [3]								
Value of shipments, total	2,117	2,531	2,500	[1] 2,472	2,710	10	2,930	8
SIC 3534 Elevators	296	317	461	491	520	6	550	6
SIC 3535 Conveyors	655	744	720	745	795	7	845	6
SIC 3536 Hoists, cranes and monorails	385	460	409	414	450	9	485	8
SIC 3537 Industrial trucks	781	1,010	910	823	945	15	1,050	11
Value of imports, total	40	89	97	97	112	15	125	12
Elevators	2	2	5	6	7	17	8	14
Conveyors	14	31	29	29	31	7	33	6
Hoists, cranes, and monorails	21	42	41	45	50	11	53	6
Industrial trucks	3	14	22	17	24	41	31	29
Value exports, total	139	162	194	220	253	15	285	13
Elevators	8	10	11	12	14	17	20	18
Conveyors	39	43	41	61	67	10	75	12
Hoists, cranes, and monorails	26	22	25	49	58	18	64	10
Industrial trucks	66	87	117	98	114	16	126	11
Wholesale price indexes (1967=100)	100	107	115	121	124	2		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the materials handling equipment industry (SIC 3534, 35, 36, 37).
[3] Includes value of shipments of materials handling equipment made by all industries.

NOTE.--NA=not available. [p]=preliminary.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

plied from U.S. manufacturing facilities abroad. Exports of conveyors are expected to increase 12 percent and hoists, cranes, and monorails 10 percent in 1973.

In addition to international monetary revaluations which made U.S. products more competitive, the formation of Domestic International Sales Corporations (DISC's) stimulated foreign sales. The largest share of exports went to Canada and the European industrial countries, although shipments were made to all parts of the world. Most exports of compounds for industrial trucks went to Europe for assembly at U.S.-owned facilities or licensed companies.

Imports increased by 15 percent in 1972 to an estimated $112 million, compared with $97 million in 1971, and should increase approximately 12 percent in 1973 to about $125 million. The largest rise in imports in 1972 was that of industrial trucks, up 41 percent to $24 million from $17 million in 1971. More modest gains were made by other imported products, including elevators 17 percent, conveyors 7 percent, and hoists, cranes, and monorails 11 percent.

Continued Growth Through 1980

Growth of the U.S. economy, expanding plant and equipment expenditures, and the need of industry to improve efficiency and reduce costs of materials handling should insure continued growth of the materials handling equipment industry.

In 1980, product shipments should total about $5.2 billion and industry shipments $5.7 billion, with annual growth averaging 8.5 percent. Estimates are for elevator shipments to reach $875 million in 1980, a growth rate of 6.7 percent a year; conveyor shipments to reach $1.4 billion with annual growth averaging 7.2 percent; hoists, cranes, and monorails to attain shipments of $975 million at an annual growth rate of 10.1 percent; and industrial truck shipments to average growth of 9.6 percent a year to $2.0 billion.

Exports will continue to grow, but because foreign facilities will meet more of the world's needs, the rate of increase will slow to about 6.3 percent a year, with shipments reaching $410 million in 1980. Imports of all product lines likewise are expected to rise—to $255 million in 1980, a rate of growth averaging 10.9 percent a year from 1972. Although the price advantage of imports has been somewhat reduced by the monetary changes, foreign companies as well as U.S. subsidiaries abroad will continue to penetrate the U.S. market.—*John A. Lien, Office of Business Research and Analysis.*

PUMPS AND COMPRESSORS

Pump and compressor industry shipments are expected to approach $2.8 billion in 1973, exceeding 1972 levels by $132 million or 5 percent. The value of pumps and compressors shipped by all industries is estimated at close to $3 billion in 1973, 8 percent over 1972. Sales of more powerful, better designed, and more costly equipment contribute to shipments growth. Also, increasing demand from major industries using pumps and compressors to control the movement of liquids and gases will assure a strong market for these products. Increased population and urbanization will require more pumps and compressors for water and sewage facilities, petroleum and gas pipe lines, construction actvity, and water power.

Past increases in the value of shipments was partly due to rising prices. From 1967 to 1972, prices increased at an average annual rate of about 4.3 percent. Prices are expected to continue to rise, but at a lower rate.

Since 1967, total employment in the pump and compressor industry has ranged from a low of 74,600 in 1971 to a high of 80,500 in 1970. In 1972, employment was 75,000 and the number of production workers rose fractionally from year earlier levels to 45,700.

The industry is composed of approximately 660 manufacturing establishments. Largest producing States are New York, Ohio, Pennsylvania, California, and Illinois.

Markets Are Diverse

Major suppliers for manufacturing pumps and compressors are iron and steel mills, foundries, and forge shops; aluminum producers; suppliers of electric motors and generators; and engine manufacturers.

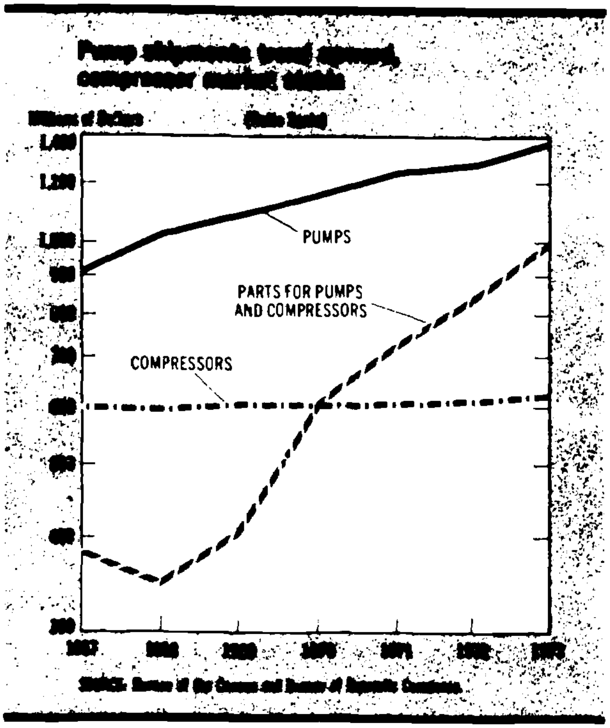
Major customers are construction contractors, water and sewer works, power plants, mines,

Pumps and Compressors: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	2,208	2,440	2,520	2,537	2,638	4	2,770	5
Total employment (thousands)	78.3	79.2	80.5	74.6	75.0	1		
Production workers (thousands)	49.8	50.1	50.2	45.2	45.7	1		
Value added	1,210	1,382	1,433	1,356.3	NA			
Value added per production worker man-hour (dollar)	$11.57	$13.41	$14.06	$15.07	NA			
Product: [3]								
Value of shipments, total	1,905	2,100	2,363	2,559 [1]	2,769	8	2,996	8
Pumps	913	1,094	1,155	1,224	1,297	6	1,375	6
Compressors	608	600	601	607	613	1	625	2
Parts for pumps and compressors	384	406	607	728	859	18	996	16
Value of imports, total	33	53	63	77	93	21	109	17
Pumps, including parts	13	25	31	43	54	26	65	21
Compressors including parts	20	28	32	34	39	15	44	12
Value of exports, total	286	317	343	358	415	16	466	12
Pumps, including parts	146	180	200	210	252	20	292	16
Compressors, including parts	140	137	143	148	163	10	174	7
Wholesale price indexes (1967=100)	100	109.8	115.1	121.6	123.5	2		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the pumps and compressors industry (SIC) 3561.
[3] Includes value of shipments of pumps and compressors made by all industries.
P Preliminary.
NOTE.—NA = Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.



chemical plants, petroleum and gas companies, and the maritime industry.

Today, the industry is concerned with designing equipment to provide higher pressures and carry corrosive materials more economically. Ease of maintenance and portability are also important factors. More plastics and other synthetic materials are being utilized. Efforts are being made to standardize equipment so as to facilitate parts replacement. To reduce noise pollution, the industry has developed equipment to operate at lower sound levels and noise absorbent material has been incorporated in product design. The operating sound level rating is a strong selling factor where noise pollution regulations are in effect.

Exports Rise Sharply

The United States—an important world supplier of pumps and compressors—exports about 15 percent of the industry's product shipments. Because U.S. manufacturers commonly encounter difficulty competing with local foreign production or neighboring country production on the more standard equipment, most exported pumps and compressors are of advanced design.

Pump exports in 1972 rose sharply to $252 million, 20 percent above the 1971 level of $210 million. In 1973, pump exports will probably rise about 16 percent and reach $292 million. In 1972, U.S. pumps were exported to 136 countries. The ten leading countries in order of importance were Canada, Japan, Venezuela, United Kingdom, Mexico, West Germany, Netherlands, Iran, Taiwan, and Indonesia. Combined exports to these countries represented about 58 percent of the total U.S. foreign market. Canada purchased 25 percent of all exports.

Compressor exports increased 10 percent in 1972 over the 1971 level of $148 million. Growth in compressor exports is expected to continue in 1973 to $174 million, an increase of 7 percent. Of 131 countries to which compressors were exported in 1972, the leaders in value of exports were Canada, United Kingdom, Venezuela, Mexico, Argentina, Japan, Brazil, USSR France, and Libya. Combined exports to these countries accounted for about 60 percent of the total U.S. compressor export market. Canada accounted for 22 percent of the exports.

Imports—Small Share of Sales

Pump imports in 1972 rose 26 percent from the 1971 level of $43 million and are expected to rise another 21 percent to $65 million in 1973.

Imports of compressors reached $39 million, a 15 percent advance over 1971. In 1973, compressor imports are expected to increase 12 percent to $44 million.

Leading supplier countries in order of value of pumps and compressors imports to the United

1972 Profile

Pumps and Compressors

SIC Code	3561
Value of industry shipments (millions).	$2,638
Number of establishments	660
Total employment (thousands).	75.0
Exports as a percent of product shipments.	15
Imports as a percent of apparent consumption.	4
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	3.6
Value of exports (current dollars).	7.8
Value of imports (current dollars).	23
Employment	−0.9
Major producing areas	New York, Ohio, Pennsylvania, California, and Illinois

States are Canada, United Kingdom, Japan, West Germany, and Sweden. Imports from these countries account for about three-fourths of all pumps and compressors imported into the United States. However, these imports amount to only about 4 percent of apparent consumption.

Demand Will Continue Strong

Anticipated expansion in domestic and world construction, sewage and water facilities, oil and gas pipelines, power generation and chemical production will provide strong future demand for pumps and compressors. Industry shipments are expected to increase from $2.6 billion in 1972 to about $3.4 billion in 1980, reflecting a 3.4 percent compound annual growth rate. Product shipments are expected to increase at an annual rate of 6.4 percent from $2.8 billion in 1972 to nearly $4.6 billion in 1980.

During this decade, exports of pumps and compressors are expected to rise further because of increased foreign economic development, urbanization, and continued preference for American equipment. U.S. pump and compressor exports will probably total about $860 million by 1980, an average annual increase of 9.5 percent from 1972.

Pump and compressor imports will probably increase at an annual rate of 12.3 percent to $235 million in 1980.—*Edward J. McDonald, Office of Business Research and Analysis.*

AIR CONDITIONING, COMMERCIAL AND INDUSTRIAL REFRIGERATION

Shipments of air conditioning and commercial and industrial refrigeration equipment from all producers during 1973 are expected to rise about 8 percent to more than $5.5 billion.

The 1972 building boom sharply increased the demand for unitary systems for central home air conditioning systems and was a major factor in the 10 percent shipments growth to $5.1 billion.

The United States continues as the largest market for air conditioning and refrigeration equipment, but demand in the world market is rising, stimulated in part by the response of developing and developed nations to tourists' demand for comforts and the associated need for room air conditioners and food freezing and refrigeration equipment.

More Homes and Offices Air-Cooled

The expected high level of new housing starts and the expected increases in commercial construction utilizing unitary air-conditioning systems should raise unitary shipments 8 percent to almost 2.4 million units in 1973.

Sales of room air conditioners, usually directly affected by temperature conditions during the summer months, were sharply depressed by the relatively cool summer weather of 1969 through 1971. Dealer inventories were at a painfully high level in early 1972. The high temperatures of last June, July, and August caused a spurt in sales and drastically reduced inventories. Dealers will be replenishing their stocks during the first half of 1973 and shipments should rebound about 10 percent to almost 5.4 million units with a normal hot summer. Demand for large tonnage air conditioning equipment continues strong as more industries provide worker comfort in efforts to improve productivity and attract competent workers.

Air-Cooled Autos Increasing

Over 60 percent of new cars are now equipped with air conditioning and the percentage continues to rise. In the next several years, greater use of air conditioning in trucks, farm tractors, and off-the-road vehicles of all types will further aid automotive air conditioning sales. Automotive air conditioner shipments, including after-market sales, rose about 11 percent in 1972 to 6.5 million units.

1972 Profile

Air Conditioning and Commercial and Industrial Refrigeration

SIC Code	3585
Value of industry shipments (millions).	$4739.0
Number of establishments	700
Total employment (thousands).	149.1
Exports as a percent of product shipments.	9.1
Imports as a percent of apparent consumption.	2.9
Compound annual average rate of growth 1967-72 (percent):	
Value of shipments (current dollars).	[illegible]
Value of exports (current dollars).	10.3
Employment	4.6
Major producing areas	Middle Atlantic and East North-Central States

Air Conditioning and Commercial and Industrial Refrigeration Industry: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	3549.8	43[illegible]0	4394.9	4308.0	4739.0	10	5129.0	8
Total employment (thousands)	94.9	116.0	116.7	114.0	119.1	4		
Production workers (thousands)	69.6	86.3	85.7	81.4	85.4	5		
Value added	1479.8	1971.2	1990.2	2166.4	NA			
Value added per production worker man-hour	$10.50	$11.39	$11.76	$12.29	NA			
Product: [3]								
Value of shipments	3469.0	4651.2	4738.9	4664.0	5130.5	10	5540.0	8
Quantity shipped (thousands) units:								
Room air conditioners	4129	5459	5886	5438	4894	−10	5385	10
Unitary air conditioners	1005	1635	1572	1877	2159	15	2374	10
Automotive air conditioners	3506	5298	4965	5850	6500	11	6700	3
Value of imports [4]	7.5	22.3	35.9	95.0	140.0	47	175.0	25
Value of exports	286.8	361.4	397.3	413.0	469.0	13	506.0	8

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the air conditioning commercial and industrial refrigeration industry (SIC 3585).

NOTE.—NA = Not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

[3] Includes value of shipments of air conditioning commercial and industrial refrigeration made by all industries.
[4] New base in 1971.
P Preliminary.

They are expected to increase 3 percent further in 1973, to about 6.7 million.

Manufacturing Facilities

The industry consists of more than 700 establishments manufacturing a wide range of highly specialized equipment. Although about half of these establishments are located in the Middle Atlantic and East North Central States, some equipment manufacturing facilities are located in nearly every State. A few large companies dominate the industry, with over 50 percent of domestic shipments and an even higher percentage of exports. Those companies also lead in establishing overseas manufacturing facilities and entering into licensing agreements to better serve foreign markets. Despite the added foreign installations, exports—particularly of components—continue to rise.

Following a decline in 1971, total employment in the industry rose about 4 percent in 1972 to more than 119,000 and is expected to increase further in 1973. Production workers increased 5 percent to more than 85,000.

Technological Challenges

With the rapid rise in foreign competition in recent years, a high level of research and development is necessary if the industry is to maintain leadership in technology and design of both air conditioning and refrigeration equipment.

Extensive research and development is being directed toward ecological demands of industry and government for reduced gaseous and particulate emissions by all industries. Adequate conditioning of air has passed the point of being desirable and is fast becoming mandatory. Much of the equipment required for pollution abatement will ultimately be developed and marketed by air conditioning and refrigeration equipment manufacturers.

Exports Rise

Exports, after rising at a faster rate than product shipments in 1972 to reach $469 million, are expected to rise 8 percent in 1973 to about $506 million. U.S. equipment manufacturers shipped equipment to 150 countries in 1972 compared with 146 countries in 1971. Exports accounted for over 9 percent of U.S. shipments in 1972 and are expected to account for a similar share in 1973.

Shipments to Canada of $144 million accounted for almost a third of last year's exports. Shipments to West Germany, Japan, France, Kuwait, and the Republic of South Africa amounted to an additional $85 million.

While shipments to some developed countries excluding Canada, continue to improve, greatest gains are being made in the developing country markets. Developed countries are accelerating expansion of local production facilities, often in cooperation with American companies because the world market for air conditioning and refrigeration equipment is expanding rapidly. Furthermore, the growing acceptance of frozen foods in the developed countries as well as the expansion of perishable food processing plants in developing countries, point to a continued strong demand for refrigeration equipment of all types.

Imports Increasing

Continuing the trend of recent years, imports in 1972 rose 47 percent to $140 million. A further 25 percent rise to more than $175 million is expected in 1973. Italy, Canada, Japan, Sweden, and West Germany accounted for almost 90 percent of last year's imports and will probably maintain this dominance in 1973. Compressors and parts, air conditioners and freezers comprise the bulk of U.S. imports. However, with the expansion of production facilities in these countries, increasing import competition of other types of air conditioning and refrigeration equipment as well as increased competition in third country markets is anticipated.

Steady Growth to Continue

Industry prospects through 1980 appear favorable with overall growth averaging about 8 percent a year from 1972 to $8.6 billion. Product shipments are expected to top $9.3 billion in 1980 reflecting an annual growth rate of 7.7 percent from 1972.

Central air conditioning for the home, as well as commercial and industrial applications, have become accepted standards and a high percentage of future new construction will be so equipped. Room air conditioners will continue to have a steady market in homes and small commercial buildings not equipped with central air conditioning, however, in addition, the relatively untapped area of industrial air purification to preserve the environment will offer expanding sales opportunities.

World markets for refrigeration equipment are expected to continue to expand. The economic impact in developing countries of increased modernization of food processing, preservation and transportation equipment will produce a sustained demand for such equipment during the next 10 years.

With U.S. manufacturers continuing to expand overseas facilities and licensing agreements, exports of sophisticated componentry to these plants will remain at a high level. These shipments, coupled with shipments of other technologically advanced equipment should expand our exports to over $850 million a year by 1980.

Imports are expected to remain relatively small in relation to domestic output. However, rapidly rising imports concern some segments of the industry, especially compressors manufacturers. Imports will probably reach $300 million by 1980, an annual average growth of about 10 percent from 1972.—*Thomas J. Jackson, Office of Business Research and Analysis.*

CHAPTER 23

General Components

General components—parts and subassemblies manufactured for a variety of end-use applications in contrast to components designed for a specific product—include such items as screw machine products, antifriction bearings, valves, and pipefittings.

The level of operations in general components industries reflect the broad spectrum of U.S. manufacturing, since orders for most components must be placed 3 to 9 months before they are to be used in production of end items.

Combined shipments of the screw machine products, bearings, and valve and pipefittings industries reached about $5.6 billion in 1972, up nearly 11 percent from 1971 levels. Paralleling the anticipated upward trend in industrial production, shipments of components are expected to increase more than 9 percent to almost $6.2 billion in 1973.

Foreign trade of components cannot be accurately measured since many components included in machinery and equipment trade statistics are not identified. In recent years, identifiable exports increased modestly—from $390 million in 1970 to $412 million in 1972. In contrast, imports rose from $155 million in 1970 to about $222 million in 1972 and are expected to reach $265 million in 1973. Valve and fitting products have contributed to a favorable trade balance while a negative balance for bearings was reported for the first time in 1972.

By 1980, combined shipments of screw machine products, antifriction bearings, valves and pipefittings are expected to reach $9.7 billion, reflecting an annual growth rate from 1972 of 7.1 percent.

Strong Demand for Screw Machine Products

Shipments of screw machine products are expected to increase about 9 percent in 1973 to $1.25 billion following a substantial rise of 19 percent to $1.15 billion in 1972 over 1971. Anticipated increases in automotive output and continued growth in most industrial machinery and equipment markets will result in a high level of demand for industry products.

The screw machine products' primary production tool is the automatic screw machine which

General Components: Projections 1972–80[1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
	Total	$5, 625	11	$6, 150	9	$9, 730	7. 1
3451	Screw machine products	1, 145	19	1, 250	9	1, 950	6. 9
3494	Valves and pipefittings	3, 070	8	3, 375	10	5, 680	8. 1
3562	Ball and roller bearings	1, 410	10	1, 525	8	2, 100	5. 1

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

Valves and Pipe Fittings: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	2,275	2,499	2,679	2,842	3,070	8	3,375	10
Total employment (thousands)	95	96	97	93.8	97.6	4		
Production workers (thousands)	68	68	67	65.3	67.9	4		
Value added	1,377	1,472	1,588	1,634	NA			
Value added per production worker man-hour	$9.91	$10.59	$11.70	$12.57	NA			
Product: [3]								
Value of shipments	2,103	2,428	2,515	2,650	2,860	8	3,150	10
Value of imports	39	57	76	83	100	20	120	20
Value of exports	209	248	280	304	307	1	320	5
Wholesale price indexes (1967 = 100)	100.1	106.1	113.5	118.4	123.1	3.9	NA	NA

[1] Estimated by BDC.
[2] Includes value of all products and services sold by the valves and pipefittings industry (SIC 3494).
[3] Includes value of shipments of valves and pipefittings made by all industries.

P = Preliminary.

NOTE.—NA = Not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

turns out a wide variety of unassembled parts from metal rod bar or tube stock, as well as from fiber, plastic and other materials. Primary markets for these products include automotive, aircraft, household appliances, and electronic and communications industries as well as most types of industrial machinery. Screw machine products are made almost entirely on a job order basis to customer specifications.

The industry consists mostly of small firms. Although the number of firms in the industry declined 5 percent to 1,712 between 1967 and 1971, firms with fewer than 20 employees increased to 1,188, or 69 percent of the total. In contrast, the number of firms with more than 50 employees dropped to 56, just over 3 percent of the total. In addition to these independent producers, there are numerous captive screw machine departments in companies producing components for internal manufacturing use.—*William E. Fletcher, Office of Business Research and Analysis.*

VALVES AND PIPEFITTINGS

Valve and pipefitting industry shipments increased in 1972 to $3.07 billion, up 8 percent from $2.84 billion in 1971. Another substantial increase of 10 percent to about $3.4 billion is expected in 1973. In 1972, exports showed only a slight gain of 1 percent to $307 million, while imports jumped 20 percent to over $100 million.

Strong Demand Continues

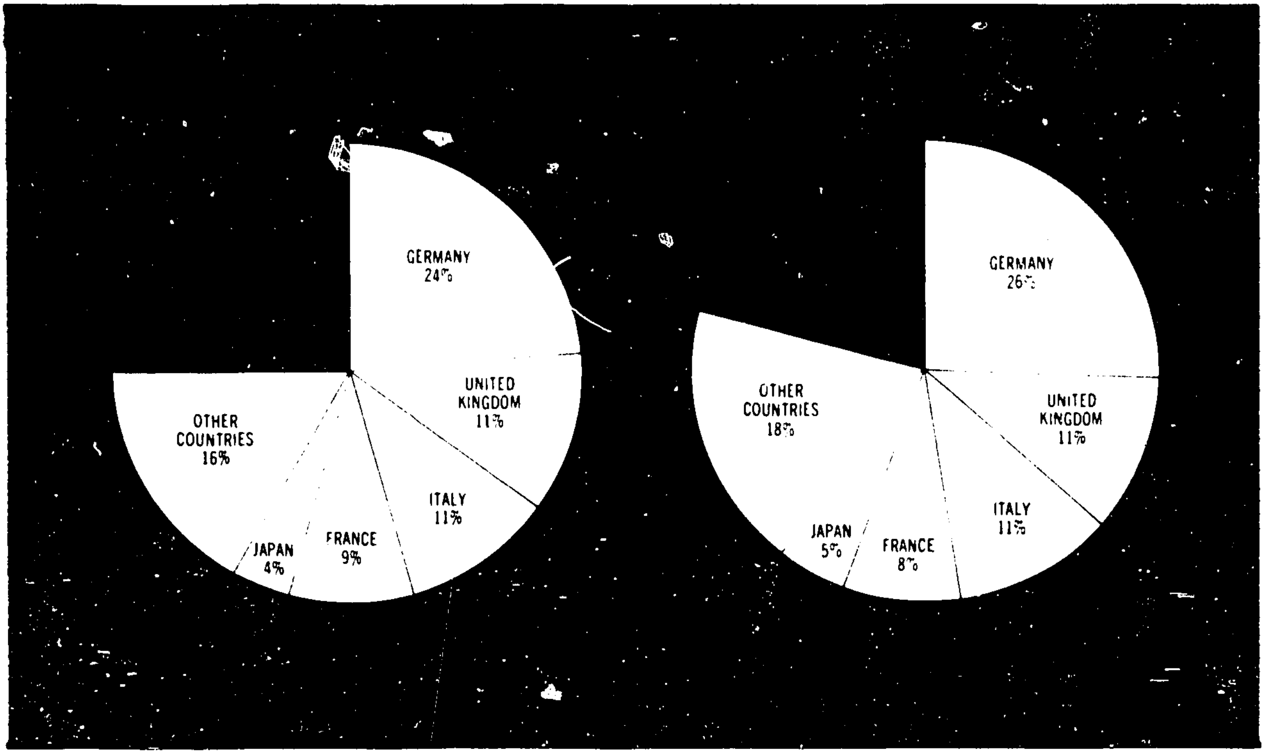
Shipments of valves and pipefittings produced by all industries increased to almost $2.9 billion in 1972, up 8 percent from $2.7 billion in 1971, and are expected to increase 10 percent in 1973 to almost $3.15 billion.

Approximately 30 percent of the total valve and pipefitting market is in new industry structures. Other major markets for valves and pipefittings include aircraft, maritime and water industries, oil and gas recovery and transmission facilities, chem-

1972 Profile

Valves and Pipe Fittings

SIC Code	3494
Value of industry shipments (millions).	$3,074
Number of establishments	666
Total employment (thousands).	99
Exports as a percent of product shipments.	10.7
Imports as a percent of apparent consumption.	3.7
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	6.9
Value of exports (current dollars).	8.0
Value of imports (current dollars).	21.0
Employment	1.5
Major producing areas	Middle Atlantic and East North-Central States



ical processing, heating and air conditioning, and boiler shop products. Expanding requirements for nuclear power plants as well as for liquefied natural gas (LNG) shipping and storage facilities should result in a growing market for these special purpose valves and fittings.

Output Per Man Hour Up

Total employment in the valve and pipefitting industry increased about 4 percent in 1972 to 97,600 from 93,800 in 1971. The number of production workers also expanded an estimated 4 percent in 1972 to 67,900 from 65,300 in 1971. Production worker employment remained at approximately this level for the last 5 years while the value added per production worker man hour increased at an average annual rate of 6.2 percent during the last 5 years from $9.91 in 1967 to $12.57 in 1971.

Wholesale prices of valves and fittings have increased at an annual rate of 4 to 5 percent since 1967. In 1972, the wholesale price index increased 4 percent to 123.1 (1967=100) from 118.4 in 1971, and following the 4 percent gain from 113.5 in 1970.

Technological Requirements Shift

Simple valves and fittings for stopping and starting the flow of liquids and gases at moderate temperatures and pressures are still the industry's major output. However, technological advances in a wide range of industrial markets have prompted development and increased use of more sophisticated valves and fittings, including types capable of withstanding extremes in temperature, pressures, and highly corrosive atmospheres. Some markets that should increase substantially in the next several years include liquefied natural gas shipping and transfer and storage facilities that require cryogenic valves and fittings to withstand temperature variations of from −425° F. to +250° F. Also, the anticipated growth in nuclear power plants and facilities should provide an expanding market for special valves and fittings that can withstand extreme temperatures and pressures. The market for plastic valves should continue to increase commensurate with applications requiring noncorrosive materials, light weight materials, and modernization of building codes which, in the past, have prohibited their use.

Average Size of Firms Up

The number of valve and fittings producers has increased to almost 680 in 1972 from 666 in 1967. Also, the number of larger firms with over 20 employees expanded from 412 in 1967 to almost 420 in 1972.

The industry has remained highly concentrated in the Middle Atlantic and East North Central States, which account for about 54 percent of total industry shipments. However, the West South Central States increased their share to almost 9.5 percent of the total and West North Central States producers have expanded their share to almost 8.5 percent.

Imports Up Sharply

U.S. imports of valves and fittings rose a sharp 20 percent in 1972 to over $100 million, from less than 2 percent of apparent consumption in 1967 to 3.7 percent in 1972. Imports may supply 4 percent of domestic demand in 1973. Canada and Japan continued to be the principal supplier countries in 1972, each with a 28 percent share of the total U.S. import market. Other major sources of imports in 1972 were West Germany, 11 percent; United Kingdom, 10 percent; and Italy, 7 percent.

Exports Level Off

Exports of valves and fittings from the United States, which increased only slightly in 1972 to $307 million from $304 million the year before, are expected to gain about 5 percent in 1973 to $320 million. An increase of about 6 percent in 1971–72 exports to Canada brought the Canadian share of the total U.S. export market to almost 28 percent. Other major customers include Japan and the United Kingdom, each accounting for 6 percent of total exports, and Venezuela with a 5-percent share.

United States Loses Lead in World Market

Exports of the 14 major valve producing countries increased 63 percent to $930 million in 1970 from $570 million in 1967. While U.S. exports rose 40 percent from $141 million in 1967 to $197 million in 1970, our share of the world market dropped from 25 percent to 21 percent during this period. Exports from Germany took the lead, growing 75 percent from $137 million in 1967 to $240 million, or 26 percent of the 1970 total, and the United Kingdom, Italy and France, as other major suppliers, maintained a relatively constant share of the world market during the 1967–70 period.

Foundry Operations Pollute

The air pollution problems of valve and pipefitting manufacturers stem from their foundry operations—a significant part of production. Federal and State pollution control regulations requiring expanded use of industrial gas cleaning equipment can be costly and are of particular concern to the smaller firms in the industry. Some firms are therefore considering closing their foundries and turning to purchased foundry products.

Prospects for 1980

Shipments of the valve and pipefittings industry are expected to rise about 8.1 percent annually to reach almost $5.7 billion by 1980.

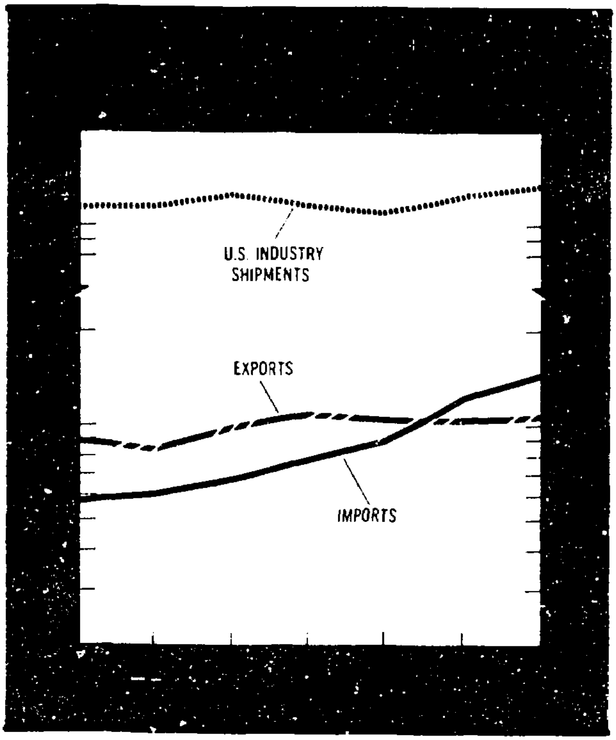
Continued steady growth in the market for valves and pipefittings is expected throughout the 1970's. Generally, for these components, demand depends on the growth rate of water and sewage systems and industrial expansion and modernization. Some of the substantial demands for valves and fittings is expected to come from increased shipbuilding and maritime maintenance and replacement, new oil and gas transmission lines, construction of liquefied natural gas (LNG) transportation and storage facilities, and nuclear power plant installations.

Based on the historical pattern of growth and the anticipated rapid future growth in investment in new plant and equipment during the 1970's, product shipments of valves and pipefittings are also expected to increase at an average annual rate of 8.1 percent to $5.3 billion in 1980 from just under $2.9 billion in 1972.

The growing trend toward automation in industrial production will be reflected by an increase in the demand for remotely controlled valves and central station operations. The expanding use of ball valves, butterfly valves, and plastic valves should continue as valve maintenance and repair become more important factors to users who are particularly concerned with cost of operation and plant downtime.

Imports have increased at a fast pace during the past few years and are expected to continue to grow in the 1970's, particularly standard valves and fittings. By 1980, imports should reach $310 million, to provide 6 percent of domestic consumption.

Although they hit a plateau this year, exports are expected to expand, but at a slower rate of about 6 percent during the rest of 1970's. Estimated at close to $500 million, they will account for about 9 percent of total domestic output in 1980.—*William E. Fletcher, Office of Business Research and Analysis.*



BALL AND ROLLER BEARINGS

Shipments by the ball and roller bearing industry are expected to climb 8 percent in 1973 to $1.5 billion following a 10 percent increase in 1972 to $1.4 billion.

Product Shipments Up

Product shipments of ball and roller bearings are expected to increase to more than $1.3 billion in 1973, up 8 percent from $1.2 billion in 1972. As components, antifriction bearings are used in practically all mechanisms incorporating wheel or shaft operations. The automotive industry is the principal consumer of antifriction bearings, purchasing an estimated 30 to 35 percent of output. Farm and construction machinery and aerospace are also large consumer industries. Other significant users are makers of general and special industrial equipment. In addition to demand for original equipment, there is a substantial replacement market that consumes about 25 percent of total bearings output. The replacement market is serviced primarily through distributors while most original equipment is sold directly to manufacturers.

Between 1967 and 1972 wholesale prices of antifriction bearings increased at an average annual rate of 3.6 percent. Production worker wages increased at an average annual rate of 7.9 percent during this period, and the relative cost of materials per dollar value of shipments increased at an average annual rate of 0.25 percent.

Roller Bearings Lead in Production

During the last 10 years, roller bearings increased from a third to more than half of industry production. One reason for the rapid growth has been a shift in some markets from ball to roller bearings. However, a more important factor has been the rapid growth in imports of ball bearings, resulting in a proportionately lower rate of growth in domestic production of ball bearings. The volume of roller bearing imports has been relatively small.

Productivity Rising

Ball and roller bearing industry employment dropped from 56,000 in 1970 to 48,100 in 1971 and decreased an estimated 4 percent further in 1972. Production worker employment declined an estimated 1.6 percent in 1972 to 37,800. However, increased average weekly hours in 1972 resulted in a rise in actual manhours worked—from 74.4 million hours in 1971 to 89.7 million hours in 1972.

Value added per production worker manhour increased over 13 percent in just 1 year—from $9.19 in 1970 to $10.44 in 1971 compared with an annual average increase of only 4 percent from 1967 to 1970.

U.S. World Market Share Declines

From 1967 to 1971, U.S. bearings exports increased at an annual rate of 6 percent from $88

1972 Profile

Ball and Roller Bearings

SIC code	3562
Value of industry shipments ($ millions).	$1,410
Number of establishments	96
Total employment (thousands).	46
Exports as a percent of product shipments.	9
Imports as a percent of apparent consumption.	10
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	1.0
Value of exports (current dollars).	3.5
Value of imports (current dollars).	16.1
Major producing areas	Northeast and Midwest

Ball and Roller Bearings: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	1,329	1,409	1,315	1,279	1,410	10	1,525	8
Total employment (thousands)	59	59	56	48	46	−4		
Production workers (thousands)	48	48	45	38	37.8	−2		
Value added	833	852	805	777	NA			
Value added per production worker man-hour	$8.26	$8.58	$9.19	$10.44	NA			
Product: [3]								
Value of shipments	1,161	1,260	1,166	1,107 [1]	1,220	10	1,320	8
Quantity shipped (millions of units)	751	845	730	751	825	10	890	8
Value of imports	57.8	68.9	77.8	90.1	122	35	145	20
Value of exports	88.2	99.5	109.3	105.9	105	−1	107	2
Wholesale price indexes (1967=100)	100	102.7	108.6	115.3	119.0			

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the ball and roller bearing industry SIC 3562.
[3] Includes value of shipments of ball and roller bearings made by all industries.
[P] Preliminary.

NOTE.—NA = not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

million to more than $109 million. The value of exports declined fractionally to $105 million in 1972, reflecting the declining U.S. share of the bearings world market—from 22 percent in 1967 to about 15 percent in 1972. In contrast, West German exports rose from $85 million in 1967 to over $143 million in 1970 and exports from Japan jumped from $59 million in 1967 to $134 million in 1970.

Imports Up Sharply

U.S. imports of antifriction bearings are expected to increase about 20 percent in 1973 to $145 million, about 11 percent of U.S. apparent consumption. In 1972, imports rose 35 percent from 1971 to about $122 million. Ball bearings accounted for almost two-thirds of all bearings imports in both 1971 and 1972. In contrast, the import share of roller bearings increased from 21 in 1971 to 24 percent in 1972.

Japan continues as the leading supplier of bearings; its share of U.S. bearings imports was 56 percent in 1972. Other major suppliers include Canada, 16 percent; West Germany, 14 percent; and the United Kingdom, 8 percent.

Exports Stable

The level of U.S. exports of bearings has fluctuated between $100 million and $110 million in recent years and no significant change is expected in 1973. Generally, exports consist of replacement parts for U.S. machinery and limited quantities of sizes and types of bearings that are not produced overseas. Many foreign firms now have the capability to produce a complete line of bearing sizes and types. However, since most bearings can only be economically produced in relatively long production runs, limited demand in overseas markets gives U.S. manufacturers a competitive edge for some types of bearings. As local markets expand, however, foreign manufacturers are producing a larger number of sizes and types, providing increased competition for U.S. suppliers.

Shipments To Grow

With greater U.S. industrial production, ball and roller bearing shipments are expected to maintain an average annual growth rate of about 5.1 percent through 1980, reaching about $2.1 billion. Substained demand from the automotive industry and anticipated output of most capital goods producing industries will generate demand for bearings in the next several years.

Demand for high precision in bearings will continue as requirements of the computer and instrument, aerospace, agricultural and construction machinery and machine tool industries become more stringent. The constant push to extend the operating life of bearings will result in continued advances in bearing product design and new and improved lubricants. Foreign suppliers are expected to continue to penetrate the U.S. bearings market and provide stiffer competition to the domestic industry during the remainder of the 1970's.—*William E. Fletcher, Office of Business Research and Analysis.*

CHAPTER 24

Power Equipment

Shipments of power boilers, steam, hydraulic and gas turbines, and industrial internal combustion engines are expected to reach $4 billion in 1973, more than 7 percent higher than 1972 levels.

While shipments of power boilers declined during 1972, the sharp 15-percent rise in steam, hydraulic, and gas turbine shipments to $2.5 billion increased total power equipment sales. Industrial internal combustion engine shipments rose fractionally in 1972.

Construction delays in the startup of power systems by customer industries, and stricter pollution control requirements, have shifted the mix of equipment orders. Demand for electric and mobile power continues to outstrip the increase in population. Supplying those demands on schedule, especially in metropolitan areas, in conformance with the Environmental Protection Act and the Occupational Safety and Health Act, are problems the power equipment industries are attempting to solve.

By 1980, product shipments of the 3 power equipment industries are expected to reach $5.6 billion, reflecting an annual average gain of 5.2 percent.—*Ernest Loeb, Office of Business Research and Analysis.*

POWER BOILERS AND NUCLEAR REACTORS

Shipments of power boilers declined for the third successive year in 1972, dropping to $521 million, about 12 percent below 1971 shipments. In contrast, new orders for nuclear reactor steam supply systems climbed steadily for the fourth year and are estimated at above 32,000 megawatts in 1972 as compared to 19,885 megawatts in 1971, 14,252 in 1970, and 7,203 in 1969.

Heavy Backlog of Orders

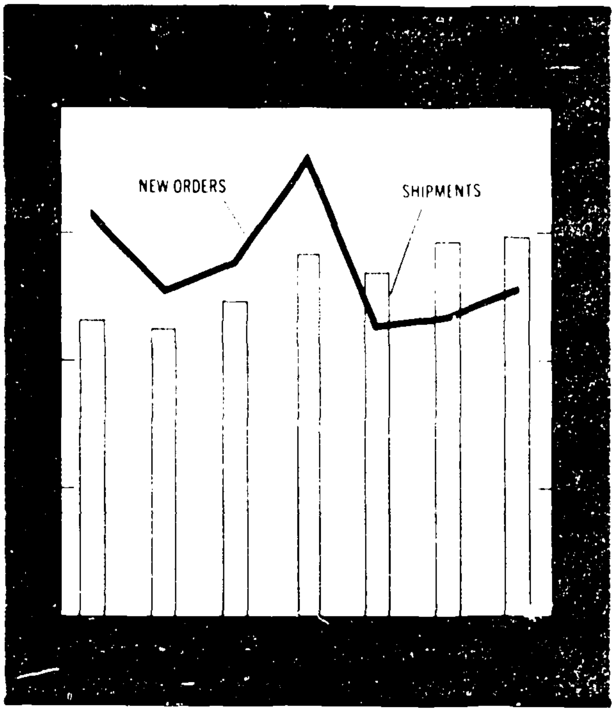
The large backlog of orders for power boilers and nuclear steam supply systems is keeping manufacturers at or near capacity production. The five principal nuclear reactor suppliers report unfilled orders ranging from $2 to $4 billion each.

Power Equipment: Projections 1972–80[1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80[2]
	Shipments:[3]						
34433	Power boilers	$521	−12	$493	−6	$660	3.0
3511	Steam, hydraulic and gas turbines	2,200	15	2,465	12	3,425	5.7
3519 (part)	Industrial internal combustion engines	990	1	1,035	5	1,500	5.3

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth.
[3] Includes value of power equipment product shipments made by all industries.



Suppliers in a Standards Dilemma

Requirements originated by the Occupational Safety and Health Act and the National Environmental Policy Act concern power boiler manufacturers because of the long lead time required for production—up to 4 years from design to operation. There are risks involved in designing and manufacturing units under existing standards which may be obsolete by the time the equipment is installed and ready for operation. Manufacturing problems are further compounded because of the variations in codes and standards usually adopted during the period of production by State and local authorities.

Delays Affect Procurement

While delays in powerplant construction have been experienced in the start-up schedule of all base load powerplants, delays for nuclear plants have been more serious and are responsible for marginal generating capacities in some areas of the country. Contributing to delays are problems of a new technology, licensing, public concern over safety, and pollution, component deliveries and labor problems.

Since such delays, extending from 6 to 24 months, cause a critical local energy gap, electric utilities must consider shorter but costlier lead time generating equipment. Combustion turbine generator sets, some mounted on barges, have solved this problem. Utilities are also advancing time schedules in planned procurement of base load plants to compensate for the delays experienced in construction.

Gas-Cooled Reactors Break Into Market

Until recently, the light water cooled and moderated nuclear reactor dominated markets for nuclear steam supply systems. The gas (helium) cooled reactor, which has a higher thermal efficiency, within the past year has made significant inroads into the commercial nuclear market and is also expected to compete for a share of the foreign nuclear reactor market.

New Concept in Nuclear Plant Siting

Problems of siting and licensing nuclear powerplants and the low availability of adequate amounts of cooling water have led suppliers to de-

Power Boilers: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Product: [2]								
Value of shipments	521.7	633.2	616	587	521	−12	493	−6
Quantity shipped (million pounds of steam per hour)	249	264	304	290	257	−12	243	−6
Value of imports	2.4	3.2	11.0	15.1	20.2	34	25	25
Value of exports	71	66	58	67	90	35	94	6

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of shipments of power boilers (SIC 34433) made by all industries.

NOTE.—NA = Not available.
Source: Bureau of the Census, Edison Electric Institute, Bureau of Domestic Commerce.

velop offshore platform or barge mounted nuclear powerplants.

The first orders received by a major supplier specify several plants to be located off the shore of New Jersey. The supplier now has a shipyard-like manufacturing facility under construction that will utilize assembly line techniques on a standardized nuclear plant design. After construction and testing, the completed plant is towed to the site and permanently moored in a protective breakwater. Underwater cable transmits the electric power to a shore station for distribution to coastal load centers.

In addition to easing siting, licensing, and coolant problems of nuclear plants, the barge concept has the potential of reducing overall costs, improving quality control, and effecting shorter construction time as assembly line techniques can be employed.

Power Boiler Imports Continue Up

Imports of power boilers and associated equipment were negligible until 1970 when such imports jumped to $11 million. In 1971, imports climbed to $15 million and in 1972 are estimated in excess of $20 million.

Principal supplier countries are Japan, Canada, The Netherlands, and France. The steady rise in imports is ascribed to concerted efforts by the competing countries to penetrate and widen their share of the U.S. market.

Exports of Power Boilers Spurt

Exports of power boilers, associated heat exchangers, steam condensers, accessories, and parts rose significantly in 1972 to a record high estimated at around $90 million, about 35 percent above 1971 levels. The major portion of these exports went to Japan, Iran, Spain, and Brazil.

Power Boilers

450 pounds per square inch pressure and greater

[Million pounds of steam per hour]

	New orders	Shipments
Year:		
1967	235	174
1968	191	169
1969	207	185
1970	268	213
1971	159 [1]	203 [1]
1972	70 [1]	180 [1]
1973	75 [1]	170 [1]

[1] Estimated.

1972 Profile

Power Boilers

SIC Code	34433
Value of industry shipments (millions).	$521
Number of establishments	8
Employment (thousands)	25
Exports as a percent of product shipments.	17.2
Compound annual rates of growth (1967–72) percent:	
Value of shipments (current dollars).	0
Value of exports (current dollars).	4
Value of imports (current dollars).	42.5
Major producing areas	Pennsylvania, Ohio, and Tennessee

Large capacity boilers together with boiler components, parts and accessories are the mainstay of U.S. exports.

Nuclear Power Exports Rise Sharply

From 1959 to 1971, the Export-Import Bank made direct loans totaling over $1 billion in support of nuclear equipment, fuel, and service exports. In 1971 alone, funding for 10 direct loans granted and 10 related guarantees extended passed the $500 million mark. Transactions averaged about $52 million. In 1972 the average was higher largely because of heavy commitments on behalf of five large reactors sold to Spanish utilities, two to Japan, and one to Mexico. Direct loans plus guarantees in 1972 were expected to reach $1 billion.

U.S. nuclear power-related exports are expected to average $2.2 billion a year in the 5-year period beginning mid-1973.

Major Exports to Developing Countries

In the next few years, nuclear exports probably will include a number of major sales to lesser developed nations requiring virtually every item of nuclear equipment, as well as fuel to be imported. These countries would also continue awarding orders after the initial sale.

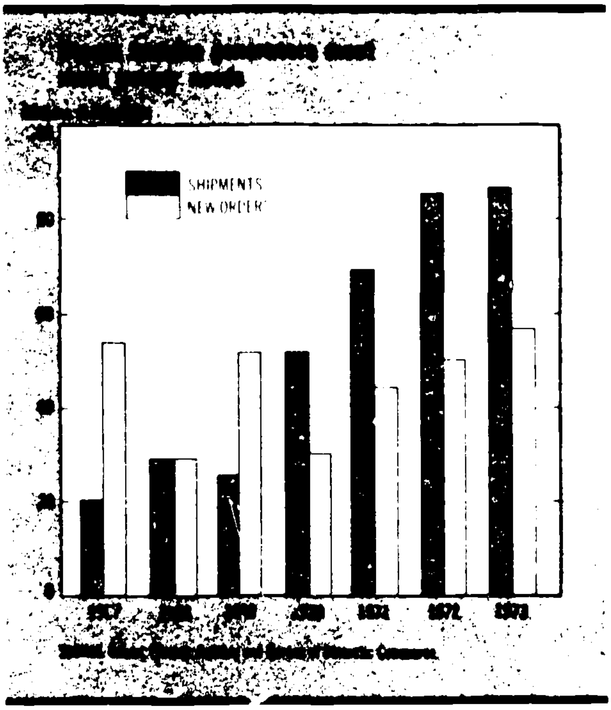
U.S. suppliers probably will benefit from expanding foreign markets since they have unequalled experience in commercial nuclear applications, ability to offer the advantages of continuing, aggressive technical innovation, and large-scale manufacturing capability.

Utilities on Steep Spending Climb

To meet the growing demand for electrical energy, the electric utility industry—principal users of power boilers and nuclear reactors—must build over 1 million megawatts of new generating capacity by 1990 on a timely basis. Capital expenditures by the industry were expected to reach a record $17 billion in 1972. Approximately $4.75 billion was spent on fossil-fueled steam generation utilizing power boilers and about $3.25 billion for nuclear steam generation using nuclear reactors. By 1980, capital expenditures of the electric utilities industry will reach $23 billion.

Shipments of power boilers for 1973 are expected to drop 6 percent because of the cyclical nature in ordering by the utilities. For the long term, shipments of power boilers are expected to rise to $661 million in 1980, reflecting an annual growth rate of around 3.5 percent.

Because of the long lead time required in manufacturing nuclear reactor steam supply systems, orders placed in the late 1960's are being shipped now. Annual growth in nuclear power equipment orders meanwhile is at the rate of over 35 percent.—*Ernest Loeb, Office of Business Research and Analysis.*



STEAM, HYDRAULIC, AND GAS TURBINES

Steam turbine-generator shipments of 41,845 megawatts of electric power in 1972 were at an all-time high, 20 percent over 1971 levels. An expected decline in scheduled shipments for 1973 reflects the cyclical nature of the electric utility industry's requirements for generators.

Hydraulic turbine-generator shipments were over 1,500 megawatts in 1972. That was a decrease of about 20 percent from 1971.

Gas turbine-generator shipments declined 3 percent in 1972 to 6,595 megawatts, from the record high of 6,790 megawatts in 1971.

Gas Turbine-Generators Fill Energy Gap

For many years, gas turbine-generators have been used to provide emergency and peak-load, electrical power for utilities and commercial operations. Increased delays in construction and licensing of new base-load powerplants in the past several years have created a growing demand for generating units that can be delivered in from 12 to 18 months. The gas turbine generator will continue to meet this need for several more years. As larger and more economical base-load plants come on line in the years ahead, demand for gas turbine-generators will probably decline.

Combined-Cycle Installations May Rise

Expanded interest by utilities in combined-cycle installations may reverse the shift from gas-turbine generator use by 1980. A combined-cycle powerplant employs a gas turbine to power a generator to produce electricity, while heat from the turbine's exhaust is used to make steam which in turn powers a steam turbine-generator to produce additional electricity. If combined-cycle systems prove feasible for certain intermediate-load requirements of electric utilities, a $2-billion-a-year market could develop by 1980. Over a dozen combined-cycle plants were ordered by utilities in 1972.

Steam Turbines Have Record Year

Steam turbine-generators—principal elements in generating electrical power in the United States—are used in fossil-fired powerplants, nuclear steam supply systems, and in combined-cycle plants. Since those generators require a long lead-time for production, actual shipment levels are known 3 to 4 years in advance. Scheduled additions from the start of 1973 through 1975 total over

Steam, Hydraulic and Gas Turbines: Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1968	1969	1970	1971 [P]	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Industry: [2]									
Value of shipments	1, 059	1, 319	1, 473	1, 791	2, 202	2, 532	15	2, 810	11
Total employment (thousands)	36	38	43	47	49	53	8		
Production workers (thousands)	25	25	27	29	316	NA			
Value added	582	646	734	968	1, 093	NA			
Value added per production worker man-hour	$11. 67	$12. 17	$12. 31	$16. 14	$17. 26	NA			
Product: [3]									
Value of shipments	1, 001	1, 154	1, 316	1, 558	[1] 1, 916	2, 200	15	2, 465	12
Quantity shipped, total (megawatts):									
Steam turbine generator sets 4000 kw. and over	20, 196	25, 460	25, 815	25, 951	34, 700	41, 845	20	36, 963	-13
Gas turbine generator sets	2, 522	4, 018	4, 012	6, 038	6, 790	6, 595	-3	6, 184	-7
Value of imports	42. 6	57. 7	66. 0	64. 3	63. 9	64. 0	0	67	5
Value of exports	104. 0	129. 6	133. 2	137. 4	181. 4	194. 0	7	200	3

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the Steam Hydraulic & Gas Turbine industry (SIC 3511).
[3] Includes value of shipments of turbine and turbine generator sets made by all industries.
[P] Preliminary.
NOTE.—NA = not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce, Edison Electric Institute.

107,000 megawatts capacity of steam turbine-generators.

Suppliers Expand Facilities

Turbine-generator manufacturing capacity will continue to expand, especially for gas and steam turbine-generator sets. The predicted annual increase in demand for electric energy of over 7 percent, the need to retire less efficient powerplants, and the cumulative demand effect of delays in powerplant construction have found dramatic increases in production capacity. In some cases, capacity doubled in a period of 7 years.

1972 Profile

Steam, Hydraulic, and Gas Turbines

SIC code	3511
Value of industry shipments (million)	$2,532
Number of establishments	34
Total employment (thousands)	53
Exports as a percent of product shipments	9.0
Imports as a percent of apparent consumption	3.0
Compound annual average rate of growth 1967-72 (percent):	
Value of shipments (current dollars)	19.0
Value of exports (current dollars)	13.3
Value of imports (current dollars)	8.5
Employment	8.1
Major producing areas	New England, Mid-Atlantic, and East North Central States

Costs Increasing Moderately

Dollar costs per kilowatt for turbine generators increased only moderately in recent years, largely because of the increase in equipment unit sizes which allow economy of scale in manufacturing. Some cost increases have occurred because of rising freight rates and higher erection labor costs.

Imports To Increase

Since 1969, imports have remained at a level of about $64 million. Imports are expected to increase in the next several years, however, because of the number of orders placed with foreign suppliers by U.S. utilities for hydraulic and steam turbine-generators. Orders to foreign suppliers of fossil and nuclear steam turbine-generators scheduled for shipment total over 20,000 megawatts capacity.

In 1971 and 1972, shipments of hydraulic turbine-generators from foreign suppliers to the United States totaled about 4,500 megawatts capacity. This is approximately 30 percent over the total of 3,375 MW, shipped by U.S. suppliers.

Exports Improve Steadily

Exports are expected to continue their rise of several years but at a somewhat slower rate. Tur-

Internal Combustion Engines: Trends and Projection 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Industry:								
Total employment (thousands)	68.9	75.5	69.3	72.0	72.5	1		
Production workers (thousands)	50.9	56.2	51.2	52.0	52.5	1		
Product [2]:								
Value of shipments	882	988	984	985	990	1	1,035	5
Gasoline	420	487	453	455	460	1	481	5
Diesel	440	480	489	480	480	0	503	5
Gas (natural and LPG)	22	21	42	50	50	0	51	2
Quantity shipped (thousands)	8,537	9,818	8,898	8,890	8,830	0	9,280	5
Gasoline	8,364	9,638	8,733	8,735	8,720	0	9,115	5
Diesel	163	174	158	150	155	3	160	3
Gas (natural and LPG)	10	6	7	5	5	0	5	0
Value of imports	65	95	136	131	132	1	132	0
Value of exports	130	149	173	181	190	5	195	3

[1] Estimated by Bureau of Domestic Commerce.

[2] Includes value of all products and services sold by the internal combustion industry (SIC 3519) (over 750 r.p.m.) except automotive, aircraft, and outboard engines.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

bine exports in 1972 increased about 7 percent over 1971. However, the gain in 1973 is expected to be only about 3 percent for a total of approximately $200 million.

Shipments Will Continue Up

Keeping pace with the Nation's increased energy requirements, shipments of steam, hydraulic, and gas turbines are expected to increase to $3.9 billion by 1980, reflecting an average annual increase of 5.7 percent.—*Ernest Loeb, Office of Business Research and Analysis.*

INTERNAL COMBUSTION ENGINES

Shipments by all producers of internal combustion engines for stationary, marine, traction, and similar uses are expected to exceed $1 billion in 1973, about a 5 percent increase over 1972. Exports increased an estimated 5 percent in 1972 over 1971 levels and will probably rise 3 percent further in 1973. Imports are also expected to increase fractionally in 1973.

Demand is expected to remain steady for engines for construction machinery, snowmobiles, all-terrain vehicles, farm machinery, electric generators, pumps, compressors, lawn mowers, garden tractors, military items, and motorbikes. Recreation vehicles and low horsepower household and industrial machinery engines account for a large share of the internal combustion engine production.

Pollution Control Looms

Air pollution control remains the greatest challenge to the industry as the deadline looms for compliance with Environmental Protection Agency (EPA) controls. Primary efforts center on filtering emissions and on improving combustion efficiency. The new filters which have been developed are both costly and of short duration. Increased research and development efforts are also aimed at improving combustion efficiency in conventional gasoline piston engines. Diesel engines already meet EPA standards but must be carefully serviced regularly to retain low pollutant levels. Some gas turbines currently being tested may prove to keep exhaust emissions at or below the desired levels.

Wankel a Revolutionary Engine

The Wankel rotary engine may be one answer to air pollution problems. A unique characteristic of this engine is considerably reduced noise output even at high operating speeds.

An imported automobile powered by a Wankel engine is now available in this country and this style of rotary engine will be incorporated in a broad range of nonautomotive machinery in the near future. Already, Wankel powered snowmobiles are appearing on the market. Soon to follow will be Wankel powered garden tractors, motorbikes, other recreation vehicles, and even model airplanes. One engine model as small as an orange is rated at one-third horsepower and retails at $93. A diesel-Wankel is also being considered for future use. This rotary engine, having fewer moving parts, produces high torque at low speeds, starts readily in cold weather, and vibrates less than conventional piston engines.

A Newcomer Appears

A newcomer in the higher horsepower engine range is the combined cycle gas turbine. Power generating utilities are observing the performance of these units closely. Operating as a regular turbine, the main unit generates a considerable amount of heat that normally is discharged as exhaust. Recycling this heat into a steam generating system would produce additional power for use during peak load periods. This system could prove valuable aboard ships that are propelled by gas turbines. Power would be supplied to auxiliary machinery without incurring additional fuel consumption or overloading the main propulsion machinery.

Exports Expand

In 1972, internal combustion engine exports increased an estimated 5 percent over 1971, to $190 million. Exports will probably increase only about 3 percent in 1973 and remain level in subsequent years. Imports in 1972 were estimated at $132 million, a fractional increase over 1971 levels. No change is anticipated in 1973. The less sophisticated emission control systems of foreign engines will limit imports after EPA standards are applied.

1972 Profile

Industrial Internal Combustion Engines

SIC code	3519
Value of shipments (millions).[1]	$990
Number of establishments	155
Total employment (thousands).	72.5
Exports as a percent of product shipments.	19.2
Imports as a percent of apparent consumption.	14.2
Compound annual average rate of growth 1967-72 (percent):	
Value of shipments (current dollars).*	2.3
Value of exports (current dollars).	7.9
Value of imports (current dollars).	15.2
Employment	1.0
Major producing areas	North Central States: Wisconsin, Michigan, Ohio, Illinois, Indiana

[1] Product.

Outlook for 1980

Industrial internal combustion engine shipments will total an estimated $1.5 billion in 1980, reflecting a 5.3 percent annual increase in the next several years. However, production may rise at a higher rate during these years if economical, effective pollution-free engines complying with EPA standards are developed in the near future.—*George R. Delgado, Office of Business Research and Analysis.*

CHAPTER 25

Electrical Transmission, Distribution and Industrial Equipment

Shipments of electrical transmission, distribution, and industrial equipment are expected to continue upward in 1973, sharing in the economic expansion stimulated by increased capital spending in 1972. An increase of nearly 5 percent is forecast, with shipments reaching $7.8 billion.

There was a steep growth in additions of heavy equipment—transformers and circuit breakers—in the middle and late sixties, a transition period while regional transmission pools were being established. Slower growth for this equipment is expected during the 1970's, matching a more gradual demand for generating additions. By 1980, annual shipments of transmission, distribution and industrial equipment are expected to exceed $10 billion, growing at an average of 4.2 percent a year from 1972.

Switchgear Advances

In anticipation of continued increases in electric utility construction, shipments of switchgear in 1973 are expected to parallel the 5 percent growth rate of 1972 and total $2.2 billion.

Major products of the switchgear industry provide load switching and short circuit protection. The choice of switchgear to meet the requirements of steadily rising system voltages has stimulated advances in technology and design. The air-blast circuit breaker was the primary device for interrupting very heavy fault currents. A major problem with the airblast breaker is the considerable noise caused during switching because of sudden emissions of compressed air at high velocity. In recent years the airblast breaker has been developed into a closed circuit gas-blast device using sulphur hexafluoride (SF_6) as the extinguishing medium. The inherent capacity of SF_6 is 6 to 8 times that of airblast. Such breakers are silent in operation and provide great compactness, reducing the need for space in some city substations by 80 to 90 percent.

Electrical Transmission, Distribution and Industrial Equipment: Projections 1972–80 [1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
3612	Power, distribution and specialty transformers	1,455	7	1,540	6	2,100	4.7
3613	Switchgear	2,100	5	2,205	5	3,000	4.6
3621	Motors and generators	2,625	4	2,730	4	3,500	3.7
3622	Industrial controls	1,235	5	1,285	4	1,700	4.1

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

Motor and Generator Demand Up

Shipments of the motor and generator industry are expected to total $2.7 billion in 1973, 4 percent over 1972. Shipments will be influenced by increased outlays for new plant and equipment, with primary stimulus coming from rising production of refrigeration and air-conditioning equipment, pumps and compressors, general industrial equipment and appliances.

Exports of electrical motors and generators, at $200 million, outpaced imports by almost 2 to 1 during 1972. Parts and accessories for motors, generators, and generator sets, and control equipment for land transportation motors and generators, were major sales categories. Imports rose above the $100 million level during 1972, advancing 29 percent over 1971 to $105 million. The largest categories of imports were fractional horsepower motors and generator parts. Major supplier countries are Japan, West Germany, Mexico, United Kingdom and Canada, with Japan predominant in 1972 with total motor sales to the United States of over $40 million. Imports of motors and generators are not expected to increase substantially in 1973.

Industrial Controls

Industrial controls industry shipments are expected to reach $1.3 billion in 1973, 4 percent above 1972 levels. This industry produces devices used primarily in industrial applications for the control of motors or other power utilization apparatus. They start, stop, protect, accelerate, decelerate, reverse, and regulate the speed of electric motors, or provide mechanical movement by the use of magnets or solenoids. .

Specific special purpose controllers—such as those used for air-conditioning and machine tool applications—constitute the largest segment of sales, generally accounting for about 25 percent of all industry shipments. Other significant product areas include a.c. full voltage starters of 600 volts or less and pilot circuit devices, each representing 10 percent of shipments.

Exports declined slightly in 1972 to $55 million, with motor control parts and pilot circuit devices the primary export products.—*Richard A. Whitley, Office of Business Research and Analysis.*

POWER, DISTRIBUTION, AND SPECIALTY TRANSFORMERS

Shipments of transformers advanced 7 percent to $1.45 billion in 1972 and are expected to exceed $1.5 billion in 1973, a gain of 6 percent.

Primary demand for power and distribution transformers comes from the expansion and maintenance programs of the electric utility industry.

Substation capacity additions are expected to advance only slightly in 1973, following substantial gains in transformer capability in 1972. A recent survey of electric utilities by "Electrical World" indicated planned installations of 768 transformer banks totaling 115,623 megavolt amperes (MVA) in transmission substations during 1972. This increase in capacity represents a jump from an average of 143 MVA per bank in 1971 installations to 150 MVA in 1972.

Installations of new banks during the 7-year period ending in 1978 are expected to reach 5,043 and average 162 MVA. Planned expansion in transmission substation capacity will include 732 new banks in the extra high voltage ranges of 345, 500 and 765 kv, with an average of 588 MVA each.

Distribution substations, which account for the majority of the 3-phase banks but less than 25 percent of capability, are expected to register only minor gains in capacity in 1973 and even through 1978, following a 14-percent increase in 1972.

Industry Transformer Shipments 1970–72

[In megavolt amperes except as otherwise indicated]

Power rating (kilovolt-amperes)	1970		1971		1972 [1]	
	Units	MVA [2]	Units	MVA [2]	Units	MVA [2]
501 to 10,000	7,961	20,831	6,366	17,675	7,494	19,365
10,000 and above	1,786	140,253	1,881	155,909	1,961	166,108
Total	9,747	161,084	8,247	173,584	9,455	185,473

[1] Total shipped and scheduled for shipment as of July 1, 1972.

[2] Megavolt-amperes.

Source: Edison Electric Institute.

Transformers: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	1, 188	1, 353	1, 393	1, 360	1, 455	7	1, 540	6
Total employment (thousands)	46	47	50	46	46	0		
Production workers (thousands)	34	36	38	34				
Value added	679	743	752	739	NA			
Value added per production worker man-hour	$9. 91	$10. 25	$10. 02	$11. 58	NA			
Product: [3]								
Value of shipments	1, 134	1, 296	1, 389	1, 306	1, 397	7	1, 480	6
Specialty transformers	208	271	287	261	279	7	295	6
Power and distribution transformers	790	886	902	888	950	7	1, 010	6
Power regulators, etc	121	128	175	144	154	7	160	4
Transformers (not specified by kind)	15	11	25	13	14	8	15	7
Value of imports	25	40	40	36	37	3	36	−3
Value of exports	37	36	40	41	45	10	47	4

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the transformer industry (SIC 3612).
[3] Includes value of shipments of transformers made by all industries.

NOTE.—N.A. = not available.
P = preliminary.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Underground distribution systems will continue to influence the type of transformer installations used. Pole-type units will probably account for about 55 percent of all capacity added from 1972 through 1978. Other capacity additions expected during the 7-year period, by type, include single-phase pad-mounted units 18 percent, subsurface types 6 percent, and 3-phase pad-mounted units 21 percent.

1972 Profile

Transformers

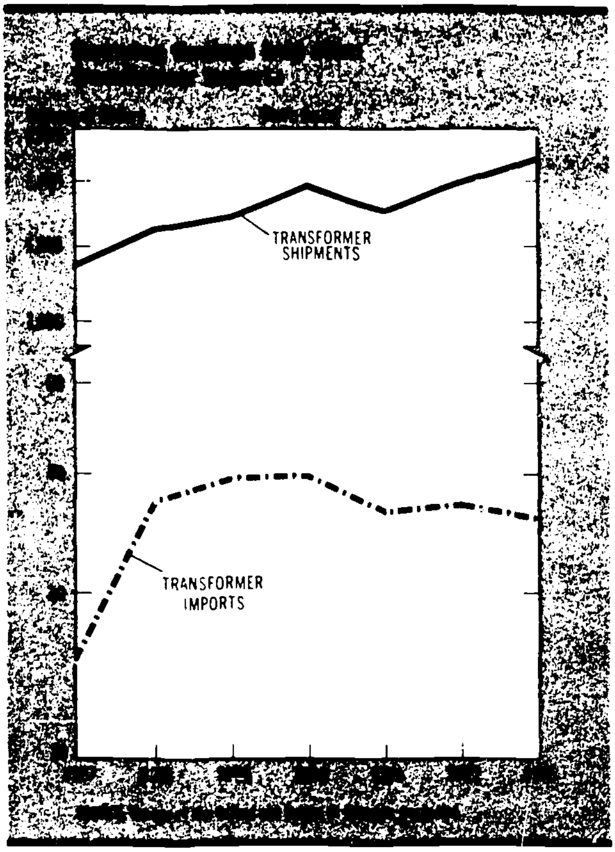
SIC code	3612
Value of industry shipments (million)	$1,455
Number of establishments	205
Total employment (thousands)	46
Exports as a percent of product shipments	3.2
Imports as a percent of apparent consumption	3.6
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars)	4.1
Value of exports (current dollars)	4.0
Value of imports (current dollars)	8.2
Employment	
Major producing areas	Northeast and North Central States

Demand for specialty transformers is primarily influenced by building or commercial construction. Those transformers are used for such applications as signaling, oil and gas furnaces, fluorescent lights, and other ballast applications. Shipments of these transformers are expected to advance 6 percent in 1973.

Dumping Injures U.S. Firms

On January 20, 1972, the Treasury Department notified the Tariff Commission that large power transformers from France, Italy, Japan, Switzerland, and the United Kingdom were being sold at less than fair value. The Treasury Department asserted that dumping margins were as high as 46 percent, and that there had been 28 sales transactions where foreign producers undersold the lowest U.S. bidder by margins ranging from 2.8 to 33.7 percent, based on evaluated bids.

The Tariff Commission's investigation disclosed that market penetration by sales at less than fair value was 7 percent of shipments, on a cumulative basis from 1967 through 1969. The Commission ruled that such a penetration was more than adequate to warrant a determination that the domestic industry was being injured. The injury, the Commission stated, came not from the loss of orders, but from the depressing effect the low prices of the imports had on domestic producers' prices for large power transformers.



Prior to the market penetration by less-than-fair value imports, the industry was receiving a modest return on its sales, according to the Commission's report. The industry was profitable during the period 1965–69 but in 1970 earnings from large power transformer operations declined to just above the breakeven point and in 1971, the industry experienced a 4.5-percent loss on net sales, the Commission noted.

As a result of the Commission's decision, large power transformers from producers in the five European countries will become subject to special dumping duties.

R. & D. Efforts Are Coordinated

An extra high voltage (EHV) network spreading over many hundreds of miles shrinks the electrical distances between various load centers and their generating sources to the equivalent of only a few miles at lower voltages. The practical consequence is that a disturbance at one point of the interconnected network has a much greater effect many hundreds of miles away than in the past. Thus, interconnected networks necessitate greater coordination of planning and operation among individual systems.

Planning new equipment requirements must also be coordinated with research and development efforts of power transformer manufacturers. The U.S. power transformer industry requires very heavy investment in physical plant, basic research and product development. Investment in new generations of equipment must be planned and made many years ahead of market requirements. For power transformers, at least 5 years of R. & D. and field tests are usually required to provide each new generation of EHV equipment.

New R. & D. Hampered by Import Impact

Improvements in transformer insulation systems during the last few years have increased maximum allowable operating temperatures, permitting higher capacities to be attained without a corresponding increase in physical size. Nevertheless, the need for continued increases in transformer capacity requires new approaches to design.

Future efforts by domestic manufacturers in the areas of EHV and UHV equipment may be curtailed. Under section 232 of the Trade Expansion Act of 1962, the General Electric Co. applied on August 7, 1972, for an investigation to determine whether EHV power circuit breakers, power transformers, and shunt reactors are being imported into the United States in such quantities or under such circumstances as to threaten to impair the national security of the United States.

Essentially, the application contends that producers of EHV apparatus who have made heavy financial commitments for research and development have suffered great financial loss because of foreign penetration of the market, and have been forced to limit further product development effort. Future requirements of the utility industry in the advanced technology of EHV and UHV, it was contended, may be served from sources outside the United States unless imports are sold at competitive prices.

Sweden Comes to the United States

A large Swedish electrical equipment manufacturer has joined forces with a U.S. corporation in a joint venture for the manufacture in the United States of Swedish-designed medium capacity power transformers. The company's first transformer was delivered in January 1972. The Swedish manufacturer will supply large-capacity units for the U.S. market from its new wholly owned heavy power transformer plant near Montreal.

Profits Decline in Heavy Power Sector

Profits of manufacturers of power transformers rated 10,001 kilovolt amperes and above have declined during the last several years. Special survey data presented to the Tariff Commission by the National Electrical Manufacturers Association at the recent antidumping hearings indicated that net income before taxes of these manufacturers in 1965 of $6.6 million represented 5 percent of net sales. By 1968, net income had increased to $30.1 million and 12.5 percent of net sales.

Since then profits have been eroded. Net income declined to $19.6 million and $9.6 million during 1969 and 1970 respectively. In 1971 these manufacturers registered a $1.9 million loss, largely reflecting the depressing effect of imports on the price level of the entire U.S. market for large power transformers.

Prices of U.S. power transformers rose approximately 12.5 percent from 1965 to 1968. In 1969, prices declined 10 percent from a year earlier and remained at those levels throughout the 1969–71 period. In 1972 prices rose slightly, and a more favorable profit picture is projected for 1973.

Growth to 1980

Continuing growth of the Nation's total transmission capability, and a favorable outlook for building and construction, are expected to spur transformer shipments to a record $2.1 billion in 1980, reflecting a 4.7-percent annual gain. Capacity of power transformers in service in 1972 was approximately 1,280 gigavolt amperes (GVA). It is expected to rise to 1,416 GVA in 1973, and by 1980 should reach 2,511 GVA.

Although the dumping and injury decisions in 1972 should impede imports temporarily, those decisions are not expected to have a lasting effect. Imports are expected to total $45 million by 1980.—*Richard A. Whitley, Office of Business Research and Analysis.*

CHAPTER 26

Lighting and Wiring Equipment

Shipments of electric lighting and wiring equipment industries increased 11 percent in 1972 over 1971 levels. Supported by favorable prospects for construction activity, lighting and wiring equipment shipments are expected to total $5.8 billion in 1973, up from 1972's level of $5.4 billion.

Electric lamp (bulb) shipments should reach $1.1 billion in 1973 with large incandescent and high-intensity discharge lamps leading the way to greater sales gains. Imports of lamps are expected to soar to a record $71 million in1973, compared with $59 million in 1972.

Lighting fixture shipments will continue to be the predominant influence on the overall total of the group with a substantial advance of 14 percent in 1972 over 1971 and a further rise to $2.6 billion in 1973.

Shipments of wiring devices are also expected to register gains in 1973 but at a slightly lower rate than in 1972. Current-carrying wiring devices, principally for interior electrical construction, include such items as switches, attachment plugs, receptacles, lampholders, and fluorescent starters. Such devices represent approximately one-half of 1 percent of all materials and equipment used in single-family housing construction. These items further represent $2.32 of material per $1,000 of construction price and $3.69 per 100 square feet of livable space. Shipments of current-carrying devices should reach $1.1 billion in 1973, 7 percent higher than 1972 shipments. Value added per production worker man-hour increased from $8.44 in 1967 to $10.64 in 1971, an average of 6 percent per year.

Noncurrent-carrying wiring devices are used in conjunction with the installation and operation of the current-carrying products. Switch and outlet plates are probably the most common types, while others include rigid conduit, stamped metal boxes and covers, and pole-line hardware. Products of this industry used in single-family housing construction represent 0.40 percent of total materials and equipment and account for $1.77 per $1,000 of construction price and $2.82 per 100 square feet of livable space. Noncurrent-carrying wiring device industry shipments are expected to increase

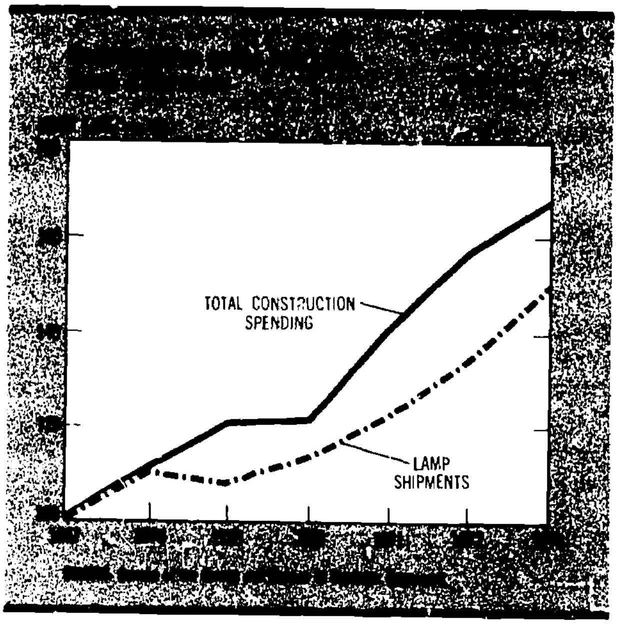
Lighting and Wiring Equipment: Projections 1972–80 [1]

[Value of shipments in millions of dollars except as noted]

SIC code, industry	1972	Percent increase 1971–72	1973	Percent increase 1972–3	1980	Percente increas 1972–80[2]
3641, electric lamps (bulbs)	1, 051	9	1, 135	8	1, 834	7 .2
3642, electric lighting fixtures	2, 400	14	2, 590	8	2, 710	8 .8
3643, current-carrying wiring devices	1, 060	7	1, 130	7	2, 110	9 .0
3644, noncurrent-carrying wiring devices	865	9	930	8	1, 560	7 .6

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.



from $865 million in 1972 to $930 million in 1973. While shipments of these devices will be stimulated by general construction activity, demand for the pole-line hardware type materials will be influenced by transmission and distribution line requirements of the electric utilities.—*Richard A. Whitley, Office of Business Research and Analysis.*

ELECTRIC LAMPS (BULBS)

Stimulated by the strong upward trend in total new construction activity, particularly residential housing, and continued expansion in the national economy, manufacturers' shipments of electric lamps (bulbs) in 1973 are expected to total over $1 billion, up 8 percent over 1972 sales of $900 million. Increased sales for all types of lamps are expected in 1973.

In 1972, sales of incandescent and electric discharge lamps, primarily used for lighting purposes, are estimated at $668 million, up 11 percent over 1971 sales of $613 million; while sales of the specialty type lamps—photographic, miniature incandescent, and Christmas tree lamps—amounted to $322 million, up 9 percent over 1971 sales of $295 million.

The proportion of total lamp sales represented by the five groups of lamp bulbs and tubes in 1971 is: large incandescent, 38 percent; electric discharge, 30 percent; miniature incandescent, 16 percent; photographic incandescent, 14 percent; and Christmas tree lamps, 2 percent. Between 1967–71, the large incandescent electric discharge lamps made the greatest sales gains. After increasing substantially in 1968, photographic lamp sales have since declined, returning to 1967 levels in 1971. Lower sales are attributed to the introduction of photoflash cubes and new features on cameras.

Foreign Trade Brisk

Imports of electric lamps were expected to reach a record level of $59 million in 1972, up 40 percent over 1971, and to climb to $71 million in 1973. Major import items were filament lamps. Christ-

Electric Lamps: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	782	843	892	964	1,051	9	1,135	8
Total employment (thousands)	30	32	33	35	35	0		
Production workers (thousands)	26	28	28	31	31	0		
Value added	533	550	591	651	NA			
Value added per production worker man-hour	$10.69	$10.76	$11.22	$12.89	NA			
Product: [3]								
Value of shipments	743	816	836	908	990	9	1,069	8
Value of imports	23	26	35	42	59	40	71	20
Value of exports	33	33	40	39	43	10	47	9
Wholesale price indexes (1967=100)	100	101	104	113	117	4		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the electric lamp industry (SIC 3641).
[3] Includes value of shipments of electric lamps (bulbs) made by all industries.

[P] Preliminary.

NOTE.—NA=Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

mas tree lamps and electric discharge lamps. Japan, Canada, Taiwan, West Germany and the Netherlands are the major suppliers to the U.S. market.

Lamp exports in 1972 totaled $43 million, up 10 percent over 1971. Part of the increase reflects a more favorable competitive position as a result of the U.S. dollar devaluation and revaluation of foreign currencies.

While the deficit in lamps in 1972 was approximately $16 million, our exports are no indication of the importance of the U.S. lamp industry in foreign markets. A number of U.S. producers have plants overseas as well as licensing agreements with foreign lamp companies.

Relamping New Technique

A leading chain store increased its profitability and provides better lighting levels through group relamping. Comparisons based on their in-store labor costs of spot relamping proved that group relamping significantly reduced labor costs per fixture while maintaining the rated light level of the fluorescent lamps. The approximate frequency of spot relamping is 5 years while group relamping takes place at about 70 percent of the lamp-life, or between 1⅓ and 1½ times in a 5-year period. Spot relamping labor costs are 80 cents per fixture, while group relamping labor costs are 17 cents per fixture, thus a saving of 63 cents per fixture.

High-Mast Lighting Used in Shopping Centers

Installation of high-mast lighting systems has moved from highway interchanges to off-street parking in commercial areas. Utilizing mercury arc discharge lamps, this system provides average illumination of three-foot-candle power, virtually shadow free, with a minimum 1.5 foot-candle power. The luminaires on each pole have overlapping light patterns. In the event one lamp burns out, the light level reduces proportionately, leaving no areas in shadow. This lighting system minimizes installation and operating costs, while reducing "pole clutter" and making available additional space for parking.

Artificial Outgrows Natural Light

Hot-house farmers report use of metal-halide lamps in greenhouses to shorten growing time, thereby reducing production costs while increasing crop production. The lamps make it possible to produce tomato seedlings for resale to commercial growers in 7 weeks, compared with sunlit grown seedlings requiring 10 to 11 weeks to reach the transplant growth stage. Year-round growing under metal-halide lamps might yield about 2½ crops more per year than natural light.

Natural Gas Cell Produces Electricity

An innovation in transforming natural gas to electric power has been developed by a midwest gas utility firm. This natural gas fuel cell produces up to 12.5 kilowatts, enough electricity to power the average single family house. The system, which has few moving parts and is described as virtually non-polluting, produces electricity electrochemically by combining natural gas with oxygen in the air. Reportedly it has the lowest pollution index for any power generation source, emitting an exhaust consisting of air, carbon dioxide and water. Thermal and noise pollution also are at a low level. A nationwide field testing program is currently underway to determine whether commercial production would be feasible.

Electricity Usage, Cost Increase

The national average monthly bill for 500 kilowatt-hours (kw.-hrs.) in 1970 for residential consumers was $11.13, or 2.23 cents per kw.-hr. This represented a 6 percent increase over 1969 of $10.51, or 2.10 cents per kw.-hr.

Typical electric bills for all residential usage categories rose in 1970 for the 100–1,000 kw.-hrs. levels with residential consumption averaging

1972 Profile

Electric Lamps (Bulbs)

SIC Code	3641
Value of industry shipments (millions).	$1,051
Number of establishments	106
Total employment (thousands).	35
Exports as a percent of product shipments.	4.3
Imports as a percent of apparent consumption.	5.9
Compound annual average rate of growth 1967–72 (percent):	
Value of product shipments (current dollars).	5.9
Value of exports (current dollars).	6.0
Value of imports (current dollars).	20.0
Employment	3.1
Major producing areas	Middle Atlantic, New England East North-Central

6,367 kw.-hrs., up 7 percent from 5,943 in 1969 and 45 percent above 1965. Typical consumption ranged from a low of 2,517 kw.-hrs. in the Bronx, New York to a high of 20,215 kw.-hrs. in Chattanooga, Tennessee. Washington State electric bills averaged the lowest with $6.08 for 500 kw.-hrs. and $9.69 for 1,000. Alaska had the highest with an average bill of $15.00 for 500 kw.-hrs. and $24.89 for 1,000.

For commercial users, the national average monthly bill was $253 for 10,000 kw.-hrs. in 1970, compared with $239 in 1969; for industrial users, the average bill was $3,774 for 200,000 kw.-hrs. in 1970, compared with $3,492 in 1969.

$1.7 Billion by 1980

Shipments of electric lamps are expected to increase from 1972 at an average annual rate of 7 percent, exceeding $1.7 billion in value in 1980. Continued high levels of construction of new homes, factories, office buildings, hospitals, nursing homes, shopping centers—all requiring the latest in lighting—will be a major stimulus for lamp sales.—*Philip J. Schneider, Office of Business Research and Analysis.*

LIGHTING FIXTURES

Shipments of the lighting fixture industry should reach approximately $2.6 billion in 1973, primarily because of continued growth in construction and modernization activity. However, the anticipated 8 percent advance in shipments will be slightly more than half the gain of 1972, when the greatest increase in sales occurred in commercial and institutional type fixtures. Vehicular lighting equipment shipments were favorably influenced by a strong market for motor vehicles.

The construction and automotive industries are the primary customers of the lighting fixture industry. The industry's input is derived from five areas: plastic products, glass products, basic steel products, transformers, and wiring devices. Wholesaling services are an equally large cost factor to the industry.

Heat-By-Light Trend Accelerates

As typical minimum lighting levels have steadily increased during recent years, handling the heat gain by conventional means has become a tremendous challenge. An integrated system of lighting, heating and air-conditioning now utilizes free heat from high-intensity lamp-luminaires, automatically mixes warm and cool air for comfort conditioning and, if needed, transports the remaining heat to offset heat losses through the building perimeter. Although these intergrated systems do not eliminate the need for air-conditioning systems, the size of the central air-handling system and associated ductwork are considerably reduced. One manufacturer contends that his fixture concept can save up to 50 cents per square foot

Lighting Fixtures: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [p]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	1, 594	1, 987	1, 976	2, 112	2, 400	14	2, 590	8
Total employment (thousands)	65	72	68	68	69	1		
Production workers (thousands)	50	55	52	52	53	2		
Value added	829	1, 029	1, 049	1, 111	NA			
Value added per production worker man-hour	$8. 39	$9. 48	$1, 049	$11. 19	NA			
Product: [3]								
Value of shipments, total	1, 512	1, 773	1, 784	1, 996	2, 270	14	2, 460	8
Value of imports	30. 4	40. 7	43. 9	48. 7	56. 0	15	59. 0	5
Value of exports	26. 7	29. 1	28. 0	29. 2	33. 0	13	34. 5	5

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the lighting fixture industry (SIC 3642).
[3] Includes value of shipments of lighting fixtures made by all industries.

[p] Preliminary.

NOTE.—NA = Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

in such central-station air-conditioning equipment as compressors, motors, and fans, and 20 to 30 percent in annual mechanical system operating costs.

An acceleration in shipments of air-handling fixtures is anticipated in 1973. A vigorous 43 percent increase in shipments of air-handling recessed fluorescent fixtures in 1970 over 1969 was indicative of the advance in total electric space conditioning. Shipments of air-handling troffers amounted to $22 million in 1967, increased to $26 million by 1969, and totaled $38 million in 1970 with 30 companies having shipments of $100,000 or more. Recessed nonair-handling troffers had a less spectacular advance, increasing from $94 million to $98 million from 1969 to 1970.

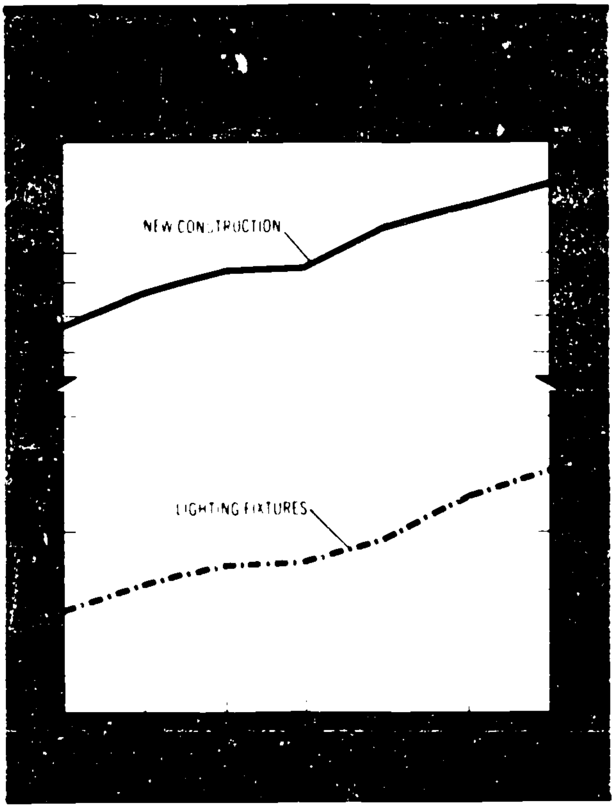
Some Lights May Dim

There has been increasing concern that most modern buildings utilize excessive lighting levels and that lower lighting levels could appreciably alleviate the Nation's growing shortage of electric power. Local government authorities in New York are considering cuts in required lighting levels in office buildings as well as a ceiling on permissible lighting. One environmental group in Wisconsin has petitioned to repeal codes that specify illumination levels in office buildings.

Strobe-Type Obstruction Lighting Rises

High-intensity strobe beacons are gaining in acceptance among electric utilities. Because of a

1972 Profile Lighting Fixture Industry	
SIC Code	3642
Value of industry shipments (millions).	$2,400
Number of establishments	1,300
Total employment (thousands).	69
Exports as a percent of product shipments.	1.0
Imports as a percent of apparent consumption.	2.0
Compound annual average rate of growth 1967-72 (percent):	
Value of shipments (current dollars).	9.0
Value of exports (current dollars)	4.0
Value of imports (current dollars).	13.0
Employment	1.0
Major producing areas	Illinois, New Jersey, New York, Ohio, and Pennsylvania.



new Federal Aviation Administration code for aircraft obstruction lighting, demand is growing for strobe warning systems. These xenon gas-filled flash tubes provide an extremely effective day/night means for warning aircraft pilots of the presence of high utility stacks and transmission towers. Over the past few years, FAA concern regarding navigational-hazard warning systems has increased since utilities have gone to taller and taller stacks in their efforts to control air-pollution.

One utility company is reported to have saved $23,000 by the installation of a strobe warning system on a new stack by not having to paint the stack with alternate orange and white stripes or to install red warning lights as previously required by the old FAA obstruction code. Striping of stacks has induced complaints of being asethetically objectionable.

Safety and Health Standards Stir Interest

Occupational safety and health standards which became effective in 1971 have generated a great deal of interest among many lighting fixture manufacturers. While the standards make reference to lighting levels, emergency lighting, et cetera, manufacturers contend that it is still too early to determine the actual impact of the standards. Some producers, however, foresee a favorable impact on future shipments.

Mergers and Acquisitions Slacken

Mergers and acquisitions continued through 1972, but at a reduced rate. Financial pressures have continued on small and medium-sized companies over the last several years. Larger firms are better able to provide styling, technology, economies of scale, and lower pricing.

The work force is primarily unskilled and semiskilled; approximately a third of the employees are women. Estimated production worker employment in 1972 was 1 percent above the 1971 level. Higher production projected for 1973 is expected to require only a slight addition to employment.

Imports Continue Rapid Advance

During the period 1967–72, exports of lighting fixtures continously trailed imports, advancing at an annual rate of 4 percent while imports surged ahead at a rate of 13 percent per annum. However, exports rose 13 percent in 1972, reaching $33 million. A smaller gain is expected in 1973 to approximately $35 million, up 5 percent over 1972.

Imports of lighting fixtures reached record levels in 1972, registering a 15 percent gain over 1971. Total imports were valued at $56 million as compared with $49 million a year earlier. Substantial increases occurred in virtually all categories with imports of brass fixtures for indoor installation increasing about 50 percent over 1971. Spain and Italy continue to be the chief exporters of indoor fixtures to the United States, underscoring today's trend in the U.S. home-furnishing market toward Mediterranean-styled decor. Imports are expected to rise further in 1973 and total approximately $59 million.

Prospects for 1980 Appear Bright

The advance in lighting fixtures shipments is expected to continue and reach $4.7 billion in 1980, an average annual increase from 1972 of almost 9 percent or about equal to the rate of growth for the 1967–72 period. Construction and modernization activities will continue to stimulate increased shipments in the years ahead. High-intensity discharge lamp-luminaires and environmental ceiling systems are expected to increase in usage throughout the seventies.—*Richard A. Whitley, Office of Business Research and Analysis.*

CHAPTER 27

Pollution Abatement Equipment

In 1972, American business investment in air and water pollution abatement equipment increased over 50 percent to an estimated $4.9 billion—$2.9 billion for air quality improvement and $2 billion for water quality improvement. Spending on air pollution abatement facilities increased almost 60 percent, while spending to bring water treatment facilities up to present standards increased over 40 percent. In addition, spending rose for pollution abatement efforts in the automobile industry, for solid waste disposal devices, and for municipal sewerage and incinerators.

Spending in both public and private sectors is expected to rise further in 1973, assisted by Federal funds to be provided under the Clean Waters Act enacted in October 1972. Expenditures for 1973 air and water pollution abatement are expected to exceed $5.9 billion, 20 percent over 1972 levels.

Pollution abatement equipment is being produced by manufacturers of a wide variety of product lines and by engineering firms. They all seek to meet a growing but not fully defined national need. Some manufacturers sell over-the-counter items, but most sales are of custom-designed equipment or equipment systems. Most abatement devices are created in response to developing needs, using the best current technology can produce. A diversity of problems awaits solution.

Profile of Processing Companies in Secondary Materials Industry

Processing specialty	Average investment in plant and equipment	Average number of employees
Nonferrous scrap metal processor	$844, 000	44
Paper stock processor	783, 000	43
Textile processor	695, 000	97
Recycled metals utilizers (smelters, refiners, ingot makers)	3, 134, 000	91

Source: National Association of Secondary Material Industries.

There is no definable pollution control industry. Many industries are manufacturing products adaptable to problems involving air, water, and solid waste pollution. The variety of regulations setting limitations for emissions and discharges largely determines demand for different types of equipment.

With growing markets for pollution abatement equipment, the Council on Environmental Quality (CEQ) estimates that $287 billion needs to be spent in this decade to clean up the environment. Of this, a third will go into new capital equipment and the remainder into operating costs.

U.S. Aids Air Quality Improvement

The Environmental Protection Agency (EPA) allocated almost $160 million for air quality improvement from mid-1972 to mid-1973. A portion of those funds will be used to supplement State, local, and industry efforts to improve air quality. State and local spending is expected to total about $116 million during the same period. Industry spending on necessary equipment to comply with pollution abatement legislation will account for most of the $2.9-billion effort to improve the quality of air in 1973.

Equipment Removes Air Pollutants

Equipment designed to eliminate two major pollutants in the air—particulates and noxious gases—reflects progress in the pollution abatement program.

Particulates appear in solid and liquid forms ranging from smoke and fumes to mists and sprays that impair visibility and create dense haze or smog. Air pollutants are hazardous to human health and can destroy crops in farmlands. Particulates are suspended in the air by automobile exhausts, agricultural operations, and industrial stacks.

Four types of equipment effectively remove particulates. They are mechanical cyclonic collectors, electrostatic precipitators, wet scrubbers, and fabric filters, all designed differently to solve the same pollution problem.

Gases are more expensive and more difficult to control than particulates. Absorption or combustion equipment is generally used in efforts to reduce gas levels. Sulfur dioxide, a major gaseous pollutant, is produced by the combustion of fossil fuels. It is especially prevalent near such stationary sources as conventionally fired powerplants. Reliable and economic equipment for the control of sulfur dioxide has not yet been developed. Research efforts to develop improved equipment for control of gases reflect the continuing and developing technology of abatement.

Industry Spending for Clean Air Up Sharply

Industry efforts to combat air pollution accounted for three-fifths of total pollution spending in 1972. The nonelectrical machinery, mining, and nonferrous metals industries are the three major spenders for capital equipment to reduce pollution. Producers of automobiles and trucks, commercial business, petroleum, fabricated metals, railroads, and electrical machinery will also invest in pollution abatement equipment. Projected expenditures for the entire air pollution abatement effort will be about $3.5 billion in 1973.

Industry Expenditures on Particulate Emissions Control

[In thousands of dollars]

	1972	1973
Primary equipment (electrostatic precipitators, fabric filters, wet scrubbers, mechanical collectors)	$290.6	$343.2
Ancillary equipment (pumps, piping, valves, fittings, fans)	148.2	175.0
Construction	186.0	219.6
Engineering	46.5	54.9
Total	671.3	792.7

Source: Bureau of Domestic Commerce.

Use of Industrial Cooling Water and Spending on Thermal and other Water Pollution Control

Industry	Percent of total cooling water use	Water pollution control spending (millions of dollars)
Electric power	81.3	385
Primary metals	6.8	114
Chemicals	6.2	219
Petroleum	2.4	297
Paper	1.2	252
Food	0.8	84
Other	1.3	NA
Total	100.0	1,351

Source: Council on Environmental Quality, McGraw-Hill.

Note.—NA = not available.

Water Quality Improvement Starts

Improvement in the quality of water resources requires equipment for treatment of industrial waste water, agricultural runoff, municipal water treatment plants and thermal pollution. Each of these sources of water pollution has its own characteristics.

It is hoped that effective technology will emerge to improve water quality. Contributing to limit progress in coping with water pollution problems are the large variety of water pollutants, lack of uniform national standards of water quality, the many uses of water, lack of knowledge to deal with certain chemical and biological reactions, and lack of sophisticated instruments for measuring water quality.

In October 1972, Congress enacted legislation requiring industrial and municipal compliance with clean water standards in two phases to be spread over 11 years. By July 1, 1977, all industries discharging into U.S. waters must use the "best practicable" treatment technology and by July 1, 1983, "the best available" technology must be installed. July 1, 1977 is the deadline for cities to install secondary sewage treatment facilities. The national goal for complete elimination of all discharges into navigable waters is 1985.

Under the Act, Federal assistance in the form of Federal grants will help States and cities begin new construction and refurbish old sewage and waste water treatment facilities. Waste water treatment generally requires a systems approach, involving custom-made equipment. Expenditures for water pollution control equipment in 1973 will probably reach $2.4 billion, about 20 percent more than in 1972.

Thermal Pollution

Nuclear powerplants are usually associated with thermal pollution, since light-water reactors discharge more heat per unit of electrical energy into a body of water used for cooling purposes than a conventionally fired powerplant. Breeder reactors are expected to alleviate this problem in the future.

The cooling tower, used to lower the temperature of discharge water and reduce thermal pollution, may affect the local climate when operating on an open cycle, according to recent research. Electric powerplants are the largest users of cooling water, accounting for 80 percent of consumption last year. The primary metals and chemicals industries are the next largest cooling water users, together accounting for 13 percent of consumption. Spending on systems to cool and purify water by those industry groups and the petroleum, paper, and food industries topped $1.35 billion last year.

Solid Waste Management Grows

The disposal of abandoned autos, aluminum cans, glass and newsprint, and the abundance of "disposable" consumer products, has created serious pollution problems. In addition, industrial solid wastes abound. Technological advances in both recycling and conserving salvageable parts of waste show promise of coping with the solid waste disposal problems.

New management systems and services include mobile and stationary compactors, roll-off trucks and containers, blowers to dispel odors, waste storage bins, centrifugal separators to separate and dump solids in liquid effluents, dryers, equipment for retrieving particulate matter from liquid and gaseous effluents, and many others. Related management systems of dumps, landfills, and compost sites are also still important in disposing of solid wastes.

Recycling Converts Waste to Productive Use

Advanced recycling techniques may serve to provide substitute raw materials needed for manufacturing. Economic efficiency is expected to improve as automation and centralization of solid waste disposal evolve. By providing long-term contracts to municipalities for the disposal of recoverable wastes and with the development of joint efforts of industry and municipalities to fund further research and development, new techniques may evolve. Currently, firms which recycle solid waste materials into raw materials include some that manufacture products made from recycled resources, others that recover and process waste materials, and still others that refine and convert waste materials into raw material elements. Solid waste processors operate at an estimated annual level of $8 billion in sales. They are mostly small businesses that collect, process, and convert reclaimed resources.

Outlays for plant and equipment by users of recycled metals are more than double the overall company average of major recyclers and are expected to increase further; together with nonferrous scrap metal processors, those businesses constitute a significant share of the secondary materials industry. By 1980, the Council on Environmental Quality estimates capital investment in solid waste antipollution equipment will reach $300 million.

Solid waste management is growing. With rising awareness, concern, and investment, it should become a profitable part of the total pollution abatement effort.—*Michael Willingham, Office of Business Research and Analysis.*

CHAPTER 28

Instruments For Measurement, Analysis And Control

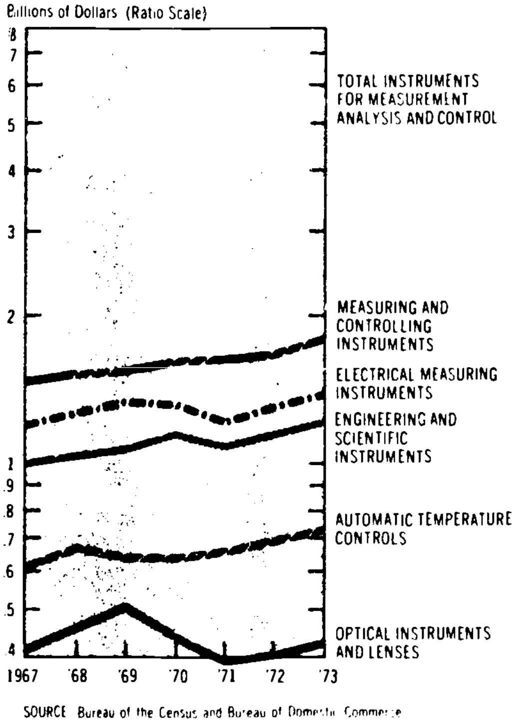
Gaining impetus from advancing technology, shipments of measuring and control instruments continue their steady growth. Despite uneven market conditions, the combined value of industry shipments is expected to reach $5.5 billion in 1973 for an overall 6 percent gain over 1972. All sectors of the industry are expected to participate in the uptrend. A high proportion of business investment is being used for equipment rather than plant facilities and the emphasis on equipment spending is also expected to sustain the high level of measuring and control instrument shipments.

New designs and techniques must be developed to keep pace with the more stringent and complex measurement needs of our technically-oriented society. For example, accuracy is implied in practically every measurement activity related to pollution monitoring and control. It is not enough to know that a river is polluted, but the nature and degree of contamination needs to be established. Analyses of effluents are necessary to ensure that pollution control laws are being observed. With accurate measurements, a real assessment of the environment can be made and harmful sources located. Need for instrumentation in pollution monitoring and control in addition to the needs of other new programs and production processes add to the industry potential.

New Universal Design

A major industrywide development is the proliferation of a broad variety of designs and applications for digital panel meters (DPM's). Adaptability of the DPM's has nurtured this development, and their use as systems components is becoming increasingly important in measurement and control applications. The DPM is a high performance instrument that currently carries a larger price tag than its analog equivalent, but the disadvantage of higher cost is offset by several advantages. The DPM offers better accuracy, resolution and readability, and is compatible with digital computing, control, recording and telemetering

Instrument shipments rebounding



SOURCE Bureau of the Census and Bureau of Domestic Commerce

Instruments for Measurement, Analysis and Control: Projections 1972-80 [1]

[Value of shipments in millions of dollars except as noted]

SIC code, industry	1972	Percent increase 1971-72	1973	Percent increase 1972-73	1980	Percent increase 1972-80 [2]
Total	5, 255	5	5, 545	6	8, 160	5. 7
3611, electrical measuring instruments	1, 300	5	1, 370	5	2, 100	6. 2
3811, engineering and scientific instruments	1, 150	5	1, 215	6	1, 800	5. 8
3821, measuring and controlling instruments	1, 700	5	1, 800	6	2, 550	5. 2
3822, automatic temperature controls	700	6	735	5	1, 070	5. 4
3831, optical instruments and lenses	405	5	425	5	640	5. 9

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

systems. Digitation is providing impetus to the development of a variety of digital test instruments and to the employment of the cathode ray tube (CRT) for control display of monitored networks and processes.

Global Activities

Foreign markets are of major significance to U.S. manufacturers of measuring and control instruments. In the 22 industrialized countries surveyed by the Department of Commerce, the market totaled nearly $3.7 billion in 1971, and is expected to approximate $5.9 million by 1975. Current U.S. exports of approximately $900 million represent 17 percent of the $5.3 billion produced in 1972. Appreciable numbers of instrument manufacturers have established subsidiary plants and joint ventures in foreign countries; revenues from these foreign operations exceed 40 percent of total sales of some instrument manufacturers.

The global market is being cultivated through participation by instrument manufacturers in major overseas industrial exhibitions and through cooperative industry-Government promotions at Government trade centers, with at least 5 such shows scheduled for 1973. To realize greatest benefits from export activities, many instrument manufacturers have formed domestic international sales corporations (DISC) through which export activities are handled.

Effectively maintaining a favorable trade balance in spite of depressed market conditions in some overseas markets, exports of measuring instruments and parts are estimated at $953 million for 1972, a $50 million or 6 percent increase over 1971. Imports for 1972 are expected to remain

1972 Profile

Instruments for Measurement, Analysis and Control

	SIC Codes 3611	3811	3821	3822	3831
Value of industry shipments (millions)	$1, 300	$1, 150	$1, 700	$700	$405
Number of establishments	546	677	661	105	303
Employment (thousands)	64	64	62	38	16
Exports as a percent of industry shipments	19. 2	15. 2	25. 4	4. 2	16. 2
Import as a percent of apparent consumption	6. 6	3. 5	4. 1	NA	17. 1
Compound annual average rate of growth 1967-72 (percent):					
Value of industry shipments (current dollars)	1. 9	2. 8	3. 2	2. 5	−0. 2
Value of exports (current dollars)	11. 8	8. 5	47. 9	3. 8	14. 2
Value of imports (current dollars)	8. 5	−0. 6	23. 5	NA	4. 9
Employment	−1. 7	−5. 7	−1. 3	−1. 0	−3. 7

NOTE.—NA = Not available.

Electrical Measuring Instruments: Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Industry: [2]								
Value of shipments	1,184	1,330	1,310	1,240	1,300	5	1,370	5
Total employment (thousands)	68	74	71	63	64	2		
Production workers (thousands)	46	46	44	39	42	8		
Women employees (thousands)	29	30	30	26	27	4		
Average weekly earnings	$106.53	$119.03	$121.52	$129.35	$141.86	10		
Average hourly earnings	$2.65	$2.95	$3.10	$3.25	$3.41	5		
Value added	800	896	886	823				
Value added per production worker man-hour	$10.16	$12.11	$12.50	$13.54				
Product: [3]								
Value of shipments	1,165	1,317	1,256	1,190	1,245	5	1,310	5
Value of imports	43	58	79	64	75	10		
Value of exports	166	242	265	226	250	10		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the electrical measuring instruments industry. (SIC 3611).
[3] Includes value of shipments of electrical measuring instruments made by all industries.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

constant at $236 million, for a net trade balance exceeding $700 million.

Propitious Future Prospects

Instruments measure the progress of knowledge and maintain the pace of scientific research. There is a continuing demand for new instruments and refinements of existing designs to satisfy the requirements of new disciplines and emerging programs. Fulfillment of these needs presages an auspicious future for the measurement and control instrument industry. The steady increase in the value of U.S. production is expected to contine at an annual average rate of 5.7 percent from 1972 with industry shipments attaining close to $8.2 billion by 1980.—*Ernest A. Capelle, Office of Business Research and Analysis.*

ELECTRICAL MEASURING INSTRUMENTS

Sales of electrical measuring instruments are expected to reach $1.37 billion in 1973, a 5 percent increase over 1972. Industry gains will result from increased demand for automation to increase productivity; advancement of systems and devices for pollution abatement; and upgrading of existing systems to satisfy requirements for computerized industrial processes and to conform to established standards.

Shipments of testing, measuring and analyzing instruments are expected to show a gain of over 5 percent to $880 million in 1973, compared with an estimated $825 million in 1972. This group of instruments is employed in production of radio and television communications equipment, electrical systems and equipment, and internal combustion engines, as well as in the maintenance and repair of the systems, equipment, and engines.

Sales of electrical integrating instruments used for measuring and indicating energy consumption are expected to increase commensurate with increases in construction of residential, commercial, and industrial buildings as well as industrial processing of manufacturing.

Instrumentation rental blossomed in the past few years and promises to continue growing into the late 1970's. In 1972, gross revenues of instrument rental companies are estimated at around $50 million. Predictions are that the rapidly growing business will account for up to 15 percent of the electrical test and measuring instrument market by the mid 1970's.

The instrument rental trend benefits instrument makers as well as rental firms. Besides promoting instrument use, much of the rental business provides additional revenue, since short-term users in today's market would probably not buy expensive instruments. Renting an instrument requires a smaller cash outlay than purchasing an instrument for short-term use. Increasingly, many firms will probably attempt to trim expenditures via the rentals route, freeing funds for more pressing purposes.

Several manufacturers now rent out their instruments through representatives employed directly by the company. The biggest liability in the rental business, however, is in educating potential customers on the use of instruments.

MOS Industry Needs Tester

The semiconductor industry is confronted with a new challenge—to develop an effective metal oxide semiconductor (MOS) tester to perform at a reasonable price. MOS manufacturers need an instrument to guarantee the integrity of their production process as well as the product's performance in accordance with the user's specifications. Since testers in general use are not designed to perform the type of tests and stress required of complex components, the speed of testers is not conducive to quality control.

Apparently, tester manufacturers currently extend systems already in production by adding to existing testers. Instead of the more expensive products for high volume production testing available from test equipment manufacturers, what is needed is a reliable tester to meet universal requirements, including those for MOS testing.

Users Demand Simplification

Emphasis has shifted from new product development to improving and simplifying existing test and measuring instruments. The trend toward simplification and ease of operation is geared to two very different markets—the service-oriented group of users as well as the large industrial market and skilled professional engineers.

Service-oriented groups and industrial markets demand greater simplicity because of the lower skill level of operators. The final goal of the drive toward simplicity is to eliminate error by semiskilled operators which, of course, is also the purpose of complex automatic testing devices. In the case of highly paid and highly skilled engineers, more simplified instruments would require less of their valuable time coping with complex test and measuring instrumentation.

Since modification or addition of features increase the costs of their instrument, manufacturers expect a return of these added costs if they include new features. Determining what service-oriented groups and skilled professional engineers require and how much they are willing to pay is a problem every manufacturer must face.

Employment and Wages Rise

Total employment in the electrical measuring instrument industry rose slightly from almost 63,000 in 1971 to nearly 64,000 in 1972, while the average number of production workers increased nearly 8 percent from almost 39,000 to 42,000 over the same period. Large reductions in the industry's work force occurred between 1969 and 1971 when total employment dropped by more than 10,000, an average of nearly 8 percent each year. Production workers' separation rates averaged about 2.5 percent a year, and women employees declined by about 7.5 percent a year. Women account for more than 40 percent of all industry employment.

During the past year, average weekly earnings increased from $129.35 to $141.36, and the average hourly wages rose from $3.25 to $3.41. Increases in weekly and hourly wages have averaged about 6 percent a year since 1967.

Trade Balance Favors United States

U.S. trade in electrical measuring instruments changed significantly between 1970 and 1971. Until then, the value of exports was four times imports. This proportion decreased when exports declined from $265 million in 1970 to $226 million in 1971, a loss of almost 15 percent. Imports dropped by more than 13 percent, from $79 million in 1970 to more than $64 million in 1971. Partially responsible for the drop in growth of exports is the expansion of overseas facilities by U.S. manufacturers through direct investments, joint ventures, or licensing agreements. A third of exports consists of parts and components intended for assembly in foreign-based plants.

Imports, which amount to less than 5 percent of industry shipments and have averaged an increase of about 11 percent a year since 1967, consist largely of electrical measuring instruments and parts.

Gains of 10 and 11 percent are estimated for both exports and imports in 1972 with the lower 3:1 ratio of exports over imports maintained and expected to continue at this pace into 1973.

Growth to Continue

The rate of growth of the past 5 years should continue through the 1970's and into 1980. New products, technological improvements of consumer products, and further sophistication of

Engineering and Scientific Instruments: Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Industry: [2]								
Value of shipments	1,001	1,055	1,151	1,094 [p]	1,150	5	1,215	6
Total employment (thousands)	86	76	68	63	64	2		
Production workers (thousands)	46	37	33	30	32	7		
Women employees (thousands)	22	20	17	15	16	7		
Average weekly earnings	$137.92	$149.62	$151.13	$162.80	$178.06			
Average hourly earnings	$3.20	$3.54	$3.75	$4.07	$4.27			
Value added	617	661	725	680				
Value added per production worker man-hour	$9.65	$11.36	$11.95	$13.15				
Product: [3]								
Value of shipments	1,049	1,115	1,176	1,120	1,175	5	1,245	6
Value of imports	24	33	34	37	36	−3		
Value of exports	186	191	178	174 [1]	175	1		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the Engineering and Scientific Instruments industry (SIC 3811)
[3] Includes value of shipments of Engineering and Scientific Instruments made by all industries.
[p] Preliminary.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

existing systems in the industrial process are expected to continue to stimulate the electrical measuring instrument industry. Shipments should reach around $2.1 million in 1980, reflecting an average annual growth of 6.2 percent.—*Frank Melnick, Office of Business Research and Analysis.*

LABORATORY AND ENGINEERING INSTRUMENTS

Emerging fields requiring laboratory and engineering instruments include pollution abatement and earth, ocean, and space exploration, in addition to the continuing demands stemming from clinical and medical research. Industry products of different types are now used in such diverse applications as laboratory analyses, aircraft flight, nautical and navigational needs, meteorological and hydrological uses, geophysical and mineral prospecting, surveying and photogrammetry, laboratory balances and laboratory furniture.

The industry is comprised of 677 establishments, with 40 percent concentrated in the Northeast, 22 percent in the North Central States, 18 percent in the South and 20 percent in the West. Industry shipments are expected to rise 6 percent in 1973 to about $1.21 billion. In 1972, shipments totaled an estimated $1.15 billion, up 5 percent from the previous year.

Instruments Assist Pollution Control

Pollution abatement requirements for instrumentation—to gather data for setting standards and to monitor standards—are expected to stimulate industry growth throughout the 1970's. Sales of air and water pollution control and monitoring instruments and apparatus are expected to reach around $100 million by the late 1970's.

Today, pollution control agencies stress measurement of contaminants many times smaller than measurement errors in existing instruments. Many instruments now in use were designed 10 to 15 years ago and lack the reliability required for finite measurements. Development of better mechnisms to overcome deficiencies inherent in older instruments is considered essential to effective pollution abatement. Industries planning large outlays for pollution abatement equipment include electric utilities, steel, pulp and paper, chemical, and petroleum.

Modern oceanographic research requires new high precision instruments capable of investigating unexplored fields. Improvement in oceanographic instruments will result from applying expertise gained in modern electronics and microminiaturization in the space program. Programs for continuing advancement of oceanographic capabilities need to be undertaken to improve the quality and reliability of instruments and related equipment.

Instrumentation for marine biology has lagged further behind than that for other sectors of marine science. Long-range planning by industry to reduce costs of instrumentation, improve reliability of components and systems, and provide the oceanographic community with a variety of precise standard oceanographic devices is essential to ocean resource exploration.

Analytical Instrument Demand Continues

Analytical instruments are primarily used for process control, laboratory research and quality control, in clinical laboratories and in medical research laboratories. Sales of analytical instruments are expected to reach around $500 million in 1973. Influencing purchases of these instruments are levels of spending for research and development, and growing pressures to improve product quality and reduce operating costs.

R. & D. outlays continue to create demand for analytical instruments by industry, government, and nonprofit organizations. Industry accounts for about 45 percent of R. & D. expenditures, the government provides more than 50 percent, and the remaining funding is from universities and other nonprofit organizations.

Processing and manufacturing industries are spending time and money to adapt computerized analytical instruments to the industrial process in order to improve productivity. Capital spending for such use of analytical instruments has increased around 10 percent over the past decade and is expected to continue upward throughout the 1970's.

Exports Continue To Exceed Imports

Exports continue to far exceed imports of laboratory, engineering, and scientific instruments. Foreign trade levels changed slightly last year with imports down nearly 3 percent and exports gaining less than 1 percent. Exports in 1972 totaled $175 million, almost 5 times greater than imports. Largest export declines were among navigational instruments and parts, electric aircraft flight instruments and parts, and meteorological and hydrological instruments and parts. Substantial increases occurred in instruments exported for aircraft, except electric flight instruments, geophysical and mineral prospecting, and export of laboratory furnaces and ovens.

Engineering, laboratory and scientific instruments used in diverse applications related to automation of the industrial process, control and monitoring of ecological deficiencies and resource exploration will probably be in the forefront of international trade through the 1970's.

Employment and Wages on Upswing

Estimated industry employment totaled 64,000 in 1972, a small increase of about 1.5 percent from 1971. Production workers account for about 50 percent of the total work force, of whom half are women. Employment levels fluctuated between 1967 and 1972, reaching a high of almost 74,000 employees in 1969 and a low of around 63,000 employees in 1971.

While employment levels reflected uncertainties during these 5 years, weekly and hourly earnings increased steadily. Average weekly earnings rose from $137.92 in 1967 to $178.06 in 1972, and average hourly earnings from $3.20 in 1967 to $4.27 in 1972. Rising demand for technologically advanced instrumentation for precise measurement will probably boost employment further in the mid-1970's.

Growth Will Continue

Engineering, laboratory, and scientific instrument shipments are expected to increase at an annual rate of 5.8 percent in the years from 1972, reaching around $1.8 billion by 1980. Influencing growth will be new requirements for sophisticated instruments designed to cope with pressing programs concerning ecology, resource exploration, and social adjustments tied to drugs and crime. Instrumentation and equipment development in the mid-1970's is expected to emphasize increases in speed and efficiency of standard measurements rather than the creation of devices for obtaining new types of information. Air and water pollution are becoming worldwide problems and development of satellite instrumentation may be developed for global monitoring by the end of the decade.—*Frank Melnick, Office of Business Research and Analysis.*

MEASURING AND CONTROLLING INSTRUMENTS

Continuing the upward trend of the past several years, the value of shipments of the measuring and controlling instruments industry is expected to total $1.8 billion in 1973, a rise of 6 percent over the $1.7 billion estimated for 1972. Product ship-

Measuring and Controlling Instruments: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	1,455	1,527	1,607	1,618 [P]	1,700	5	1,800	6
Total employment (thousands)	66	72	69	61	62	0		
Production workers (thousands)	40	43	40	35	36	0		
Value added	972	1,017	1,117	1,105	NA			
Value added per production worker man-hour	$10.81	$12.07	$13.87	$15.78	NA			
Women employees (thousands)	19	22	21	19	20	5		
Average weekly earnings	$116.00	$129.33	$134.60	$137.46	$146.29			
Average hourly earnings	2.85	3.18	3.34	3.48	3.63	3		
Product: [3]								
Value of shipments	1,369	1,427	1,403	1,450	1,520	5	1,610	6
Value of imports	19	31	34	42	55	13		
Value of exports	292	334	378	413	432	5		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the measuring and controlling industry (SIC 3821).
[3] Includes value of shipments of measuring and controlling instruments made by all industries.
[P] Preliminary.

NOTE.—NA = Not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

ments are expected to reach $1.6 billion in 1973, 6 percent higher than the $1.5 billion estimated for 1972.

Anticipated increases in capital spending combined with the continuing expansion of the domestic economy are expected to stimulate a gradual growth in demand for measuring and control instruments. Contributing to the rising demand is the expanding need for instrumentation for water and waste treatment facilities to clean up our environment. As the economy improves, additional funds will be made available for plant construction and the modernization of facilities and equipment in the process industries—petroleum refining and distribution, chemical and petrochemical production, food processing, paper manufacturing, and metals production. Although pressures from environmentalists' groups are slowing the construction of energy producing facilities needed to meet the surging demand for energy, expectations are that there will be a gradually increasing market for instrumentation systems to be employed in the production and distribution of various forms of energy resources.

The impact of foreign competition is becoming more significant in determining obsolescence in many sectors of U.S. industry. While much existing equipment is technologically adequate, it is not sufficiently automated to be competitive in the face of rising labor costs.

New Technology Accelerated

Demand is constantly mounting for measuring instruments and controls to enable the process, utility, and service industries to meet prescribed ecological standards. New instruments are being developed to reliably measure identified contaminants, and new controllers and control loops are being devised to function with the most recent process systems designed to achieve pollution abatement. Investigative interest continues in the use of the laser in conjunction with spectroscopy to remotely analyze plant effluents. In the flow measurement category, numerous methods are undergoing research and experimentation to improve the performance of head type flow measuring elements. Investigation continues on developing and improving nonobstructing flow measuring techniques and principles.

Advancing automation has and is furthering the development and sophistication of process programmers and programmable logic controllers. Various forms of these instruments operating on the analog or digital principle, and combinations thereof, are receiving greater attention. Programmers are available to function pneumatically, electrically or electronically, with programs established by drums, punched tape, electronically stored information, and profile tracking techniques.

Progress is continuing in advancing the state of the art for remote and automatic reading of residential utility meters and several different systems are being field tested. In the same product area, the first residential type watermeter made largely of molded plastic was introduced last year.

Productivity and Pollution Control

A considerable amount of environmental pollution is generated by less than optimum control of conventional manufacturing processes and power generating facilities. In many instances, efficiency of the operation can be improved by a more thorough application of control techniques and instrumentation equipment. Such increased efficiency would both improve productivity and enhance profitability. Also, efficiency gains could minimize or offset added pollution control costs.

Greater productivity would logically result from expanded use of testing, measuring, and control instrumentation. Product quality would be enhanced with prospects for reducing the volume of substandard production, decreasing amounts of rejected material, and the lowering of the number of reruns and reworks.

Exports Continue Rise

The value of export shipments continues upward despite unsettled economic conditions in overseas industrial markets. Estimated exports in 1972 totaled $432 million, 5 percent above 1971 levels. A similar increase was registered in 1971. Of items exported last year, electrical and electronically actuated instruments are estimated to have increased 7 percent over 1971, matching a similar gain in the previous year; mechanical and pneumatically actuated instruments are estimated to have risen 13 percent over previous year levels, following a negligible gain in 1971. An 11 percent decline in exportation of parts and accessories reversed the 24 percent surge registered in 1971.

Imports Grow Sharply

Although imports of measuring and controlling instruments account for only a small share of shipments, estimated imports rose sharply to $55 million in 1972, a 31 percent advance over 1971. This substantial rise exceeds the average annual rate of 19 percent recorded for the prior 4 years. Helping to boost last year's imports was a spectacular threefold spurt in the value of nuclear radiation and detection instruments entering the United States as well as a 31 percent advance in the value of industrial process measuring instruments. These two categories constituted half of industry imports for 1972. Nuclear radiation and detection instruments imported from the United Kingdom accounted for 36 percent of the total for this category in 1971, more than double the 14 percent in 1970, and were expected to account for 75 percent of the total in 1972.

Future Prospects Good

Progressive industrialization on a worldwide basis combined with trends toward expanded use of automation provide expanded future markets for measuring and controlling instruments. Industry shipments are expected to grow at an annual average rate of 5.2 percent in the next several years, reaching a value of $2.6 billion by 1980.—*Ernest A. Capelle, Office of Business Research and Analysis.*

AUTOMATIC TEMPERATURE CONTROLS

Buoyed by the continued brisk pace of residential construction, the value of shipments of the automatic temperature controls industry is expected to total $735 million in 1973, a 5 percent increase over 1972. Shipments of automatic temperature controls made by all producers are expected to reach $630 million, 5 percent over the $600 million achieved in 1972.

Residential construction provides a dual market for the products of this industry. Housing facilities generate demand for instruments and controls for heating and central air-conditioning systems as well as for household appliances incorporating a broad variety of regulators. In addition, there is a significant replacement market for home appliances spurred by an improving economy. Further enhancing business prospects is the increasing use of thermostatically equipped air-conditioning systems in automobiles, with the trend reaching 100 percent usage in models which incorporate fully automated climate control. However, some sluggishness in the construction of nonresidential and commercial building facilities has reduced the sales potential for the more sophisticated environmental control systems.

Marketing Techniques Changing

Appliance regulators produced by industry manufacturers are used in a wide variety of manufactured products including air-conditioners, vending machines, home appliances, and X-ray de-

Automatic Temperature Controls: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	618	654	642	[P] 660	700	6	735	5
Total employment (thousands)	40	43	40	37	38	3		
Production workers (thousands)	28	30	27	24	26	8		
Women employees (thousands)	18	20	18	16	17	6		
Average weekly earnings	$109.87	$125.46	$126.49	$134.59	$147.33	9		
Average hourly earnings	$2.74	$3.12	$3.26	$3.45	$3.62	5		
Value added	420	451	440	450	NA			
Value added per production worker man-hour	$9.29	$9.36	$9.94	$11.03	NA			
Product: [3]								
Value of shipments, total	524	563	548	565	600	6	630	5
Value of exports	25	30	30	25	30	20		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the automatic temperature controls industry (SIC 3822).
[3] Includes value of shipments of automatic temperature controls made by all industries.

[P] Preliminary.

NOTE.—NA=Not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

velopers. Alert to new market developments and customer needs, this industry is adding to the basic line of automotive heating and air-conditioning controls an emission control system designed to meet new stringent Federal automotive emission standards.

To effectively and fully market products emanating from research and development efforts, seminar programs have been organized to acquaint managers and consulting engineers with application techniques to reduce operating costs and assist in the conservation of manpower and energy.

To make full use of the broad capability and flexibility of current building automation systems, the marketing process starts in the design stage through consultations between architect-engineers and control system suppliers to establish desired performance objectives for the planned automated control system. In further consultations, product and system specifications are developed in preparation for the procurement and installation of coordinated control systems.

Computers Aid Automation

Currently, research and development emphasis is on design of coordinated automation systems based on the modular or building-block principle. Utilization of the modular concept permits unlimited expandability and is a built-in guarantee against obsolescence. Miniaturization and reliability are accomplished by utilizing the latest developments in integrated circuitry. Cathode ray tubes (CRT) are incorporated in the system design for convenient display of system performance and for operator reference and monitoring. The past year witnessed the inclusion of minicomputers in building automation systems. Computerization adds the intelligence needed to operate automated building functions at peak efficiency, generates management data to increase the effectiveness of preventive maintenance by scheduling servicing only when needed, and decreases energy waste with resulting economy.

Exports Up

In 1972, exports are estimated at about $30 million, equal to export levels reached in 1970 and in 1969, but 20 percent over the $25 million recorded in 1971. As a result of categorization changes made in the Statistical Classification of Domestic and Foreign Commodities Exported from the United States in January 1972, more definitive data are being obtained on types of exports. Of last year's exports, 55 percent are estimated to be the electrical and electronically actuated type, 5 percent mechanical and pneumatic, and the remaining 40 percent consisting of parts and accessories for both types.

Long Range Prospects

Continued vigorous demand for h[illegible]ng units of all types, and consumer preference for increased automation in environmental control systems and

Optical Instruments and Lenses: Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Industry [2]								
Value of shipments	407	508	432	385 [P]	405	5	425	5
Total employment (thousands)	19	19	18	16	16	0		
Production workers (thousands).	12	11	10	9	9	0		
Women employees (thousands).	6	6	5	4	4	0		
Average weekly earnings	$100.20	$129.35	$134.02	$134.72	$144.67	7		
Average hourly earnings	$2.50	$3.11	$3.28	$3.38	$3.57	6		
Value added	284	340	277	265	NA			
Value added per production worker man-hour.	$10.28	$12.44	$11.84	$13.74	NA			
Product [3]								
Value of shipments	452	525	506	460 [1]	485	5	510	5
Value of imports	55	68	69	62	70	13		
Value of exports	34	57	64	65	66	2		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the optical instruments and lenses industry (SIC 3831).
[3] Includes value of shipments of optical instruments and lenses made by all industries.
[P] Preliminary.
NOTE.—NA = not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

household appliances provide expanding markets for automatic temperature controls. An anticipated pickup in nonresidential and commercial construction, and a further expansion in the design and use of fire and security monitors that are component parts of centralized and automated building systems, further enhance business prospects. Total shipments by the automatic temperature control industry are expected to register a 5.4 percent annual growth rate in the next several years, reaching $1,070 million by 1980. Product shipments are expected to increase at the same rate, totaling $920 million by 1980.—*Ernest A. Capelle, Office of Business Research and Analysis.*

OPTICAL INSTRUMENTS AND LENSES

Sales of the optical instruments and lenses industry are expected to reach around $425 million in 1973, an increase of over 5 percent from 1972. Shipments for 1972 also rose an estimated 5 percent from 1971 compared with the 10 percent decline between 1970 and 1971. The sharp decline in shipments of optical instruments and lenses in 1971 was offset by a 10 percent increase in shipments of surgical and medical instruments, reflecting the shifting of industry classification of manufacturers using similar techniques and technologies—electro-optics and fiber optics—to produce different end-use instruments.

The industry consists of 303 establishments located in four geographical areas. The Northeast Region has 152 plants, North Central States 46 plants, Southern States 26 plants, and the West 79 plants. Primarily small establishments, less than half of the plants have 20 employees or more. Industry output is 65 percent optical instruments, 15 percent non-optical analytical instruments, 10 percent lenses and components, and 10 percent sighting and fire control equipment made in the same plant.

Wages Up, Employment Down

Employment in the optical instruments and lenses industry fell from 18,000 to 16,000 between 1970 and 1971 and remained virtually unchanged in 1972. Total employment dropped 3.5 percent a year between 1967 and 1972. Over 50 percent of the total work force are production workers and about 25 percent are women. No changes are foreseen in employment for 1973.

While employment dropped rather significantly over the past 4 years, average weekly earnings increased 7.6 percent a year from $100.20 in 1967 to $144.67 in 1972, and hourly earnings rose from an average $2.50 to $3.57. The optical instruments and lenses industry earnings follow those of other instrument producing industries.

Exports Outgain Imports

Between 1970 and 1971 exports of optical instruments and lenses increased almost 2 percent to $65 million, while imports declined by nearly 11 percent to $62 million. Increases occurred in seven of 14 categories of instruments and lenses exported in 1971. Leading customers include Canada, $9 million; United Kingdom, $5.6 million; West Germany, $5.3 million; Japan, $5 million; and France, $3.6 million. All other countries accounted for a total of $36.5 million.

Losses outnumbered gains in the 37 categories of optical instruments and lenses imported into the United States in 1971, with 23 declining and 14 increasing over the preceding year. Leading supplier countries were Japan, $39.4 million; West Germany, $9.5 million; United Kingdom, $3.2 million; France, $0.7 million; Canada, $0.6 million; and the rest of the world $8.5 million.

Gains in both exports and imports occurred during 1972. Imports rose an estimated 13 percent and exports almost 2 percent from 1971.

Instruments Benefit from R. & D.

Programs linked to dealing with pressing national needs such as obtaining clean, cheap energy for industrial and domestic consumption, upgrading the quality of mass transportation, and continuing the fight against intractable diseases are only a few markets eyed by analytical instrument producers.

Significant markets for laboratory nonoptical analytical instruments are those tied to medicine and socio-economic progress. The National Heart and Lung Institute is expected to receive around $110 million in 1973 to combat lung and heart diseases and sickle-cell anemia. Research Applied to National Needs (RANN) will receive around $80 million for programs dealing with such diverse topics as solar energy and pest control and is expected to share $38.5 million with the National Bureau of Standards to study methods of bringing new technology to new markets.

Laser Growth Certain

Laser technique and technologies gained from government funded military programs are certain to find their way into nonmilitary uses in the mid-1970's. Largest growth is expected in construction and industrial applications for meteorological devices used for measuring, ranging and aligning. Construction looms as a large market because of the laser's ability to greatly extend the capability and efficiency of surveying instruments. Industrial laser systems are employed to calibrate radar systems, tune television components, adjust balance wheels in wristwatches, process material, and optically process data. Lasers have also a number of applications linked to education, pollution abatement and scientific research. Most spending in the laser market goes for ancillary equipment that unites the laser to its function.

Currently, U.S. military services are the laser industry's largest customers. The Department of Defense is expected to spend around $70 million ing 1973 for laser operated systems, including rangefinders, target illuminators, bomb guidance equipment, long wavelength infrared detectors for tracking, optical correlation devices to insure target accuracy, bomb fuses and other prototype devices. Yearly military spending for laser operated systems is expected to continue at these levels into the mid 1970's.

Fiber Optics Ready To Grow

Fiber optics—the technology of transmitting light or image from one place to another through a flexible fiber—is emerging as a viable component of instrumentation for diverse uses. Its ability to pipe light and images to and from inaccessible areas and along irregular paths is improving traditional methods involving light transmission and opening new product possibilities for the optical instrument industry. Most significant recent development has been the incorporation of fiber optics into a wide range of medical instruments.

Fiber optics answers the need for a greater range in flexibility, light view, patient comfort, surgeon fatigue, biopsy capability, and diagnostic documentation. It is also being extended to more special medical instruments such as fiber optics image and illumination systems for surgical, diagnostic, and medical applications. More and more fiber optics instruments are being developed and engineered for specific end uses, serving the needs of technicians and specialists in performing a wide variety of diagnostic functions. Although still largely a special-order business and a division of the optical industry, fiber optics seems ready to become a thriving industry in its own right.

Productive Future Bright

Electro-optics and fiber optics will continue to lead the optical instruments and lenses industry into an expanding industry. Sales are expected to increase 5.9 percent a year, reaching around $640 million by 1980. Contributing to the projected gains are lasers, holography, fiber optics, and advanced analytical instrumentation for research and development. The transfer of techniques, technologies and sophistication of optics and electronics developed for space and military applications into the industrial process is making headway. New products and new technologies will remain the catalysts needed to keep the industry moving through the 1970's to 1980.—*Frank Melnick, Office of Business Research and Analysis.*

CHAPTER 29

Medical and Dental Instruments and Supplies

With increased hospital modernization and construction and rising public and private spending on health care, demand for medical and dental instruments and supplies continues upward. The value of shipments for these industries will probably exceed $2.7 billion in 1973, an increase of about 8 percent over 1972.

More than 80,000 workers are employed in about 1,500 medical and dental instruments and supplies manufacturing establishments located primarily on the east coast, in Illinois and in California. Most of these establishments are small companies that specialize in a few product areas. Increasingly, larger medical equipment and supply companies are taking over smaller plants through acquisition and mergers.

Trade Balance is Favorable

Industry exports totaled an estimated $220 million in 1972, slightly less than 10 percent over 1971 levels. Exports were almost four times greater than imports and accounted for nearly 9 percent of all industry shipments. Although imports have been rising more rapidly than exports in recent years and are expected to continue to gain through the decade, the favorable balance of trade is expected to continue for the next several years. Imports in 1972, however, amounted to only $55 million, or less than 2 percent of total shipments.

Productivity Rising

Industry employment increased 5 percent from 1969 to 1972. Production workers accounted for 66 percent of the work force last year, a 3 percent decline since 1969. The drop, compared to the rise in shipments, reflects a significant rise in productivity. Almost half of the industry's workers are women. Gross average weekly and hourly earnings of production workers in medical instruments and supplies are slightly lower than earnings of production workers in the instruments and related products area.

Expanding Markets

Expanded public and private health insurance coverage and benefits have made health care available to increasing numbers of people and have stimulated sales for a wide spectrum of instru-

Medical and Dental Instruments and Supplies: Projections 1972–80 [1]

[Value of shipments in millions of dollars except as noted]

SIC Code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
	Value of industry shipments, total	$2,515	7.9	$2,725	8	$4,950	8.8
3841	Surgical and medical instruments	855	10	940	10	1,990	11.1
3842	Surgical appliances and supplies	1,355	7	1,450	7	2,400	7.4
3843	Dental equipment and supplies	305	7	335	7	560	7.9

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

Medical and Dental Instruments and Supplies: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments, total	1, 534	2, 018	2, 089	2, 332	2, 516	8	2, 727	8
Surgical and medical instruments (SIC 3841)	475	529	605	777	855	10	940	10
Surgical appliances and supplies (SIC 3842)	838	1, 224	1, 210	1, 269	1, 355	7	1, 450	7
Dental equipment and supplies (SIC 3843)	221	265	274	286	306	7	335	7
Total employment (thousands)	67	80	78	78	80	3	NA	
Surgical and medical instruments (SIC 3841)	22	24	26	27	28	4	NA	
Surgical appliances and supplies (SIC 3842)	35	45	41	40	41	2	NA	
Dental equipment and supplies (SIC 3843)	10	11	11	11	11	0	NA	
Production workers (thousands), total	48	56	56	55	56	2		
Surgical and medical instruments (SIC 3841)	16	18	19	20	20	0		
Surgical appliances and supplies (SIC 3842)	25	31	29	27	28	0		
Dental equipment and supplies (SIC 3843)	7	7	8	8	8	0		
Value added, total	965	1, 284	1, 321	1, 535	NA	NA		
Surgical and medical instruments (SIC 3841)	297	339	384	528	NA	NA		
Surgical appliances and supplies (SIC (3842)	527	773	767	832	NA	NA		
Dental equipment and supplies (SIC 3843)	141	172	170	175	NA	NA		
Value added per production worker man-hour (dollars):								
Surgical and medical instruments (SIC 3841)	9. 07	9. 70	10. 09	12. 87	NA	NA		
Surgical appliances and supplies (SIC 3842)	10. 98	12. 88	14. 10	16. 00	NA	NA		
Dental equipment and supplies (SIC 3843)	9. 86	12. 11	11. 12	12. 00	NA	NA		
Product: [3]								
Value of shipments, total	1, 436	1, 801	1, 916	2, 132	2, 303	8	2, 504	9
Surgical and medical instruments (SIC 3841)	543	686	746	901	991	10	1, 090	10
Surgical appliances and supplies (SIC 3842)	691	882	929	976	1, 042	7	1, 125	7
Dental equipment and supplies (SIC 3843)	202	233	241	255	270	6	289	7
Value of imports, total	18	25	33	46	55	16		
Surgical and medical instruments (SIC 3841)	8	10	14	23	28	21		
Surgical appliances and supplies (SIC 3842)	5	8	11	14	17	21		
Dental equipment and supplies (SIC 3843)	5	7	8	9	10	11		
Value of exports, total	132	142	169	197	215	8		
Surgical and medical instruments (SIC 3841)	64	72	88	111	123	11		
Surgical appliances and supplies (SIC 3842)	43	43	47	48	50	4		
Dental equipment and supplies (SIC 3843)	25	27	34	38	42	11		

[1] Estimated by Bureau of Domestic Commerce.

[2] Includes value of all products and services sold by these industries: surgical and medical instruments (SIC 3841); surgical appliances and supplies (SIC 3842); and dental equipment and supplies (SIC 3843).

[3] Includes value of shipments of medical and dental instruments and supplies made by these industries.

Source: Bureau of the Census and Bureau of Domestic Commerce.

[P] Preliminary.

NOTE.—NA = Not available.

mentation used in health treatment. Sales increases have encouraged hospital supply firms, drug companies, aerospace companies, and computer manufacturers to enter fields such as biomedical devices, medical electronics, radio-pharmaceuticals, automated clinical testing, multiphasic screening, and other advanced areas.

Implementing the recommendations of the Cooper Committee established by the Secretary of Health, Education, and Welfare to study problems involved in the expanded use of medical devices, the Federal Drug Administration has almost completed an inventory of medical devices currently in use. Plans are now underway to establish review panels of appropriate scientific, health, and engineering experts for the purpose of grouping medical devices into categories—those unquestionably safe to market, potentially hazardous devices which could require either initial or continuing review by an outside group of experts before marketing, and those where safety standards applicable to all manufacturers could be established. Panels on cardiovascular and orthopedic devices were the first two to be established.

Healthy Future Forecast

Significant gains in industry activity are anticipated in the late 1970's, with shipments expected to amount to about $5 billion in 1980, an average yearly gain of 8.8 percent.

Multiphasic testing for diagnostic screening will continue to rise along with increased use of a variety of electronic diagnostic equipment. Equipment leasing will also probably increase significantly since it enables hospitals and clinics to gain the use of needed equipment without capitol investment.

SURGICAL AND MEDICAL INSTRUMENTS

In keeping with the rapidly rising use of more sophisticated instrumentation in hospitals and laboratories, surgical and medical instruments shipments will probably increase around 10 percent in 1973 to $940 million. Shipments in 1972 were estimated at $855 million, an increase of about 10 percent over the previous year. Accounting for a large share of increased sales were instruments produced in new plant facilities as well as the inclusion of additional companies in this industry category. Recently, some pharmaceutical companies have set up new medical electronics equipment divisions through additions to present facilities or through acquisitions.

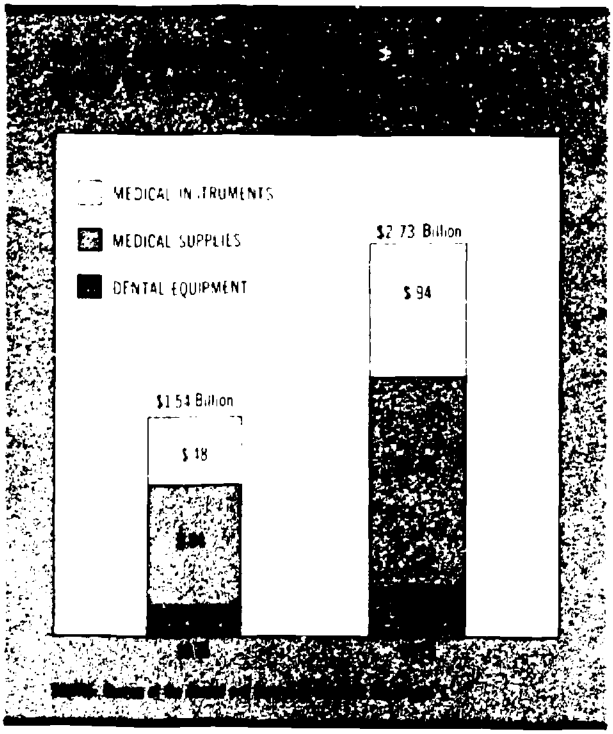
Exports Exceed Imports

Exports of medical and surgical instruments continue to far exceed imports, which represent only 3 percent of all shipments. In 1971, exports accounted for about 15 percent of industry shipments compared with around 13 percent in 1967. Exports for 1972 alone increased approximately

1972 Profile

Medical and Dental Instruments and Supplies

	Surgical and medical instruments	Surgical appliances and supplies	Dental equipment and supplies
SIC Code	3841	3842	3843
Value of industry shipments (millions)	$855	$1,355	$306
Number of establishments	321	811	334
Total employment (thousands)	28	41	11
Exports as a percent of product shipments.	12.4	4.8	15.5
Imports as a percent of apparent consumption.	3.7	1.3	3.6
Compound annual average rate of growth 1967–72 (percent):			
Value of shipments (current dollars)	12.5	10.1	6.7
Value of exports (current dollars)	13.9	3.0	10.9
Value of imports (current dollars)	28.0	28.0	14.9
Employment	4.9	3.2	1.9
Major producing areas	New England, New York, Ohio, Illinois, Indiana, California	Illinois, New York, New Jersey, Pennsylvania	New York, Illinois, California



11 percent over previous year levels and are estimated at $123 million for 1972.

The estimated value of imports in 1972 was $28 million, which represents an increase of 21 percent over 1971.

Diagnostic Equipment Sales Increase

Diagnostic equipment, whose sales will probably increase about 8 percent in 1973, may serve as a partial answer to rising health care costs. Such equipment is designed to perform essential tests accurately and quickly. Examples include electronic blood analyzers and automated blood analysis instruments. The electronic blood analyzer is capable of performing up to 60 tests in 30 minutes. The blood analysis instrument will permit automatic performance of any 10 of 17 tests simultaneously at the rate of 400 tests per hour. Most new medical electronic equipment may be used in conjunction with patient identification systems and can be adapted to hospital computer facilities.

Growth in Therapeutic Equipment Sales

Sales of therapeutic equipment were expected to increase about 10 percent in 1972. In particular, medical specialty product companies have compiled an impressive record of long term earnings growth stimulated by increased product demand which should continue during the late 1970's. Included among specialty products are implanted cardiac pacemakers, pacemaker's byproducts, and the artificial kidney or hemodialysis machines.

The artificial kidney or hemodialysis machine is continually being improved through technological and engineering advancement in search of cost reductions. Home treatment costs about $3,000 to $4,000 for the machine and between $3,000 to $5,000 for components and chemicals that must be replaced through the year—half the cost of hospital treatment.

Patients may finally be able to obtain nuclear batteries that last 10 years instead of only 2 or 3 years. Two hospitals have already received approval from the Atomic Energy Commission for implanting such nuclear pacemakers.

A portable external cardiac pacemaker with a telephone handset has recently been introduced, an improvement over larger units when emergency work necessitates portability. Within seconds, the operator can have the unit functioning on a patient because of the telephone handset applicator and the simple controls. In some situations, the operator can also use tape-on external electrodes or internal pacing available in the unit.

Need for Instrument Maintenance

With the increasing use of electronic devices in hospitals, trained workers are needed to service the equipment. Alert medical and surgical dealers are trying to fulfill this need through the utilization of skilled technical and other workers laid off in the aircraft and allied electronics component fields.

Future Diagnosed as Promising

Surgical and medical instrument sales are expected to continue to grow 11.1 percent a year through the remainder of the seventies. By 1980, the value of industry shipments should reach almost $2 billion.

New instruments emerging from further research on lasers, fiber optics, cryogenics, and nuclear medicine will probably be marketed by the end of the decade. According to industry sources, patient monitoring equipment sales are expected to grow at an annual rate of 18 percent in the next several years.

The laser will become a more valuable tool to researchers in the medical field. Characteristics which make it useful include a beam which can be precisely narrowed for use to less than 1/10,000th of an inch in diameter and the adjustment of the beam to utilize the most effective wavelength for each experiment. Within the next 2 years the laser may be used to identify and filter dangerous bacteria out of the air, to spot breast cancer almost as soon as it begins, and even to prevent inherited diseases.

Early stomach cancer detection may be made possible by photographs taken through a flexible fiber optic bundle capable of remote viewing of internal areas of the human body. Fiber optics is making a great contribution to the improvement of endoscopic diagnostics throughout the world, and fiber optic signoidoscopes are being used more and more for detecting cancer and other abnormalities in the lower intestinal tract.

In surgery, space-age thermal transfer techniques have brought about a small hand-held surgical instrument that will bring cryogenic temperatures directly to the affected area. The instrument consists of a 12-inch probe and a ½-liter reservoir that can sustain the probe tip at temperatures lower than $-190°$ C for over 30 minutes.

Nuclear diagnostic procedures will be based on the detection of gamma rays emitted by radioisotopes (radionuclides). The radionuclides are injected into the patient's vein in one of several forms, including colloids and salt solutions. The isotope tends to concentrate in the circulatory system of a particular organ. The scintillation probe will counterdetect the concentration of radionuclide in the organ and depict it on a cathode ray tube. This electronic display is then photographed on self-developing film at four second intervals to provide an actual step-by-step picture of the patient's blood flow.

SURGICAL APPLIANCES AND SUPPLIES

Shipments of the surgical appliances and supplies industry will reach about $1.4 billion by 1973, a 7 percent increase over 1972's level. About 800 establishments, predominately smaller firms, manufacture surgical appliances and supplies. Because of rising demand from hospitals, outpatient facilities, and nursing homes for products, the number of firms within the industry is expected to increase by 1973.

Leaders in surgical appliance and supply industry sales are prosthetic equipment and disposables products. Equipment sales in the prosthetic field have grown annually at about 12 percent for the past 5 years. Disposables sales have gained 20 percent since 1968.

Exports Surpass Imports

Exports for 1972 increased about 4 percent over 1971 levels and were estimated at $50 million for 1972. The ratio of exports to imports for surgical appliances and supplies has been decreasing--from 9:1 in 1967 to 3:1 in 1972. The value of imports for 1972 rose to $17 million, nearly 2 percent over a year earlier. Currently, imports represent only about one percent of industry shipments.

Biomedical Plastic Products Expand

Sales of biomedical plastic products—collection and administration sets, catheters and trays, dental products, and prosthetic and orthopedic devices—rose to close to $200 million in 1971. An additional $83 million in sales for 1971 was for medical tubing, medical devices, plastic sutures, implanted prostheses, and contact lenses. Demand for these products will continue to be strong.

Disposables Continue Popular

Markets for disposable medical products continue to expand rapidly, accounting for an estimated 35 percent of all surgical appliances and supplies sales in 1972, compared to 20 percent in 1968. Disposables include a wide variety of items ranging from hypodermic needles, syringes, and surgical knives to a broad group of woven disposable products that eliminate the need for sterilization and laundering. Although the problem of disposing of disposables continues, efforts are being made to replace incinerators with less polluting solid waste disposal devices.

New Orthopedic Products

Recently developed orthopedic products include sight switch controlled wheelchairs, developed as a spin-off from the space program. They are battery powered electric wheelchairs of a commercial variety. Eye control of the chair is achieved through the exclusive use of high reliability solid-state components. The left-eye switch is used to control the forward-stop-reverse mode of operation in sequential steps. Steering is accomplished by using the right-eye switch. When this switch is activated, the chair will move alternately first right and then left.

Another innovation in orthopedics is a voice controlled wheelchair. The user hums a tone into a dynamic throat microphone to control the direction of the wheelchair. As long as the tone is sustained, the chair will move in a direction determined by the frequency of the tone.

Future Gains Anticipated

Surgical appliances and supplies industry shipments will probably reach about $2.4 billion by 1980, reflecting an annual gain of 7.4 percent. Demand from hospitals, physicians, clinics and nursing homes will continue to rise for such disposable supplies as sheets, surgical gloves, gauze bandages, syringes, and similar items. Dealers who handle permanent type equipment will experience moderate growth. In contrast, turnover of disposable items will continue to grow very rapidly.

DENTAL EQUIPMENT AND SUPPLIES

The value of industry shipments for dental equipment and supplies is estimated at about $336 million in 1973, an increase of approximately 7 percent over shipments of $306 million in 1972. During the past 5 years, shipments have increased at an annual rate of 6.7 percent.

Exports Exceed Imports

Industry exports totaled an estimated $42 million in 1972, an increase of about 11 percent over 1971 levels. The prime export market for dental equipment and supplies is Canada, with Japan the second largest country customer. Imports account for less than a quarter of the dollar volume of exports and were estimated at about $10 million for 1972, an 11 percent increase over 1971. The ratio of exports to imports has been about 5:1 since 1967.

States receiving Federal funding for Medicaid programs must provide screening, diagnosis, and treatment for beneficiaries under the age of 21 for a wide variety of ailments, including dental diseases. Even if a State's Medicaid program lacks dental care facilities, dental treatment must be made available to eligible youngsters. With joint Federal-State funds, Medicaid paid almost $102 million from mid-1971 to mid-1972 for dental care of children. Since there are an estimated 10 million children who are eligible (but not necessarily enrolled) under Medicaid plans, spending on dental care for children is expected to increase in the next several years.

Increasing Demand for Dental Services

By 1980 industry shipments for dental equipment and supplies should reach close to $560 million, which would represent about an 7.9 percent increase per year through the decade. The next several years will bring an increasing demand for dental services because of population growth and increasing consumer acceptance of the importance of dental hygiene. Disposables will also be used to a greater extent in the dental materials market with a fluorident prophylaxis and prevention treatment, and care kits for office and home.

By the end of this decade, group dental insurance coverage probably will expand. Presently, there exist three basic plans for dental insurance: (1) plans with a schedule of benefits for payment of various procedures; (2) the more common plan that bases its payment on "customary and reasonable" fees for dental procedure; and (3) a recommended form of dental insurance to be used in major medical coverage.—*Marlene P. Barger, Office of Business Research and Analysis.*

CHAPTER 30

Photographic Equipment and Supplies

Shipments of photographic products and supplies reached an estimated $5.2 billion in 1972, and a further rise of 10 percent to about $5.8 billion is expected in 1973. These gains represent a significant improvement over the 1967–72 average annual growth of 7 percent. Higher incomes, larger recreational expenditures and more leisure time, and the increase in numbers of young families, coupled with technological advancements in the amateur, professional, commercial and industrial fields have provided the thrust for higher sales.

A major trend in recent years has been the increasing application of photographic techniques to other technologies—microfilm, computers, printing, reproduction, audiovisuals, medicine and television. Thus, photography has participated in the information explosion. It gathers, reproduces, and conveys visual communication and, at the same time, helps to reduce and confine information for storage and retrieval.

Still Equipment—Strong Recovery

Demand for still camera equipment declined an average of 2 percent a year from 1967 to 1971; however, the trend was sharply reversed in 1972 with the introduction of the "pocket" instant loading camera. Measuring only one-inch thick, this camera was designed for portability, ease of use, and ability to produce large quality color prints from films loaded in small-format cartridges.

This year will witness another new concept in picture-taking systems—a compact one-step camera with no film waste and a motor driven film transport which pushes the film through the developing process, eliminating human error and the bulkiness associated with previous models. Customer response to these cameras is expected to increase the value of still camera equipment sales to $550 million in 1973 for a over-the-year gain of 12 percent.

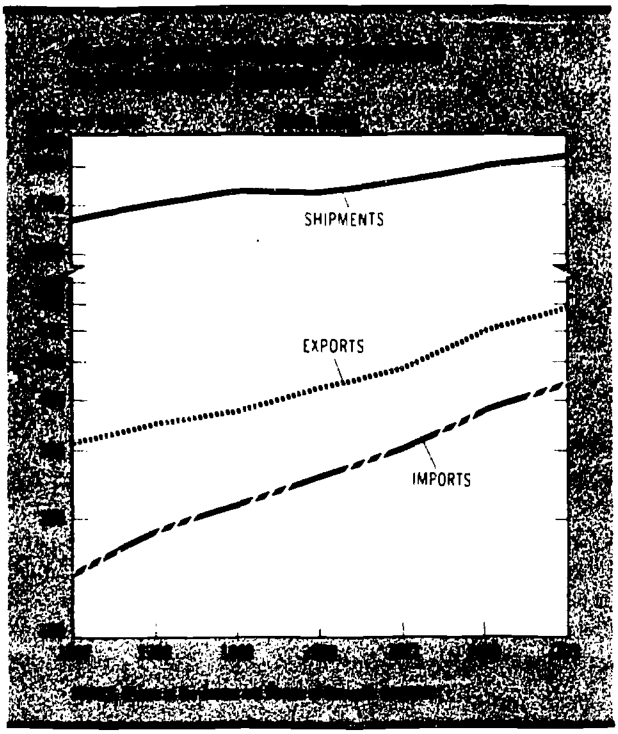
Free World Production of Photographic Equipment and Supplies by Country, 1967–71

[Value in millions of U.S. dollars]

Country	1967	1968	1969	1970	1971 [1]	Annual percent change 1967–71	Percent of 1971 total
United States	$3, 138	$3, 531	$3, 798	$3, 872	$4, 165	8	63
Japan	411	481	593	734	772	17	12
West Germany	400	439	526	696	698	16	10
United Kingdom	283	298	329	390	422	11	6
France	106	122	140	154	175	14	3
Italy	89	105	115	130	145	13	2
Belgium	107	115	130	140	148	9	2
Other countries	74	82	95	102	107	10	2
Total	4, 608	5, 173	5, 726	6, 218	6, 632	10	100

[1] Estimated.

Source: Official country statistics based on State Department reports and Bureau of Domestic Commerce. Percentages rounded to whole numbers.



Amateurs are expected to account for about 70 percent of total sales. Accordingly, manufacturers are very consumer oriented, allocating large outlays for promotion and distribution. The international industry is keenly competitive, and U.S. producers have maintained their relative position through continuing research and high-volume production techniques, enabling them to offer moderately priced cameras for the mass market. More sophisticated cameras, involving higher labor costs, are primarily the domain of foreign manufacturers.

Still equipment imports rose an estimated 25 percent in 1972 over 1971 levels and accounted for an estimated 30 percent of domestic consumption. Japan, as the dominant supplier, accounted for more than 70 percent of the estimated $170 million import total. Exports, estimated at $100 million, constituted 20 percent of U.S. production. Imports are expected to rise at a lower rate in 1973 than in 1972.

Movie Equipment Growth Resumes

Shipments of motion picture equipment declined 5 percent on an average annual basis during the 1967–71 period. In 1972, the available-light camera that eliminates the need for cumbersome artificial light equipment, combined with improved projection systems provided the thrust for growth in motion picture equipment. Sales in 1973 are projected at $170 million, a gain of 6 percent over 1972.

Technical advances in the fully automatic, cartridge loaded super 8mm. camera have been numerous, involving power zoom multiple element lenses, reflex viewfinders and electronic mechanisms designed to allow the less experienced amateur to obtain good picture composition at a relatively low price. Advances in auto-threading movie projectors have involved instant loading features, automatic re-wind, greater light efficiency for brighter screen images, and rear-screen projection.

Movie equipment imports, composed primarily of 8 mm. cameras, accounted for an estimated 27 percent of U.S. consumption in 1972. Japan accounted for over 50 percent of the estimated $45 million import total. Exports, estimated at $40 million, amounted to 25 percent of U.S. production. Strong foreign competition in motion picture cameras is expected to continue.

Sensitized Films Continue Strong

Demand for sensitized film is not subject to cyclical swings because supplies are always needed for both new and previously purchased equipment. Film shipments have increased steadily over the past 5 years, averaging an 8 percent gain annually, and are expected to reach $1.8 billion in 1973, a further increase of 10 percent.

Production of film is a highly complex, precision automated process, and consequently less labor intensive than equipment manufacturing. Research involving emulsion technology in the development of higher performance imaging materials has been, in many respects, more innovative than advances in equipment design. The new "pocket" camera, for example, required an entirely new color film that would produce large quality prints from miniature-size negatives. The one-step compact instant camera required a complex film to produce pictures involving multiple layer coatings and diffusion transfer technology. Introduction of the available-light movie camera was made possible by the development of a highly sensitive, high speed color film which has 20 times the light-recording power of previous films. Vigorous growth in the commercial-industrial area can be traced to new color films offering improved detail and contrast, rapid process X-ray films, ultra high resolution films for micrographics, photo based

Photographic Equipment and Supplies: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	3, 665	4, 375	4, 373	4, 756	5, 230	10	5, 750	10
Total employment (thousands)	104	111	111	106	108	2		
Production workers (thousands)	56	55	52	54	55	2		
Value added	2, 481	2, 874	3, 148	3, 490	NA			
Value added per production worker man-hour	$22. 13	$26. 93	$31. 67	$40. 11	NA			
Product: [3]								
Value of shipments, total	3, 138	3, 798	3, 872	4, 165 [1]	4, 550	9	4, 980	9
Still picture equipment	435	475	422	447	492	10	550	12
Photocopying equipment	620	845 [1]	990 [1]	1, 107	1, 240	12	1, 375	11
Motion picture equipment	194	181	146	152	160	5	170	6
Microfilming, blueprinting, etc	54	96 [1]	89	100	110	10	125	14
Photographic films and plates	1, 085	1, 341	1, 368	1, 465	1, 610	10	1, 770	10
Photographic paper (silver)	239	297	288	302	320	6	340	6
Photographic paper (without silver)	193	220	232	244	255	5	270	6
Prepared photo chemicals	148	229	214 [1]	220	230	5	240	4
Photographic equipment and supplies (not specified by kind)	120	114 [1]	123 [1]	128	133	4	140	5
Value of imports	145	217	253	302	380	26	440	16
Value of exports	313	379	428	482	600	24	680	13
Wholesale price indexes (1967=100)	100	101. 6	104. 9	106. 1	106. 7	. 6		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the photographic equipment and supplies industry (SIC 3861).
[3] Includes value of shipments of photographic equipment and supplies made by all industries.
[P] Preliminary.

NOTE.—NA = Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

films for graphic arts, and high speed recording films for aerial photography.

U.S. film manufacturers, who account for nearly 40 percent of total photographic exports, contributed significantly to world trade. U.S. exports were estimated at $235 million in 1972 while imports were estimated at $115 million, or only 8 percent of domestic consumption. The United States will continue to maintain a strong export program in color films, X-ray, graphic arts films, and microfilm.

Photocopy Market Widens

In response to the need for quick copying systems emphasizing convenience and push-button automation, the value of shipments of photocopying equipment grew 15 percent annually during the past 5 years, and is expected to reach $1.4 billion in 1973, a gain of 11 percent over 1972.

Over 1 million photocopiers are in use today, an increase of 70 percent over 1967, while copy volume has tripled. Plain paper photocopiers are market leaders, more than doubling in volume during 1967–72. These high speed machines produce low cost copies and provide optional automatic feed, reduction capabilities and on-line collators. Other products—principally coated-paper photocopiers—have increased steadily but have lost a share of the market to the increasingly popular plain paper copiers.

Use of low cost copiers aimed specifically at the needs of multiple installation and small to medium volume requirements is expected to increase. For example, the desktop copier is one of a family of copiers designed to meet individual needs. Recent developments in photocopying include color reproduction capabilities, reproduction of both sides of a document utilizing a 2-step automatic process, and improved copier-duplicators.

Photocopiers constitute the second largest photographic export category—an estimated $135 million in 1972, representing 11 percent of production. Japan is the major foreign supplier, accounting for about 80 percent of the estimated $25 million imported last year. Superior technology and economy of scale production will enable U.S. photocopy manufacturers to maintain their export position in 1973.

1972 Profile

Photographic Equipment and Supplies

SIC Code	3861
Value of industry shipments (millions).	$5,230
Number of establishments	560
Employment (thousands)	108
Exports as a percent of product shipments.	13.2
Imports as a percent of apparent consumption	8.8
Compound annual rates of growth 1967–72 (percent):	
Value of shipments (current dollars).	7.4
Value of exports (current dollars).	14.0
Value of imports (current dollars).	21.4
Employment	0.8
Major producing areas	North eastern region

Demand Rising for Microfilm

Need to modernize information systems has accelerated microfilm demand. Industry sales, including equipment, supplies and services, will reach an estimated $500 million in 1973, a gain of 15 percent over 1972. About 35 percent of sales involve services to customers. Supplies accounted for about 40 percent of sales. Sensitized film (essentially 16 mm.) will lead in gains, followed by printout paper and chemicals. Equipment accounted for about 25 percent of the total, and sales increases are expected for readers, reader-printers, cameras, processors, retrieval devices, and duplicators. Photo reductions of 24:1 will continue as the most popular size and microfiche, containing 60 to 200 documents, will be the major retrieval format.

Demand is increasing for action-oriented informational systems involving on-line computer search and off-line automatic retrieval units. New products are microfiche cartridge-loaded reader printers and low cost portable viewers. Computer-output-microfilm, which converts computer tape data directly to microfilm, and micropublishing will represent major growth areas. Micropublishing will benefit from the Government Printing Office's new program to offer its publications on microfilm.

Net Exports Increase

From 1967 to 1971, exports of all photographic equipment and supplies increased 12 percent annually to $482 million, while imports rose at an annual rate of 20 percent to $302 million. Following a 24 percent advance last year, exports are expected to increase further to $680 million in 1973, a slower gain of 13 percent.

In 1971, 47 percent of U.S. exports were shipped to Europe, 23 percent to North American markets, 17 percent to Asia, and 12 percent to Latin America. Imports from Japan increased at an average annual rate of 25 percent during 1967–71 and accounted for 52 percent of total U.S. imports of photographic equipment and supplies during 1971. Japan and Belgium were the only major countries with whom the U.S. did not have a favorable balance of trade in photographic goods in 1972. The U.S. export trade balance in photographic equipment and supplies reached an estimated $220 million in 1972 and is expected to increase 9 percent in 1973.

Shifts in World Production

Free world production of photographic products increased 44 percent from 1967 to $6.6 billion in 1971, or about 10 percent a year. While the United States continues as the dominant producing nation, its share declined 6 percent during these years as Japanese production advanced 88 percent on the competitive strength of their quality cameras. Lacking large domestic markets, foreign producers are heavily oriented toward exports. The proportion of production represented by exports in 1971 ranged from 12 percent in the United States to 50 percent in Japan, and over 60 percent in West Germany. Only the United States has a domestic mass market allowing large-scale volume output and accounting for 92 percent of domestic consumption. In contrast, home markets in West Germany and France account for less than 50 percent of their output.

Japan, West Germany and U.S. manufacturers have built facilities abroad near growing markets. With plants already operating in the United States and West Germany, Japanese firms have begun production in Brazil and North Korea. Two major Japanese camera manufacturers have signed mutual technical cooperation agreements and business cooperation agreements with West German producers. West Germany has transferred major camera production to Singapore and expanded facilities in Argentina.

U.S. overseas activities are also extensive. In West Germany alone there are 12 American subsidiaries, 11 local companies holding licenses for

U.S. photographic technology, and over 60 U.S. manufacturers represented by local agents. Currency realignments, mutual agreement pacts, common economic markets, and production expansion away from home markets will tend to reshape the world photographic industry.

Environmental Improvement

Pollution control is an essential part of photographic product manufacturing, extending from in-plant quality control to waste disposal. Progress has been significant in reducing chemical solutions in the processing cycle, reducing chemical toxicity prior to waste discharge, and use of higher processing speeds requiring less wash water. The new one-step camera eliminates throw-away negatives and the increasing use of micofilm reduces paper disposal problems. Also, photography is used extensively to record and monitor environmental conditions, including air and water quality.

Strong Expansion to 1980

Photographic industry shipments are expected to continue upward in the next several years, advancing at an estimated average annual rate of 9 percent to reach $10 billion by 1980.

Research efforts will focus on new technology to match future needs for recording, storing, dissemination and display of visual information.

The momentum created by new technological developments in the amateur market will continue as the Nation's increasing young adult population photographs families and favorite vacation spots. In applied photography, microfilm—with higher density packing capabilities—will provide a major growth impetus, followed by higher speed photocopying equipment.

Imports are expected to grow at a slower annual rate than in the past 5 years, while the currency realignments will tend to make U.S. photographic exports more competitive in world markets.—*Richard M. Blassey, Office of Business Research and Analysis.*

CHAPTER 31

Business Machines

The business machines industries recovered in 1972 from their 1970–71 downturn. Total shipments of $7.9 billion were nearly 11 percent above 1971's figure, and another 11 percent gain to $8.8 billion is forecast for 1973. Electronic computing equipment—the largest industry in the grouping—recorded an even greater gain of 14 percent in 1972, and expects similar advances in each of the next few years.

Exports of business machines in 1972 were $1.6 billion, compared with imports of $730 million, a net trade surplus of $870 million.

Growth of the business machines market, at home and abroad, stems from the application of high technology to product development, particularly in electronic circuitry. Advanced circuitry has been developed for use in a wide range of products, such as computer memories and electronic calculators, unmatched in the world market for their speed of operation and economy in cost.

Strong growth throughout the seventies is expected in word processing systems, minicomputers, electronic calculators, point-of-transaction systems, and peripherals used in telecommunications. As the trend to more applications of automatic data processing equipment continues, the terminal market is expected to expand sharply. Increasing numbers of these products, offering greater productivity and higher efficiency, will find markets in retail business and in industry.

TYPEWRITERS

Shipments of typewriters in 1972 were estimated at $720 million, a gain of 6 percent over 1971. They are expected to increase 5 percent to $756 million in 1973. Imports of typewriters and parts in 1972 were estimated at $128 million, up 35 percent from 1971. Leading suppliers were the Federal Republic of Germany, followed by Japan, Italy and the United Kingdom. U.S. exports of typewriters and parts, valued at $46 million in 1972, are expected to increase slightly in 1973.

Use of word processing machines is expected to stimulate industry growth. These machines consist of an electric typewriter linked to a memory device such as magnetic tape, paper tape, or other storage medium. Sometimes used in conjunction with dictating equipment, word processing typewriters

Business Machines: Projections 1972–80 [1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
3572	Typewriters	720	6	756	5	1,192	6.5
3573	Electronic computing equipment	5,965	12	6,740	13	13,746	11.0
3574	Calculator and accounting machines	588	11	647	10	1,189	9.2
3579	Office machines (not elsewhere classified)	634	5	666	5	937	5.0

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

Business Machines: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	1,821	2,127	1,834*	1,813	1,942	7	2,069	7
Total employment (thousands)	85	78	73	59.5	67	14		
Production workers (thousands)	65	58	52	[1] 53	54	2		
Value added	1,313	1,314	1,459	1,236	NA			
Value added per production worker man-hour	$10.60	$11.80	$14.60	$16.30	NA			
Product: [3]								
Value of shipments:								
Typewriters (SIC 3572)	508	461	465	[1] 535	565	6	594	5
Calculating and accounting machines (SIC 3574)	631	577	543	600	672	12	773	15
Office machines, not elsewhere classified (SIC 3579)	418	555	508	534	561	5	589	5
Value of imports: [4]								
Typewriters and parts	62	72	99	94	128	35	131	3
Calculating and accounting machines	88	132	183	192	211	10	245	16
Office machines, not elsewhere classified	10	13	19	19	21	11	25	16
Value of exports: [5]								
Typewriters	41	37	50	42	46	8	47	2
Calculating and accounting machines	130	167	202	166	180	8	202	12
Office machines, not elsewhere classified	65	65	61	51	46	−10	48	5

[1] Estimated by Bureau of Domestic Commerce.

[2] Includes value of all products and services sold by the typewriter, calculating and accounting machines, and office machines, not elsewhere classified industries (SIC 3572, 3574, 3579).

[3] Includes value of shipments of typewriters, calculating and accounting machines, and office machines, not elsewhere classified made by all industries.

[4] Parts excluded except as noted.

[5] Parts included.

* In 1970 several companies classified in the calculator and accounting machine industry were shifted to other industries.

NOTE.—NA = Not available.

P Preliminary.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

are increasingly being used to reduce the cost of producing letters. The advantages of word processing include easy error correction, reduced time spent proofreading, rapid editing, faster typing, and the ability to store standardized letters in a readily accessible form. Sales and rentals of these systems are expected to reach $500 million a year in the next few years.

CALCULATORS AND ACCOUNTING MACHINES

Shipments of calculators and accounting machines, boosted by interest in electronic calculators and point-of-sale systems, are expected to increase 10 percent to $647 million in 1973, compared with an 11 percent increase in 1972 to shipments of $588 million. Electronic calculators are the result of successful application of advanced technology and production methods to office machines. Entire circuits are now manufactured in small single chips of silicon, known as MOS/LSI (metal oxide/large-scale integrated) chips.

MOS/LSI Boon to Producers

Development and application of MOS/LSI circuitry may enable U.S. manufacturers to compete with foreign makers, including the Japanese who have dominated the world market. Use of MOS/LSI technology reduced the labor required to manufacture calculators. Costs of producing MOS/LSI chips are being reduced. Another important component of the electronic calculator is the unit from which the figures are read. It consists of light-emitting diodes (LED's) and liquid crystal displays (LCD's). Price competition among domestic firms should be vigorous during most of 1973, especially in the smaller pocket size and desktop calculators.

Programmable Calculators

Electronic calculators for both office and scientific use, which can be programmed for specific data manipulation and storage of limited amounts of data, are in growing demand. In effect, such calculators are very small computers. Estimates of the potential worldwide market for this type of calculator range from $300 million to $600 million.

Japan is the Competition

Imports of electronic calculators from Japan for 1973 are expected to remain near the $90 million level of 1972 as U.S. products become more competitive and prices move down. Competition will be strongest in the lower priced desktop and pocket-sized calculators.

Until 1972, Japanese cartel agreements limited the minimum export prices of electronic calculators. Those price agreements have been suspended in the face of increased U.S. competition. Japan will maintain export quotas on the numbers of desktop calculators at about 40 percent above 1971 levels for the fiscal year 1973. Japan exported 550,000 units to the United States in 1971.

The world market for calculators in 1973 is estimated at $500 million to $1 billion. U.S. exports of electric/electronic calculators and components are expected to exceed $70 million annually within the next few years.

Cash Register Market Shifts to POS

Sales of point-of-sales (POS) systems which combine the functions of a cash register and a computer terminal are expected to top $120 million in 1973, up 50 percent from $80 million in 1972. The market is highly competitive; more than a dozen manufacturers are concentrating on the large retail chain stores using conventional cash registers.

The system with which manufacturers of point-of-sale equipment aim to replace the cash register offers significant advantages for inventory control, credit authorization, and monitoring and recording unit sales, reducing the time, paperwork, and manpower needed to handle sales information. With sales continuing to rise during 1973, most major retailers will probably be in the market for point-of-sale equipment. As those systems gain, sales of traditional cash registers can be expected to decline.

POS systems will bring a change in buying habits of retail stores. Armed with computerized analysis of sales, product by product, retailers will place different demands on distributors. POS systems help solve problems of product and tag coding and standardization. By 1980 all but small retailers probably will be using them.

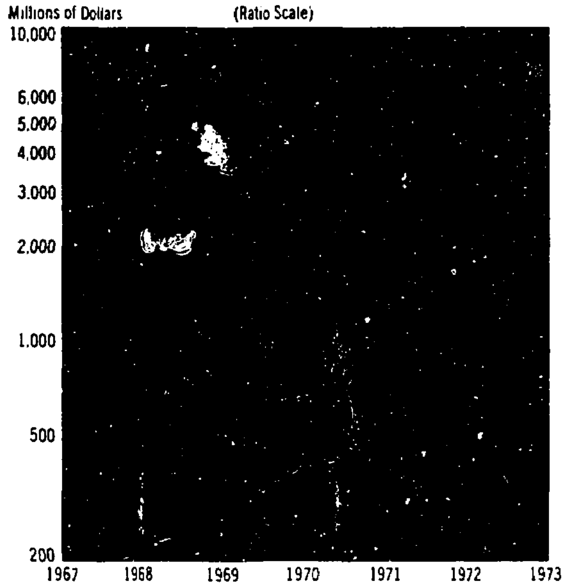
While the export potential of POS systems to Western Europe is excellent, the market there appears to be some two years behind that in the United States.

ELECTRONIC COMPUTING EQUIPMENT

Recovering from its poor performance in 1970 and 1971, the electronic computing industry, especially mainframe manufacturers, registered substantial gains in 1972, with shipments approaching $6 billion. Sales of data communications terminals, minicomputers, and semiconductor computer memories are showing strong growth.

Shipments of computers and related equipment are expected to total $6.7 billion in 1973, a gain of 14 percent from 1972. While imports have increased sharply in the last 3 years, to $210 million, they continue to be far exceeded by exports, estimated at $1.3 billion in 1972. In 1973 the trade

Business machines resume upswing



SOURCE: Bureau of the Census and Bureau of Domestic Commerce

Electronic Computing Industry: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [p]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	3, 761	5, 112	5, 232	5, 227	5, 965	14	6, 740	13
Total employment (thousands)	98	167	146	139	165	19		
Production workers (thousands)	50	69	67	61	NA			
Value added	1, 921	2, 730	2, 817	2, 825	NA			
Value added per production worker man-hour	$19	$19	$21	$23	NA			
Product: [3]								
Value of shipments	4, 049	5, 213	5, 628	5, 624	6, 299	12	7, 118	13
Value of imports [4]	20	37	60	119	210	77	250	19
Value of exports	475	786	1, 237	1, 262	1, 323	5	1, 624	23

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the electronic computing equipment industry (SIC 3573).
[3] Includes value of shipments of electronic computing equipment made by all industries.
[4] Parts excluded, (represents accounting, computing and data processing machines TSUSA 676.1500 and data processing machines not specsfically provided for).
[5] Computer related machines and statistical machines using punched cards or tape included (previous outlooks did not include these commodities).
[p] Preliminary.

NOTE.—NA = Not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

surplus is expected to continue, despite a 19 percent increase in imports to $250 million.

Exports of computer related equipment, peripherals, and parts increased some 10 percent from 1971, with Federal Republic of Germany, France, United Kingdom, and Japan the primary purchasers.

Antitrust Action Pending

Mainframe and independent peripheral manufacturers, the Justice Department, and IBM have been embroiled in several antitrust suits for the last 4 years. Independent peripheral manufacturers are concerned that alleged hardware bundling and pricing as practiced by IBM violates antitrust statutes. The Justice Department is looking at broader issues centering around potential monopoly. Actions that may be taken in the pending civil or Federal suits will be critical to the future of the U.S. electronic computer industry, which holds over 90 percent of the world market.

Security a Problem

Physical security has become more of a problem in the past few years as computer installations have been targets of radical attacks. As more companies move to teleprocessing and data communications, the possibility of malicious or unauthorized entry into a user's information file grows. As users ask for systems to limit access to data to authorized personnel only, more firms are offering software security systems.

The problem with software security systems, apart from their cost, is the lack of user technical expertise to evaluate their performance. In 1972, IBM announced plans to spend $40 million in a long range program to evaluate data security measures. Costs of data security systems are expected to add to software expenditures.

1972 Profile

Business Machines

SIC Codes	3572, 3573, 3574, 3579
Value of industry shipments (millions).	$7, 907
Total employment (thousands).	232
Exports as a percent of of product shipments.	20.0
Imports as a percent of apparent consumption.	8.0
Compound annual average rate of growth 1967–72 (percent):	
Value of product shipment (current dollars).	8.0
Value of exports (current dollars).	18.0
Value of imports (current dollars).	26.0
Major producing areas	California, Florida, Massachusetts, Minnesota, Ohio, Texas

Use of Minicomputers Broadening

Shipments of minicomputers in 1972 are estimated at around $200 million, with sales in 1973 expected to go well over $250 million. Prices are expected to continue to decrease with growth in unit shipments rising, possibly to $500 million by 1975.

Minicomputers generally have been used in process control, numerical control, scientific problem solving and data communications. Now more of them are being used for payroll and accounting purposes. Because of its relative low cost and flexibility, the minicomputer offers the businessman who cannot afford a large computer installation an efficient means of handling data processing and information needs. Its simplicity of operation also makes it easy to train personnel in its use.

Demand for minicomputers in France, Germany, and Japan is also good and is expected to grow at a greater rate than the market for larger computer systems. As domestic firms face greater competition in the United States, they are expected to seek expansion in foreign markets.

United States to Remain Competitive

U.S. domination of the world electronic computing market is expected to continue throughout the seventies. Industry shipments are expected to top $13 billion by 1980 as the applications of computers and related devices continue to broaden, a growth of 11 percent a year from 1972. Advanced electronic devices such as semiconductor memories in computers will keep U.S. products competitive. Increased user sophistication will result in wider applications for electronic data processing equipment and continue to provide markets for new products. The trend to greater expenditures for software and lower costs of hardware will accelerate.

The potential of the East Europe market for computing equipment is estimated by industry observers at from $400 million to $800 million annually throughout the seventies. The U.S.S.R. showed strong interest in large computers, minicomputers, and peripherals at the American Computer Exhibit in Moscow in 1972. The French, British, German, and Japanese are currently gaining a foothold in the East European market. A comparison of installed computers in the United States with Soviet installations indicates the growth possibilities. The U.S.S.R. has approximately 5,500 computers. All the other Communist bloc nations together have probably 1,000 to 1,500. The United States has more than 80,000.

The U.S.S.R. and other Communist bloc nations have a joint venture aimed at producing third generation computers to meet domestic needs, but it has just begun, and is not expected to be able to meet demands in the bloc during the seventies. Consequently, U.S. equipment should still be in demand.

Storage Media

Considerable research and development is under way in memory technology, both for mainframe memories and for auxiliary storage. The focus of this research is the present electromechanical peripherals market, primarily magnetic tape, disc, and drum units. Using semiconductor, domain-tip propagation, or other advanced techniques such as bubble memories, manufacturers hope to replace the existing electromechanical units with faster and less costly ones.

Outlook for 1980

Buoyed by expansion anticipated in the electronic computing industry, business machine industry shipments are expected to grow 10 percent annually and approach $20 billion by 1980. Exports should climb to $3.5 billion during these years. Shipments of electronic computer equipment companies will probably rise an estimated 11 percent annually, reaching $13 billion by the end of the decade. The most significant trend in the industry is the further utilization of advanced electronic circuitry to improve productivity and reliability in industry products.—*Stephen L. Schilling, Office of Business Research and Analysis.*

CHAPTER 32

Electronic Equipment and Components

Shipments of all U.S. electronic manufacturing industries in 1972 reached a record total of $25.6 billion, 7 percent over the 1971 figure. A further gain expected in 1973 should bring shipments to a new high of nearly $26.9 billion.

The 1972 advance occurred despite continuing heavy market inroads by imported consumer electronic products.

Following a depressed market in 1971, increases in consumer product shipments contributed significantly to recovery in the components segment of the industry. Record sales of color TV sets were a major factor in shipment gains.

Telecommunications Again a Leader

A gain of 7 percent in 1972 over the previous year in shipments of telephone and telegraph equipment resulted mainly from an increase in telephone installations, particularly in the business community, and rate increases in many sections of the country. New U.S.-manufactured PABX equipment, competitive with foreign-made installations, will strengthen the position of domestic manufacturers.

In recent years the communication and control industry has developed one-way tone/digital communications systems to transmit alarms from remote stations. Earlier systems were limited to either monitoring or control functions. Increased operating costs now demand the capability of both remote monitoring and control.

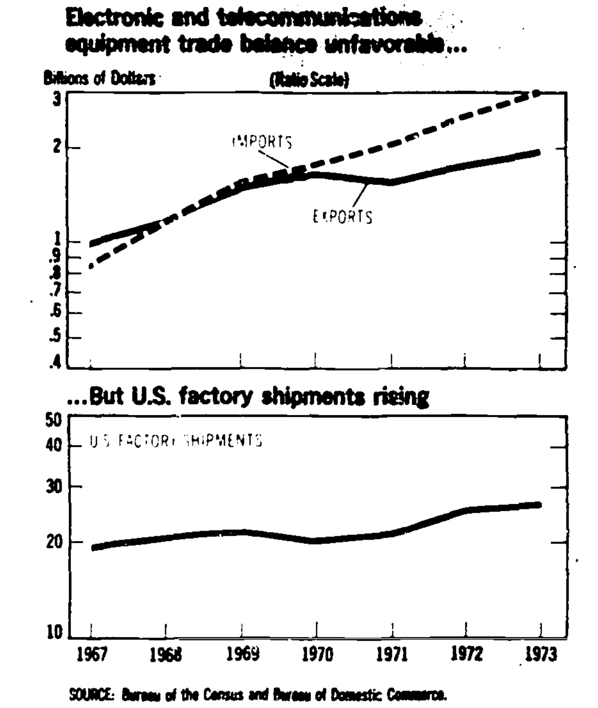
The industry has also introduced a two-way digital system for communicating with a remote terminal by wire or voice radio channel. Reports can be received from the remote terminal indicating status of devices, condition of operating equipment, and environment. The dispatcher can manipulate up to eight two-stage control devices, or 16 one-stage control devices (using one code bit per control).

Electronic Equipment and Components: Projections 1972–80 [1]

[Value of shipments in millions of dollars except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
	Value of industry shipments, total	$25,620	7	$26,895	4	$34,560	4.2
3651	Consumer products	4,320	6	4,360	1	3,400	−2.5
3652	Phonograph records	520	2	530	2	545	1.1
3661	Telephone and telegraph equipment	3,775	7	4,265	13	9,000	11.5
3662	Electronic equipment	9,170	5	9,540	4	12,000	4.1
367	Electronic components	7,160	7	7,485	4	8,690	2.2
	Research and development [3]	675	7	720	8	925	4.3

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth.
[3] Receipts on billings not reported as shipments of specific products.



The petroleum and gas industry will find the system useful for control and monitoring of remote wells and pumping/compressor stations. Utilities will find similar applications in distribution and transmission.

Recovery in Components Market

Rising demand for consumer electronic products in 1972 helped bring a reversal of the depressed electronic components market, giving rise to new optimism for 1973. Increased purchases of electronic entertainment products, leading to higher consumption of electronic components, are expected. Higher levels of industrial activity will stimulate market demands for data processing equipment, electronic controls, and similar industrial equipment.

New Legislation Sought

The continuing growth of imports of consumer electronic products and communications products prompted the introduction in the recently-adjourned 92nd Congress of legislative proposals to benefit the electronic industries. Measures proposed included the establishment of import quotas, reduction or elimination of incentives for U.S. firms to establish foreign subsidiaries and modification of present tariff regulations that permit low duties on products imported into the United States after they have been assembled abroad from U.S.-made parts and components. The import tariff for such products now is applied only to the foreign labor content of the product, or the value added to the sum of the value of the U.S. parts by their being assembled into a finished article.

Trade With East Bloc Soon

A trade mission to the Soviet Union and Poland in September 1972 may be important in establishing trade relations in the telecommunications industries with Eastern Europe. The mission, jointly supported by the Commerce Department and the Electronic Industries Association, comprised executives from 12 electronic firms. Major expansion of telephone units in the Soviet Union is planned. Comparable expansion is contemplated in Poland. Television broadcasting is another area in which Russia wants to improve. The growth potential for electronic communications equipment in those countries is great.

The U.S.S.R./Poland mission on telecommunications thrusts into virtually untested markets.—*L. H. Niemann, Office of Business Research and Analysis.*

CONSUMER ELECTRONICS

Shipments of the consumer electronic industry rose 6 percent to $4.3 billion in 1972 and are ex-

1972 Profile

Consumer Electronics

SIC code	3651
Value of industry shipments (millions).	$4,320
Number of establishments	89
Total employment (thousands).	97
Exports as a percent of products shipments.	5
Imports as a percent of apparent consumption.	43
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (Current Dollars).	1.2
Value of exports (Current Dollars).	16.6
Value of imports (Current Dollars).	27.0
Employment	1.6
Major producing areas	North Central, Northeastern States

Radio and Television Receiving Sets: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [P]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	3, 846	4, 054	3, 595	4, 035	4, 320	6	4, 360	1
Total employment (thousands)	117	106	90	91	97	6		
Production workers (thousands)	96	85	69	70	75	7		
Value added	1, 405	1, 585	1, 388	1, 531	NA			
Value added per production worker man-hour	$7. 66	$9. 72	$10. 62	$11. 60	NA			
Product: [3]								
Value of shipments, total	3, 568	3, 569	2, 919	3, 600 [1]	3, 950	9	3, 990	1
Quantity shipped, total domestically produced (thousands):								
Television sets:								
Monochrome	4, 738	4, 247	3, 734	3, 033	3, 300	10	3, 450	5
Color	5, 019	5, 139	4, 465	5, 631	6, 700	19	7, 870	10
Radios	19, 257	17, 525	13, 628	14, 068	14, 400	2	14, 000	−3
Phonographs	4, 478	4, 990	3, 951	4, 068	3, 800	−6	3, 880	2
Value of imports	533	1, 078	1, 274	1, 487	1, 770	19	2, 100	19
Value of exports	93	140	161	190	200	5	210	5
Wholesale price indexes (1967=100):								
Radio	100	95. 6	94. 7	94. 2	92. 7	−2		
Television	100	93. 0	91. 9	92. 8	91. 9	−1		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the radio and TV set industry (SIC 3651).
[3] Includes value of shipments of consumer electronics products made by all industries.

P = Preliminary.

NOTE—NA = not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

pected to remain at that level in 1973. Increase in consumer demand for entertainment products is expected to stem from the growth in disposable personal income and general improvement in consumer confidence. However, almost a third of this consumer electronics market in 1973 is expected to be satisfied by imported products, with a consequent dampening effect on domestic shipments.

Television set production remains the largest segment of the consumer electronic industry, constituting over two-thirds of the value of total domestic shipments. Color TV sets valued at $2.2 billion accounted for 88 percent of the $2.5 billion in television sets shipped in 1972. By 1973 TV shipments should increase to nearly $2.9 billion, most of which will be color sets. Unit shipments should total 11.3 million sets in 1973—7.9 million color and 3.4 million monochrome.

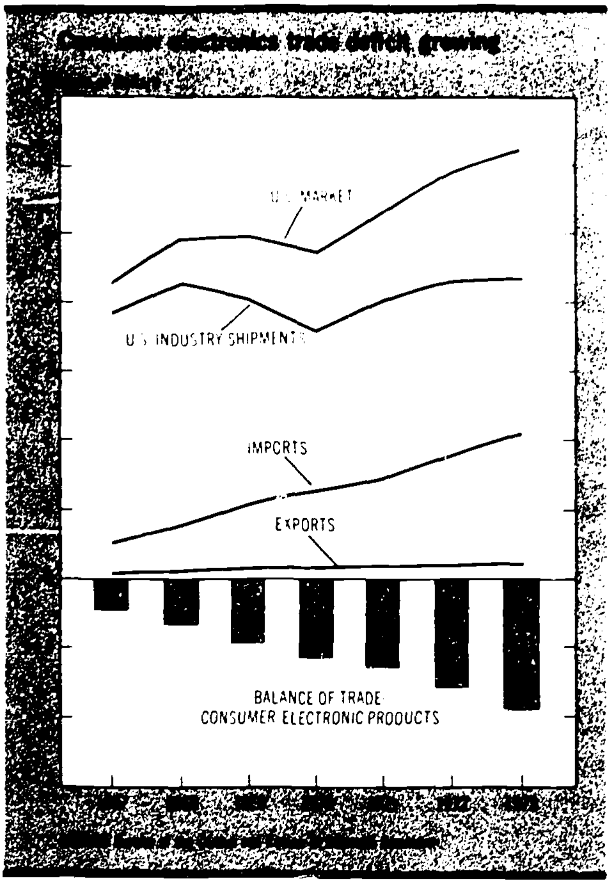
Imported TV sets, tape players, tape recorders, and transistorized pocket and table model radios have made extensive inroads into the U.S. consumer electronics market. Most of the remaining domestic radio production base is devoted to auto radios, which accounted for 9 million of the 14 million radios produced in 1971. Shipments of phonographs are expected to recover in 1973 to reach 3.9 million units.

TV Prices Decline

The average factory price of color TV receivers dropped $10 in 1972 to $328 while the average factory price of a monochrome TV receiver was $3 below the 1971 level of $86. There has been no substantial shift in product mix during this period. Average factory prices of radios in 1972 remained at the 1971 level of $16 and phonograph prices dropped from $42 in 1971 to $34 in 1972.

Imports Continue To Rise

In 1971 imports of monochrome and color television receivers totaled $413 million, radio receivers $360 million, and tape recorders and tape players of all types $355 million. In 1972, imports of all consumer electronic products totaled $1.7 billion, up 19 percent from 1971, and represented 41 percent of the value of domestic shipments. In 1973, imports are expected to reach $2.1 billion. Japan, Taiwan, Mexico, and Hong Kong continue to be the principal suppliers, providing the United States with nearly 90 percent of all consumer electronic product imports.



Nearly half of all U.S. consumer electronic imports are radio and television receivers. Japan, continuing to exert the greatest impact on this complex U.S. market, provided more than 70 percent of all U.S. imports of consumer electronic products in 1972. Value of these Japanese products was over $1.2 billion.

In May 1972, on the basis of complaints by domestic producers, the Treasury Department issued a notice of countervailing duty proceeding to determine whether an alleged series of government incentives to Japanese manufacturers and exporters of consumer electronic products constitute "bounties or grants" within the meaning of the countervailing duty provisions of U.S. tariff law. If an affirmative determination is made, countervailing duties will be imposed on these products to offset the bounties or grants.

Indications are that U.S. manufacturers through their overseas subsidiaries (mainly in Taiwan and Mexico) are making substantial inroads into Japan's share of the U.S. import market, particularly in monochrome television sets.

Exports Overstated

In 1972 exports of consumer electronic products rose 5 percent above 1971 to $200 million and are expected to reach $210 million in 1973. Nearly all of this increase comes from rapid expansion in exports of TV chassis and unassembled TV kits, principally to Mexico, where they are assembled and returned to the U.S. as TV sets under the provisions of item 807.00 of the Tariff Schedule of the United States. This permits U.S. producers to manufacture equipment using U.S. components at their facilities in Mexico or other countries, return completed products to the United States, and pay duty only on the value added through assembly. Inclusion of these items as exports overstates the real U.S. export levels.

Most of the consumer electronics exports consisted of color and monochrome television receivers, phonograph record players, loudspeakers, and radio receivers. Major customers for these items in 1971 were Canada $64 million, Mexico $30 million, and West Germany $16 million. These same countries will probably continue to absorb the major portion of U.S. consumer electronic exports. Forty percent of the exports to Canada are color TV receivers and another 20 percent are auto radios. Nearly half of the consumer electronic exports to Mexico are TV chassis and unassembled kits for use by U.S. facilities operating under Mexico's "Border Industries Program." A substantial part of the U.S. exports to Germany are coin-operated phonographs. Although the German market at present is rather small, it has promise for the future.

The U.S. share of world exports of television receivers had declined from 13 percent in 1966 to 7.5 percent in 1970, but the share for radio receivers has remained constant at 2.6 percent.

Employment in the consumer electronics industry is estimated at 97,000 in 1972, up 6 percent over the 1971 level. Wages also continued to rise, with average hourly earnings up 5 percent to $3.31.

Color TV Competitive Position Improved

The Administration's actions in the realignment of international exchange rates, together with steady or declining prices of domestic products, improved the U.S. competitive position vis-a-vis Japan, the primary foreign supplier with the predominant share of the U.S. color TV import total. Domestically produced color sets held at and in some cases dropped below 1971 price levels.

Conversely, the price of imports of Japanese sets increased an average of 15 percent. As a result, imports of Japanese color sets held in the range of 1971 imports. This development is particularly significant because the average annual increases of imported Japanese color TVs between 1966 and 1971 by set count ran 59 percent. In addition, the slowdown in Japanese import growth occurred in the period of a record United States sales year in color TVs. In other consumer electronic product areas, the effect of monetary changes has been minimal because the U.S. has largely lost its production base. This would be in such products as radios (other than auto), tape recorders and tape players and hi-fi equipment.

Outlook for 1980

Important products to emerge recently are the 8-track cartridge tape player and recorder, both expected to assume significance in the consumer electronics market of the seventies. Although only a few manufacturers now offer quadrasonic playback equipment for prerecorded tapes, other manufacturers are expected to share in meeting demand for this promising newcomer.

By the midseventies home video tape systems will probably help boost demand for electronic entertainment equipment. In the early stages, these systems will provide only the playback function from cassette or cartridge type units. Prerecorded video tapes promise to become an important new market, with manufacturers already making plans for its development. As the cost of recording equipment, including cameras, declines, demand will rise for units with both recording and playback functions, providing an excellent stimulus to the consumer electronic market in the last half of the decade.

By 1980 the home electronic communications system will be a reality, providing a 24-hour communications capability with banking, educational, retail and service facilities. The system, presently under trial in selected locations, performs both data transmission and data copy functions. The Japanese can already provide much of this equipment at moderate prices.

Import Growth to Continue

Although domestic demand for consumer electronic products is expected to grow substantially by 1980, imports will probably continue to satisfy an increasing share of the market. Unless the trend changes, the value of imported consumer electronic products will exceed the value of those produced domestically by 1980. The Japanese, as the leading supplier of such equipment, will continue to be a key factor in the future.—*I. J. Morrison, Office of Business Research and Analysis.*

TELEPHONE AND TELEGRAPH EQUIPMENT

Shipments of telephone and telegraph equipment are expected to reach about $4.3 billion in 1973, an increase of 13 percent over the estimated $3.8 billion for 1972. The expansion of business activity, coupled with rate increases for the operating companies, has encouraged equipment orders. Rate increases place operating companies in position to raise capital for expansion through equity financing. Their calls on the manufacturing

Telephone and Telegraph Equipment: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	2,624	3,380	3,800	4,020	4,300	7	4,900	14
Total employment (thousands)	134	152	163	165	167	1	-----	
Product: [3]								
Value of shipments	2,229	2,941	3,328	3,538	3,775	6	4,266	13
Value of imports	31	34	55	79	85	9	94	10
Value of exports	46	69	76	61	73	20	88	21

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the telephone and telegraph equipment industry (SIC 3661).
[3] Includes value of shipments of telephone and telegraph equipment made by all industries.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce, and industry reports.

segment of the industry provide the impetus for a significant gain in 1973 shipments.

The excess of equipment imports should continue to decline in 1973 to about $6 million, down from $18 million in 1971 and $12 million in 1972. The first such excess of imports came in 1971. It was caused by several factors: The East Coast dock strike delayed exports of bulky telephone equipment; large orders had been placed abroad by operating companies in 1970, to catch up on a backlog that domestic producers could not fully meet; Japanese companies entered the customer-owned equipment market.

Exports should reach $88 million in 1973, up about 21 percent from 1972. Imports, which have increased significantly since 1969, are expected to be about $94 million, 10 percent more than in 1972.

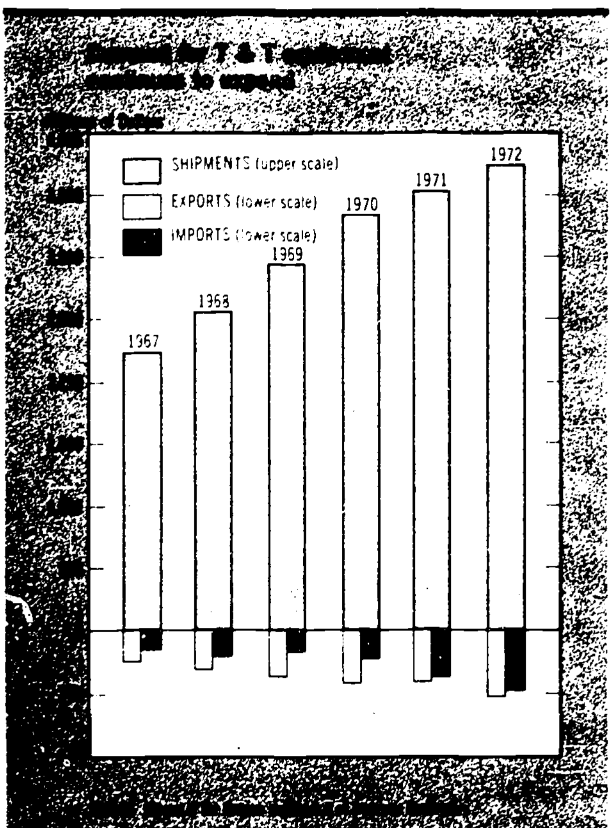
Production Slowdown

After record advances made by the industry in 1969 and 1970 to meet backlog requirements, production slowed in 1971. There were strikes against telegraph and telephone operating companies and a number of equipment manufacturing plants. Many independent operating companies failed to obtain from public utility commissions rate increases they claimed were needed to help raise capital for required equipment. The economy was sluggish.

All those factors limited production in 1972 to a modest gain over 1971. Equipment manufacturers dependent on orders from the telegraph and independent telephone operating segment were particularly affected. Employment dropped in a number of plants.

Expansion of the economy in 1972, reflected in the high rate of telephone installations—particularly in the business community—and rate increases in some areas have brought an increase in orders for equipment that will raise industry shipments in 1973.

Major producing plants are located in California, Illinois, Indiana, Massachusetts, New Jersey, New York, North Carolina, Ohio, Tennessee, and Virginia. Major plants were opened in Denver and Dallas in 1972. And new plants were under construction in Atlanta, Richmond, Vancouver, Wash., and San Ramon, Calif.



Household Demand Key to Growth

Growth of households continues as the main source of expansion for the telephone and telegraph operating industry. The number of households exceeded 66 million in 1972, up from the 65 million of the previous year, and is expected to increase at about 1.2 million per year for the remainder of the seventies. Each household is a potential customer for various types of services from telephones to mailgrams, constituting a constant demand source for the manufacturing industry. Manufacturers produced on order only until recent years and did not depend on price competition. In the field of private branch exchange equipment for offices, hotels, and motels, U.S. manufacturers now have to compete with foreign suppliers and other U.S. firms entering the communications equipment field for the first time. One major U.S. company introduced three different types of private branch exchanges in late 1971, all in the price range offered by foreign manufacturers.

Industry Levels Affect Many

Thousands of suppliers who help communications manufacturers meet the needs of the telephone and telegraph operating segment will share in the growth of the equipment manufacturing industry. One single manufacturer spent $2.7 billion in 1971 for materials and services from about 50,000 suppliers in more than 4,000 communities in every State of the Union. Over 90 percent of the suppliers, who provide that manufacturer with 150,000 separate items, are small businesses.

Data Transmission Continues Upward

Data transmission service provided by the telephone and telegraph industry continued its upward trend in 1972 in the business community and in local, State, and Federal governments. Revenues from teleprinter exchange service of the major supplier reached $38.1 million in the first quarter of 1972, compared with $15.4 million for the like period of the previous year. The number of teleprinter subscribers reached 83,000 at the end of 1971, an increase of about 11 percent over the 1970 figure of 76,000.

This growing demand is translated into orders for teletypewriters, data sets, and peripheral equipment. However, in 1972 production of data sets declined to about 75,000 from the all-time high of 104,000 in 1969, partly because of cuts in defense procurement. Sales of new data access arrangements offset losses in sales of modems—data transmission sets which must be connected to telephone circuits. Much of this equipment is produced by about 40 companies outside the telephone and telegraph equipment industry.

Demand Met Through New Equipment

In recent years the industry has introduced more sophisticated equipment to meet the expansion programs of the telephone and telegraph operating segment. Included among these developments are electronic solid-state exchange equipment, high-speed teletypewriters, long-haul digital data transmission systems, and use of microwave techniques in burglar and fire alarm systems. Small, inexpensive electronic private branch exchanges, with capacities from 60 lines to 400 lines, were introduced by the industry in 1972 to compete with foreign companies and U.S. suppliers outside the industry for the customer-owned equipment market. The *Carterfone* decision of a few years ago, permitting the attachment of foreign devices to telephone equipment, opened the door to that market. Innovations the industry is expected to apply in the near future include the magnetic bubble technology in telephone systems and laser beams in existing communications and satellite systems.

1972 Profile

Telephone and Telegraph Equipment

SIC Code	3661
Value of shipments (million)	$3,800
Number of establishments	92
Employment (thousands)	167
Exports as a percent of shipments	2.0
Imports as a percent of apparent consumption	2.1
Compound annual average rates of growth 1967–72 (percent):	
Value of shipments	12
Value of exports	10
Value of imports	23
Employment	4
Major producing areas	Illinois, New Jersey, North Carolina, New York, California, Ohio, Indiana, Tennessee, Virginia, and Massachusetts

Exports Recover in 1972

Returning to their 1970 level after a sharp drop of 20 percent in 1971, exports of telephone and telegraph equipment totaled about $73 million in 1972, a gain of 20 percent. Most of the exports are to support U.S. forces abroad. Because of differences in equipment prices and standards and availability of attractive financing from competing countries, U.S. manufacturers rely on subsidiaries in Europe to compete for the foreign commercial market.

The 9-percent increase in imports in 1972, to $85 million from $79 million in 1971, was the lowest in 4 years because of a decline in imports of components and crossbar equipment from Canada. Imports of telephone equipment from Japan approximated $31 million, about 3 percent over the $30 million of the previous year.

Industry and the Environment

In addition to reducing pollution in existing plants to levels prescribed by law, the telephone and telegraph equipment industry is also applying processes to convert waste materials into usable items, using new ways of manufacturing that minimize waste byproducts, and installing abatement devices. The industry is presently searching for ways to use recycled materials. One manufacturer,

Electronics Systems and Equipment: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	8, 556	9, 653	9, 331	8, 733	9, 170	5	9, 540	4
Total employment (thousands)	410	413	390	348	337	−3		
Production workers (thousands)	221	204	185	161	154	4		
Value added	5, 156	6, 170	6, 040	5, 428	NA			
Value added per production worker man-hour	$11. 53	$15. 06	$16. 52	$17. 92	NA			
Product: [3]								
Value of shipments	7, 482	8, 506	8, 287	[1] 7, 775	8, 165	5	8, 490	4
Value of imports	118	213	163	194	218	12	240	9
Value of exports	441	604	549	555	658	19	690	5

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the electronic systems and equipment industry (SIC 3662).
[3] Includes value of shipments of electronic systems and equipment made by all industries.
P Preliminary.

NOTE.—NA=not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

for instance, is working with paper companies to produce recycled paper stock suitable for use in telephone directories.

Outlook for 1980

Shipments of telephone and telegraph equipment should increase an average of 11.5 percent a year to approximately $9 billion in 1980, in response to demand for all types of communication devices—from the traditional telephone set and data communications equipment to ground station requirements for domestic satellite communications systems planned for 1974. Telephone and telegraph equipment manufacturers will open five additional plants in 1973 to meet those future requirements, as well as to carry out the program to convert about 250 central office switching centers to electronic switching in the upcoming year.

As to data communications, the A.T. & T. Bell System is expanding short-haul digital systems at the rate of 50 percent a year and introducing its T2 long-haul digital systems. The T2 system provides data over distances of up to 500 miles.

Telephone operating companies, including new carriers to the field, are planning to spend billions of dollars during the seventies for the expansion of telephone and data service and implementation of domestic satellite systems. Independent telephone companies will spend about $26 billion over that period. Manufacturers who depend on orders from the independent operating segments will have to compete with foreign firms for the customer-owned equipment market in the years ahead.

Exports and imports will continue upward at compounded annual rates of growth of 15 percent and 12 percent respectively for the remainder of the decade. U.S. trade will continue to be affected by the development of new foreign markets and the importation of components from U.S. subsidiaries in Canada and Europe.—*Mario J. Molinari, Office of Business Research and Analysis.*

ELECTRONIC SYSTEMS AND EQUIPMENT

Shipments of commercial, industrial, and Government electronic systems and equipment are

1972 Profile

Electronics Systems and Equipment

SIC Code	3662
Value of industry shipments (millions)	$9,170
Number of establishments	600
Employment (thousands)	337
Exports as a percent of product shipments	8.0
Imports as a percent of apparent consumption	2.5
Compound annual rates of growth 1967–72 (percent):	
Value of shipments (current dollars).	1.4
Value of exports (current dollars).	8.4
Value of imports (current dollars).	13.0
Employment	−2.2
Major producing areas	California, Illinois, New York, Pennsylvania

expected to reach $9.5 billion in 1973, up about 4 percent from the $9.2 billion level of 1972.

Mixed Trends in Government Funding

Department of Defense prime contract awards for communications systems and equipment were estimated at $978 million in fiscal year 1972, down 30 percent from a year earlier. A further 18 percent decline was anticipated in fiscal year 1973 to around $800 million. Procurement of military weapons systems, which determines over 80 percent of defense electronics systems and equipment production, will remain relatively constant during fiscal year 1973. However, Department of Defense spending on research, development, test and evaluation of electronic systems and equipment in fiscal year 1973 should remain at the previous year's level of $2.7 billion.

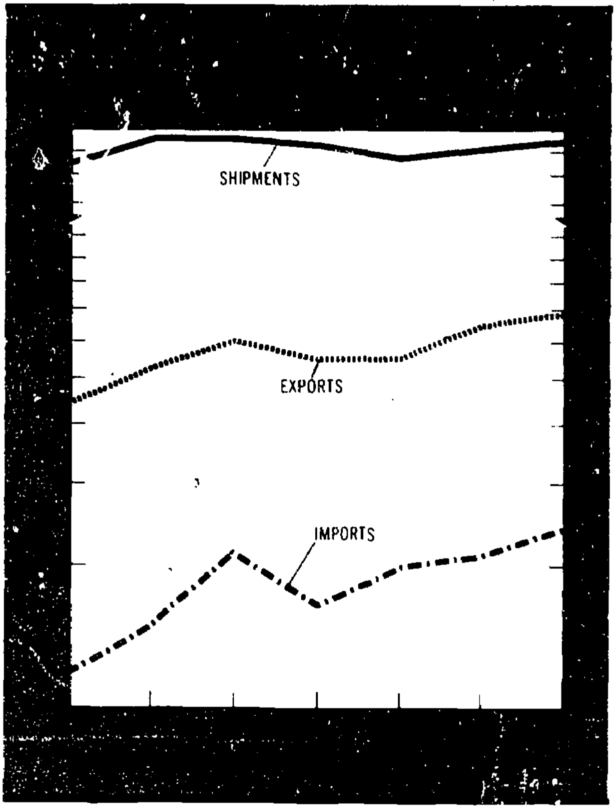
The Federal Aviation Administration's appropriation for communications and electronics equipment in fiscal 1973 of $303 million is below the $320 million appropriated in fiscal 1972. Nearly $138 million of these funds will be used for the procurement of navigational aids, air traffic control equipment and communications equipment in support of the enroute air traffic control system and the continuing airport improvement program. The remainder will be used for construction work associated with these programs, including steel towers and shelters needed to house communications and electronics equipment.

FAA's research and development appropriations for fiscal 1973 are $66 million, $5 million over the year earlier. More than $28 million of this appropriation is to be used for research and development activities in the field of navigational aids, microwave instrument landing systems, collision avoidance equipment, and airborne communications equipment.

The National Aeronautics and Space Administration's budget for electronics decreased from $931 million in fiscal year 1972 to $895 million in fiscal year 1973. These funds are for electronics and communications support on the experimental short take off and landing aircraft (STOL), the Space Shuttle, the Skylab experimental space station, and the unmanned Viking Mars lander.

Many Uses for Rapid Data Communications

Use of data communications has risen sharply in recent years, especially in areas where quick reaction capability is of utmost importance. For ex-



ample, in the law enforcement field, police cars are being equipped with data terminals which permit rapid two-way transmission of information between mobile units and control centers. By using a single voice channel for data transmission, the amount of information sent can be expanded extensively, alleviating overcrowding of law enforcement radio channels.

Environmental monitoring will require vast networks of hydrological, meteorological and radiological sensors capable of transmitting information in either analog or digital form to remote sites. Similar techniques are being used by electrical power companies, pipeline systems, railroads and other industries to furnish complete and up-to-date information for operation control.

Specialized data communications service organizations are being established to exchange necessary management information on an intracompany and intercompany basis. For example, the trucking industry requires that a large volume of documentation and information be exchanged quickly and accurately to insure efficient operations and proper management.

Exports Exceed Imports

Exports of communications and electronic equipment should reach $690 million in 1973, a 5-percent increase over 1972 levels. These exports consist of equipment for radio communications, radio and television broadcasting, and electronic navigational aids and radar. The bulk of U.S. exports are shipped to Canada, Italy, United Kingdom, Japan, and West Germany.

Imports, which rose to $218 million in 1972 and are expected to reach $240 million in 1973, consist of radio and television apparatus and parts, radio telecommunications navigational aid apparatus, remote control equipment, and parts. Mexico, Taiwan, Japan and Canada continue to supply the major portion of imports. Except for Japan, a large portion of U.S. imports are manufactured by American subsidiaries in these countries.

During the first 6 months of 1972, the balance of trade in commercial, military, and electronic industry products rose 30 percent over the same period in 1971 while rapidly growing exports were three times as great as imports. Export expansion possibilities are greatest for this group of commercial, and military and industrial system.

Employment Decline Continues

Employment in the commercial, industrial, and military electronics industry continued to decline in 1972, dropping 3 percent below 1971 levels to an estimated 337,000. Production workers account for about 46 percent of total employment.

Prospects for 1980

The value of industry shipments is expected to increase 4.1 percent yearly to $12.6 billion in 1980. This relatively low rate of increase in industry output will be due to the leveling off of military electronic systems and equipment procurement during the 1970's. Commercial electronics production is expected to grow at a much higher rate. Application of computer techniques to telecommunications systems operations and increasing automation of commercial, industrial and military electronics systems will contribute to sales gains in the next several years.

Integrated circuits emphasizing microminiaturization will play an important role in the manufacture of complex communications and electronics equipment. Sophisticated techniques developed for the space program will find increasing application in the manufacture of electronic equipment, providing such equipment with a high degree of reliability and efficiency by reducing "down time" and minimizing service requirements.

The electronic content of the DOD budget should continue to grow at a moderate rate, with electronics playing a greater role in the future. As an example, electronic subsystems are being used for remote control of unmanned aircraft. Procurement of major weapons systems with high electronic content in the mid-1970's will also contribute to the growth of military electronics. A leveling off of the electronics content of the Defense budget is likely by 1980, with nonhardware items such as operation and maintenance and personnel costs accounting for a greater share of DOD expenditures.—*Ivan J. Morrison, Office of Business Research and Analysis.*

ELECTRONIC COMPONENTS

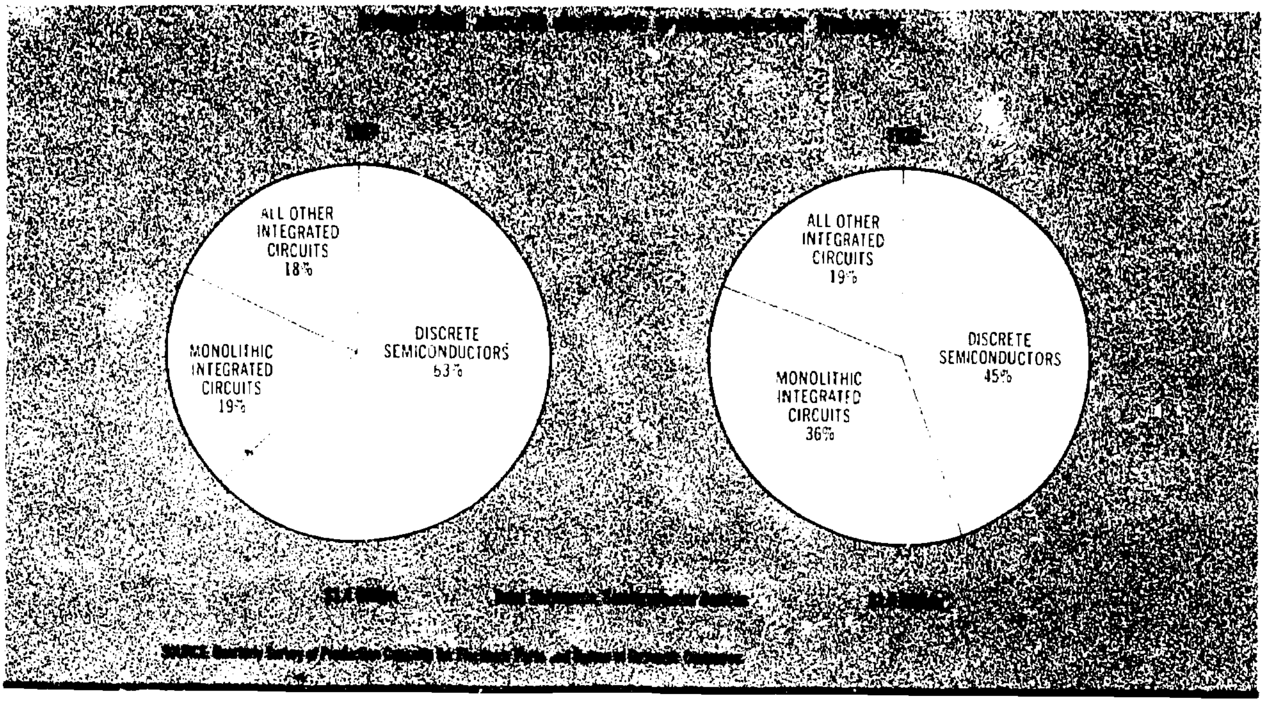
Shipments by all electronic component producers are expected to rise to $6 billion in 1973, up 4.5 percent from the 1972 level of $5.75 billion. Industry shipments are expected to rise by 4 percent to about $7.5 billion.

Greater demand anticipated for consumer electronic products in 1973 will be the primary reason for the projected gains in component shipments. Although imported products account for a larger share of the consumer market, offshore facilities of U.S. manufacturers are using an increasing number of U.S. components, minimizing the impact of such imports. Computers and industrial controls will also continue to require a significant share of the components market. With the reduction of the United States ground combat role in Vietnam, electronic component requirements for the defense sector are not expected to increase much over the $800 million level, or about 17 percent of the total market.

Growth in disposable personal income and a return of consumer confidence will be reflected in increased purchases of electronic entertainment products and consequently the consumption of larger quantities of electronic components.

Most Prices Stable

Since 1967 the number of production facilities manufacturing color TV picture tubes have declined, resulting in a tightly controlled market. With present upturn in demand for such tubes



from this smaller number of producers, prices have generally moved upward.

Except for receiving tubes and integrated circuits, prices of electronic components are relatively stable. Receiving tubes are used more extensively in the replacement market where they command higher prices. The stiff competition that characterizes the market for integrated circuits continues to reduce their prices. With the movement toward large scale integration (LSI), the price per functional unit will tend to decline below present levels.

While the rate of mergers among manufacturers seems to be subsiding, some larger corporations have consolidated facilities to improve their competitive position. Increased demands for electronic components in 1973 should stablize these conditions.

Major production facilities of the electronic component industries are concentrated in Massachusetts, New York, New Jersey, Pennsylvania, Indiana, Illinois, and California, with some additional establishments located in 36 states.

Employment Recovers

Estimated 1972 employment in the electronic component industries was 356,000, up 6 percent from 1971 to equal 1970 levels. Average hourly earnings rose only 3 percent in 1972 to $3.12. In addition, average weekly hours rose slightly above 1971, reflecting the increased activity.

Advanced Technology—Key Factor

Advanced component technology usually precedes the development of new equipment. An example of this is Bell Laboratories' development of charged-coupled devices (CCD's) making possible the first all solid-state color TV camera. These devices replace the more complex and cumbersome camera tube and are expected to lead to a new generation of such cameras, with substantial reductions in weight, size and power requirements.

Another area in which solid-state technology is making rapid advances is in telephone switching equipment. The new solid-state electronic switching system scheduled for service in 1976 to replace the present electromechanical system will be able to handle three times the number of calls of the older equipment. Other new products such as bubble memory devices and liquid crystals hold promise of a new generation of advanced electronic products.

With rapid technology changes and new product innovations, capital investments in advanced production equipment are imperative for a company to stay competitive.

1972 Profile

Electronic Components

SIC Code	367
Value of industry shipments (millions).	$7,160
Number of establishments	1,400
Total employment (thousands).	356
Exports as a percent of product shipments.	14.9
Imports as a percent of apparent consumption.	8.8
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	−0.8
Value of exports (current dollars).	16.6
Value of imports (current dollars).	27.0
Employment	−2.3
Major producing areas	Massachusetts, New York, New Jersey, Pennsylvania, Indiana, Illinois, and California

Integrated circuits, which are the product of advanced solid-state technology, now dominate the semiconductor industry. In 1972 these integrated circuits, most of which were monolithic, represented 55 percent of the total value of all semiconductor shipments.

While pollution is not a major problem in the electronics industries, possibilities do exist for some water pollution in the discharge into local water systems of chemicals utilized in production processes. Efforts are being made to eliminate these potential hazards through recycling and filtration.

United States and Japan Leading Exporters

The United States is the largest supplier of active electronic components, shipping more than 40 percent of these products to world markets in 1970. Semiconductor parts accounted for 40 percent of U.S. exports of active components in 1971 and were shipped to U.S. offshore operations. At the same time, an estimated 53 percent of the value of these parts returned to the United States in the form of finished semiconductors under the provisions of Item 807.00 of the Tariff Schedules of the United States. Largest export markets for U.S. finished semiconductors are Japan and West Germany, while Mexico and Korea are the prime markets for semiconductor parts destined primarily for offshore operations of U.S. owned companies. U.S. dominance in semiconductors may be affected as other nations achieve production capabilities for this product.

While the United States ranked second to Japan in world exports in the passive component area, their combined shares declined from 44 percent in 1966 to 40 percent in 1970 divided almost equally—Japan, 20.8 percent and United States, 19.4 percent.

Principal U.S. export markets for components other than semiconductors are Canada, Mexico, United Kingdom, and West Germany, in that order.

Imports Outpace Exports

U.S. imports of electronic components have grown at nearly twice the rate of exports. By 1972 more than half of the $470 million components imported consisted of semiconductor devices and the remaining 45 percent almost entirely of electron tubes, capacitors, and resistors. The four leading suppliers to the United States in order of importance are Japan, Korea, United Kingdom, and Canada.

A number of major U.S. producers of electronic components have established production facilities in Europe to service the European countries and avoid existing tariff and nontariff barriers. In addition, other multinational corporations have established offshore operations, principally in the Far East and Mexico, to strengthen their competitive position domestically, and to combat the rising tide of imports. Between 1970 and 1971, the value of electronic component imports from these offshore facilities rose by 6.5 percent, and now represents 45 percent of the total imports of all electronic components. Mexico is the main source of these imports, which reached $52 million in 1971.

United States Acts on Trade Barriers

Some tariff changes are expected upon entry of the United Kingdom into the European Economic Community this January. Negotiations are under way with Japan to eliminate its import quotas on integrated circuits of 100 elements or larger. These quotas are nontariff barriers that have restricted U.S. trade with Japan in these products for sometime. Elimination of such quotas will open important markets to the United States in the future.

Presently there are problems arising in Europe as an outgrowth of the recent Multipartite Accord which would attempt to standardize the specifications of certain products as well as the inspection procedures to certify that they meet these specifications. The first products to come under this program will be electronic components. The Accord could represent a nontariff barrier to those countries who are not parties to the agreement.

The United States has been working for the establishment of a truly international standards organization with full participation of all members. U.S. industry in general and specifically the electronic industries will benefit if the Government continues to push for its full participation program in lieu of the present narrow European regional concept.

Effects of Stabilization Mixed

As a result of the President's Economic Stabilization Program, the wage/price guidelines appear to have slowed rising industry labor costs. The industry is still faced with rising costs for raw materials. Imposition of the import surcharge in 1971 and revaluation of currencies have had little depressing effect on electronic component imports.

Outlook for 1980 Optimistic

The electronic component industries are expected to grow an average of 2.5 percent annually from 1972 to yield shipments of nearly $8.7 billion in 1980.

Integrated circuits will play a prominent role in the development of new communication and electronic products. The consumer electronic industry in particular should benefit from this advanced technology. Continued high levels of spending for research and development should lead to new technological achievements. Products for commercial and industrial markets should increase in importance by 1980 while defense requirements remain relatively stable.

Charged coupled devices (CCD's), magnetic bubble memories, and electronic solid-state telephone switching systems are examples of new products likely to stimulate development of new electronic equipment and systems of the future.

The recent upturn in the demand for consumer electronic products promises higher levels of output in the component industries. However, the consumer market is served by a very complex manufacturing system consisting of foreign producers, domestic producers operating from domestic facilities, and domestic producers operating from offshore facilities. The latter two represent primary markets for U.S. components. Future U.S.

Electronic Components: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	7,453	7,722	7,224	6,715	7,160	7	7,480	4
Total employment (thousands)	403	406	355	336	356	6		
Production workers (thousands)	293	291	243	225	244	8		
Value added	4,359	4,731	4,401	4,093	NA			
Value added per production worker man-hour	$7.57	$8.28	$9.39	$8.55	NA			
Product: [3] Value of shipments, total	5,990	6,205	5,794 [r]	5,395	5,750	7	6,010	5
3671 Receiving tubes	254	238	212	207	200	−3	195	2
3672 TV picture tubes	823	580	464	509	535	5	560	5
3673 Transmitting and special purpose tubes	373	380	337	307	310	1	325	5
3674 Semiconductor and related devices	1,384	1,687	1,720	1,502	1,600	7	1,675	5
Semiconductor	879	936	832	687	720	5	750	4
Integrated circuits	505	751	888	815	880	8	925	5
3679 Other components (not elsewhere classified)	3,156	3,320 [r]	3,061 [r]	2,870	3,105	8	3,260	5
Value of imports	142	238	296	348	470	35	585	25
Value of exports	396	673	839	727	855	18	990	16

[1] Estimated by Bureau of Domestic Commerce.

[2] Includes value of all products and services sold by the electronic components industry (SIC 367).

[3] Includes value of shipments of electronic components made by all industries.

[r] Revised.

NOTE.—NA = Not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

components output will depend upon the degree of penetration of the U.S. consumer market by foreign producers.

Consumer products such as home video tape recorders and quadrasonic stereo systems are not expected to achieve the high growth rate attained by color television, but will contribute to the future growth of the electronic component industries.

Foreign Trade Increasing

Exports now are nearly 15 percent of the total U.S. component shipments while imports are less than 9 percent. However, with the continued rapid growth in imports, both exports and imports are expected to be at nearly the same level of $1.6 billion by 1980, thereby erasing what is currently a favorable trade balance. At that time, exports will probably represent nearly 23 percent of the value of product shipments.

Sophisticated electronic component exports will be most important to this industry for the balance of the seventies. Markets for these products will usually exist in the more advanced countries such as those in Western Europe, Japan, and possibly, the Eastern Bloc.

While growing needs of emerging nations may provide some new markets for U.S. components, they will primarily require low technology products that are highly competitive. U.S. production techniques and marketing methods will be important in determining the share of these markets the United States will gain in 1980.—*Jack Clifford and Gerard Sharpe, Office of Business Research and Analysis.*

CHAPTER 33

Motor Vehicles

The motor vehicle industry continued its upward surge throughout 1972. Combined total output of passenger cars, trucks and buses in 1972 was an estimated 11.4 million units for a new record, topping the 11 million units produced in 1965. Included are 8.8 million passenger cars and a record 2.5 million trucks and buses.

Retail sales in 1972 also reached an all-time high. Sales in the United States of North American-type passenger cars were estimated at a new high of over 9.3 million units, surpassing the 8.8 million units sold in 1965. Retail sales of trucks and buses in 1972 totaled about 2.6 million units.

Major efforts are being made to produce vehicles that meet the Government mandated antipollution standards and safety requirements. The industry is seeking power sources that emit fewer pollutants and still perform satisfactorily. Gas turbines are being installed experimentally in heavy trucks and buses.

Increased sales of motor vehicles are forecast for 1973, with domestic manufacturers expected to produce 9 million passenger cars and 2.6 million trucks and buses.

The 1973 U.S. retail passenger car market is expected to exceed 11 million units, including an estimated 1.5 million foreign-built cars. Truck and bus sales are estimated at 2.7 million units.—*Clayton J. Larson, Office of Business Research and Analysis.*

AUTOMOBILES

U.S. automobile manufacturers are expected to produce about 9 million passenger cars in 1973, 2 percent over the 8.8 million units produced in 1972. Production during 1972 exceeded the output of 8.6 million units in 1971 achieved as the industry recouped production lost during the 1970 strike.

Sales Continue Up

Today about 80 percent of the Nation's workers ride to their jobs in automobiles. Continuing movement of jobs and people to the suburbs creates a

Motor Vehicles: Projections 1972-80 [1]

[Shipments in millions of units except as noted]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
37111	Passenger Cars	8.8	2	9.0	2	11.0	2.8
37112, 37113	Truck and bus chassis	2.6	11	2.7	4	3.0	1.8
3715	Truck trailers (1,000) (including detachables)	174	43	170	−2	206	2.1

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

Automobiles: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]								
Value of shipments	19, 277	23, 542	18, 707	23, 200	23, 900	3	24, 400	2
Total employment (thousands)	341	397	354	390	390	0		
Quantity shipped, total (million units)	7. 4	8. 2	6. 6	8. 6	8. 8	2	9	2
Total imports value (millions)	1, 695. 2	3, 356. 2	3, 723. 3	5, 133. 7	5, 630	10		
Quantity (1,000 units)	1, 008	1, 841	2, 014	2, 587	2, 680	4		
Value of imports from Canada (in millions)	818. 0	1, 826. 6	1, 806. 1	2, 393. 1	2, 630	10		
Quantity of imports from Canada (units) [3]	310, 974	685, 007	690, 913	800, 176	880, 000	10		
Value of foreign built cars (millions) (excludes Canada)	877. 2	1, 529. 6	1, 917. 2	2, 740. 6	3, 000	9		
Quantity of foreign built cars (units) (excludes Canada)	697, 063	1, 156, 423	1, 322, 507	1, 787, 308	1, 800, 000	1		
Value of exports	823. 5	1, 023. 1	836. 6	1, 183. 3	1, 160	−2		
Quantity of exports (units)	281, 000	345, 000	294, 000	394, 000	386, 000	−2		
Wholesale price indexes (1967=100)	100. 0	103. 7	107. 4	114. 4				

[1] Estimated by Bureau of Domestic Commerce.
[2] Value of product shipments (SIC–3711).
[3] Facts and figures of the automotive industry (Canada).

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

growing need for more than one automobile per family.

Retail sales by U.S. dealers of United States and Canadian manufactured North American type new passenger cars were estimated at 9.3 million units in 1972, 4 percent over 1971 levels. Sales of imported cars were estimated at 1.5 million, about the same as in 1971. Sustained economic expansion, gains in personal income, and rising employment are expected to contribute to record car sales in 1973—9.5 million North American built units, or 2 percent higher than a year earlier. With an additional 1.5 million imported cars, retail sales in 1973 are expected to exceed 11 million units.

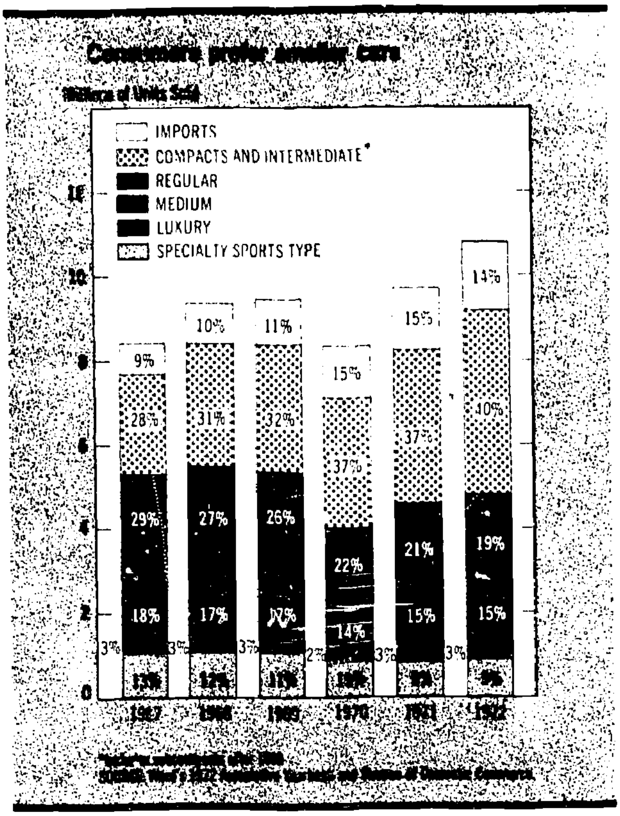
Popularity of U.S.-built compact cars, together with the impact of currency realignments on the prices of imported automobiles, has halted the growing penetration of imported cars in the domestic market. In 1972 foreign models captured an estimated 14 percent of the domestic market—down from the 15 percent of 1970 and 1971. In 1967 the imported car share was only 9 percent of the domestic sales market. Sales of foreign-made cars are expected to remain about 15 percent of the market through 1973.

The Economic Stabilization Program has contributed to rising automobile production. Elimination of the automotive excise tax and subsequent

1972 Profile

Automobile

SIC code	3711
Value of industry shipments (millions).	$23, 900
Number of establishments	47
Total employment (thousands).	390
Exports as a percent of product shipments.	4. 4
Imports as a percent of apparent consumption.	26. 3
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	2. 5
Value of exports (current dollars).	2. 6
Value of imports (current dollars).	28. 0
Employment	2. 7
Major producing areas	Michigan, Missouri, California, New Jersey, Wisconsin, Ohio



wage-price controls held prices of domestic cars at levels which stimulated sales.

Motor registration and sales data reveal growing consumer preference for lower priced and generally smaller models, at the expense of regular or full-sized automobiles with higher price tags. The market share of automobiles priced at $2,610 and less, which includes compacts and most intermediate models, increased from 12 percent of sales in 1967 to an estimated 25 percent in 1972. This gain resulted in fewer sales of automobiles costing $2,611 to $3,270—mostly regular-sized models. The market shares of higher priced luxury and sports models have remained relatively stable.

The sales shifts to lower priced compacts reduces new car gross profit margins about 5 percent, with subsequent lower returns to producers, dealers and investors.

Safety and Pollution Control

Major efforts are devoted to meeting emission control standards and safety requirements. While laboratory cars have been built that meet the 1975–76 standards of the Environmental Protection Agency for permissible emissions, production line problems are yet to be solved and car makers have been denied extensions for compliance. More testing and development is necessary to insure that present pollution control equipment will maintain control standards for 50,000 miles.

One of the most promising developments in efforts to control engine emissions is the rotary combustion chamber engine. A rotor operating within a chamber gives almost vibrationless power. Because of the rotary engine's compact size and light weight, front-end suspensions and sheet metal components to accommodate new emission control and safety devices are easier to design. New electronic control equipment and electronic spark ignition systems are appearing. Radar controlled anticollision braking may soon be practical; antiskid braking is now possible.

Price Increases

Following the freeze and rollback of prices in mid-1971, manufacturers were granted price increases of about 3 percent on 1972 models to compensate for higher production costs. In mid-1972, the Price Commission denied auto manufacturers' applications for 1973 model price increases, because the companies' profit margins for the first half of the year exceeded base-period guidelines. The companies reapplied for and were granted price increases on the 1973 models.

Foreign Trade Trends

Of the estimated 8.8 million autos produced in the United States in 1972, only 386,000, or 4 percent, were exported—mostly to Canada. Many countries have tax and licensing structures that result in prohibitively high prices for American cars. However, U.S. manufacturers maintain assembly and manufacturing plants all over the world to produce cars inside tariff boundaries so that they are competitively priced. There are such plants in West Germany, United Kingdom, Belgium, France, the Union of South Africa, Australia, Brazil, Argentina, and Mexico.

In 1972, an estimated 1.8 million foreign-built autos were imported for sale in the United States. Imports—excluding U.S. types from Canada—also totaled an estimated 1.8 million in 1971, when they accounted for 15 percent of U.S. retail sales. Imported cars from West Germany—771,000 in 1971—continue to dominate the U.S. market, with Japanese makes a close second at 704,000 units.

Under the terms of the Automotive Products Trade Agreement between the United States and

Canada, automobiles are shipped both ways across the border by bona fide manufacturing companies for final sale without tariffs. The Canadian cars are identical to U.S. models. Imports from Canada in 1972 amounted to about 880,000 units, up 10 percent from 1971. while U.S. exports to Canada totaled 350,000 units.

Although there have been no significant tariff changes recently, some countries trading with the United States contend that U.S. emission and safety standards for automobiles constitute non-tariff trade barriers.

Big Changes Coming

In this decade, an avalanche of technological advances is expected. While the gasoline engine still holds most promise, either through modification of the present reciprocating piston engine or adoption of the rotary combustion chamber engine, the search for new power sources continues. The feasibility of gas turbines for normal passenger car service is still unknown. The greater energy storage systems required for electric cars have yet to be developed. Control problems and steam management handicap steam power systems.

Controversy continues over the effectiveness of automatically inflated air bags as passive restraint devices for passenger protection. Several fleets of cars have been equipped with air bags, but test results are not yet available.

Tomorrow's autos—equipped to comply with 1975 emission and safety standards—will be heavier, consume about 15 percent more fuel, and may tend to stall unless new technology solves problems of added pollution abatement equipment. Yearly maintenance costs may increase about $65 a car.

Demand for Autos Will Continue Strong

While rapid transit bus and rail systems are expected to improve considerably in the next few years, demand for automobiles will probably not be reduced proportionately. Car-loving Americans will continue to use autos for commuting to work and for pleasure trips. In response to rising demand for new autos, passenger car production is expected to rise 3 percent annually and total an estimated 11 million units by 1980.

Exports of domestically produced passenger cars may decline unless prices become more competitive. Imports of foreign-built cars are expected to continue upward, although the import share of the U.S. market will remain at about 15 percent.—*Clayton J. Larson, Office of Business Research and Analysis.*

1972 Profile

Truck and Bus Chassis

SIC Codes	37112, 37113
Value of industry shipments (millions).	$7,500
Exports as a percent of shipments	5.5
Imports as a percent of consumption.	10.3
Compound annual rates of growth 1966–72 (percent):	
Value of shipments (current dollars).	7.5
Value of exports (current dollars).	10.9
Value of imports (current dollars).	31.5
Major producing areas	North Central States

TRUCK AND BUS CHASSIS

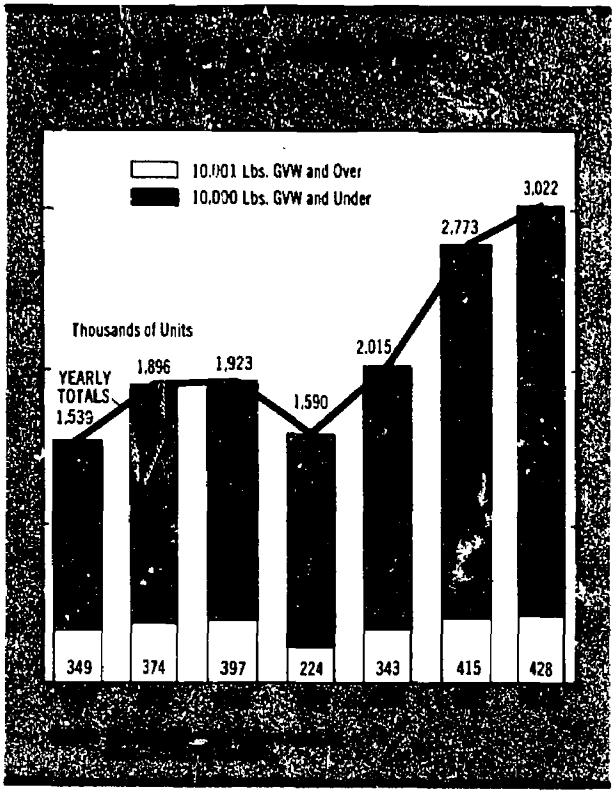
Reflecting continued increases in the movement of goods and in travel, production of motor truck and bus chassis is expected to reach 2.6 million units in 1973, 6 percent above the 2.46 million of 1972. Retail sales are expected to exceed $10 billion, representing sales of about 2.7 million units, 6 percent above the 2.55 million units sold a year earlier.

Trucks under 10,000 pounds gross vehicle weight (GVW)—largest category in the market in number of units sold—will be subject to all the demand influences that made 1972 sales a record. Sales of pickup trucks to farm, industrial, and business users are likely to decline because those users have recently purchased trucks, but this decline will be more than offset by the fast rising demand for pickup trucks as recreational vehicles.

In the 19,500-and-over weight range—over-the-road transport trucks—1973 models will not be greatly different from 1972's. However, truck operators may postpone purchases because of high costs and in hopes of further advances in truck engine technology.

Price Increase Delayed

Truck and bus chassis prices for the 1973 models, which reached the market late in September 1972, remained at 1972 levels, although the Price Commission approved in principle increases of



almost 4 percent to cover required safety and pollution-control equipment. Sanction of actual price rises was postponed to await figures on 1972 fourth-quarter profits of manufacturers.

Light, Heavy-Duty Sales Gain

Largest gains in retail sales of truck and bus chassis are at the bottom and the top of the gross vehicle weight scale. In the under-10,000 GVW range, about 85 percent of the total, 1972 sales ran about 30 percent above 1971. In the 19,500-and-over range—14 percent of the total—retail sales for 1972 ran 28 percent over 1971. In the middle range, 10,000-to-19,500 GVW, 1972 retail sales fell 16 percent below 1971.

Chassis in the under-10,000 GVW range are largely produced by the four major automobile manufacturers. The heavy-duty range, small in number of units sold, accounts for a disproportionately large percentage of total truck-market dollars. Since units are custom made, one unit is priced at 10 to 15 times a pickup's price; profits on such sales are 15 to 20 times that on pickups. The 10 independent truck and bus chassis manufacturers are small compared to the automobile-producing corporations, but they share a $1.5 billion annual market.

Light-Duty Sales Soar

The removal of the excise tax and the increasing popularity of the recreational vehicle were responsible for the great increase of sales in the 10,000-and-under range in 1972. Historically, pickups have been tools—light-haul vehicles for contractors, farmers and industrial plants. Today every family that wants a camper or a folding camper has become a potential light-truck customer. Those bodies must be mounted on a pickup chassis. An estimated 15 to 17 percent of all households have a light-duty truck occupying the second spot in their two-car garages. In addition, the pickup truck and small van appear to be replacing the hard-to-insure "muscle-car" of 2 and 3 years ago as a status symbol for young Americans.

Heavy-Duties Get a Shove

Retail sales increases in the 19,500-and-over range received initial impetus from the investment tax credit, revived as a stimulus to economic recovery. As economic growth resumed, truck loadings rose, and with them the need to update the national truck fleet. Ample funds were available to trade in overage units and step up conversion to vehicles better designed for container operation. Diesel sales—almost totally in the 19,500-and-over range—jumped about 20 percent in 1972 to 135,000 units, compared with 112,000 in 1971. This substantial increase occurred even though one major diesel manufacturer was strike-bound. It followed a high level of activity in 1971, when sales were compensating for the industry-crippling strike at the end of 1970. Estimates are that diesel

Truck and Bus Chassis Retail Sales

[Thousands of units]

	10,000 pounds GVW and under	10,001 pounds GVW and over	Total
1967	1, 193, 748	329, 762	1, 523, 510
1968	1, 465, 263	342, 204	1, 807, 469
1969	1, 550, 976	383, 553	1, 934, 529
1970	1, 353, 000 [2]	393, 076 [2]	1, 746, 076
1971	1, 672, 374	338, 910	2, 011, 284
1972 [1]	2, 117, 000	433, 000	2, 550, 000
1973 [2]	2, 092, 500	607, 500	2, 700, 000
1980 [2]	2, 300, 000	690, 000	2, 990, 000

[1] Preliminary.
[2] Estimated by Bureau of Domestic Commerce.

truck retail sales will exceed 145,000 units in 1973, for the first time.

Truck Technology Under Pressure

Stringent pollution control requirements place increasing responsibility on the industry's engineering staffs. Working with new fuel-injection and supercharging/after-burning techniques, diesel engineers are improving fuel-consuming characteristics and lessening the visible smoke that gives trucks and buses their reputation as polluters. Supercharging in diesel engines produces greater power and cleaner exhausts by a more complete burning of fuel. One of the larger diesel manufacturers produced 15 percent more supercharged and correspondingly fewer naturally aspirated engines in 1972, compared with his 1971 output. Similar methods are being applied with moderate success to traditional spark-ignition gasoline engines for small and medium truck applications.

Every major manufacturer has on the road today a number of experimental gas turbines powering trucks and buses. Many are second-generation and some third-generation models. To the advantages of reduced weight and size and simplified maintenance can now be added some evidence that pollutant emissions are not as uncontrollable as the industry had feared. The questions of high initial cost and unproven durability compared with diesels are not yet resolved.

In 1972, one manufacturer's pilot became a customer's vehicle. The largest intercity bus line in the United States placed 10 turbine-powered passenger buses in service between New York and Washington, D.C. Although the engines' initial cost is far above that of conventional engines, the bus line expects offsets in longer engine use between overhauls; ability to use a wider range of engine fuels; less pollution and vibration; fewer water and oil system problems; fewer clutch, muffler, and cold weather starting difficulties; extended brake life, due to engine braking capacity; and a 50-percent weight saving compared with an average diesel installation.

Laboratories of principal U.S. truck manufacturers are matching efforts of German and Japanese technologists to use the Wankel, or rotary, engine in trucks. So far it appears those applications will be confined to the under 19,500 GVW ranges.

Exports Down, Imports Up

Exclusive of Canadian trade, exports of truck and bus chassis are estimated at 33,624 units for 1972, 15 percent below the 39,660 units exported in 1971. Venezuela, Mexico, Colombia, and Peru in the Western Hemisphere, and Iran, Saudi Arabia, Indonesia, South Vietnam, and the Republic of South Africa in the Eastern Hemisphere continue as principal customers.

With Canadian trade included, 1972 truck and bus chassis exports were expected to be about 135,000 units, down 4 percent from the 141,000 of 1971.

Through most of 1972, imports of truck and bus chassis were almost 56 percent ahead of 1971—492,408 compared with 315,845 units. A small rise in imports from Canada, from 173,049 in 1971 to 196,687 in 1972, plus a doubling of imports from other countries from 143,000 units in 1971 to 296,000 for 1972 produced the startling 1972 increase.

Retail sales of truck and bus chassis imported from Japan were 53 percent ahead of 1971 through the third quarter of 1972. As in past years, those vehicles were almost entirely in the 6,000-pound-GVW, under-$2,000 range. U.S. manufacturers participated in import sales through joint-venture arrangements, made possible by some liberalization of Japanese policies. Of the 96,935 Japanese imports sold in the United States during the first three-quarters of 1972, 29,216 were imported and sold under U.S. manufacturers' names.

1972 Profile

Truck and Bus Bodies

SIC code	3713
Value of industry shipments (millions)	$700
Number of establishments	679
Employment (thousands)	40.1
Exports as a percent of product shipments	1.9
Compound annual rates of growth 1967–72 (percent):	
Value of shipments (current dollars)	9.6
Value of exports (current dollars)	1.4
Employment	2.7
Major producing areas	Ohio, Illinois, Pennsylvania, New Jersey, Minnesota, Missouri

Truck and Bus Bodies: Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971 P	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Industry: [2]								
Value of shipments	706.1	837.9	935.5	1,028.4	1,118.9	8.8	1,209.4	8.5
Total employment (thousands)	30.4	33.8	35.5	33.9	34.7	2.3		
Production workers (thousands)	24.6	26.9	27.5	26.3	28.1	6.8		
Value added	331.7	399.7	456.7	473.0	NA			
Value added per production worker man-hour	$6.71	$7.76	$8.49	$9.11	NA			
Product: [3]								
Value of shipments	604	635	580	665 [1]	700	5.0	755	8.0
Value of exports (not included in total value of product shipments)	12.6	8.5	8.6	11.7	13.5	15.0	14.8	10.0

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the truck and bus body industry (SIC 3713).
[3] Includes value of shipments of truck and bus bodies made by all industries.

P Preliminary.

NOTE.—NA=Not available.
Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Continued Increases Through Seventies

U.S. manufacturers are expected to produce 2.89 million truck and bus chassis in 1980, a compound annual increase of 2 percent from 1972. While not expected to maintain the high rate of market expansion that characterized 1972, retail sales throughout the seventies are expected to continue strong and reach 2.99 million units by 1980, an average compound annual increase of 2.1 percent. Dollar value of this market should reach $11.6 billion.—*Thomas C. Meehan, Office of Business Research and Analysis.*

TRUCK AND BUS BODIES

Truck and bus body shipments, excluding exports, are expected to reach $755 million in 1973, about 8 percent higher than the $700 million estimated for 1972. Shipments growth from 1967 to 1972 averaged 3 percent a year. Exports are estimated $13.5 million in 1972 and are expected to rise to about $14.8 million in 1973.

Nearly 70 percent of industry shipments are to truck operators, truck dealers, and to manufacturers of chassis—consisting of a wide variety of body types, including vans, pickups, panels, dumps, utility bodies, stakes with platforms, and tanks, as well as some special purpose bodies such as refuse compaction units and school buses. In 1972, shipments to large truck operators or to truck dealers totaled $392 million and accounted for 56 percent of total shipments. In 1973, these sales are expected to reach $425 million. Sales to manufacturers who mount bodies on truck chassis for sale as complete commercial vehicles totaled $90 million, or 13 percent of all shipments in 1972, and are estimated at $97.3 million in 1973.

The balance of industry shipments—about 31 percent—are by manufacturers who purchase or assemble chassis on which they mount special bodies they produce. Their sales of complete specialized vehicles include ambulances, hearses, fire fighting vehicles, transit type buses, and some types of garbage packers. These shipments were valued at an estimated $215 million in 1972 and are expected to total $232 million in 1973.

Industry Also Good Customer

Production and installation of bodies and equipment in 1973 will consume 600,000 tons of stainless, alloy, and carbon steel; 65 million pounds of aluminum sheet and plate, plus another 60 million pounds of aluminum extrusions and mouldings; 800,000 pounds of copper wire; 18 million square feet of wood flooring and decking; 30 million square feet of plywood for linings and structural applications; and innumerable nuts, bolts, rivets, screws, hinges and other assorted hardware.

Federal Procurement Spurs Sales

Use of commercial type dump trucks rather than trucks built to military specifications is being increasingly approved by U.S. Army procurement agencies. Recently ordered units were identical to commercial models of body manufacturers and are designed to double the capacity of replaced

Truck and Bus Body Shipments

[In millions of dollars]

	1967	1972 [3]	1973 [3]
Truck, bus and other vehicle (except passenger car) sold separately: [1]			
To motor vehicle manufacturers, including interplant transfers	$78.2	$90.3	$97.5
To other than motor vehicles manufacturers (including bodies installed on on chassis owned by others):			
Truck:			
Van	32.7	37.8	40.8
Multistop	18.1	21.0	22.7
Pickup	3.7	4.2	4.5
Panel	7.4	8.4	9.1
Dump	42.6	49.0	52.9
Stake and platform	14.0	16.1	17.4
Utility, including service and line construction, and repair types	52.3	60.9	65.8
Tank including street flushing petroleum and other tank types	6.9	7.7	8.3
Refuse and garbage (packer type)	36.6	42.7	46.1
Other	40.0	46.2	49.9
Bus	62.9	72.8	78.6
Other vehicles (ambulance, hearse, fire department)	23.0	26.6	28.7
Complete vehicles except passenger cars produced on purchased chassis:			
Ambulances	20.5	23.8	25.7
Hearses and undertakers' vehicles	12.9	14.7	15.9
Fire department vehicles	17.9	21.0	22.6
Other [2]	65.5	75.6	81.6
Truck and bus bodies, not specified by kind	68.6	79.8	86.2
Total truck and bus bodies	[1] 603.8	700.0	756.0

[1] Truck and bus bodies built by garages, service stations and other establishments not primarily engaged in manufacturing activities are excluded.

[2] All other highway vehicles, including trucks, street cleaning apparatus, rotary and blow-type snowplows, pickup sweepers, noncombat amphibious vehicles.

[3] Estimated by Bureau of Domestic Commerce.

NOTE.—Table does not include truck or bus bodies produced on chassis of own manufacture.

Source: Bureau of the Census, Bureau of Domestic Commerce.

units. Advantages to military use of commercially available products include elimination of the long lead time from specification to design, order, and delivery; benefits of innovative improvements developed by the manufacturer; and lower unit costs because of economies of scale.

Commercial body-types such as transit mixers and bituminous spreaders are expected on upcoming invitations-to-bid from Army construction battalions. Speed of delivery and ready availability of parts without special ordering could open the way for vehicle sales of other body types in the future.

Bus Bodies Gain

Bus body manufacturers anticipate sales of 41,500 units in 1973, 10 percent over the 37,690 shipped a year earlier. In 1971, 34,580 units were shipped. These estimates include bus bodies exported as well as exports of complete buses where the body installed was supplied by a bus body manufacturer. Not included are bus bodies produced by chassis manufacturers.

Exports on Sustained Rise

Greatly increased truck and bus body exports to Canada—42 percent over 1971 to an estimated $5.7 million in 1972—were responsible for the 15 percent increase in total truck and bus body exports to $13.5 million. After Canada, Venezuela, and United Kingdom are principal customers. With continued operation of the U.S.-Canada Automotive Products Trade Act, a 10 percent increase in total export volume to $14.8 million in 1973 seems likely.

Imports, aside from Canada, are limited. High value bus bodies and chassis fabricated into transit-type intercity vehicles are imported in limited quantities from Belgium by one of America's large national bus lines. Also, a limited number of garbage compaction bodies are imported from Sweden. In total, the U.S. balance of trade in truck and bus bodies is favorable.

Market Expansion Assured

The burgeoning motor truck and bus chassis market, plus continued increases in motor freight

Truck Trailers: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry:								
Value of shipments	714	962	778	692	987	43	964	−3
Total employment (thousands)	23	27	23	22	26	28		
Production workers (thousands)	18	22	18	17	21	24		
Value added	269	354	287	290	NA			
Value added per production worker man-hour	$7.57	$8.28	$8.39	$8.92	NA			
Quantity shipped, total (units)	124,036	171,679	131,847	122,293	174,000	43	170,000	−2
Vans	59,147	94,808	71,274	65,785	99,000	50		
Tanks	7,197	5,114	4,537	4,736	5,500	16		
Bulkers	1,065	1,862	1,618	1,426	3,000	110		
Pole and logging	1,312	2,747	1,092	1,588	2,000	26		
Platforms	15,488	20,714	14,922	16,830	19,000	13		
Low beds	3,356	3,937	3,488	3,225	5,000	55		
Dump trailers and dollies	6,660	6,475	6,051	5,954	7,500	26		
All other trailers	2,314	2,690	2,727	4,240	5,000	18		
Containers, total	27,497	33,332	26,138	18,509	28,000	51	24,000	−14
Detachable bodies	17,005	20,375	11,880	8,734	16,000	83	24,000	
Detachable chassis	10,492	12,957	14,258	9,775	12,000	23		
Value of exports	14.4	19.8	18.2	21.6	23.1	7	23.8	3

[1] Estimated by Bureau of Domestic Commerce.

NOTE.—NA=not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

tonnage hauled, guarantee expansion of the truck and bus body market. Truck and bus body shipments are expected to increase at an average annual compound rate of 3.2 percent and reach $940 million by 1980.—*T. C. Meehan, Office of Business Research and Analysis.*

TRUCK TRAILERS

Truck trailer manufacturers are expected to ship 170,000 units (including detachables) in 1973, 2 percent under the estimated 174,000 units of 1972 and below the former record high of 171,679 of 1969.

Below average purchases of all types of trailers in 1970 and 1971, and the excellent health of the economy account for the unprecedented volume of shipments in all categories in 1972. Sales of some categories, such as detachable bodies and chassis, increased by as much as 50 percent, while vans—the trailer type most in demand—increased 65 percent over 1971.

More Cubic Capacity Needed

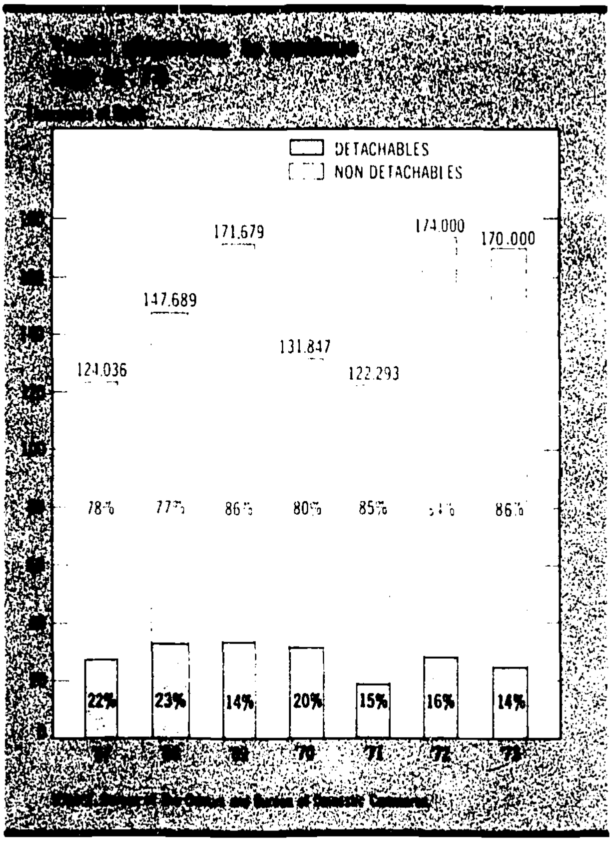
With freight becoming bulkier, truck operators most frequently obtain the needed additional cubic capacity by increasing trailer length. The share of the market of trailers 45 feet-and-over in length increased from 13.3 percent in 1970 to 31.7 percent in 1972. Another way of obtaining increased cubic capacity is by shifting to two smaller trailers hauled in tandem, the so-called "double bottoms." However, double bottoms are legal in only 34 States, which has slowed sales of those vehicles. The market share of trailers 26–28 feet long has grown only 4 percent.

A 6-inch increase in trailer width which would supply the greater interior capacity needed may have to await completion of more of the Interstate Highway System, where lane dimensions provide for wider vehicles. Efforts are under way to obtain Federal legislation allowing use of trailers 8 feet 6 inches in width in interstate commerce.

Trade Balance Favorable

U.S. exports of truck trailers and parts are expected to reach $23.8 million in 1973, 3 percent above $23.1 million in 1972 when the gain was 7 percent over the previous year. Shipments to Canada account for roughtly one-third of the volume of truck trailer and parts exports.

Truck trailer sales have been expanding steadily overseas. In Europe alone sales have increased an estimated 10 percent yearly for the past 5 years.



Principal U.S. trailer manufacturers have manufacturing and/or assembly plants in foreign countries and most of the $24 million in exports are parts going to these manufacturers. Only a third of the value of exports by U.S. producers overseas consists of vehicles, 80 percent of which are detachables. These are "lease-shipped"—filled with freight going to the same country, a method that all but eliminates the cost of shipping the containers.

Tank Trailers Advance Technologically

Among the materials being used by tank trailer manufacturers for tanks and insulation is reinforced fiberglass laminated over mandrils. These vessels, designed for handling corrosive liquids, are less expensive to build and lighter in weight than the tanks of stainless steel or aluminum-with-glass linings that have historically been used for shipping chemicals.

Advances in construction of cryogenic tanks, formerly custombuilt and operated by the chemical firms to transport liquid nitrogen and oxygen at the necessary −320 degrees Fahrenheit, have opened this high-revenue traffic to contract- and common-carriers. Increased use of liquid gases in the space program and in refrigeration processes has quadrupled the transport of these and other cryogenic products over the last 10 years. The technological breakthrough came with the successful application of the Dewar flask, or thermos bottle, principle to tank-trailer construction. The method consists of fabricating a large tank around a small one, with the space between reduced to a vacuum. To the degree that the vacuum is absolute, conductance of temperature is eliminated.

Prospects Excellent

Trailer shipments, including detachables, are expected to reach 206,000 units in 1980. While annual increases will average 2.1 percent, there will be wide fluctuations in the number of units produced during these years.—*Thomas C. Meehan, Office of Business Research and Analysis.*

CHAPTER 34

Railroad Cars

Railroad freight car production is expected to increase modestly in 1973, with freight car deliveries totaling about 52,000, up 2 percent from an estimated 51,000 deliveries in 1972. Railroads continue to be financially unable to obtain the necessary funds for needed new car purchases. Passenger car production and deliveries are confined to commuter and self-propelled transit types.

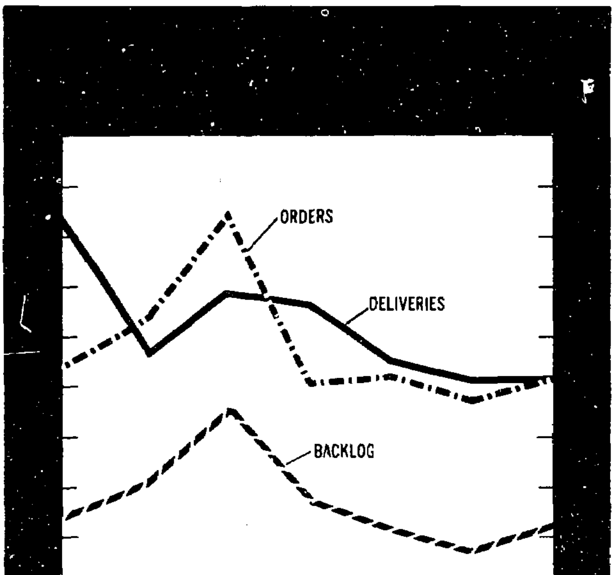
Industry shipments declined 2 percent from $1.25 billion in 1971 to an estimated $1.23 billion in 1972, reflecting the decline in deliveries. In 1973, however, shipments of the railroad car industry are expected to rise to $1.3 billion, about 6 percent above 1972. Imports and exports are each 1 percent or less of industry shipments.

Low Orders Persist

Reintroduction of the investment tax credit did not increase orders as had been expected during 1972 and deliveries during the year declined an estimated 8 percent from 1971. In addition to their general financial problems, orders by the railroads have been at a low level awaiting the outcome of legislation pending in Congress as well as the new Federal track standards. Several bills have been introduced to provide assistance to the railroads, varying from Federal guarantee of loans for the purchase of railroad cars to the setting up of a national corporation to purchase freight cars.

Also contributing to low car orders is the impact of Federal track standards. The Federal Railroad Safety Act of 1970 ordered the Department of Transportation (DOT) to establish and enforce safety standards in all areas of railroading. DOT regulations covering non-geometric standards will become effective on October 16, 1973. Cost of bringing track into compliance has been estimated as high as $1.6 billion. As a result of low net earnings, railroads have tended to postpone needed track maintenance in recent years.

The standards have come at a time when the railroads have much track on which expenditures could no longer be postponed and the Federal standards simply reinforced the need for maintenance expenditures. As a consequence, while capital expenditure by the railroads increased from $1.67 billion in 1971 to an estimated $1.9 billion in 1972, a greater proportion of the money is being



Railroad Cars: Trends and Projections 1967–80

[In millions of dollars except as noted]

	1967	1969	1970	1971[1]	1972[1]	Percent increase 1971–72	1973[1]	Percent increase 1972–73	1980	Percent increase 1972–80*
Industry:[2]										
Value of shipments	1,421	1,400	1,425	1,253	1,231	−2	1,306	6	1,450	2.0
Total employment (thousands)	41	36	34	33	31	−6				
Production workers (thousands)	33	29	26	25	24	−4				
Deliveries of new freight cars (units)	83,095	69,028	66,185	55,307	51,000	−8	52,000	2	60,000	2.0
By railroad car manufacturers	64,775	47,119	52,411	50,522	45,900	−9	46,800	2	54,000	2.0
By railroad carline shops	18,320	21,908	13,774	4,785	5,100	7	5,200	2	6,000	2.0
Backlog of freight cars on order[3]	56,440	31,735	46,751	27,552	22,221	−19	22,000	−11		
Deliveries of rail passenger and rapid transit cars (units)	117	900	340	500	100	0	100		300	14.8
Value of imports	3.5	5.5	2.5	1.0	2.6	160	2.7	4		
Value of exports	16.0	24.0	10.1	11.7	12.4	6	12.6	2		
Wholesale price index (1967=100) Railroad equipment	103.6	112.4	115.1	121.1	129.0	6	133.0	3		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by the railroad carbuilding industry (SIC 3742).
[3] As of Jan. 1 of each year.

*Compound annual rate of growth.
Sources: American Railway Car Institute, Bureau of the Census, Bureau of Labor Statistics, Department of Transportation, Bureau of Domestic Commerce.

spent for track maintenance and repairs and less for new cars. Because these conditions will continue to exist in 1973, the level of new car orders will probably be only slightly above 1972 unless new legislation provides an incentive to new car purchases.

Subway and commuter car deliveries in 1972 were below 1971 and are expected to remain at a low level until late 1973 when deliveries under orders signed in the second half of 1972. One of the four subway car builders in 1972 withdrew from activity as a prime contractor for subway cars. However, the firm will continue to offer its services as a subcontractor and in 1973 will begin delivery of an order for double decked locomotive-drawn commuter cars.

1972 Profile

Railroad Cars

SIC Code	3742
Value of industry shipments (millions).	$1,231
Number of establishments	78
Total employment (thousands).	31
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	−2.3
Value of exports (current dollars).	−5.0
Value of imports (current dollars).	−5.0
Employment	−3.0
Major producing areas	Northeast and North Central

Changes in Design Gradual

Changes in freight car design continue to be evolutionary as industry investment in R&D remains relatively low. Much new technology represents improvements in components made by suppliers.

Of interest for the future is the experimental work being done at the Department of Transportation's High Speed Ground Test Center near Pueblo, Colo. A track dynamics laboratory is being built that will provide data for improved car design. A test vehicle powered by a linear induction motor reached 188 miles an hour and only the short track length of 6.2 miles prevented the vehicle from reaching its potential of 250 miles an hour.

The Urban Mass Transportation Authority (UMTA) funded the design of a new light rail car (street car) design. The car was designed after consultation with nearly all United States operators of street cars and should be accepted by all operators seeking new cars. Street cars have not been built in the United States since 1952 and UMTA expects a standard design to substantially lower costs of any new cars ordered.

Employment and Prices

Average employment in the railroad carbuilding industry in 1972 is estimated at 31,000, a decline of 6 percent from 33,000 in 1971. Some 10,000 jobs have disappeared in this industry since 1967.

The railroad equipment price index (1967=100) for August 1972 was 130.2, an increase from the 1971 annual average of 121.1, reflecting increased labor and material costs.

Prospects for 1980

Prospects of the railroad equipment industry are of course directly dependent on the future of the railroads. Estimates for 1970 and 1980 were that ton miles of intercity freight carried by the railroads would grow about 30 percent, with the railroads' share of total ton miles hauled dropping from about 36 to 33 percent. Although computers with inputs supplied by automatic trackside scanners will allow more efficient use of the existing carfleet, additional cars will be needed. The number purchased will depend upon the solution to the financial problems of the railroads.

By 1980, new car deliveries are expected to average at least 60,000 per year, an increase of 2 percent a year from 1972.—*Rolf R. Nordlie, Office of Business Research and Analysis.*

CHAPTER 35

Shipbuilding and Repair

During 1973, the value of work done in privately owned shipbuilding and repair yards on the U.S. mainland is expected to total approximately $3.46 billion, an increase of 21 percent over the estimated $2.85 billion of 1972.

As of the end of 1972, 56 naval vessels and 73 merchant ships of various types were under construction or on order in private U.S. shipyards. Shipbuilding activity will rise during 1973 as the major shipyards begin work on new contracts.

The U.S. shipbuilding market for commercial vessels is improving as a result of incentives provided by the Merchant Marine Act of 1970 and in response to the growing energy needs of the country. The new maritime program—the largest peacetime merchant shipbuilding program in this Nation's history—has rapidly gathered momentum. Major shipyards received a substantial increase in their shipbuilding backlogs with awards through September 1972, of nearly $1.226 billion in contracts for construction of 22 merchant ships.

Contracts valued at $566 million for the first six liquefied natural gas carriers (LNG's) to be built in the United States were awarded in September 1972, to two shipyards. Each will build three ships.

The Secretary of Commerce, in announcing the

Shipbuilding and Repair: Trends and Projections 1967–73

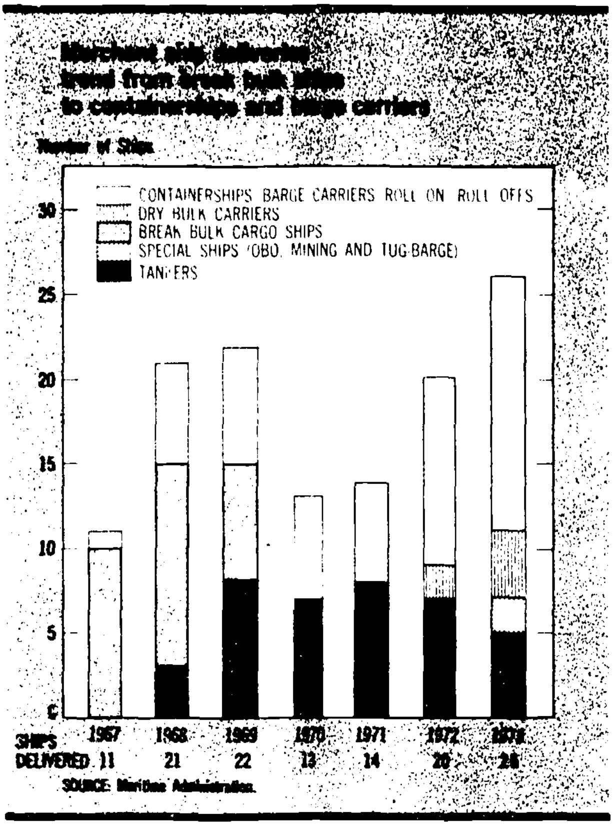
[In millions of dollars except as noted]

	1967	1968	1969	1970	1971P	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry: [2]									
Value of work done	2,518	2,488	2,560	2,534	2,758	2,855	4	3,460	21
Total employment (thousand)	138.8	142.0	142.9	130.2	128.2	132.7	4		
Production workers (thousand)	114.2	117.5	117.7	106.3	104.7	105.9	1		
Value added	1,430	1,346	1,451	1,573	1,700				
Product: [3]									
Value of work done, total	2,358	2,360	2,437	2,457	2,670 [1]	2,765	4	3,350	21
Nonpropelled new ships	149	154	169	173	200	185	−8	190	3
Self-propelled new military ships	974	885	869	998	980	1,000	2	1,200	20
Self-Propelled new nonmilitary ships	362	478	457	461	580	702	21	1,036	48
Repair of military ships	423	363	384	359	430	408	−5	454	12
Repair of nonmilitary ships	407	458	532	435	450	440	−2	440	0
Shipbuilding and repair, not specified by kind	43	22	26	31	30	30	0	30	0

[1] Estimated by Maritime Administration and Shipbuilders Council of America.
[2] Includes value of all products and services sold by the shipbuilding & repair industry (SIC 3731).
[3] Includes value of work done on ships only.

P = Preliminary.

Sources: Bureau of the Census, Bureau of Labor Statistics, Maritime Administration, Shipbuilders Council of America.



first contract award, said "this order represents a historic milestone for American shipbuilders, for it signals the entry of domestic shipyards into the world market for these unique ships."

The market for offshore oil drilling platforms and prospects for additional very large crude carriers (VLCC's) also hold high promise for U.S. shipbuilders in the next several years.

1972 Shipbuilding Activity

Twenty-six large merchant ships are scheduled for delivery in 1973, including one barge carrier, three LASH ships, 10 containerships, five large tankers, four dry bulk carriers and one oil-bulk-ore (OBO) ship. In 1972, 20 comparable ships were delivered.

Twelve Navy ships are scheduled for delivery in 1973, compared to the 21 delivered in 1972. The 1973 deliveries comprise one nuclear aircraft carrier (CVAN), three nuclear submarines (SSN's), one nuclear guided missile frigate (DLGN), six destroyer escorts (DE's), and one replenishment oiler (AOR).

Procurement of naval vessels continues to account for the largest share of the dollar value of work done in private U.S. shipyards. Work on new military ships in 1972 represented about 53 percent of all new shipbuilding activity. Naval vessels accounted for an estimated 48 percent of the total value of ship repair work. Together, new military ships and repair of military ships accounted for 51 percent of the total value of work done.

Employment Increase

The shipbuilding and repair industry is made up of a fairly large number of companies and facilities; however, only a limited number have major production capability. In July 1972, the Bureau of Labor Statistics reported 134,200 employees in the industry. The Maritime Administration, in mid-1972, found that of that number 130,250, or about 97 percent, were employed in the 91 facilities with more than 100 workers each. In mid-1971 there were 83 such facilities, employing 113,300 of the industry's 126,800 workers.

Twenty private shipyards with an employment of 84,584 in July 1972, are considered to have facilities of sufficient size to build the large oceangoing merchant liners of the C3 class (475′ by 68′) and over. Most of those yards are also active in the repair of ships in the same size range. The balance of the industry is engaged in the construction and repair of ships under 2,000 gross tons, such as small cargo ships, tugs, barges, fishing vessels, and drilling rigs.

VLCC and LNG Shipbuilding Facilities Being Readied

If current energy policies are continued, estimates are that as many as 35 liquefied natural gas (LNG) tankers will be required by 1980, and 250 to 300 very large crude oil carriers (VLCC's) will

1972 Profile

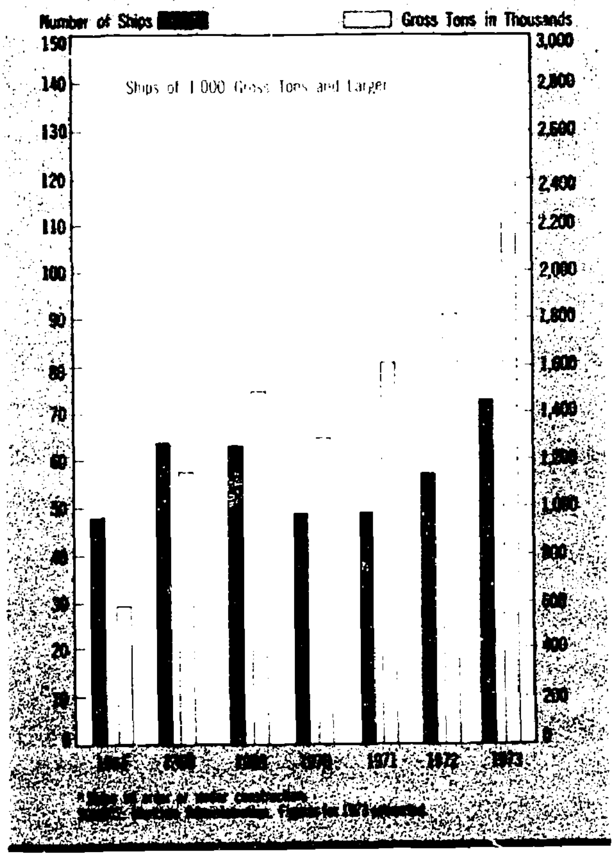
Shipbuilding and Repair

SIC code	3731
Value of industry work done (millions).	$2,855
Number of shipbuilding and repair yards.	138
Total employment (thousands).	132.7
Compound annual average rate of growth 1967–72 (percent):	
Value of work done (current dollars).	2.5
Employment	−0.9
Major producing areas	Atlantic, Pacific, and Gulf Coasts

be required by 1985, to meet the energy needs in the United States. However, potential changes in national energy policies to place greater reliance on domestic sources could sharply reduce these shipping requirements. LNG's promise to become of prime importance to highly industrialized nations, including the United States, where energy needs are mounting and concern over pollution has intensified. Natural gas meets energy requirements of industry along with the antipollution goals of environmentalists. The shipbuilding industry is gearing up to participate in the production of those large tankers.

Already, two U.S. shipyards are building VLCC's, two other U.S. shipyards have accepted orders for LNG's, another is ready to start a new facility for the same type of ships, and three other yards have announced similar plans, contingent on the development of a market. Another American shipyard, presently doing naval work, could be adapted for LNG and VLCC construction in future years.

Large merchant ship orderbook* for 1973 (as of January 1)



Shipbuilding and Repair: Investment and Employment 1960–71

Year	Number of production workers (thousands)	Capital expenditures ($ millions)	New capital expenditures per production worker (dollars)
1971[1]	104.7	62.6	598
1970	106.3	78.7	740
1969	117.7	88.1	748
1968	117.5	75.9	646
1967	114.2	70.3	615
1966	114.3	52.8	462
1965	109.5	44.6	407
1964	97.1	32.8	338
1963	96.5	24.5	254
1962	94.1	23.0	244
1961	95.7	31.6	330
1960	90.1	28.9	321

[1] Estimated by Bureau of Census.

Source: Bureau of Labor Statistics, Bureau of Census.

Changing Shipbuilding Markets

With containerships all but completely taking over the movement of general cargo, shipbuilders are confronted with declining orders for carriers in the liner trades and are placing increasing importance on the market for bulk carriers.

The very large crude carrier (VLCC) and liquefied natural gas carrier (LNG) business is expected to continue to be a major factor in shipbuilding in the years immediately ahead.

Steadily increasing needs of chemical industries throughout the world for liquefied petroleum gas have brought about an expanding need for the liquefied petroleum gas carrier (LPG), a promising growth area for shipyards looking for new fields of endeavor. Offshore oil rigs, specifically drilling platforms, are a distinct departure from the customary type of work for most shipyards. The floating platform comes closest to actual vessel configuration, with semisubmersibles and jack-up rigs calling for an entirely new design approach and engineering know-how. Domestic shipyards are presently building well over half the oil rigs now under construction or on order throughout the world. Since the industry moved into this area nearly a decade ago, it has developed considerable expertise.

Naval Fleet To Be Improved

The Navy is expected to have a fleet of fewer than 600 ships at the end of June 1973, 37 percent fewer than before the Vietnam conflict began. Since the United States must increasingly rely on transportation of raw materials, including petroleum and gas, the Navy is striving to create a fully balanced fleet that will cover roles of projection of force, sea control, and overseas presence in addition to fulfilling the nuclear deterrent portion of the Navy's mission.

Fiscal year 1973 appropriations for naval shipbuilding and conversion projects amount to $3.1 billion, about the same as for fiscal year 1972. The new construction and conversion budget for fiscal year 1974 is expected to be higher by approximately $500 million and should fund the nuclear powered carrier, CVN 70, and the lead ships for a new class of naval ship, the Trident submarine, formerly known as the underwater long range missile system (ULMS).

A major portion of fiscal year 1974 funds will be spent in the three private yards possessing nuclear capabilities, and most of the remaining funds will cover additional authorizations of the DD-963 class destroyers which have already been awarded to a single shipyard. Thus the Navy is expected to provide very limited funds for new construction and conversion to support other shipyards in 1974.

Funding for the Patrol Frigate (PF) production is planned to begin in fiscal year 1975 and continue for 5 years at the rate of approximately 10 ships a year. Authorizations for naval auxiliaries, which in the past have provided most of the Navy work in nonnuclear yards, are expected to be very restricted in the near future as the Navy is emphasizing the upgrading of its combatant forces. The guided missile hydrofoil patrol craft (PHM)—a combined U.S. and NATO R. & D. program being funded in fiscal year 1973—

Distribution of Shipbuilding and Repair Industry Employment, July 1972

[All employees]

Employment level	Number of shipyards	July 1972 reported employment
Over 2,000	14	90, 917
500 to 2,000	28	27, 656
100 to 500	49	11, 684
Total	91	130, 257 [1]
Below 100	(2)	3, 943
Total	138	134, 200 [3]

[1] Maritime Administration Survey.
[2] All other yards.
[3] Bureau of Labor Statistics.

has initially been awarded to an aircraft manufacturer rather than a traditional shipbuilder.

In the ship overhaul and repair field, the level of Navy work provided to the private shipyards is expected to increase substantially over the next 2 fiscal years.

New and Expanding R. & D. Technologies

The improved market in U.S. shipbuilding has spurred research and development toward innovative production techniques.

In fiscal 1972, several major MarAd/industry cost-sharing R. & D. programs were begun, whose immediate goals are to satisfy the subsidy limits set by the Merchant Marine Act of 1970. In the long run, these programs have two purposes. The first is to catch up to foreign competition either by absorbing the foreigners' technologies or by developing American counterparts. The second step will be for American shipyards, building on those improvements, to take the technological lead in efficient ship production.

Initial task areas are welding technologies and automation, quantum increases in materials handling capabilities, improved painting and surface preparation techniques, and other production applications, including the application of laser technology to the alinement of hull modules.

Planned for fiscal 1973 is a study of optimum ship design for production and—even more significant to the industry's long-range success—widespread use of research in computer-aided production. The latter is a key to U.S. efforts to match and surpass the innovations of foreign competitors. In the calculated catchup step, the Government has purchased a foreign developed production software package, which has been sublicensed to U.S. shipbuilding firms on a payback basis. This package now forms the nucleus for American improvements and innovations in the use of computers for ship production.

All those efforts are supported in turn by shipyard inhouse research and improvements in shipbuilding facilities to make best use of the new and expanding technologies.

Pollution Control in Shipbuilding, Repair

Control of pollution as related to the shipbuilding and ship repair industries continues to gather momentum in this country and abroad.

To combat pollution from such construction processes as sandblasting, coating, painting, asbestos insulation, etc., shipyards are being equipped with enclosures to confine those activities. In general, shipyards have equipment for the control and clean up of oil spills which may occur in the normal operation of the yard. As a result of passage of the Water Quality Improvement Act, placing financial liability for cleaning up oil spills, some shipyards have purchased newer equipment and established new responsibility and operational procedures. In addition, most shipyards have joined in a cooperative effort with other water-oriented industries to contract for backup services and equipment, to be sure those will be available in the event of a major spill.

On June 23, 1972, the Environmental Protection Agency published in the Federal Register final standards requiring all marine sanitation devices installed on vessels to be designed and operated to prevent the overboard discharge of sewage, treated or untreated, or of any waste derived from sewage. The standards become effective for new vessels 2 years after initial promulgation of implementing U.S. Coast Guard regulations, and for existing vessels 5 years after such promulgation.

Effective July 10, 1972, the Ports and Waterways Safety Act authorizes new vessel traffic control and other port and waterfront safety measures by the Coast Guard. It also authorizes comprehensive regulations for the design, construction, maintenance, and operation of tankers and certain other vessels, to protect the marine environment from operational or accidental oil spills. Those regulations are currently under consideration by the Coast Guard, in cooperation with the Maritime Administration and the Environmental Protection Agency.

In preparation for the 1973 International Conference on Marine Pollution, the Inter-governmental Maritime Consultative Organization (IMCO) has reviewed and accepted a final report on a design study conducted by the United States on segregated ballast tankers. This study provides a base for evaluation of the economic impact and degree of effectiveness in pollution abatement of each of twelve large crude carrier designs. The study has been extended to include smaller clean-product and crude-oil tankers down to 21,000 d.w.t.—*Robert Lowry*, *Maritime Administration*.

CHAPTER 36

Aerospace

Shipments of complete aerospace vehicles [1] are expected to total $10.2 billion in 1973, a 2 percent decrease from the $10.4 billion in 1972 and 26 percent below the $13.8 billion of the peak year, 1968. Almost all phases of the civilian aerospace industry should improve in 1973, but programs dependent on Government funding are expected to decline.

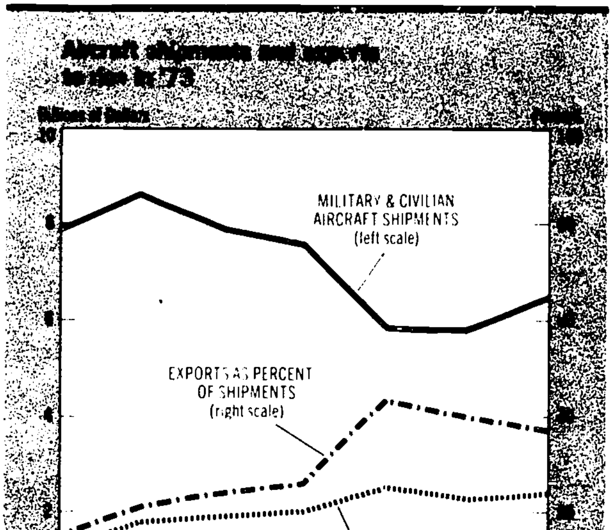
During 1972 light aircraft shipments exhibited extremely strong growth. The value of shipments of the large transport aircraft declined 5 percent. Military and space vehicle shipments continued the decline that started in 1970.

Cutbacks by the United States in direct world peacekeeping efforts will have little immediate effect and limited long-range impact on the aerospace industry's shipments or financial situation. Existing contracts for military hardware, and contracts for research and development for needed future equipment, are already approved expenditures in the Federal budget and cancellations are not expected. Satellites, moon probes and manned lunar landings already budgeted are not expected to be either stepped up or decreased.

Exports of aerospace products are expected to increase to $4.1 billion in 1973, 4 percent over 1972, when exports declined 6 percent from the previous year's all time high of $4.2 billion. Business, personal and utility aircraft showed the largest export gains in 1972; continued improvement is expected for 1973.

High-unit-cost large transports accounted for $1.37 billion, or 35 percent of overall value of exports, in 1972. They are expected to increase to $1.48 billion, or 37 percent, in 1973.

Shipments of complete vehicles and of components, parts, and related equipment are not combined because of extensive duplication arising from



[1] For purposes of this report, the aerospace industry includes those firms whose value of shipments and/or value of work done is classified in the following Industrial Classifications (SIC): 3721 Aircraft; 3722 Aircraft engines and engine parts; 3729 Aircraft parts and related equipment, n.e.c.; 1925 Guided missiles and space vehicles complete. Communications, navigation, and electronics equipment are included only as part of the aerospace vehicle, except for avionics, which has been included in the export statistics.

Aerospace: Trends and Projections 1967-80

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73	1980 [1]	Percent increase 1972-80 [5]
SIC 1925, Complete guided missiles:										
Industry: [2]										
Value of shipments	4,641	4,632	3,994	3,962	4,245	7	3,570	−16	4,000	−.7
Total employment (thousands)	201	178	144	131	134	2				
Production workers (thousands)	70	58	50	49	52					
Value added	3,339	3,481	2,874	2,880						
Value added per production worker man-hour	$23.36	$30.24	$29.87	$31.31						
Product: [3]										
Value of shipments	4,367	4,364	3,770	3,575	3,860	8	3,245	−16	3,900	1.5
Value of imports										
Value of exports	212	165	119	134	134	0	140	4		
SIC 3721, Aircraft: [4]										
Industry: [2]										
Value of shipments	11,080	12,446	10,996	9,313	9,350	1	10,475	12	9,000	−.4
Total employment (thousands)	387	398	320	238	221	−7				
Production workers (thousands)	231	223	170	128	121					
Value added	5,448	6,687	5,128	4,569						
Value added per production worker man-hour	$11.12	$15.25	$15.34	$18.10						
Product: [3]										
Value of shipments	9,172	10,220	8,722	8,019	8,060	0	9,030	12	8,000	0
Quantity shipped	19,717	17,488	11,392	10,321	11,725	14	12,150	4		
Value of imports	61	104	48	78	233	199	260	12		
Value of exports	1,222	1,866	1,994	2,542	2,284	−11	2,370	5		
SIC 3722, Aircraft engines and engine parts:										
Industry: [2]										
Value of shipments	5,290	5,284	5,150	4,693	4,090	−12	3,800	−7	3,000	−3.8
Total employment (thousands)	195	181	164	146	127	−13				
Production workers (thousands)	113	98	90	77	66	−14				
Value added	2,922	2,953	2,659	2,426						
Value added per production worker man-hour	$11.89	$14.42	$14.60	$15.61						
Product: [3]										
Value of shipments	4,782	4,607	4,594	3,759	3,270	−13	3,040	−7	2,500	−3.3
Value of imports	31	30	34	36	128	256	135	5		
Value of exports	345	381	420	470	546	16	570	5		
SIC 3729, Aircraft equipment, not elsewhere classified:										
Industry: [2]										
Value of shipments	4,694	4,504	3,846	3,767	3,580	−5	3,600	1	4,100	1.8
Total employment (thousands)	220	197	161	136	124	−9				
Production workers (thousands)	146	124	100	81	75	−7				
Value added	2,957	2,882	2,516	2,361						
Value added per production worker man-hour	$9.48	$11.23	$11.99	$14.49						
Product: [3]										
Value of shipments	5,542	6,064	5,273	4,767	4,530	−5	4,550	0	4,700	.4
Value of imports	189	187	226	258	297	15	250	−16		
Value of exports	590	687	865	1,049	1,009	−4	1,025	1		

[1] Estimated by Bureau of Domestic Commerce.
[2] Includes value of all products and services sold by establishments in this industry.
[3] Includes value of products primary to this industry produced by all industries.
[4] Value of work done rather than value of shipments.
[5] Compound annual rate of growth.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

shipments among establishments within the aerospace industry.

Civilian Aircraft Deliveries Increase

Shipments of civilian aircraft in 1973 are expected to total $4.1 billion, a 24-percent increase over the $3.3 billion of 1972, but 7 percent below the 1968 high of $4.4 billion. Civilian shipments in 1973 will approximate 10,170 units, a 9-percent gain over the 9,375 in 1972, but down 32 percent from 1968's high of 14,974.

Expected large transport shipments in 1973, valued at $3.3 billion, will be 31 percent over the $2.5 billion of 1972. In 1973, 260 large air transports are expected to be shipped, a 26 percent gain over the 206 shipped in 1972. In the peak year of 1968 702 large transports valued at $3.8 billion were delivered.

General Aviation Shipments Jump

Shipments of general aviation (nonmilitary and nonairline) aircraft in 1973 will continue to rise following the strong advance during 1972. Single-engine aircraft shipments rose almost 20 percent in 1972 over 1971 while shipments of multiengine craft rose over 50 percent. Value of 1972 shipments of all general aviation aircraft more than doubled 1971's, because of the large increase in deliveries of high-unit-cost multi-engine types.

An estimated 2,240 general aviation aircraft, valued at over $136 million, were exported during 1972, in comparison to 1,565 units worth $88 million in 1971—increases of 43 percent in units and 55 percent in value. Exports are expected to rise during 1973 by 12 percent in units and 14 percent in value.

General aviation manufacturers conduct aggressive worldwide education and public awareness activities to increase their sales. Those efforts bring gains in exports, frequently in direct competition with foreign-produced aircraft.

New Orders Stabilize, Inventories Rise

The backlog of unfilled aircraft, missile and parts orders at the end of 1972 was estimated at $17 billion, about $500 million less than at the end of 1971. Total new orders received during 1972 remained about equal with those of 1971, at over $25 billion. That is 21 percent below the $31.5 billion peak of 1968. Inventories at the end of 1972 were over $9 billion, 23 percent above the $7.4 billion of 1971.

Funding by U.S. Decreases

Shipments of military hardware will continue to decline in 1973 because of lower U.S. spending. Military exports are also expected to decline in 1973 as foreign countries attempt to become less dependent on this country—either by purchasing from other sources, producing their own requirements, or producing under license from the United States. The high cost of military hardware has limited sales abroad.

The gradual shift in national priorities and resultant reduction in defense spending has seriously affected the U.S. aerospace industry, which depends on the Federal Government for about 70 percent of its business. The space program, however, appears to be assured constant funding since the decision was made to go ahead with the space shuttle.

1972 Profile

Aerospace

SIC Codes	1925, 3721, 3722, 3723
Value of industry shipments (millions).	$21.3
Number of establishments	1,275
Total employment (thousands).	606
Exports as a percent of product shipments.	16.5
Imports as a percent of apparent consumption.	3.3
Net profits as a percent of net worth.	6.6
Compound annual average rate of growth 1967–72 (percent):	
Value of shipments (current dollars).	−5.7
Value of exports (current dollars).	10.8
Value of imports (current dollars).	18.5
Employment	—9.6
Major producing areas	Pacific, New England, Middle Atlantic, North Central

Employment Continues Decline

In 1972, aerospace employment averaged an estimated 606,000, with 52 percent or 314,000 consisting of production workers. Only a slight overall employment decline is expected during 1973, in contrast to the 40-percent drop from the 1,016,000 of 1968 through 1972.

Airframe and engine manufacturers continue to sustain employment losses. Missile and parts manufacturers' work forces increased 4 percent during 1972, and employment in space industries is expected to rise slightly in 1973.

The Aerospace Industries Association (AIA) reports that employment of scientists and engineers will decline slightly by mid-1973 to about 157,000, a 33-percent drop from the 235,000 peak of 1967.

The Pacific coast region accounts for 43 percent of total aerospace employment, the New England and Middle Atlantic regions for 20 percent, the South Atlantic region 14 percent, the Central region 20 percent and the Rocky Mountain region 3 percent.

Exports Lower in 1972—Rise in 1973

Exports of U.S. aerospace products dropped to an estimated $4 billion in 1972, the first year-to-year decrease since 1964. The decline was principally the result of a 16-percent decrease in units and an 11-percent decrease in value of large commercial transports—from 147 units valued at $1.54 billion to 123 units valued at $1.37 billion. Exports of military aircraft also declined 35 percent, from $626 million to $408 million. Aircraft engine parts exports in 1972 totaled $546 million, a 16 percent increase over the $470 million of 1971.

Exports of large commercial transports in 1973 are expected to total $1.48 billion, an 8-percent gain over 1972. Export shipments of the smaller general aviation aircraft are also expected to register moderate gains. Aerospace exports are now being affected by the multinational consortiums formed by the European and British aircraft industries with the strong support of their governments. Foreign airlines are buying the new economical foreign-made medium-range and short-haul transports. U.S. manufacturers are conducting aggressive campaigns to gain new markets in the

Shipments of Aerospace Vehicles and Equipment, 1967–73

[Value in thousands of dollars]

	1967		1969 r	
	Number	Value	Number	Value
Aircraft and aircraft services, total		$9, 123, 535	-------	$9, 594, 919
Complete aircraft, total	19, 717	7, 891, 435	17, 488	7, 887, 219
Complete military aircraft	5, 057	4, 909, 956	4, 291	4, 293, 826
Complete civilian aircraft	14, 660	2, 981, 479	13, 197	3, 593, 393
Fixed-wing, total	14, 206	2, 938, 479	12, 687	3, 518, 393
Multiengine	2, 542	2, 769, 351	2, 781	3, 322, 195
30-place and under	2, 062	311, 351	2, 267	383, 195
31-place and over	480	2, 458, 000	514	2, 939, 000
Single engine	11, 664	169, 128	9, 906	196, 198
Rotary-wing, total	454	43, 000	510	75, 000
Aircraft services, total [2]		1, 232, 100	-------	1, 707, 700
Modifications, conversion, and overhaul		596, 800	-------	712, 300
Other aeronautical services for aircraft		635, 300	-------	995, 400
Aircraft engines, and engine parts, total		4, 781, 700	-------	4, 607, 300
Aircraft engines for U.S. military customers		1, 087, 600	-------	109, 400
Aircraft engines for other than U.S. military customers		690, 700	-------	671, 600
Aircraft engine parts including engines and parts, not specified by kind		1, 453, 800	-------	1, 554, 300
Complete missile and space vehicle engines and engine parts [3]		1, 023, 100	-------	775, 200
Other aeronautical services on aircraft and missile engines		526, 500	-------	496, 800
Aircraft propellers and propeller parts, total		75, 750	-------	64, 199
Aircraft parts and auxiliary equipment, not elsewhere classified		5, 542, 200	-------	6, 064, 300
Guided missiles and space vehicles, complete [2], [3]		5, 076, 000	-------	4, 958, 000
Complete missile systems (excluding propulsion)		2, 877, 000	-------	2, 676, 000
Complete space vehicle systems (excluding propulsion)		2, 199, 000	-------	2, 282, 000

	1970 r		1971 [1]	
	Number	Value	Number	Value
Aircraft and aircraft services, total		$9, 269, 817	-------	$7, 115, 532
Complete aircraft, total	11, 392	7, 571, 717	10, 321	5, 799, 332
Complete military aircraft	3, 534	3, 966, 682	2, 687	2, 826, 419
Complete civilian aircraft	7, 858	3, 605, 035	7, 634	2, 972, 913
Fixed-wing, total	7, 363	3, 556, 035	7, 181	2, 913, 113
Multiengine	1, 597	3, 434, 372	1, 360	2, 801, 913
30-place and under	1, 286	276, 372	1, 137	191, 913
31-place and over	311	3, 158, 000	223	2, 610, 000
Single engine	5, 766	121, 663	5, 821	111, 200
Rotary-wing, total	495	49, 000	453	59, 800
Aircraft services, total [2]		1, 698, 100	-------	1, 316, 200
Modifications, conversion, and overhaul		499, 500	-------	366, 200
Other aeronautical services for aircraft		1, 198, 600	-------	950, 000
Aircraft engines and engine parts, total		4, 593, 500	-------	3, 758, 900
Aircraft engines for U.S. military customers		932, 300	-------	628, 400
Aircraft engines for other than U.S. military customers		678, 000	-------	582, 400
Aircraft engine parts including engines and parts, not specified by kind		1, 683, 500	-------	1, 283, 800
Complete missile and space vehicle engines and engine parts [3]		727, 800	-------	699, 900
Other aeronautical services on aircraft and missile engines		571, 900	-------	564, 400
Aircraft propellers and propeller parts, total		45, 881	-------	30, 136
Aircraft parts and auxiliary equipment, not elsewhere classified		5, 273, 300	-------	4, 767, 000
Guided missiles and space vehicles, complete [2], [3]		4, 782, 000	-------	4, 356, 000
Complete missile systems (excluding propulsion)		2, 826, 000	-------	2, 641, 000
Complete space vehicle systems (excluding propulsion)		1, 956, 000	-------	1, 715, 000

Shipments of Aerospace Vehicles and Equipment, 1967-73—Continued

	1972[1] Number	1972[1] Value	Percent increase in value 1971-72	1973[1] Number	1973[1] Value	Percent increase in value 1972-73
Aircraft and aircraft services, total		7,081,700	−1		7,875,750	11
Complete aircraft, total	11,725	5,781,700	0	12,150	6,475,750	12
Complete military aircraft	2,350	2,507,800	−11	1,980	2,384,000	−5
Complete civilian aircraft	9,375	3,273,900	10	10,170	4,091,750	25
Fixed-wing, total	8,842	3,163,900	9	9,670	3,991,750	26
Multiengine	1,945	3,014,200	8	2,170	3,823,000	27
30-place and under	1,739	532,000	177	1,910	573,000	8
30-place and over	206	2,482,200	−5	260	3,250,000	31
Single engine	6,897	149,700	35	7,500	168,750	13
Rotary-wing, total	533	110,000	84	500	100,000	−9
Aircraft services, total[2]		1,300 000	−5		1,400,000	8
Modifications, conversion, and overhaul		300,000	−18		300,000	0
Other aeronautical services for aircraft		1,000,000	5		1,100,000	10
Aircraft engines and engine parts, total		3,275,000	−13		3,035,000	−7
Aircraft engines for U.S. military customers		500,000	−20		450,000	−10
Aircraft engines for other than U.S. military customers		480,000	−18		450,000	−6
Aircraft engine parts including engines and parts, not specified by kind		1,080 000	−16		1,000,000	−7
Complete missile and space vehicle engines and engine parts[3]		665,000	−5		625,000	−6
Other aeronautical services on aircraft and missile engines		550,000	−3		510,000	−7
Aircraft propellers and propeller parts, total		43,000	43		47,000	9
Aircraft parts and auxiliary equipment, not elsewhere classified		4,500,000	−5		4,500,000	0
Guided missiles and space vehicles, complete[2 3]		4,548,000	4		3,700,000	−19
Complete missile systems (excluding propulsion)		2,864,000	8		2,400,000	−16
Complete space vehicle systems (excluding propulsion)		1,684,000	−2		1,300,000	−23

r = revised.
[1] BDC estimate.
[2] Represents value of work done.
[3] Includes receipts for research & development & other services.

Sources: Bureau of the Census; Aerospace Industries Association.

U.S. Exports of Aerospace Vehicles and Equipment 1967–73

[Value in thousands of dollars]

	1967		1969		1970	
	Number	Value	Number	Value	Number	Value
Aerospace vehicles and equipment, total		2, 368, 236		3, 098, 343		3, 398, 522
Civilian aircraft, total	3, 885	788, 483	3, 309	1, 265, 130	2, 939	1, 527, 307
Business, personal and utility, new	3, 124	91, 156	2, 460	125, 468	2, 037	112, 441
Rotary-wing, new	223	25, 205	252	29, 131	333	27, 163
Transport, new:						
Under 33,000 lbs., empty weight	14	4, 348	17	25, 487	19	6, 809
33,000 lbs. and over, empty weight	120	606, 794	168	946, 032	165	1, 276, 312
Other new aircraft, not elsewhere classified	37	1, 963	33	1, 344	27	538
Used, rebuilt, and converted	367	59, 017	379	137, 668	358	104, 044
Military aircraft, total	576	433, 792	647	600, 344	634	466, 682
Aircraft engines and parts:						
Internal combustion, total		168, 993		131, 470		128, 240
Military, new or used	231	4, 542	211	3, 602	265	7, 060
Nonmilitary, new	2, 076	18, 498	2, 524	12, 630	2, 340	11, 951
Nonmilitary, used	1, 406	13, 164	899	8, 017	816	7, 230
Parts, not elsewhere classified		132, 789		107, 221		101, 999
Jet and gas turbines and parts		175, 588		249, 903		292, 084
Military, new or used	336	16, 364	340	37, 238	370	28, 551
Nonmilitary, new or used	878	74, 682	767	83, 314	639	99, 190
Parts, not elsewhere classified		84, 542		129, 351		164, 343
Missile engines and parts		3, 237		7, 830		10, 480
Propellers and parts		17, 483		17, 766		18, 644
Landing gear and parts		24, 502		34, 202		32, 225
Aircraft parts and access., not elsewhere classified		396, 839		513, 480		617, 736
Guided missiles, components and rockets		208, 411		157, 049		108, 675
Avionics		150, 908		121, 169		196, 449

	1971 r		1972 [1]		1973 [1]	
	Number	Value	Number	Value	Number	Value
Aerospace vehicles and equipment, total		4, 194, 095		3, 952, 772		4, 104, 500
Civilian aircraft, total	2, 522	1, 915, 694	3, 304	1, 856, 471	3, 590	1, 986, 500
Business, personal and utility, new	1, 565	88, 300	2, 239	136, 416	2, 500	155, 000
Rotary-wing, new	296	45, 329	257	53, 143	250	50, 000
Transport, new:						
Under 33,000 lbs., empty weight	26	25, 477	55	10, 823	66	16, 000
33,000 lbs. and over, empty weight	147	1, 540, 994	123	1, 372, 387	124	1, 476, 000
Other new aircraft, not elsewhere classified	75	3, 622	138	3, 917	150	4, 500
Used, rebuilt, and converted	413	211, 972	492	279, 785	500	285, 000
Military aircraft, total	787	626, 419	550	407, 804	480	384, 000
Aircraft engines and parts:						
Internal combustion, total		111, 827		130, 402		126, 000
Military, new or used	310	5, 817	372	7, 751	350	7, 000
Nonmilitary, new	1, 909	11, 692	2, 246	15, 081	2, 000	17, 000
Nonmilitary, used	914	8, 233	1, 179	10, 985	1, 200	12, 000
Parts, not elsewhere classified		86, 085		96, 585		90, 000
Jet and gas turbines and parts		357, 732		415, 135		445, 000
Military, new or used	393	29, 671	384	47, 839	400	50, 000
Nonmilitary, new or used	707	128, 551	592	137, 309	600	145, 000
Parts, not elsewhere classified		199, 510		229, 987		250, 000
Missile engines and parts		13, 989		10, 856		10, 000
Propellers and parts		22, 579		20, 008		22, 000
Landing gear and parts		33, 258		39, 535		41, 000
Aircraft parts and access., not elsewhere classified		793, 976		748, 741		750, 000
Guided missiles, components and rockets		119, 858		123, 358		130, 000
Avionics		198, 763		200, 462		210, 000

r = revised.
[1] Estimated by Bureau of Domestic Commerce.

Source: Bureau of the Census and Bureau of Domestic Commerce.

U.S. Imports of Aerospace Vehicles and Equipment 1967–73

[Value in thousands of dollars]

Item	1967 Number	1967 Value	1969 Number	1969 Value	1970 Number	1970 Value
Aerospace vehicles and equipment, total		280,791.9		322,475.2		308,177.6
Complete aircraft, total	170	60,857.2	343	103,937.5	198	47,726.2
Civilian aircraft, total	148	59,165.8	306	102,236.5	194	47,683.2
Under 10,000 lbs. empty weight, new	61	11,081.9	132	15,450.9	59	5,904.5
10,000–33,000 lbs. empty weight, new	41	32,947.6	122	66,758.8	53	27,410.4
Over 33,000 lbs. empty weight, new	12	13,449.5	9	15,969.5	3	6,924.8
Rotary-wing, new	10	260.2	3	216.9	39	4,796.8
Used, rebuilt, and converted	24	1,426.6	40	3,840.4	40	2,646.8
Military aircraft, total	22	1,691.4	37	1,701.0	4	43.0
Aircraft engines, total [2]	944	30,750.1	1,147	30,420.2	880	33,631.2
Piston-type, new	194	954.1	103	605.1	3	6.9
Turbo-jet and gas turbine, new	563	27,904.0	698	19,956.6	728	18,154.6
Non-piston-type, not elsewhere classified	187	1,892.0	346	9,858.4	149	15,469.7
Aircraft and spacecraft parts, not elsewhere classified [2]		188,024.6		187,026.6		225,621.7
Spacecraft		1.0				
Other		1,159.0		1,090.9		1,198.5

Item	1971 r Number	1971 r Value	1972 [1] Number	1972 [1] Value	1973 [1] Number	1973 [1] Value
Aerospace vehicles and equipment, total		372,688.3		505,923.4		473,950.0
Complete aircraft, total	198	78,312.4	233	81,146.3	262	87,020.0
Civilian aircraft, total	173	38,664.9	219	48,102.3	242	39,820.0
Under 10,000 lbs. empty weight, new	50	5,187.6	102	10,075.2	130	12,740.0
10,000–33,000 lbs. empty weight, new	42	26,531.8	29	24,868.0	20	17,140.0
Over 33,000 lbs. empty weight, new	1	83.3	1	3,663.9		
Rotary-wing, new	34	4,550.8	15	2,092.8	12	1,700.0
Used, rebuilt, and converted	46	2,311.4	72	7,402.4	80	8,240.0
Military aircraft, total	25	39,647.5	14	33,044.0	20	47,200.0
Aircraft engines, total [2]	981	36,007.0	994	127,496.7	1,010	135,930.0
Piston-type, new	28	352.0	15	42.9	10	30.0
Turbo-jet and gas turbine, new	591	24,401.1	647	116,523.7	700	126,000.0
Non-piston-type, not elsewhere classified	362	11,253.9	332	10,930.1	300	9.900.0
Aircraft and spacecraft parts, not elsewhere classified [2]		257,876.8		296,513.5		250,000.0
Spacecraft						
Other		492.1		766.9		1,000.0

r = revised.
[1] Estimated by Bureau of Domestic Commerce.
[2] Aircraft engine parts are not included as they are not separately classified. All imports of engine parts, for whatever type of engine, are classified in TUSSA 6605200—"Parts of Piston-Type Engines, Except Compression-Ignition Engines", and TSUSA 6605400— "Other than 6605200."

Source: Bureau of the Census.

developing countries as well as in the East European countries and the Peoples' Republic of China.

Imports Reach All-Time High in 1972

Value of aerospace imports reached an all-time high at an estimated $506 million in 1972, a sharp 36-percent increase over the $373 million in 1971. Imports of aircraft engines of $127 million during 1972 were 253 percent over the $36 million total of 1971. This rise is principally attributed to purchases of Rolls Royce engines from the United Kingdom for use in the three-engine Lockheed L-1011 transport. Twenty-two of those new aircraft were delivered in 1972 and 31 more will be delivered in 1973, making a 2-year total of 53.

Profits Show Upturn in 1972

Aerospace industry net profits after taxes rose to 2.5 percent of sales in the first half of 1972, from 1971's 4-year low of 1.8 percent. After tax profits rose to 7.8 percent of stockholders' equity, following the 9-year low of 5.8 percent in 1971. Federal Trade Commission reports indicate that for the first half of 1972 the aerospace industry's gain was substantially greater than the average of all other manufacturing industries. Improvement in the financial condition of the industry is the result of reductions in operating costs in relation to shipments and sales. With the bulk of these cutbacks having taken place, and an improved profit picture already a matter of record, further improvement in profits is expected in 1973.

Development Costs Inhibit Growth

Tremendous costs are associated with technological developments. Aircraft systems (airframes, engines, on-board systems) are complex and technology-intensive due to the continuing demand for higher aircraft performance and productivity. Each succeeding increase in systems performance requires the development of new technology; the greater the advance, the higher the development cost. According to a recent study of the Department of Defense, National Aeronautics and Space Administration, and Department of Transportation, costs of commercial transport development double about every 5 years. The scale of development costs ranges from the relatively low costs—in the hundreds of millions—for product improvements using existing technology through derivatives, to advanced technology where costs can run over $1 billion.

According to RADCAP (R. & D. Contributions to Aviation Progress), it cost almost five times as much to develop the DC-8 for the 1960's market as to develop the DC-6 for the 1950's market, and over twice the cost of the DC-8 to develop the DC-10 for the 1970's market. Significance of the long-term trends is that unit prices and developmental costs of civil transport aircraft are rising faster than GNP, while funds for aeronautical research and development are growing more slowly than GNP. If those trends persist, say industry leaders, major new aircraft programs must decrease in number or change in nature, slowing the momentum of aeronautical development and lessening the technological superiority of U.S. aviation.

The New Competitive Environment

After serious setbacks in the last few years, U.S. aerospace industry profits are at a low level. Debt/equity ratios have risen markedly, and internal cash flows are insufficient to undertake the high development costs of new programs.

At the same time, foreign manufacturers have under development major projects aimed primarily at the markets of the late 1970's and early 1980's. Those programs, often multinational, are heavily financed by the participating foreign governments. In most cases the new foreign aircraft

Aerospace Industry Earnings Compared With All Manufacturing, 1963–72

Year	Profits after taxes as percent of sales		Profits after taxes as percent of stockholders' equity	
	Aircraft and parts industry [1]	All manufacturing	Aircraft and parts industry [1]	All manufacturing
1963	2. 3	4. 7	11. 1	10. 1
1964	2. 6	5. 2	11. 9	11. 4
1965	3. 2	5. 6	15. 1	13. 0
1966	3. 0	5. 6	14. 4	13. 5
1967	2. 7	5. 0	12. 8	11. 7
1968	3. 2	5. 1	14. 2	12. 1
1969	3. 1	4. 8	10. 6	11. 5
1970	2. 0	4. 0	6. 8	9. 3
1971	1. 8	4. 2	5. 8	9. 7
1972 (First half)	2. 5	4. 3	7. 8	10. 4

[1] Includes only data for companies classified in industry group 372.

Source: "Quarterly Financial Reports," Federal Trade Commission.

programs will have no direct competition from U.S. suppliers.

A new round of airline reequipment is expected to start in 1974, accelerate through the late 1970's, reach a peak about 1980, and continue at a high but declining level until 1985. Estimates of the total volume of airline equipment business in the 1974–85 period range from $55 billion to $148 billion. Ability of U.S. manufacturers to maintain their traditional market domination is in doubt because of financing problems, which limit the development of the wide range of aircraft types the industry created in the past.—*Randolph Myers, Jr., Office of Business Research and Analysis.*

CHAPTER 37

Transportation

Airlines, railroads, motor buses, and automobiles transported passengers 1.301 billion miles in 1972, 3 percent more than in 1971. Passenger miles are expected to increase by another 3 percent in 1973.

Cargo ton-miles for scheduled airlines, railroads, inland waterways, motor carriers and pipelines advanced 3 percent to an estimated 2,002 billion in 1972. Cargo ton-mileage is expected to increase another 3 percent to 2.066 billion ton-miles in 1973.

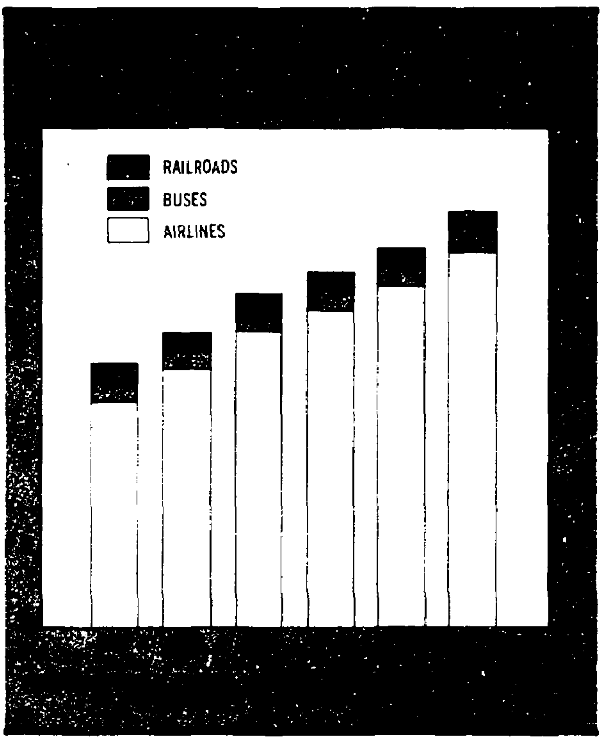
Railroad Ton-Miles Increase

Led by increased shipments of grain, metals, and metal products, revenue freight hauled by the railroads rose an estimated 3 percent over 1971 to 763 billion ton-miles in 1972 and should grow another 3 percent in 1973.

Financial problems continue to plague many railroads. Earnings in 1972 for the railroad industry as a whole were expected to be above those in 1971, but still below levels needed to maintain plant and equipment and attract new investment. Faced with wage increases of 10 percent granted in 1972 and another 5 percent increase scheduled for January 1, 1973, the railroads were allowed to apply a 2.5-percent temporary surcharge on freight rates beginning in February 1972. The surcharge was ended when the carriers were granted permanent increases of 4 to 6 percent in October. Railroads assert that the approved increases will not cover the higher costs. They may apply for another rate increase.

Hurricane Agnes caused severe damage to several Eastern railroads. One filed bankruptcy papers after the storm. Because of the financial plight of many U.S. railroads, several bills have been introduced in Congress to provide various forms of assistance.

Intercity rail passenger volume remains below the level necessary for profitable operation of Amtrak, the National Railroad Passenger Corporation, which took over most intercity passenger operations in 1971. The Corporation hopes to double the number of rail passengers within 2 years and move toward a breakeven point in its operations.



Transportation: Passenger Revenue-Miles: Trends and Projections 1967–80

[In billions]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73	1980 [1]	Percent increase 1972–80 [2]
Total	1, 028. 6	1, 140. 0	1, 194. 0	1, 228. 0	1, 266. 1	3	1, 301. 8	3	1, 614. 5	2. 7
Scheduled airlines	98. 7	125. 0	131. 7	136. 7	143. 3	5	152. 0	6	275. 2	8. 5
Railroads	15. 2	12. 3	10. 9	9. 0	8. 8	−2	8. 9	1	10. 3	2. 0
Motor bus	4. 9	24. 9	25. 3	26. 0	27. 0	4	28. 0	4	35. 0	3. 0
Automobiles	889. 8	977. 0	1, 026. 0	1, 056. 0	1, 087. 0	3	1, 112. 0	2	1, 294. 0	2. 0

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth.

Source: Air Transport Association, Interstate Commerce Commission, Bureau of Domestic Commerce.

The Federal Railroad Safety Act of 1970 ordered the Department of Transportation (DOT) to establish and enforce safety standards in all areas of railroading. During 1972 DOT issued track standards and published a notice of proposed rulemaking regarding initial equipment safety standards for railroad freight cars. Proposals for car design and maintenance standards were to be issued during the latter part of 1972.

Freight hauled by the railroads is expected to grow an average of 3.3 percent annually to 967 billion ton-miles in 1980. However, the railroads' share of total domestic intercity freight traffic will drop from 36 percent in 1970 to 33 percent in 1980.

Pipeline Shipments Grow

An increasing share of crude petroleum and petroleum products is transported domestically by pipelines. In 1972, ton-miles totaled an estimated 462 billion, an advance of 4 percent from 1971. Another 4 percent rise to 480 billion ton-miles is forecast for 1973. Pipeline shipments are expected to continue growing at an average 3.6 percent a year from 1972, to reach a level of 614 billion ton-miles by 1980.

Inland Waterways Busier

Cargo ton-miles hauled via the inland waterway system rose 3 percent to 316 billion in 1972, and are expected to grow another 3 percent to 326 billion in 1973. Coal, the main cargo, accounts for slightly over 20 percent of all waterway tonnage. Growth of 3.1 percent a year to 801 ton-miles in 1980 is expected.

Truck Revenues and Expenses Increase

Gross revenues for class I, II, and III motor carriers reached $18.9 billion in 1972, a 12-percent gain over the $16.9 billion of 1971. Ton-mile totals reached 450 billion, an advance of about 5 percent. The excess of the percentage rise of revenues over that of ton-miles reflects freight rate increases granted late in the year, and the growing trend

Transportation: Cargo Ton-Miles: Trends and Projections 1967–80

[In billions]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73	1980 [1]	Percent increase 1972–80 [2]
Total	1, 764. 9	1, 901. 4	1, 942	1, 944. 0	2, 002. 0	3	2, 065. 8	3	2, 840. 0	4. 4
Cargo airlines	3. 4	4. 7	5	5. 1	5. 5	9	5. 9	7	10. 1	9. 0
Domestic airlines	1. 9	2. 6	3	3. 0	3. 2	7	3. 4	6	6. 3	10. 0
International airlines	1. 5	2. 1	2	2. 1	2. 3	10	2. 5	9	4. 8	10. 0
Railroads	719. 0	774. 0	771	746. 0	763. 0	3	788. 0	3	967. 0	3. 3
Inland waterways	274. 0	303. 0	318	307. 0	316. 0	3	326. 0	3	801. 0	3. 1
Motor carriers	388. 0	404. 0	412	430. 0	450. 0	5	460. 0	2	537. 0	2. 2
Pipelines	361. 0	411. 0	431	444. 0	462. 0	4	480. 0	4	614. 0	3. 6

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth.

Source: Interstate Commerce Commission, Air Transport Association, Bureau of Domestic Commerce.

toward shipments of lighter freight and less-than-truck-loads—which command premium rates—via motor freight.

Wage increases scheduled to go into effect January 1 and July 1 of 1972 were approved by the Wage Board. Delays in approval of rate increases by the Price Commission and the Interstate Commerce Commission kept the gain in revenues to 11.8 percent, against a 12.2-percent rise in expenses.

Interstate Highway System Gains Steadily

As of June 1972, 33,523 miles of the Interstate Highway System's planned 42,500 miles had been completed and opened, and an additional 800 miles were to be opened during the balance of the year. Efforts of other transit interests to share in highway trust fund disbursements are opposed by the trucking industry.

Environmental and safety requirements are expected to increase truck equipment costs considerably over the next few years, but the trucking industries' share of intercity freight should continue to grow. Revenues are expected to increase annually at an average rate of about 3 percent through the remainder of the decade, and cargo ton-miles are expected to increase an average of 2.2 percent per year.

Airlines Continue Recovery

Continuing economic improvement for U.S. airlines is expected in 1973. The airlines rebounded in 1972 from large losses sustained in 1970 and early 1971. Scheduled airlines reported a net profit of $20.7 million in the first half of 1972, and were expecting a profit of $150 million for the year, a fivefold increase over the $30 million profit of 1971. Growth in revenue passenger miles (RPM's) exceeded 11 percent in the first half of 1972. The increase in the second half was smaller, making the gain for the year 8 percent. Another 8 percent increase is expected for 1973. International traffic grew 15 percent in the first half of 1972; North Atlantic RPM's showed a 31 percent gain from March to June.

Domestic carriers were granted a 2.7-percent fare increase effective September 6, 1972, by the Civil Aeronautics Board (CAB) which should yield an additional $158 million per year in new revenues. Currently fares are 11.9 percent higher than they were in October 1970.

New Capacity for Airlines

U.S. scheduled airlines were expected to add 60 wide-bodied jets to their fleets in 1973, after taking delivery of 62 in 1972. That will bring the total number of these high capacity planes in service to 239. Further delivery of 78 wide-bodies is expected through 1976, with 94 narrow-bodied jet aircraft scheduled for delivery during the 1972–76 period. About 215 first-generation jets are expected to be retired through 1975. To meet pollution standards set by the Federal Aviation Administration for new aircraft, modification of JT8D engines on existing Boeing 727's and 737's and McDonnell Douglas DC–9's is expected to be completed by the end of 1973. Studies continue on the feasibility of modifying JT3D engines on Boeing 707's and McDonnell Douglas DC–8's.

Airlines have begun converting the interiors of narrow-bodied aircraft to a wide-bodied look, particularly for use on routes in which wide- and narrow-bodied aircraft are in competition. The "lounge war" begun in 1971 has continued with the introduction of coach lounges in narrow-bodied aircraft. Some airlines have removed lounges from aircraft operating on routes where they do not compete with wide-bodied jets.

Operating Costs Rise

Rising operating costs, especially for labor, security, fuel, and landing fees continue to affect the airlines industry. Landing fees have tripled over the past decade and fuel costs are sensitive to oil price changes. Average hourly wages rose 7 percent in 1971; estimates are that payroll outlays rose 5 percent. Employment declined by about 5,000. Substantial new costs have been incurred to meet the threat of air piracy, with expenditures required for new personnel, metal detectors, and aircraft modifications. However, except for supplemental carriers, operating revenues rose faster than operating expenses in 1971, reversing a 6-year trend.

New Charter Rules

Late in September, 1972, the CAB issued new charter rules which allow groups of 40 or more, without regard to affinity, to travel together abroad or within the United States. Reservations 90 days in advance and a deposit of 25 percent are required, refundable only if the passenger becomes ill or dies. Travel period limits would be at least 7 days in North America and 10 days elsewhere. Either scheduled or supplemental carriers could offer the charter flights.

Scheduled carriers challenged the CAB ruling in court, fearing diversion of more North Atlantic traffic to the supplementals. If sustained, the CAB ruling will probably bring a major reduction in North Atlantic charter fares.

Air Traffic Growth to Continue

Steady growth in domestic and international passenger and cargo traffic is expected during the balance of the 1970's. Scheduled U.S. airlines are expected to increase revenue passenger miles from 143 billion in 1972 to 152 billion in 1973 and by 8.5 percent a year over the remainder of the decade, to a total of 275 million in 1980. Domestic trunk RPM's should advance from 102 billion in 1972 to 110 billion in 1973, and at an 8.4-percent annual rate to 194 billion by 1980. Local service carriers should grow from about 8 billion RPM's in 1972 to approximately 9 billion in 1973. By 1980, local service carriers should account for 14 billion RPM's.

Scheduled international traffic should rise from 31 billion RPM's in 1972 to 34 billion in 1973 and to 67 billion by 1980.

Air cargo growth averaging 9 percent a year, to 10.1 billion ton-miles in 1980, is expected in the remainder of this decade. Domestic airlines' cargo traffic is expected to reach 6.3 billion ton-miles and international air cargo shipments 4.8 billion ton-miles.

Transit View to 1980

Passenger miles of scheduled airlines, railroads, motor buses, and automobiles are expected to grow at 2.7 percent annually from 1972 to a total of 1,614,500 million passenger miles in 1980. All transportation modes will share in the growth, with scheduled airlines leading with an estimated 8.5 percent annual rate and railroad passenger miles growing the least at 2 percent per year.

Cargo ton-miles should grow an average of 4.4 percent per year from 1972 to 1980. The greatest percentage growth is expected to be in airline cargo and the least in motor carrier transportation. Cargo ton-miles for all modes in 1980 are forecast at 2,840 billion.—*Office of Business Research and Analysis.*

CHAPTER 38

Communications

Operating revenues from domestic and international telephone traffic, data communications, radio and television broadcasting, and cable television (CATV), are expected to total $35 billion in 1973, up 13 percent from 1972. By 1980, revenues should pass the $70 billion mark, reflecting an annual growth rate of 11 percent. Growth of telephone revenues is expected to make the largest dollar contribution to this increase, followed by data and record communication, television broadcasting, and cable television service.

Domestic telephone revenues are expected to exceed $27 billion in 1973, up 13 percent from 1972, while domestic telegraph and data transmission services should enjoy a 16 percent rise in revenues to $1.45 billion. Telephones in use in the United States are expected to exceed 138 million at the end of 1973. New plant investment by these two industries is projected at $13 billion, bringing gross capital investment to $101 billion by the end of 1973.

Plant expansion will lean heavily on new technology. Electronic switching systems under computer control are being introduced to replace traditional electromechanical telephone exchanges. Digital circuits for voice and data transmission are being brought into service at an increasing rate. Several applications are before the Federal Communications Commission to establish domestic communications satellite systems, and one or more may be in operation by 1975.

Existing common carriers are expanding their facilities, and specialized carriers have been established to meet the rapidly increasing demand for digital data communications channels.

International telephone and telegraph revenues in 1973 are expected to reach $900 million, up 23 percent from the 1972 level of $730 million. Tele-

Communications: Projections 1972–80 [1]

[Revenues in millions of dollars]

SIC code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80 [2]
4811	Domestic telephone	$24, 250	14	$27, 550	13	$53, 900	11
	International telephone	470	27	597	27	3, 500	29
4821	Domestic telegraph [3]	1, 250	19	1, 450	16	5, 100	17
	International telegraph	260	16	302	16	840	16
4832	Radio broadcasting	1, 356	8	1, 465	8	2, 370	7
4833	Television broadcasting	3, 015	10	3, 290	9	5, 200	7
(4899)	Cable television (CATV) [4]	390	15	470	20	1, 700	20

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth.
[3] Includes estimated revenues of the telephone companies for data transmission services.
[4] Subscriber revenues only. Does not include advertising or per program charges.

phone revenues should contribute $127 million of this increase and telegraph revenues about $42 million. This rapid growth in international communications traffic has been possible because of the large number of satellite and cable circuits that are now available. The fifth and last of the INTELSAT IV satellites, with a capacity of 6,000 voice channels, is scheduled for launch over the Pacific in 1973. Expectations are that with this addition, ample worldwide channels will be available to meet the needs of the next 5 years. A total of 70 earth stations were interconnected via satellites and in operation for international communications at the end of 1972.

The international communications cable network is also being expanded. A.T. & T. expects to add an 845 channel cable to Hawaii and a 160 channel cable in the Caribbean. Additional international cables of very high channel capacity are planned for the Atlantic and Pacific by the end of the decade.

Revenues of the commercial radio broadcasting stations and networks are expected to climb to a new high of $1.46 billion in 1973, up 8 percent for the year. Earnings before Federal income tax should also reach a new high of $130 million, up 10 percent over 1972.

Television broadcasting revenues are also expected to reach a record of nearly $3.3 billion, up 9 percent from 1972. Pre-Federal income tax earnings should rise about 12 percent to $590 million.

The license renewal process, application of the fairness doctrine, access to the broadcast media by minority groups, minority employment, cable television, and revision of the copyright law are problems that continue to occupy the attention of broadcast management.

1972 Profile

Domestic Telephone and Telegraph

SIC Codes	4811 and 4821
Revenues (millions)	$25,500
Number of companies	1,803
Total employment (thousands).	993
Number of telephones (thousands).	131,500
Compound annual average rate of growth 1967–72 (percent):	
Revenues (current dollars).	10
Employment	5
Number of telephones	5

Cable television subscriber revenues should reach about $470 million in 1973, up about 20 percent over 1972. An increase of nearly 1.1 million new subscribers is forecast for 1973, a gain of almost 16 percent. By the end of 1973, close to 8 million households could have cable service if undue delays are not encountered in the processing of certificates of compliance by the FCC.

Prospects for cable television in the 70's improved substantially when comprehensive new rules for the industry were issued by the FCC on March 31, 1972. These rules, providing for the importation of two additional signals in the top 100 markets, are expected to permit the growth of cable systems in these areas on a financially viable basis. If sufficient investment capital becomes available, the cable industry could service 23.5 million households by 1980, providing $1.7 million in subscriber revenues. Charges for other services, per program fees, and advertising revenues will add substantially to this total.—*E. MacDonald Nyhen, Office of Business Research and Analysis.*

DOMESTIC TELEPHONE AND TELEGRAPH

Operating revenues for telephone and telegraph services should exceed $29 billion in 1973, an increase of about 14 percent over the $25.5 billion estimated for 1972. Revenues in 1972 rose about 14 percent over 1971. Accounting for significant gains in new telephone stations and traffic in 1972 were planned expansion of telephone and telegraph services to meet the demand for better and more reliable telephone service, increasing activities of both traditional and special carriers in the field of data transmissions and the general upswing in business activities. Installation of new equipment and expansion of telephone and data services are expected to cost the industry approximately $13 billion in 1973, compared with $11.4 billion estimated for 1972.

Telephones Exceed 131 Million

Telephones in service reached about 131.5 million in 1972, up 5 percent over the 125.5 million in use at the end of 1971, one of the highest gains in the industry's history. Although demand for residence telephones continued to account for a substantial portion of new installations, the upswing in business activities in early 1972 and the high level of new constructions of motels, office com-

Domestic Telephone and Telegraph Trends and Projections 1967-73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73
Industry: [2]								
Total operating revenues	15,674	19,000	20,700	22,300	25,500	14	29,000	14
Number of telephones (thousands)	103,971	115,500	120,552	125,500	131,500	5	138,100	5
Total employment (thousands)	797	900	965	983	993	1	1,003	1
Gross cumulative plant investment	53,600	62,700	69,500	77,300	88,000	14	100,000	14
Value of imports								
Value of exports								

[1] Estimated by Bureau of Domestic Commerce.
[2] From domestic telephone and telegraph industries (SIC 4811 and 4821).

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce, Federal Communications Commission, and U.S. Independent Telephone Association.

plexes and shopping centers largely contributed to the significant gain. A similar expansion is expected in 1973.

Mailgram Service Continues Up

Mailgram messages reached 6 million in 1972, compared with 5 million in the previous year. This is a system for sending written messages any place in the 48 contiguous States over a high-speed computer for delivery by a mailman. It is operated jointly by the Western Union Telegraph Co. (WU) and the U.S. Postal Service. Mailgram service was introduced to the public in 1970 and by late 1972 approximately 25,000 messages a day were being handled through this service. Because of its growing popularity, WU plans to extend the service to Puerto Rico, Alaska, and Hawaii.

Multiple Entry Satellite Policy Adopted

The policy adopted by the Federal Communications Commission (FCC) in June 1972 permitting "multiple" entry in the domestic satellite field is expected to result in the construction of a number of systems for telephone or specialized services over the next several years. This policy probably will encourage competition among carriers and result in the availability of efficient and economic services to the general public. About seven applications were pending in September 1972. One carrier, intending to operate the first domestic satellite system by mid-1974, placed an order last August for three satellites at a cost of $20.7 million. Launchings are scheduled for the spring and fall of 1974. Satellite systems will cover points on the U.S. mainland, Hawaii, Alaska, and Puerto Rico.

Modernization Accelerated

The Bell System accelerated its program of converting electro-mechanical type central office switching centers to electronic switching (ESS) with memory circuits in 1972. An estimated 350 ESS centers were in operation by the end of the year, up from 200 in 1971. The number of ESS centers is expected to exceed 600 in 1973, and the industry will average one conversion per day by 1980.

Independent operators are expected to operate 70 ESS centers in 1973 compared with 35 centers last year. The program, started in 1965, will not be completed until the end of the century.

Data Transmission Expanding

The telephone and telegraph operating industry continued to expand its data transmission network in 1972 to meet increasing demands for service from banks, airlines, and Federal, State and local governments.

The telephone operating segment has realized annual gains of 30 percent in revenues from data transmission network services in the past several years. Such revenues were estimated at over $850 million in 1972. An important development in 1972 was the approval by the FCC of the Bell System's application to establish a data-under-voice system between New York and Chicago which would replace existing analog links with digital facilities. Total capacity of the system is 1.5 million bits of information per second.

The telegraph segment also expanded its higher-speed data communications network in 1972. A significant step was taken in this direction last May when a new microwave system was placed in operation between Atlanta and Cincinnati, a distance of some 400 miles. This system is the first operational commercial facility to utilize fully derived digital data transmission channels. Eventually a digital transmission network will be available to interconnect all major business centers. Plans are being made to add digital operations to an existing analog route between New York and Washington and to establish an analog/digital system on the Chicago-Pittsburgh microwave system.

The growing importance of data transmission is reflected in the entry of specialized common carriers in the field. One such carrier operated a system between Chicago and St. Louis last year and plans to place the second and third of 16 regional private microwave systems in service in June 1973 between Washington, Philadelphia and New York, and between New York and Chicago. Another specialized carrier started constructing a segment of its national system in late 1972 in Houston. Two other carriers received Federal Communications Commission approval in 1972 to construct systems between San Francisco and Seattle, Minneapolis and Houston, and Los Angeles and El Paso. These companies will be in competition with established carriers for data transmission markets.

Construction Expenditures Rise Sharply

The telephone and telegraph operating industry spent $11.4 billion in 1972 to meet the ever increasing demand for telephone, telegraph, and data services, an advance of 16 percent over the $9.8 billion expended in 1971. Gross plant investment reached $88 billion, up 14 percent over 1971.

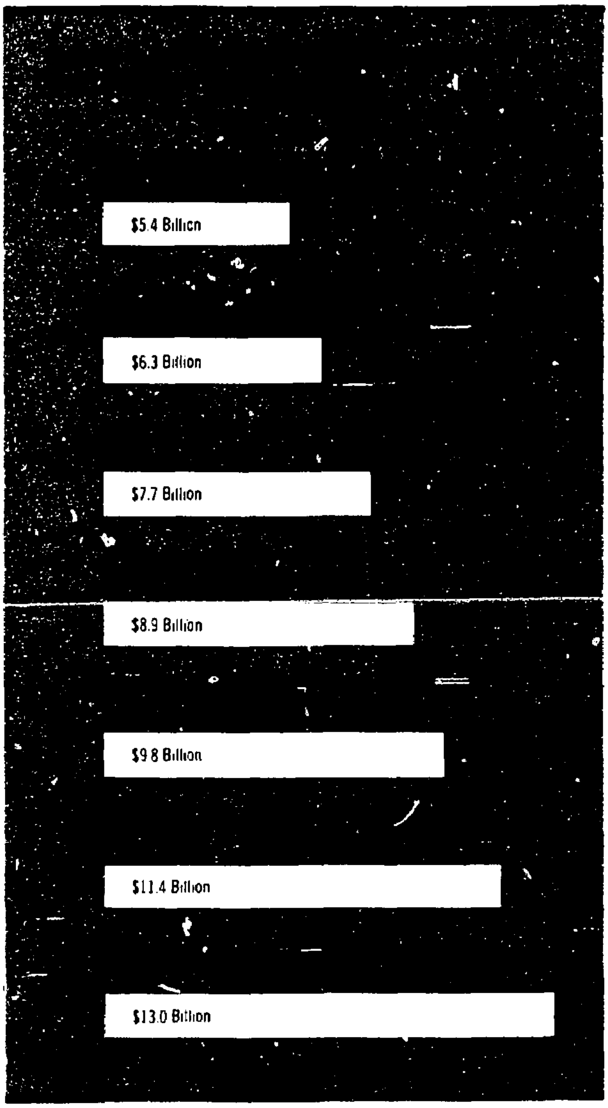
The high rate of capital investment will be maintained in 1973 and in the years ahead to upgrade existing equipment, to install newly developed equipment, to expand existing systems, and to establish domestic satellite communications networks to handle increasing voice and data traffic. To offset increasing construction and operating costs and to maintain its heavy construction programs, companies will probably continue to seek rate increases in those areas where the general level of telephone rates has remained essentially the same for over 10 years. In 1972 numerous applications for rate increases were approved by state public utility commissions.

Employment Near 1 Million

Employment in the telephone and telegraph industry reached 993,000 in 1972, 25 percent higher than in 1967 but only a nominal increase over the 1971 level. Many jobs have been eliminated with the addition of automated equipment. One large telegraph company, for instance, realized a 17 percent drop in employment in the first quarter of 1972 moving from marginal labor intensive services into automated services. Telephone and telegraph companies continue to provide summer jobs to over 20,000 high-school and college students each year.

Profits Up

Telephone and telegraph industry profits exceeded 9 percent in 1972. Increased traffic and rate



increases in many areas resulted in significant gains in revenues and accounted for the upswing in profits from less than 9 percent in 1971. Revenue losses due to work stoppages and increasing construction and labor costs were responsible for the decline in profits in 1971.

Services and Revenues To Rise

Telephone and telegraph industry revenues are expected to reach $59 billion in 1980, reflecting annual gains of about 13 percent. Increased demand for additional telephone and telegraph services and new services such as banking through visual information access, availability of a national mobile radio telephone network, increased data usage via facilities of operating and specialized carriers, and planned construction of satellite communications networks account for the bright outlook for the industry. Significant gains in employment will probably not be realized until after 1975.

Specific programs which will be implemented over the next several years include the continued conversion of electromechanical type central offices to ESS (electronic switching), the introduction of the T2 line system in early 1973 to provide digital data transmissions over distances up to 500 miles, expansion of data microwave systems of specialized common carriers in competition with the established carriers, continued expansion by Western Union in its quest to establish a single nationwide system capable of accepting, handling, transmitting, processing and disseminating data and messages by the mid-1970's, the entrance of other specialized common carriers in the data field, and the establishment of up to seven competing satellite communications networks. Carriers to provide telephone or data services via satellite hope to be in operation within the next 2 years. All of these programs are geared to meeting the economy's ever increasing demand for better and more reliable communications services and the traffic anticipated in the years ahead.

Capital expenditures will continue to increase to meet industry's program requirements to enable it to compete for the customer-owned equipment market and to compete with one another for the data market, particularly after 1974 when a number of satellite systems will be in operation. The penetration of the customer-owned equipment market by both domestic and foreign suppliers will probably not affect revenues of the telephone operating segment. To ensure its operating competitive position, for instance, the Bell System has been supplied with a number of small, inexpensive private branch exchanges by its manufacturing subsidiary. Independent telephone companies are expected to spend at least $26.8 billion over the next 8 years to fund construction programs.—*Mario J. Molinari, Office of Business Research and Analysis.*

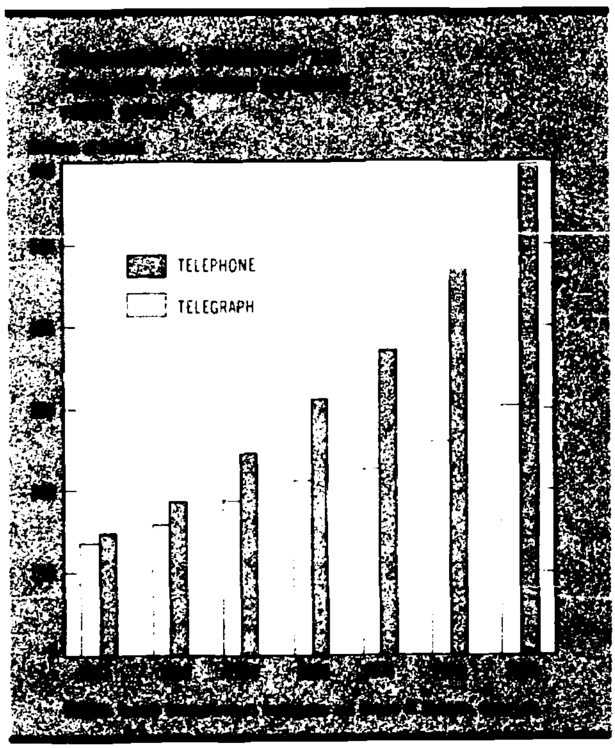
1972 Profile

International Telephone and Telegraph

SIC Codes	4811 and 4821
Revenues (millions)	$730
Number of companies	8
Employment	8,300
Compounded annual average rate of growth 1967–72 (percent):	
Revenues	17
Employment	2

INTERNATIONAL TELEPHONE & TELEGRAPH

The rapidly growing operating revenues for international telephone and telegraph services should reach $900 million in 1973, 23 percent over $730 million estimated for 1972. Revenues from



International Telephone & Telegraph: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971 [1]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
International telegraph operating revenues	137	190	212	226	260	16	302	16
International telephone operating revenues	150	246	311	371	470	27	597	27
Employment, telegraph (number)	7,400	7,700	7,900	8,100	8,300	2	8,500	2

[1] Estimated by Bureau of Domestic Commerce.

Sources: Federal Communications Commission, Company annual reports, and Bureau of Domestic Commerce.

telephone service, which rose 30 percent in 1970 and 19 percent in 1971, are expected to approximate $597 million in 1973, an increase of 27 percent over the $470 million estimated for 1972. Drastic cuts in telephone rates for service to Western Europe affected 1971 revenues, resulting in the lowest increase for the telephone operating segment in the past 5 years.

An increase of 16 percent is expected in telegraph revenues, from $260 million in 1972 to $302 million in 1973. Revenues of the international telegraph carriers rose only 7 percent in 1971 because of significant cuts in traffic from the domestic telegraph segment resulting from one of the longest strikes in communications industry history.

Launching of the last of the INTELSAT IV satellites over the Pacific and the availability of additional cable facilities to meet the demand for better and more reliable telephone and record services foretell 1973 will be another good year for the industry. Two spare satellites will be held in reserve as backups for those presently in operation.

Demand Key to Growth

International trade and investment, foreign travel, and government activities abroad have risen sharply during the past decade, thus creating a continuous demand for the expansion of existing systems to handle the mounting traffic for international telephone and telegraph services.

This demand is reflected in the rapid increase in the number of telephones throughout the world since 1965, particularly in the developing countries. With direct communication through satellite earth stations possible to almost any point on the globe, these countries are improving their systems to meet the domestic demand for international services.

At the end of 1972, world telephones in use reached an estimated 313 million, up 8 percent over the previous year. Approximately 132 million telephones were located in the United States, and were capable of reaching about 98 percent of the telephones in other parts of the world through satellite, cable and point-to-point radio circuits. Overseas telephone calls from the United States reached an estimated 44 million in 1972, an increase of 30 percent over the 33 million calls made in 1971. Of the 20 cities in the world with more than 1 million telephones in 1972, nine were in the United States.

Telephones abroad are expected to increase substantially during the remainder of the seventies, reflecting expenditures in the billions of dollars. Thailand, for instance, plans to spend $150 million over the next few years to expand its telephone system and thus increase traffic to overseas points, including the United States, via satellites over the Indian and Pacific Oceans.

Technology Spurs Services

The international telephone and telegraph operating industry has invested heavily in recent years to develop higher capacity equipment and existing facilities. The Communications Satellite Corporation (COMSAT) has invested approximately $30 million in the INTELSAT IV satellite series alone. Four of the satellites were placed in operation in 1971 and 1972, and the last of the series is scheduled for launching in early 1973. These satellites are the largest commercial communications satellites yet built, with a capacity of up to 6,000 channels—five times the capacity of the previous series. The number of satellite ground stations around the world reached 70 in 1972, compared with the 52 in operation in 1971.

As to cable facilities, the American Telephone and Telegraph Corporation placed in operation a 1380 channel cable between the United States and The Bahamas in late 1972 and expects to add two other cables to its networks in 1973—an 845 channel cable from California to Hawaii and a 160 channel cable from St. Thomas to the Netherlands Antilles. These cables will provide additional telephone and telegraph services to the Caribbean and Pacific areas.

A recent example of industry efforts to improve telegraph service abroad was the opening of a new message switching center in Manhattan by Western Union International (WUI). The center is the result of the latest application of computer technology in telecommunications and more than 5 years of specific research and development. Cablegrams in any form can be accepted by the center and converted to the required international format and sent automatically to more than 100 nations served by WUI. The Manhattan site will also be the focal point for a completely new generation computerized teletypewriter switching network and a third computerized network to serve leased circuits.

Modest Gain in Employment

Employment rose 2 percent over 1971 to about 8,300 in 1972. To handle the increasing traffic and to maintain additional plant equipment, only modest gains in employment are expected in the years ahead, particularly in the telegraph operating segment, because of the greater use of automatic equipment. Computerization of routing and transmitting of cablegrams in 1972, for example, has enabled WUI to reduce employment by about 200. This reduction affected overall employment for the industry, resulting in the modest gain for that year.

Profits Up in 1972

Net income for the international telegraph carriers was approximately $15.8 million in the first half of 1972, an increase of 21 percent over the $13.1 million realized for the same period in 1971. The substantial gain is attributable to the tax incentive on investment and the recovery of the industry from revenue losses in the last half of 1971 because of the strike affecting traffic from the domestic segment of the telegraph industry. Net income for 1971 was $29.8 million, down 4 percent from the $30.1 million for 1970.

The Communications Satellite Corporation reported a net income of $12.6 million the first 6 months of 1972, slightly more than 3 percent over the $12.2 million reported for the same period of 1971. Higher depreciation costs associated with the INTELSAT IV satellites and lower nonoperating income limited the increase in profits.

Strong Growth to Continue

Establishment of satellite systems at home in 1974 and 1975 and in other areas such as Canada—coupled with the availability of more effective domestic networks abroad—will result in additional requirements for satellite and cable circuits. Increasing telephone calls and the greater use of computers for transmission of data will continue to contribute substantially to telephone and telegraph revenues.

Completion of the INTELSAT IV series satellites in early 1973 is expected to satisfy international circuit requirements through 1978. To meet requirements beyond that date, COMSAT is directing its activities toward design and development of satellites with capacities of 100,000 or more telephone circuits. These larger capacities will be achieved through increasing the sophistication rather than the weight of satellites. By the end of 1976 over 90 ground stations should be operating around the globe.

From 1974 through 1979, international carriers plan to construct cables containing up to 4,000 circuits to Europe, the Far East, and Latin America. A.T. & T., for instance, plans to construct: (a) A 4,000 channel cable between the United States and Europe in 1976; (b) a cable between the United States and the United Kingdom with a capacity of 4,000 channels in 1979; and (c) 4,000 channel cables between California and Hawaii in 1977 and between Florida and the Virgin Islands in 1979. The United States-European cable has already been approved by the Federal Communications Commission.

Thus both domestic and foreign carriers plan to spend more than $50 billion on new equipment and facilities during the seventies, assuring a continued and healthy growth of the international telephone and telegraph industry.

Revenues for international telephone and telegraph services are expected to reach $4.3 billion in 1980, reflecting a compounded annual growth rate of 25 percent. Telephone revenues alone are expected to approximate $3.5 billion, while revenues for telegraph service should reach $840 million, with compounded annual growth rates about 29 percent and 16 percent, respectively. These projections are predicated on success of continued research and development efforts of communications carriers at home and abroad into methods to meet the demands of governments, industry and the general public for reliable and faster systems. Revenues will tend to level off in the eighties as demand is met by the carriers.—*M. J. Molinari, Office of Business Research and Analysis.*

RADIO BROADCASTING

Economic expansion in 1972 carried the combined revenues of commercial AM and FM broadcasting stations and the four nationwide radio networks to a new high of about $1.36 billion, up 8 percent from 1971. A further rise of 8 percent to nearly $1.46 billion is in prospect for 1973. FM station revenues, the fastest rising sector, are estimated to have reached $150 million in 1972, up 30 percent from 1971. A similar increase to a level of about $145 million is expected in 1973.

Radio broadcasting earnings rose in 1972 to a new high of about $125 million, up 21 percent from the 1971 total of $103 million. The outlook for 1973 is for a continued rise in earnings of about 8 percent to a level of $135 million. FM stations as a group, however, continued to operate at a loss last year.

Employment is expected to reach 77,000 in 1973, up 2.5 percent from 1972. Average station employment has decreased slightly over the last 10 years, falling from 11.5 to 11.2. Revenue per employee increased from $12,000 to $18,000 over this period, while pretax profits rose from $950 to $1,650 per employee.

Effective Local Advertising Medium

Local advertising continued to be the backbone of radio, providing nearly 70 percent of revenues. National and regional spot advertising accounted for about 27 percent, while network advertising continued to furnish about 4 percent. The strength of radio as a local medium is the result of its demonstrated effectiveness, low cost, and ability to focus on selected target audiences. National and regional advertising flows in large measure to television, despite its higher cost. Television is also emerging as an increasingly effective medium for local advertising where broad appeal to all segments of the audience rather than to selected groups is the objective.

Deregulation a Possibility

Over the years, a complex system of rules, regulations, and reporting requirements has been developed by the Federal Communications Commission to insure that broadcasting stations operate in the public interest in accordance with the Communications Act and its amendments. The Commission has established an informal task group to consider the suggestion that this structure be reviewed, insofar as radio broadcasting is concerned, to see if some simplification and deregulation is possible. It is contended that the multiplicity and diversity of radio stations, largely independent of one another in ownership and programing, may make it possible to rely on competition rather than regulation to protect the

Radio Broadcasting: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Broadcast revenues [2]	907	1,086	1,137	1,258	1,356	8	1,464	8
Income before taxes	81	101	93	103	125	23	135	8
Gross investment in tangible property	671	780	821	877	930	6	977	5
Depreciated value	362	414	423	453	473	4	487	3
Employment [3] (number)	67,210	70,029	71,048	73,368	75,230	3	77,000	3
AM stations, commercial [3] (number)	4,138	4,244	4,298	4,330	[4] 4,349			
FM stations, commercial [3] (number)	1,719	2,065	2,181	2,304	[4] 2,360			

[1] Estimated by Bureau of Domestic Commerce.
[2] Net time sales, plus talent, program, and other sundry revenues.
[3] As of Dec. 31.
[4] As of Aug. 31.

Source: Bureau of Domestic Commerce and Federal Communications Commission.

public interest. The group has requested suggestions from industry for modification and simplification of existing FCC rules and regulations. Some changes may be forthcoming.

The license renewal process continues to concern both broadcasters and the Commission. The Commission is pursuing its study of the process in an effort to establish a more satisfactory policy.

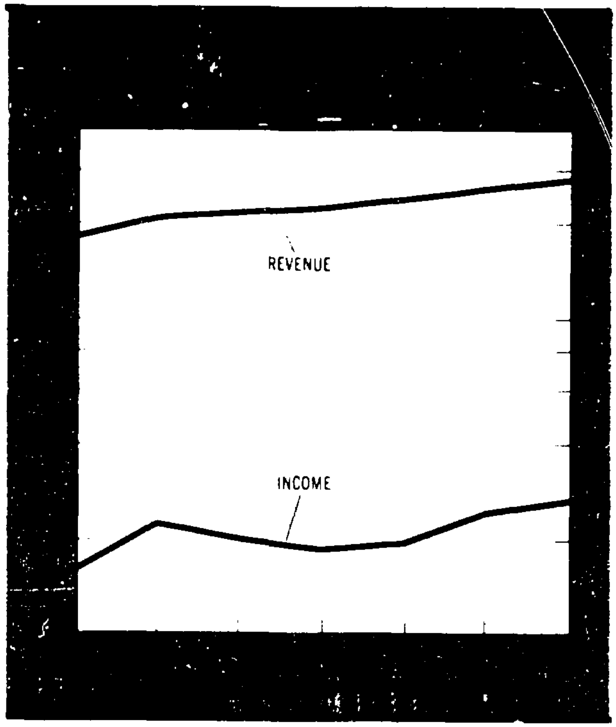
Last year, the Commission continued its inquiry into its fairness doctrine. Expectations are that the doctrine will be redefined before the end of 1973.

Expansion Continues

The number of commercial AM stations increased modestly in 1972, reaching 4,349 by the end of August. In addition, 25 noncommercial stations were operating in the medium-wave broadcast band. By the end of August, 56 new commercial FM stations had been added, making a total of 2,360. Educational FM stations increased by 53 to 547 during the first 8 months of 1972. Most new stations in the future will be licensed in the FM broadcast band.

The number of FM stations offering leased background music or other service under a Subsidiary Communications Authorization (SCA) increased during 1972. Some 867 stations had SCA authority at the end of August 1972. Two-channel stereophonic broadcasts were authorized for 835 commercial and 26 noncommercial stations as of that date. A continued increase in the number of stations offering these services is expected.

Four-channel quadraphonic broadcasting has been proposed as a logical extension of stereophonic broadcasting. Such transmissions would have to be receivable on existing monophonic and stereophonic receivers. Some discrete four-track musical tapes are now available, as are a few discrete four-channel records. Matrix encoded quadraphonic phonograph records utilizing two-channel recordings are also on the market. These latter recordings may be broadcast under existing FCC rules, and provide quadraphonic sound when suitable receiving equipment is used. Petitions have been submitted to the FCC requesting a study of quadraphonic broadcasting. The Electronic Industries Association has established a National Quadraphonic Radio Committee to prepare industry recommendations.



1972 Profile Radio Broadcasting

SIC Code	4832
Revenues (millions)	$1,356
Annual rate of growth 1967–72 (percent)	8.4
Income before taxes (millions)	$125
As a percent of revenue	9
Gross investment, tangible property (millions)	$930
Employment, commercial stations (thousands)	75.2
Nationwide networks	4
AM commercial stations[1]	4,349
AM educational stations[1]	25
FM commercial stations[1]	2,360
FM educational stations[1]	547
Radio receivers in use (estimated in millions)	356

[1] As of Aug. 31, 1972.

Continued Growth in Prospect

Steady growth is the outlook for radio in the seventies, with revenues rising at an annual rate of about 7 percent. Earnings are expected to rise at an annual rate of about 7.9 percent. By 1980, revenues are expected to reach $2.37 billion, with earnings before taxes rising to about $230 million.—*E. MacDonald Nyhen, Office of Business Research and Analysis.*

TELEVISION BROADCASTING

Buoyed by the rising economy, television broadcasting revenues recovered sharply in 1972, reaching an alltime high of $3 billion for a gain of 10 percent over a desultory 1971. Growth should continue at almost the same rate to a level of $3.3 billion in 1973.

Pretax earnings rebounded even more vigorously in 1972 to an estimated $525 million, a jump of 35 percent from the 1971 low of $389 million. A healthy increase of 12 percent is in prospect for 1973, with earnings before Federal income tax expected to reach $590 million.

Cost Control Important

Broadcast station operating costs tend to be relatively inflexible. Scheduled operations and programing must continue at competitive levels despite fluctuations in advertising revenues. During the 1960–69 period, industry revenues increased at an average annual rate of 9.2 percent, while expenses rose 9.08 percent. Earnings before taxes averaged 20.6 percent of revenues. However, under the pressure of the halt in the rise of revenues that occurred in 1970 and 1971, vigorous cost controls temporarily slowed the rise in expenses to an annual rate of 2.7 percent. Expenses resumed their rise with the upturn in revenues in 1972. Earnings before taxes fell to a low of 14.1 percent of revenues in 1971, but are expected to increase to 18 percent in 1973.

Employment is expected to be up about 1 percent in 1973. Revenue per employee should reach $52,600 in 1973, up 2 percent from 1972 and 44 percent over the past 10 years. Pretax earnings per employee should approximate $10,000, up 10 percent from 1972. Investment in plant and equipment is expected to increase about 6 percent or $100 million in 1973. This will be two-thirds of the 1966–69 average annual rate, but 50 percent above the average rate for 1970 and 1971.

Management Problems Abound

Legal and regulatory problems continue to confront the industry. Uncertainty surrounds the license renewal process. Challenges from rival applicants and complaints and petitions to deny from citizens' groups involve stations in expensive and lengthy defenses of their programing and management policies. The FCC has been studying possible changes in its renewal procedures and whether criteria should be established to determine if a station whose license is under challenge deserves special consideration. A number of bills dealing with the renewal of broadcast licenses were introduced in the 92d Congress, but not acted upon.

Rising demands from civic and minority groups for access to the broadcast media and a share in decisions on program structure are receiving greater attention from station managements, the FCC, and the courts. Increased efforts are being made by broadcasters to ascertain the programing needs of their local communities, and to respond to them. The goal is an optimum balance between the desires of special interest groups and the program preferences of the majority of a station's audience.

Application of the Commission's fairness doctrine to controversial issues of public importance

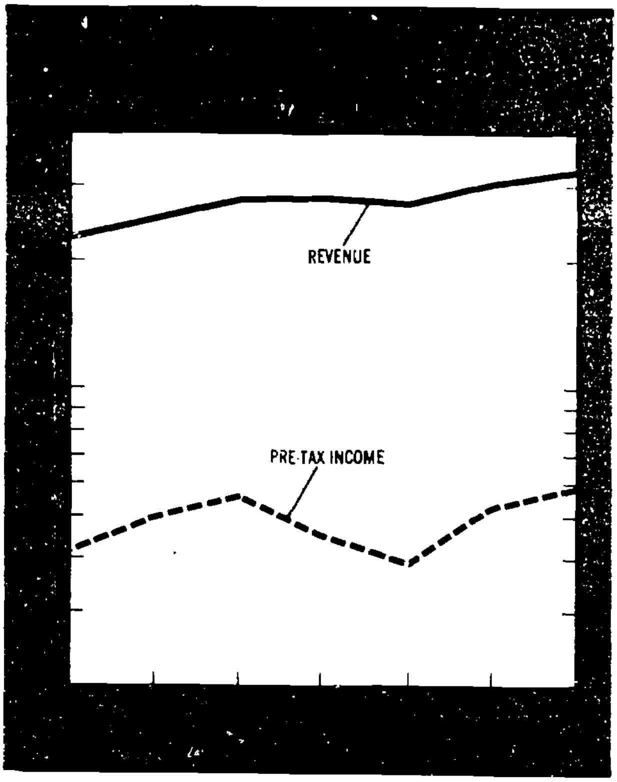
Television Broadcasting: Trends and Projections 1967–1973

[In millions of dollars except as noted]

	1967	1969	1970	1971	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Broadcast revenues [2]	2, 275	2, 796	2, 808	2, 750	3, 015	10	3, 290	9
Income before Federal income tax	415	554	454	389	525	35	590	12
Gross investment in tangible property	1, 185	1, 445	1, 497	1, 565	1, 660	6	1, 760	6
Depreciated value	661	763	739	730	742	2	760	2
Employment (number) [3]	51, 718	57, 785	58, 425	58, 099	58, 300	0	60, 000	1
TV stations, commercial (number) [3]	633	682	688	699	[4] 699			
TV stations, educational (number) [3]	154	185	204	205	[4] 221			
TV receivers in use (in millions) [5]	79. 0	88. 3	92. 7	96. 9	101. 9	5	106. 5	5
Cable television subscriber revenues [6]	150	245	295	340	390	15	470	20

[1] Estimated by BDC.
[2] Net time sales, plus talent, program, and other sundry revenues.
[3] As of Dec. 31.
[4] As of Sept. 30.
[5] Estimated number as of Dec. 31.
[6] Estimated subscriber revenues only. Does not include per program fees or income from advertising or other services.

Source: Bureau of Domestic Commerce, Federal Communications Commission, "Television Factbook"



presents a difficult problem for management because of the judgmental factors involved. What may appear to the stations to be a reasonable treatment of both sides of an issue may not satisfy special interest groups. The Commission expects to define more clearly broadcasters' obligations under the doctrine on completion of an inquiry begun in 1971.

1972 Profile

Television Broadcasting

SIC Code	4833
Revenues (millions)	$3,015
Annual rate of growth 1962–72.	7.3
Income before Federal income tax (millions).	$525
As a percent of revenue	17.4
Gross investment, tangible property.	1,660
Employment, commercial stations.	58,300
Nationwide networks, full time.	3
Television stations, commercial.*	699
Television stations, educational.*	221
Television receivers in use (millions).	101.9 (est.)

*As of Aug. 31, 1972.

Television broadcasters continue to view the growth of cable television as a serious multipronged competitive threat to their industry. Broadcasts from distant stations brought into a local market by cable systems and programs originated by cable systems are seen as diverting some of the local stations' audience, and thereby forcing a reduction in advertising rates. Subscription charges for feature programs and sports events may enable cable systems to outbid broadcasters for these programs and further reduce the broadcast audience. Broadcasters also expect their revenues to be impaired by the shift of some advertising to cable.

Cable Television Growth Resumes

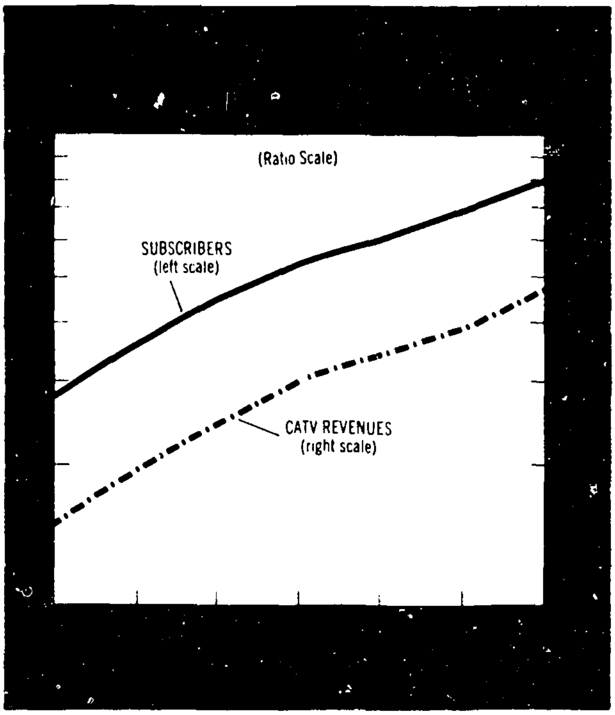
Freed from some of the regulatory restrictions and uncertainties that have hampered its growth, cable television has embarked on a new era of expansion following the issuance by the FCC of comprehensive new rules that became effective March 31, 1972.

Among other provisions, these rules require all systems to carry all local signals on request. They authorize systems in the top 50 markets to carry three full network stations and three independent stations, importing distant signals if necessary to accomplish this. In television markets 51 to 100, authorization is for three network and two independent stations, and in markets below 100, systems may carry three network stations and one independent station. In addition, systems in the top 100 markets are permitted to import two additional independent signals, less any network or independent stations imported to reach the authorized level of service. The Commission expects that the importation of two channels not otherwise available in the top 100 markets will attract sufficient subscribers to make the systems financially attractive, thereby encouraging the introduction of cable systems in these markets.

With the issuance of the new cable rules, the investment community is looking more favorably on the cable TV industry. Seasoned management is important to the success of cable operations, and there is a clear trend toward the growth of multiple system operators through acquisitions and mergers. The 10 largest multiple systems at present range in size from 100,000 to 700,000 subscribers.

A cabinet level committee on the future of cable television has been conducting an independent study to develop a long-term national policy for the industry. Its conclusions may lead to recommendations for legislative action by the Congress.

The question of the copyright liability of the cable industry and payments to broadcasters and copyright owners has not been finally resolved. In 1971 the National Association of Broadcasters, representatives of copyright owners, and the National Cable Television Association agreed in principle to support legislation that would impose copyright liability on all but small independent systems and provide for compulsory licenses and payment for all local signals, grandfathered signals, and for initially authorized distant signals. Agreement among the parties on the specific terms and conditions has been under protracted negotiation, and the final version of the copyright revision bill has been delayed as a result.



Long-Term Prospects Bright

The cable television industry was serving an estimated 6.9 million subscribers at the end of 1972. By the end of 1973 their number is expected to reach 8 million, an increase of 16 percent. Subscriber revenues in 1972 are estimated at $390 million, and are expected to increase about 20 percent to $470 million in 1973.

Provided the very substantial capital requirements of the industry can be met, and undue delays are not encountered in the issuance of franchises and FCC certificates of compliance, the number of subscribers could increase at an annual rate of 16.5 percent during the rest of the decade, reaching a total of about 23.5 million by the close of 1980. Subscriber revenues are expected to increase at a rate of 20 percent annually to $1.7 billion in 1980. Advertising, per program fees, and charges for other services are expected to add substantially to the revenues of the industry by that date.

Total TV broadcast revenues are expected to increase about 7 percent a year from 1972 to $5.2 billion in 1980, with pretax income rising 4.5 percent a year to $750 million.—*E. MacDonald Nyhen, Office of Business Research and Analysis.*

CHAPTER 39

Wholesale Trade

Sales of merchant wholesalers in 1973 are expected to reach $323.5 billion, up 9 percent over 1972. Sales of durable goods wholesalers are expected to advance 10 percent, nondurable goods wholesalers, 7 percent.

A broadly based expansion in economic activity in 1972 brought gains to all wholesale commodity lines. Of the 14 major lines, nine posted sales gains of 10 percent or better. Profits edged up, too, averaging about 5 percent in durables and nearly 7 percent in nondurables.

1973—A Year of Challenge and Change

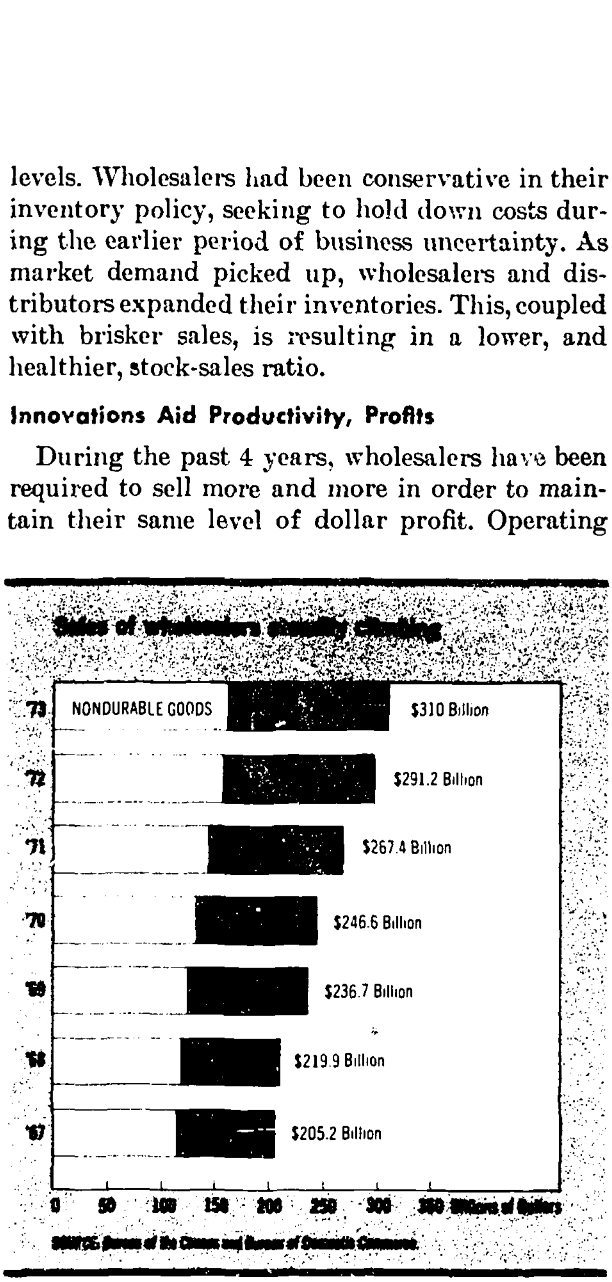
A good year for both housing and commercial construction, together with rising retail sales, will strengthen wholesalers' sales in 1973. Although the upward pressure of operating costs will continue to affect earnings, higher sales volume will probably produce a 4-percent increase in profits. While employment continues to grow about 2 percent annually, wage and salary costs also continue to rise, over 5 percent a year.

Since wholesalers with fewer than 60 employees, as all small businesses, were exempted from price controls, about 70 percent of wholesale firms were freed from regulation. Larger wholesalers are expected to keep prices within competitive ranges. The National Association of Wholesalers-Distributors (NAWD) has recommended establishment of a Wholesaler-Distributor Advisory Committee to facilitate communication regarding alleged inequities with the Price Commission. The retailing industry already has an advisory committee to resolve problems with the Commission.

Inventories—wholesalers' largest single asset item—in 1972 were about 9 percent above 1971 levels. Wholesalers had been conservative in their inventory policy, seeking to hold down costs during the earlier period of business uncertainty. As market demand picked up, wholesalers and distributors expanded their inventories. This, coupled with brisker sales, is resulting in a lower, and healthier, stock-sales ratio.

Innovations Aid Productivity, Profits

During the past 4 years, wholesalers have been required to sell more and more in order to maintain their same level of dollar profit. Operating



Wholesale Trade: Trends and Projections 1967–80

[Sales in millions of dollars except as noted]

SIC		1967	1969	1970	1971	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73	1980 [1]	Percent increase 1972–80 [2]
50	Merchant wholesalers, total.	205, 187	236, 711	246, 643	267, 357	296, 770	11	323, 480	9	526, 270	7. 2
	Total employment (thousands).	3, 525	3, 738	3, 824	3, 855	3, 940	2	NA			
	Durable goods, total.	90, 447	109, 569	111, 778	122, 420	138, 340	13	151, 800	10	251, 840	7. 5
501	Motor vehicles, equipment.	14, 195	18, 485	20, 203	24, 506	27, 690	13	31, 000	12	60, 400	10. 0
506	Electrical goods	14, 112	15, 573	15, 809	16, 800	18, 980	13	20, 880	10	31, 400	6. 0
507	Hardware, plumbing, equipment.	8, 875	10, 756	10, 634	11, 813	13, 470	14	15, 090	12	24, 230	7. 0
508	Machinery, equipment, supplies.	23, 836	28, 075	28, 515	31, 044	35, 080	13	38, 590	10	66, 130	8. 0
5091	Metals, metalwork	9, 692	11, 780	12, 625	12, 353	13, 590	10	14, 810	9	23, 780	7. 0
5097	Furniture, furnishings	4, 440	5, 418	5, 343	6, 096	6, 220	2	6, 470	4	10, 380	7. 0
5098	Lumber, construction materials.	8, 614	11, 764	10, 836	13, 003	15, 860	22	19, 040	20	37, 100	10. 0
	Nondurable goods, total.	114, 740	127, 142	134, 865	144, 937	158, 000	9	169, 060	7	262, 720	6. 5
502	Drugs, chemicals	8, 074	9, 377	9, 619	10, 397	11, 750	13	12, 810	9	20, 560	7. 0
503	Dry goods, apparel	9, 772	10, 158	10, 391	11, 799	13, 100	11	14, 280	9	21, 470	6. 0
504	Groceries	41, 287	47, 786	50, 430	53, 610	58, 440	9	63, 110	8	101, 340	7. 0
505	Farm products	14, 542	13, 371	14, 336	15, 741	17, 320	10	18, 870	9	24, 160	4. 0
5094	Tobacco	5, 357	5, 745	6, 118	6, 498	6, 890	6	7, 300	6	10, 980	6. 0
5095	Beer, wine, spirits	10, 427	11, 909	12, 862	14, 071	15, 060	7	16, 110	7	25, 870	7. 0
5096	Paper, paper products.	6, 236	7, 294	7, 317	7, 600	8, 060	6	8, 540	6	12, 840	6. 0

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth.

Note.—NA = not available.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

costs have generally been outpacing increases in productivity and gross margin.

To improve their long-term profit position, many wholesalers plan to expand their facilities. Others, especially small wholesalers, seek new cost-reducing methods such as cooperative financing, billing, buying, data processing, etc. Many firms are advising customers on sales and promotional techniques in the belief that such services, along with skilled management, will expand their own sales and earnings.

Competition also is forcing wholesalers to improve their profit position through diversification into other areas of merchandising. Some durable goods wholesalers are considering manufacturing merchandise they distribute to expand sales, since manufacturers continue to be the wholesalers' strongest competitor.

While fewer than 5 percent of wholesalers are computerized, use of computers is rapidly increasing. Computerization enables wholesalers to handle a larger volume of goods at less cost, anticipate customer needs more accurately, and move inventories through the warehouses at better turnover rates.

Since 80 to 85 percent of wholesalers' assets are inventories and accounts receivable, automatic data processing will enable them to effect better control of these elements. In recent years, for example, the record of average days outstanding for accounts receivable ranged from 42 to 44 days. A decrease of even 1 day would improve the wholesaler's cash position and reduce the amount of borrowed capital needed.

Distribution Code System Introduced

Among sophisticated management techniques recently introduced to the wholesaling industry is the Distribution Code System, which substitutes short code numbers for long descriptive names.

This system eases ordering, receiving, sorting, picking, shipping, and selling. It also shrinks the time and paperwork required to keep track of large quantities of products moving through warehouses. The Distribution Number Bank, Inc., created by the National Association of Wholesalers-Distributors, assigns nonduplicated numbers to 8,000 manufacturers in the Distribution Code System.

The grocery industry has selected the Distribution Number Bank to assign and maintain manufacturer identification numbers for its Universal Product Code (UPC), which will identify all products sold through supermarkets. The UPC, developed to promote use of automated checkout counters by retail grocers, records the complete nomenclature of the item purchased, brand name, contents, size, manufacturer or packer, and selling price from a number or symbol printed on the item.

The Distribution Code System (DCS) is designed to ease the flow of commodities to market, to help place millions of products produced by manufacturers and food processors at the precise point at the time needed. In the future, the DCS will permit orders to be communicated directly from a wholesaler-distributor's customer to his computer, then to a manufacturer's computer, thus reducing paperwork, risk of error, and response-time throughout the distributive process.

Sound Gains by 1980

Wholesalers-distributors are expected to increase sales to $526.3 billion by 1980, averaging growth of about 7.2 percent annually. Durable goods wholesalers will increase sales at an annual rate of about 7.5 percent, while nondurable goods wholesalers' sales will advance at about a 6.5 percent yearly rate.

Over the past two decades wholesalers have had the lowest failure rate of any industry. Low failure rate together with sustained growth in sales reflect skilled management and consistent demand for their services. Despite keener competition, both within and outside the industry, wholesalers are maintaining their share of the distribution markets.

Vital aspects of wholesaler-distributors' planning for the rest of the 1970's will be capital expansion, higher productivity, and lowered costs. Achievement of these goals will result in mergers and acquisitions, with fewer and larger firms selling and servicing a variety of retail outlets and increasing share of supplies and equipment. In tandem with this development will be warehouse modernization, more scientific management, greater use of computers and systems and automated devices, training of workers to improve efficiency, and closer cooperation and coordination with suppliers and customers. The 4-day workweek is considered by some.—*Jacob H. Bennison, Office of Business Research and Analysis.*

CHAPTER 40

Retail Trade

Reflecting renewed consumer confidence in the Nation's economy, retail sales in 1972 jumped more than 9 percent over previous year levels to an estimated $444 billion. Sizable increases in Social Security payments plus an anticipated multibillion dollar tax refund of excess withholding payments for 1972 will provide extra impetus to retail spending in 1973, when sales are expected to reach $482 billion, a further gain of 8.5 percent.

"Big-ticket" items were purchased in quantity in 1972 as price rises slowed and personal savings rates declined—from a record high of more than 8 percent the previous year to only 6.4 percent by the year's end. Consumers responded to new retailing techniques—catalog discount showrooms, warehouse furniture centers, electronic cash registers to speed customer service and inventory control, and extended hours.

Catalog Showrooms Prosper

Many retailers—department and discount stores and supermarkets—are converting part of their operations to catalog discount showrooms. Using a catalog as the chief advertising medium, merchandise generally includes items that sell in traditional stores at a higher markup—appliances,

Retail Trade: Trends and Projections 1969-80

[Sales in millions of dollars except as noted]

SIC code	Industry	1969	1970	1971	1972 P	Percent increase 1971–72	1973 [1]	Percent increase 1972–73	1980 [1]	Percent increase 1972–80 [2]
52–59	Total retail trade	$357, 885	$375, 527	$408, 850	$444, 000	9	$482, 000	9	$720, 000	6. 2
5311	Department stores	35, 659	37, 295	42, 027	45, 809	9	50, 400	10	91, 000	9. 0
5331	Variety stores	6, 426	6, 959	6, 972	7, 550	8	8, 080	7	12, 750	6. 8
5411	Grocery stores	72, 892	79, 756	82, 793	88, 770	7	94, 010	6	135, 600	5. 4
5611	Men's and boys' apparel stores.	4, 753	4, 630	4, 727	5, 060	7	5, 260	4	6, 400	3. 0
5621, 5631	Women's Apparel and Accessory stores.	7, 499	7, 582	8, 193	8, 440	3	8, 775	4	10, 700	3. 0
5712	Furniture stores	7, 952	7, 893	8, 331	9, 495	14	10, 350	9	13, 997	5. 0
5722	Household appliance stores.	3, 789	3, 884	4, 001	4, 480	12	4, 840	8	6, 270	4. 3
5812, 5813	Restaurants and bars	26, 970	29, 689	31, 131	32, 730	5	34, 690	6	52, 200	6. 0
5912	Drug stores	12, 224	13, 352	13, 736	14, 800	8	15, 835	7	23, 589	6. 0

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth.
P Preliminary.

Source: Bureau of the Census, Bureau of Domestic Commerce.

jewelry, luggage, cameras, silverware, china, and small gift items. Unlike catalog houses which rely on mail order delivery, the average discount cataloger usually has in stock the items on showroom display. Rapid turnover of merchandise compensates for the low margin of profit on each item sold. Sales exceeding $100 a square foot compared with $60 for discount stores and $80 for department stores are attracting new entrants. Such stores are often located off a major highway rather than in shopping centers. Also contributing to the above average profit returns of catalog showrooms are the elimination of costs for delivery, exchanges, and installment buying and lower personnel costs. Shoplifting costs are also sharply cut since merchandise remains in stockrooms until sold.

According to industry sources, sales of about 1,800 catalog discount showrooms reached $2 billion in 1972.

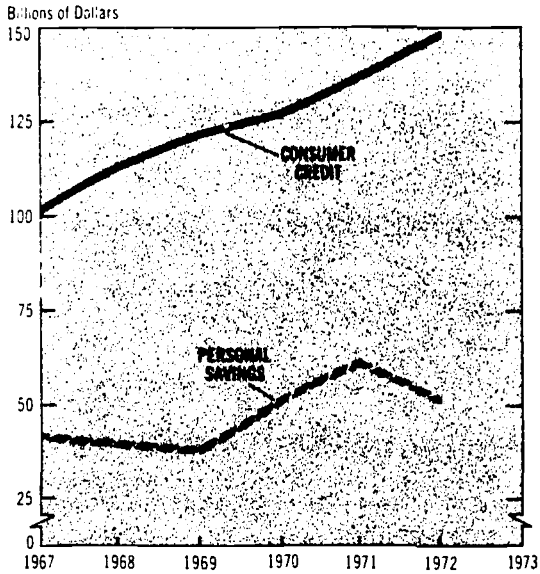
Bank Credit Cards Buoy Retail Sales

In recent years, use of bank credit cards for all types of consumer purchases has risen sharply. Bank credit plans in the U.S. increased from 390 in early 1968 to 1,432 in 1971 and outstanding balances soared from $828 million to $3.8 billion over these 3 years. Such cards are used to buy retail merchandise, gasoline, travel, and entertainment. In the years ahead, the use of bank credit cards in lieu of cash for sales transactions may increase substantially. Presentation of a card to the retailer's point of sale terminal would electronically transfer funds from the purchaser's bank account to that of the retailer. At month's end, the customer would receive a record of such credit card transactions with his bank statement.

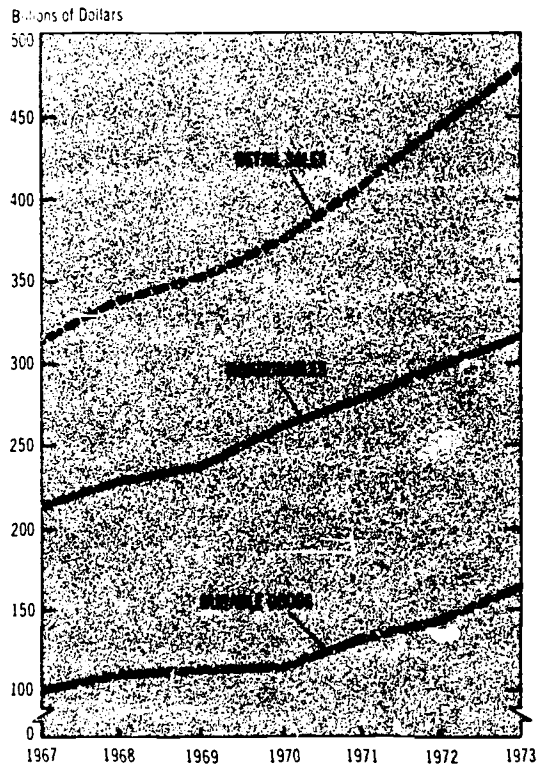
Revitalizing Downtown Shopping

Following increased efforts toward improving rapid transit services in many cities, new retail centers are being developed in downtown urban areas designed to include department stores, ample parking space, hotels, and restaurants. In downtown Los Angeles, for example, a national marketer is creating a $75 million retail center that will include a 32-story office building, hotel, an indoor shopping mall dominated by a large department store, and parking for 2,000 cars. Similar ventures are underway in downtown areas in San Francisco, Minneapolis, Chicago, and New York City.

Declining personal savings and increased consumer credit...



...Reflected in rising retail sales



SOURCE: Bureau of Economic Analysis, Bureau of the Census and Bureau of Domestic Commerce

Retail Trade Employment 1967–72

[In thousands]

SIC code	Industry	1967	1968	1969	1970	1971	1972 [1]	Percent Increase 1971–72
52–59	Total retail trade	10, 081	10, 473	10, 907	11, 102	11, 319	11, 659	3
5311	Department stores	1, 324	1, 406	1, 483	1, 517	1, 551	1, 613	4
5331	Variety stores	313	312	318	314	325	332	2
5411	Grocery stores	1, 457	1, 620	1, 683	1, 737	1, 771	1, 824	3
5611	Men's and boys' apparel stores	114	120	126	131	130	135	4
5621, 5631	Women's apparel and accessory stores.	252	261	270	269	276	287	4
5712	Furniture stores	271	279	288	288	292	301	3
5722	Household appliance stores	84	84	88	88	89	92	3
5812, 5813	Restaurants and bars	2, 191	2, 298	2, 416	2, 463	2, 545	2, 647	4
5912	Drug stores	426	435	442	442	455	464	2

[1] Estimated by Bureau of Domestic Commerce.

Source: Bureau of Labor Statistics and Bureau of Domestic Commerce.

Manufacturer Labeling Aids Retailers

"Source marking"--manufacturer-marked merchandise which includes information on price, size, color, inventory number, etc.—offers savings to retailers. The process of preticketing merchandise has advanced from regular mailing of labels to the air mailing of standard prepunched computer cards. In some instances, computer cards are sent by retailers to manufacturers with an original merchandise order to facilitate onsite label printing. Future marking systems may utilize magnetic tapes, optical characters, or color bar systems.

Computers Aid Retailers

Increasingly, department stores, variety stores, and supermarket grocery stores are replacing cash registers with automated equipment that permits management to supervise inventories continuously. Memory-console sets at checkout counters speed customer service and credit authorizations and also allow management to reorder merchandise promptly.

Warehouse operations are simplified with electronic equipment that automatically reads information from labels or cartons as they move on high speed conveyor belts, thereby eliminating excess merchandise handling and extra clerical work. Information from a scanner is directed to a computer which prepares lists intended to be used to check container contents as they are loaded at the warehouse and unloaded at their ultimate destination. Dividends of the system include reduced staff, increased security control, a quickening in the flow of merchandise and less money invested in inventories. The system also eliminates the need to manually issue and correct punch cards for product identification and manifest preparation.

Department Store Sales Continue Up

Department store sales in 1973 are expected to reach $50 billion, 10 percent over a year earlier. Sales in 1972 totaled $45.8 billion, a 9 percent increase over 1971 levels.

Leased Departments Aid Sales

Leased departments are independently owned businesses usually conducted in department stores and specialty shops. Such operations provide many benefits including extension of product lines or services for the department store or specialty shop, "one stop" shopping for the consumer, and the opportunity for an entrepreneur to attract the host store's customer's traffic and services. Physically, a leased department is usually not different in appearance from other departments.

According to industry sources, leased departments accounted for 7 percent of department store sales in 1970. Among larger department stores, popular additions are beauty shops, portrait studios, optical and jewelry repair services. In small volume stores, leased departments may sell shoes, wigs, and millinery.

Variety Store Sales to Expand

Variety stores—essentially department store chains offering merchandise ranging from pencils to appliances at low and popular prices—should continue to increase sales and improve earnings and profit margins in 1973. An estimated $180 million was spent on 300 new stores and on remodeling almost 700 existing ones in 1972. Increasingly, warehouse operations of variety chains are being expanded and upgraded with automated equipment to permit 1-day delivery service to stores within a wide geographical area.

Furniture Warehouses Increasingly Popular

In the highly competitive furniture field, the warehouse concept of furniture retailing is growing rapidly and is expected to capture 15 percent of the market by 1975. Immediate delivery, variety, and discount prices appeal to price conscious consumers. More than a third of the "big-ticket" customers handle their own deliveries in cars, trucks, or rented vehicles. Furniture warehouses are usually self-contained units along highways outside of center cities with about 150,000 square feet of floor space—one-third for the showroom and the rest for the warehouse.

Since the warehouse concept is not currently considered economically feasible in less populated areas, department stores, and specialty furniture stores continue to service customer furniture needs in traditional fashion—offering both delivery and decorating services.

Furniture sales are expected to rise 9 percent in 1973 to nearly $10.4 billion, keeping pace with new housing starts and the anticipated rise in the number of young adults setting up homes.

Appliance Stores Sell to Replacement Market

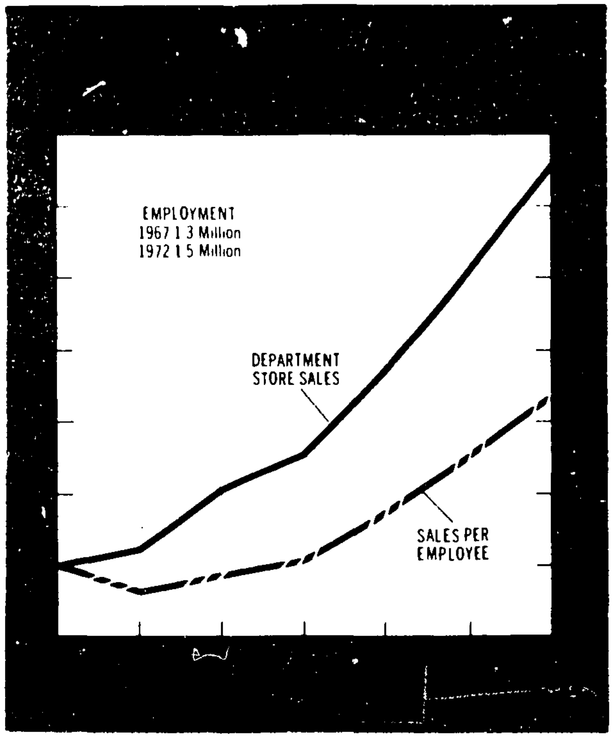
Appliance stores anticipate high sales in 1973 as new home construction continues at high levels and increased home remodeling stimulates demand for refrigerator, dishwasher, and clothes dryer replacements. Trade sources estimate that about 75 percent of automatic washers and 60 percent of refrigerator sales represent replacements since the average appliance wears out in about 10 years. Introduction of newly designed, compact appliances is expected to increase sales to apartment dwellers and owners of second homes, mobile homes, and boats.

Drug Store Receipts Rising

Drug store sales are expected to increase to a record $15.8 billion in 1973, a 7-percent gain over 1972. With increasing emphasis on self-service, employment is expected to grow at a slower rate, increasing by 2 percent in 1973 to 464,000, similar to the rise in 1972.

Drug Chains Plan Expansion

Outlays for chain drug store construction and remodeling in 1972 were expected to amount to



more than $400 million, almost double such expenditures in 1971. About 1,300 new chain stores were planned and 900 existing stores were scheduled for remodeling.

Locations favored by drug chains are in "strip" and neighborhood developments rather than large regional centers or enclosed mall shopping areas. Sixty percent of new chain stores were scheduled for "strip" locations, 15 percent in enclosed malls, and 25 percent on free standing sites elsewhere. A drug store of only 15,000 to 50,000 square feet qualifies for an anchor position in a smaller neighborhood but not in a larger center.

Third Party Prescriptions Rising

Third party prescriptions—private or public health insurance paid—accounted for 13 percent of chain store prescriptions written in 1971, compared with 5 percent in 1970 and only 2 percent in 1969. The average chain drug store filled almost 100 third party prescriptions each week in 1972, and the number of such prescriptions filled per store is expected to grow substantially in the years ahead as health insurance coverage for medicines expands.

Health Foods Spur Sales

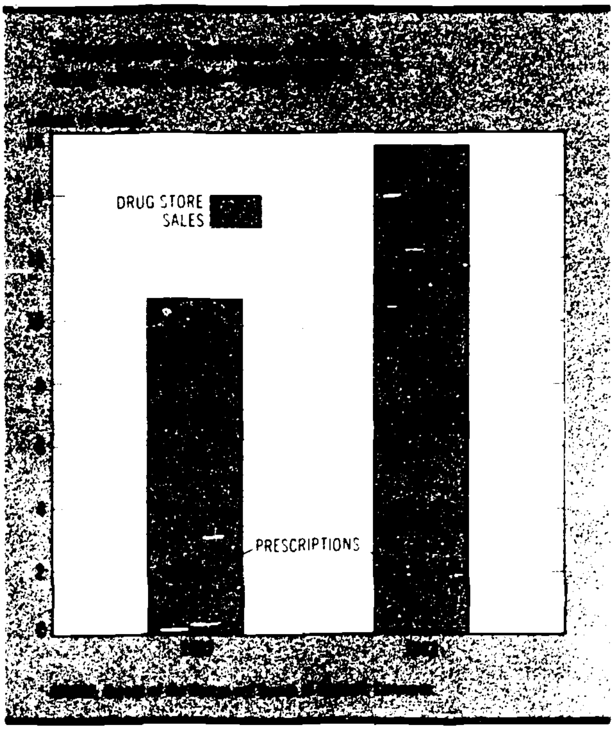
Aided by the growing popularity of natural food products, drug store sales of organically grown health foods are increasing rapidly. Individual retail sales of $5 to $8 are typical and sales of $25 to $30 are fairly frequent. Natural vitamin supplements as well as foods containing vitamins are favored sellers along with such items as wheat germ, dolomite and shelled nuts and seeds. Additional receipts result from the sale of fruit juices, salads and health breads and health food luncheons at food counters.

Drug Chain Acquisitions Up

Corporate management has found ownership of drug chains to provide increased profits as well as opportunities to maximize facilities and services provided by the parent organization. Recently, two large food store chains, a general merchandiser, a large discounter, and a conglomerate acquired substantial retail drug operations. In a move to broaden product lines, a food store chain and a drug chain agreed to develop food-drug units 75,000 to 80,000 square feet in size, to sell both food and drugs in one retailing operation.

Leased Pharmacy Departments Popular

Industry sources estimate that about 6 percent of all chain drugstores rely on leased pharmacy departments to provide prescription services. Drug department leasing in department stores, grocery chains and general merchandise stores is expected to grow in the years ahead because of favorable profit margins on drug merchandise and the traffic drawing capacity of prescription departments.



Fall Sales Spur Growth

Sales of women's apparel and accessory stores are expected to reach $8.8 billion in 1973, an increase of 4 percent over 1972's estimated $8.4 billion. Growth in sales during 1972 was estimated at 3 percent, with strong fall sales partially overcoming a lag earlier in the year.

Smaller growth in 1972 is attributed to some slowing of price increases, coupled with the fact that the previous year was a particularly healthy one for women's apparel sales. During that year the midi-mini controversy died, taking with it consumers' reluctance to buy; a condition that had lasted for some time. Triumphant midi-haters purchased wardrobes of virtually every length during 1971, pushing sales nearly 8 percent above 1970.

"Layered Look" Popular

The really bright spot in apparel store sales in 1972 resulted from heightened excitement over the "layered look." With the advent of cool autumn weather, sales of blazers, skirts, pants, sweaters, vests, and shirts picked up considerably. With the possible exception of sweater dresses, dress sales provided little impetus to overall sales increases. Body suits still generated interest among younger consumers, while long skirts continued to be a boon to retailers.

European Fashion Influence Declining

The impact of European designer fashions on the American market has been judged by many in the industry to be declining significantly. Attendance at summer 1972 showings was poor compared with previous years, as many U.S. retailers elected to pass up the events. Increasingly, top designers are turning their attention to the ready-to-wear or other markets.

Men's Store Sales Strong

Sales of men's and boys' apparel stores reached an estimated $5.1 billion in 1972, climbing about 7 percent over previous year levels. Sales are expected to increase an additional 4 percent in 1973 to close to $5.3 billion.

Men's fashions in 1972 also embodied the "layered look." While knits continued popular, stretch wovens, corduroys, and leather captured customer interest. Cuffed pants—some pleated—

re-entered the market in the form of "bag-type" trousers, which sold extremely well in many parts of the country, especially among teenagers and young adults. While jeans remained popular with many of the younger group, there was a growing trend toward dressier tailored slacks. A number of manufacturers entered the coordinates field, while retailers—although interested in the concept—approached it cautiously. Anticipating customer resistance to a "packaged" look, many merchants elected a do-it-yourself approach to coordinates promotion, allowing the customer to express his individuality in wardrobe selection.

Quality Problems Lessened

During late 1971 and early 1972, menswear retailers were faced with an increasing number of returns because of defective garments. These quality problems, particularly prevalent in knits, were attributed to a tight supply-demand situation in which quality control considerations became secondary to the urgent need for timely deliveries. Manufacture of knit goods differs somewhat from that of woven, and the sudden dramatic shift to knits in the menswear industry allowed little time for preparation, thus intensifying quality problems. Later in the year a larger supply of knit goods and adjustments in manufacturing procedures helped to alleviate these problems to some extent.

Apparel Store Competition Will Continue

Sales of men's and women's apparel stores should increase at an average annual rate of approximately 3 percent, with women's stores reaching nearly $10.7 billion by 1980 and men's and boys' rising to $6.4 billion that year.

Intense competition for the apparel dollar will continue. The home sewing market—especially women's and children's clothing—will probably continue strong. Department stores—the largest sellers of apparel—will endeavor to increase their share of the market. Yet specialized apparel stores, which can generally offer more personalized service, have advantages over larger, more diversified operations. A recent survey reveals that 20 percent of 67,000 respondents cited poor personal service in stores as one of their major annoyances with business. Thus, apparel stores offering courteous, competent service, good quality alterations, and the kinds of merchandise demanded by a constantly changing, more affluent population should continue to prosper throughout the decade.

Changing Fashions Create Problems

Men's and women's apparel stores have much in common and face many of the same problems. Perhaps the greatest problem of apparel retailers is the transiency of styles. Those who remember the midiskirt and the Nehru jacket realize that balance in apparel buying is all important.

Increases in both disposable personal income and leisure time in recent years have created demand for wardrobes for various lifestyles. Added to the market for business apparel is an expanding demand for casual clothing. Moreover, increasing popularity of such active sports as boating, skiing, and tennis has expanded markets for these other apparel categories. With limited amounts of store space, retailers are constantly faced with decisions regarding the most profitable merchandise mix. Many retailers have turned to computerization in order to stay abreast of changing characteristics of sales within their establishments, using the data obtained for making decisions regarding the most effective use of space. Such systems also provide inventory data.

Productivity of sales personnel is receiving more attention from retailers, many of whom provide special training courses either independently or through trade organizations. Part-time workers, often employed by apparel stores, help to improve efficiency by limiting the number of full-time workers employed during slow periods.

Fast Food Spots Lead Restaurant Growth

Receipts of restaurants and bars rose 5 percent in 1972 to $32.7 billion and are expected to increase another 6 percent in 1973 to $34.7 billion.

Today's restaurants vary greatly, ranging from fast-food driveins to posh restaurants. Atmosphere and entertainment are still necessary ingredients for elegant restaurants, but the basic elements for success are good food and good location.

The trend is to the suburbs where less expensive restaurants and adequate free parking appeal to patrons. Increasing patronage of fast-food restaurants in the past several years, particularly those franchised, has been responsible for better than 15-percent sales increase in this sector, compared with the total restaurant industry's 6-percent rise.

Informality in both dress and conduct has fostered this shift from the traditional restaurant. Higher priced luxury restaurants have also been affected by declining expense account business and less ostentatious spending by younger adults. Some restaurants have been sustained by promoting increased liquor sales.

The increasing popularity of take-out products and containerized-take-home meals will influence food processors to enter the food service field as the demand for such service grows. These operators will develop sophisticated food preparation techniques, finance ventures, and perform market research on concepts suited to various markets. It is anticipated that receipts of eating and drinking places will reach $52 billion in 1980, increasing at an average annual rate of 6 percent.

Grocery Sales Up, Profits Down

Following a 7-percent rise in 1972, grocery store sales are expected to increase about 6 percent in 1973 to $94 billion.

Most grocery stores have introduced a great variety of nonfood items for sale in an effort to attract a larger proportion of the consumer dollar. With rising food prices and increased consumer spending on nonfood items, an increasing share of the household budget is being spent at grocery stores.

Despite steadily rising sales, profit margins are narrowing because of rising wholesale food costs and mounting retail price discounting. A recent industry study indicates that after-tax profits of the chain grocery store sector declined from 1.31 percent to 0.82 percent of sales in the last 6 years.

In an effort to build sales volume, supermarkets have extended store hours in most parts of the country. Most supermarkets are now open 80 hours a week and more than half are open on Sundays.

The introduction of automated checkout systems in grocery stores is dependent upon the development of a universal code system by food processors for most food products. When installed, automated checkout systems will eliminate ringup errors, provide consumers with "tell-all" register tapes, and give management maximum inventory control.

Grocery store sales are expected to reach $135.6 billion by 1980, reflecting an average annual increase of 5.4 percent.

Shifting Retail Markets Ahead

Retailers will be faced with shifting markets in the years ahead. Increased leisure time and rising personal income will boost demand for a wide range of goods and services geared to the needs of specific consumer groups—working wives, young marrieds, sports fans, camping enthusiasts, and increasing numbers of retirees. With shopping centers becoming more expensive to build, there probably will be more vertical development and multipurpose use of commercial buildings. If recent trends continue, the consumer will demand more services and will be more selective in choice and quality of goods offered.

The successful multiunit merchant in the future must build and maintain a store image based on price, fashion, or service. He must recognize and anticipate trends, providing warehouse or rack jobbing sales techniques or boutiques and custom decorating service to meet varying local demand.

By 1980, retail sales are expected to total $720 billion, reflecting an annual growth rate from 1972 of 6.2 percent.—*Marvin J. Margulies, Office of Business Research and Analysis.*

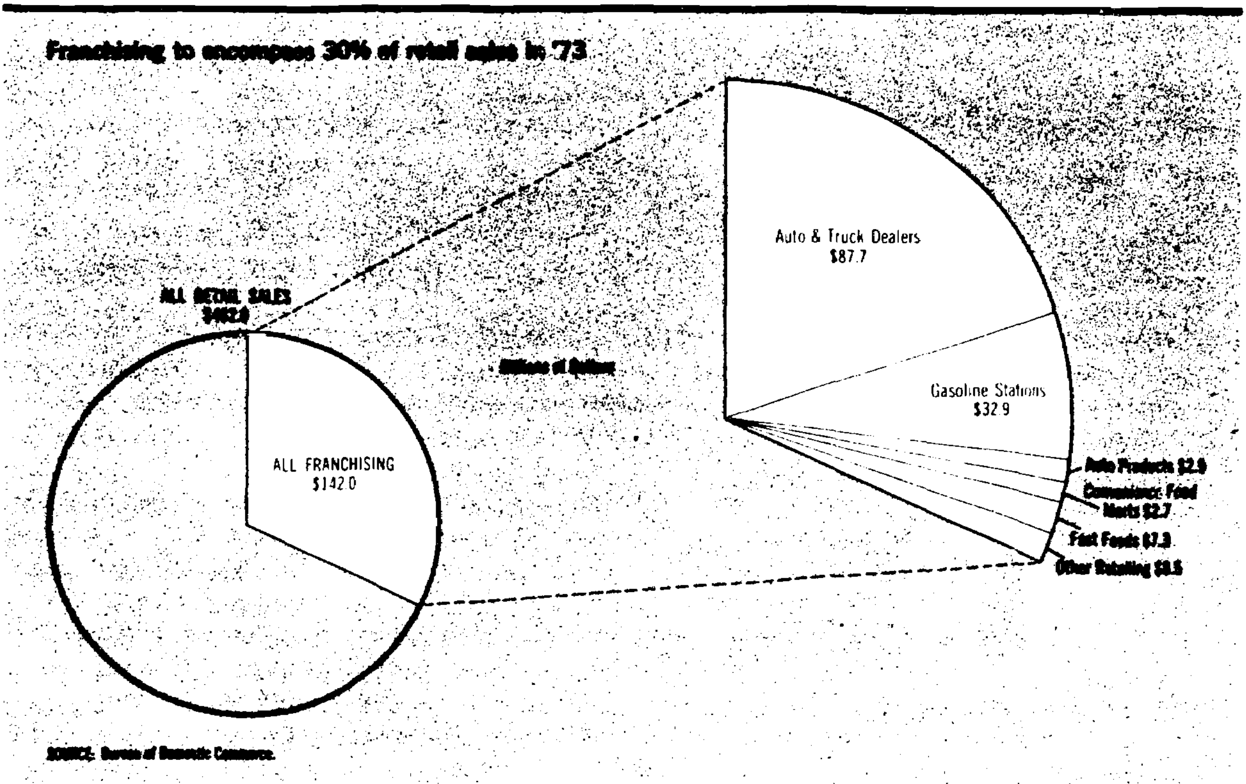
CHAPTER 41

Franchising

Franchising sales of goods and services are expected to increase 10 percent in 1973 to reach $156 billion. Growth of franchise sales continues to outpace the 9-percent expected rise in total retail sales.

Newer, nontraditional areas of franchising will increase significantly above the 10-percent level. Franchise receipts in the business aids and service area should total $1.1 billion in 1973, an increase of 18 percent over 1972. Receipts from franchise hotels and motels should total $3.3 billion, or 19 percent over 1972. Receipts of franchise fast food restaurants are expected to reach $7.3 billion, 15 percent above the 1972 level.

Other major growth sectors in franchising in 1973 are automotive products and services with expected sales of $4.1 billion, a 9-percent gain over 1972; rental services with expected receipts of $1.3 billion, 11 percent above 1972; and nonfood retail-



ing with expected receipts of $7.9 billion, 10 percent above 1972.

Growing at a slower rate than sales, the number of franchised establishments is expected to total over 466,000 in 1973, a 5-percent increase over the 443,815 establishments in 1972. Traditional franchise areas such as auto and truck dealerships, gasoline service centers, and soft drink bottlers will not show sizable gains in 1973. In the newer areas the number will increase almost 12 percent to 210,000 in 1973, up from 188,000 in 1972.

Franchising continues to affect traditional distribution methods. In 1973, approximately 30 percent of all retail sales in the United States will be made through the franchise system. Franchising now accounts for about 25 percent of the receipts in eating and drinking places.

Large organizations with more than 1,000 establishments each continue to dominate the newer fields of franchising. A recent Bureau of Domestic Commerce study indicates that 57 percent of all franchising sales in the newer areas were made by 39 companies of the approximately 800 company respondents. Sixty-two companies accounted for two-thirds of franchise sales, and three-quarters of establishments. In the traditional sectors of franchising the concentration is similar.

Minority Opportunities

Franchising offers opportunities for minority members to enter the mainstream of U.S. economic life. People with limited capital and experience can own their own businesses. Many franchisors have sought to open business doors for minority groups. A recent survey by the Bureau of Domestic Commerce (BDC) revealed that many of the most common minority-owned businesses are concentrated in those areas where franchising is most popular—gasoline service stations, food stores, eating and drinking places, and drycleaning establishments.

Entry of minorities in franchising is expected to continue, prompted by the advantages of the franchising system—loan assistance, centralized purchasing, location analysis, management training and counseling, company advertising, standardized operational methods, and recognized company image—all of which reduce risks for franchisees. The BDC survey found that of approximately 800 respondents, 173 franchisors had minority-owned franchisees. A total of 237 firms, including some large franchisors, were unable to indicate whether any of their franchisees were minority-owned. The 173 positive replies accounted for almost 1,200 minority business enterprises. The majority, 587, were Negro; 451 were Spanish surname; 42 were American Indian; and 106 were Oriental. In the fast food restaurant area, 270 establishments were minority-owned, and in food retailing other than convenience food marts, minority-owned outlets numbered 272. Sixty-eight firms indicated that they had formal programs to attract minority ownership.

Franchising: An International Market

Distribution of goods and services through franchised outlets abroad holds out promise for foreign dollar earnings for the U.S. International markets represent expansion opportunities for domestic franchisors. Developed countries exhibit the characteristics that fostered the franchising surge in the United States. These include rising per capita income, increased demand for consumer goods and services, rising labor costs and tighter capital markets.

The BDC survey discovered that in 1971 there

Franchising: Size Distribution by Number of Establishments—1971 [1]

Size groups	Franchising companies No.	Establishments		Sales	
		Number	Percent	Millions of dollars	Percent
Total	791	175,549	100	$24,010	100
1,001 and greater	39	111,352	63	13,620	57
501 to 1000	23	15,373	9	3,220	13
151 to 500	93	26,377	15	3,850	16
51 to 150	158	14,126	8	2,190	9
11 to 50	268	7,268	4	1,010	4
0 to 10	210	1,053	1	120	1

[1] Size group distribution not available for automobile and truck dealers, gasoline service stations and soft drink bottlers.

Franchising: Trends and Projections 1971–73

[In millions of dollars except as noted]

	1971	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Sales:					
Total	$128,880	$141,450	10	$156,060	10
Franchisor	18,650	20,220	8	22,140	5
Franchisee	110,230	121,230	10	133,920	11
Establishments:					
Total	431,169	443,815	3	466,049	5
Franchisor	74,721	77,408	4	80,662	4
Franchisee	356,448	366,407	3	385,387	5

[1] Based on estimates by respondents to recent survey by Bureau of Domestic Commerce.

were 156 U.S. franchisors with over 3,300 international franchised outlets. Auto and truck rentals accounted for about 1,100, while fast food operators had 930 foreign outlets.

Because of similar ways of doing business and geographic proximity, over 46 percent of all foreign franchise outlets are in Canada. They consist chiefly of fast foods restaurants (519), laundry and drycleaning establishments (262), campgrounds (131), automotive products and services (116), and auto and truck rental services (112). The country farthest from the United States—Australia—has the second largest number of franchise outlets. There are 355, mostly fast food restaurants and auto truck rental agencies.

Increasingly, foreign nations recognize the promise of franchising and are watching developments. A case in point is Japan. Based on a Japanese survey of 50 leading franchise chains, Japan's largest business daily concluded that the Japanese franchise business had entered the boom stage similar to the earlier one in the United States. The radical changes in business and environment in recent years that paved the way for development of the franchising chain system in Japan were reviewed.

According to the survey, sales of franchise businesses were expected to reach $480 million in 1972 and increase to over $1.6 billion by 1975, a yearly growth rate of 50 percent. The survey excluded traditional sales networks such as gas stations and automobile dealers, indicating that newer types of franchising are experiencing significant gains, just as they are in the United States.

Of the 50 leading franchising businesses, 30 chains, or 60 percent of the total, came into franchising after 1970. Since few franchise chains operated in the 1960's, Japan's franchising system has made spectacular gains in the last several years.

Legislative Efforts Continue

Nine States and Puerto Rico now have enacted laws extending various kinds of protection to potential franchisees in their contractual arrangements with franchisors. Ten additional States are considering franchising legislation.

During the last 4 years, a concerted effort has been made by States to regulate franchising. Generally, State legislation provides for full disclosure of contract provisions before franchisee and franchisor enter into a contract. While disclosure provisions vary, most specify disclosure of contract provisions, stipulate various registration provisions, enumerate franchisees' rights and provide for a variety of administrative and legal remedies. Some State legislation also requires a statement of the business to be conducted by the franchisee and the legal relationships into which the franchisee will enter. States have also either considered or enacted laws limiting the right of the franchisor to terminate, or refuse to renew, a franchisee contract without good cause.

The host of nonuniform State regulations could substantially affect franchising. Franchising operations are necessarily interstate in nature. Conflicting State laws, say industry leaders, could intensify recent trends toward buying back franchised outlets, and threaten growth of the concept. Capital availability for franchising has been affected, the industry contends, and new methods such as joint ventures are being explored instead.

Disputes over terminations and tying arrangements dominate franchising litigation. Some franchisees have won automatic franchise renewal rights, contingent only on fulfillment of prior contract conditions. The hazard of possible anti-trust violations in tying arrangements has enabled franchisees in some cases to win permission to purchase supplies from any source, so long as the franchisor's specifications are met.

A Look Ahead

Franchising will probably continue to show strong growth throughout the 1970's but at a slower rate than in the past. Newer areas of franchising will continue to outpace the growth of traditional sectors as new products and services are introduced into franchising. Traditional sectors will still dominate total franchise sales.

Franchise sales are expected to grow 7 percent per year to reach \$250 billion in 1980.—*Robert F. Wilson, Office of Business Research and Analysis.*

CHAPTER 42

Banking and Securities

COMMERCIAL BANKING

As a result of continued strength in the Nation's economy, commercial bank loans grew considerably during 1972 and are expected to surge further ahead in 1973. All types of loans are contributing to this advance—business loans, real estate and consumer loans, loans to nonbank financial institutions, and securities loans.

In 1970 and 1971, commercial banks channeled a large part of their increased time and savings deposits into securities rather than loans. A reverse trend developed in 1972. Total loans increased 11 percent in 1971 and an estimated 13 percent in 1972, while total investments, after a 15 percent rise in 1971, increased only an estimated 10 percent in 1972.

Demand for funds should continue strong in 1973 to meet advances in plant and equipment spending, inventory accumulation, and consumer expenditures. Loans, therefore, should rise 14 percent in 1973 to reach $447 billion. In contrast, investments may grow at a slower pace to $204 billion, 9 percent above 1972.

Deposits Rising

Time deposit flows to commercial banks will probably recede somewhat from the high volume of savings that inundated all financial institutions during the 1970–71 period. Hesitation on the part of consumers to spend plus a savings rate of 8.2 percent of disposable personal income—quite high by historical standards—pushed time and savings deposits in commercial banks to $275 billion in 1971, an 18 percent increase over 1970. Since consumers were spending more and saving less in 1972, the rate of increase in such deposits hovered around 16 percent, reaching about $319 billion. In 1973, these deposits will probably rise 14 percent to $364 billion.

Demand deposits are expected to experience a similar trend. Having increased 6 percent from $248 billion in 1970 to $263 billion in 1971, their growth in 1972 was closer to 5 percent, a rate that will probably continue in 1973, to about $291 billion.

Branches Grow at Home and Abroad

In the middle of 1972, 13,876 commercial banks were in operation in the United States, 92 more than at the beginning of the year, while total bank offices reached a high of 37,639. The increased pace of branching resulted in a net addition during the first half of 1972 of 668 branches.

A total of 577 branches in 67 foreign countries and overseas areas of the United States were in operation by 91 Federal Reserve member banks as of December 31, 1971. Of these branches, 527 were operated by 67 national banks and 50 were operated by 24 state banks. During 1970 the Board of Governors of the Federal Reserve System approved 81 applications of member banks for permission to establish branches abroad; during 1971 the Board approved 69 applications.

Part of the increasing interest in overseas branching can be attributed to the recent upsurge in profitability of foreign operations. Until recently, branches abroad concentrated on servicing corporate customers but now have broadened their scope to include functions from corporate underwriting and equipment leasing to investing in manufacturing, transportation, and real estate

Number and Location of Foreign Branches of Federal Reserve Member Banks, 1971

Abu Dhabi	1	Liberia	2
Argentina	38	Luxembourg	1
Austria	1	Malaysia	5
Bahamas	73	Mariana Islands	1
Bahrain	3	Marshall Islands	1
Barbados	4	Mexico	5
Belgium	7	Netherlands	7
Bolivia	5	Netherlands Antilles	3
Brazil	19	Nicaragua	3
Canal Zone	2	Okinawa	2
Chile	9	Pakistan	4
Colombia	28	Panama	29
Dominican Republic	14	Paraguay	6
Dubai	3	Peru	8
Ecuador	15	Philippines	4
El Salvador	1	Puerto Rico	19
Fiji Islands	1	Qatar	1
France	15	Saudi Arabia	2
Germany	22	Singapore	11
Greece	13	Switzerland	8
Guam	4	Taiwan	2
Guatemala	3	Thailand	2
Guyana	1	Trinidad and Tobago	6
Haiti	1	Trucial State of Sharjah	1
Honduras	3	Truk Islands	1
Hong Kong	15	United Kingdom	45
India	11	Uruguay	4
Indonesia	6	Venezuela	4
Ireland	3	Vietnam	2
Israel	1	Virgin Islands (U.S.)	19
Italy	6	Virgin Islands (British)	3
Jamaica	7	Other (West Indies)	10
Japan	15		
Korea	3	Total	577
Lebanon	3		

Source: *58th Annual Report, 1971*, Board of Governors of the Federal Reserve System.

companies. Extended overseas banking activities involve problems ranging from complexities of the foreign exchange market and competition from local banks to outright expropriations. However, U.S. banks have found that restrictions and regulations so common in their own country are minimal abroad, thus providing them with many challenging and lucrative opportunities.

Banking and Small Business

In an effort to expedite and ensure the adequacy of long-term commercial bank loans for small businesses the Small Business Administration and The American Bankers Association recently formed a "Task Force for Co-action with Small Business."

Since formation of the task force in early 1972, the SBA has initiated numerous changes including reductions in the number of application forms and in processing time required to actuate loans, development of secondary markets to sell direct loans, provision for a more rapid purchase of guaranty, and other changes to make SBA systems more compatible with commercial banks. These actions have already increased the participation of banks in SBA guaranteed loans and have visibly promoted a better understanding on the part of the small businessman about the interaction between the banks and the SBA.

Export Promotion

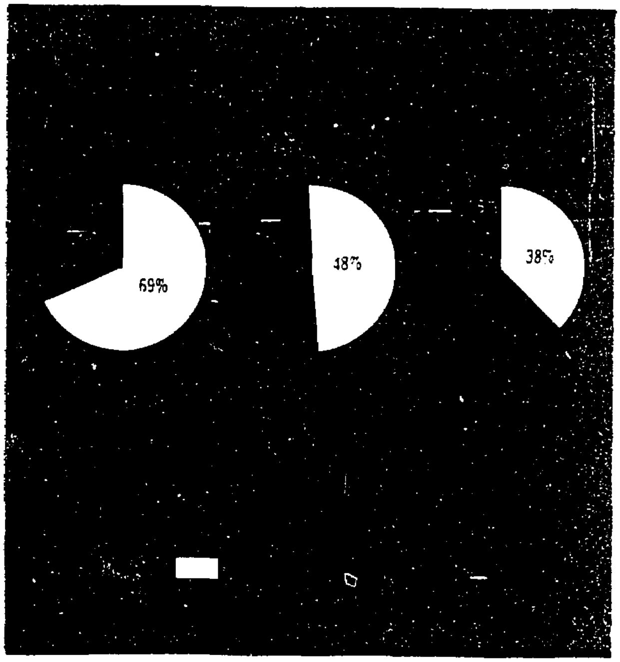
In an effort to increase export activity of the banking community and its business customers, the Commerce Department's Bureau of International Commerce (BIC) developed the Export Promotion Multiplier Program. This program provides timely export promotional materials to help participating banks maintain or improve their international full-service image. Many of the materials relate to specific industries which BIC has targeted as having the greatest export potential. The following sectors have been selected as target industries: electronic data processing; food processing and packaging machinery; pumps, valves, and compressors; industrial and scientific instruments;

air conditioning and refrigeration equipment; agricultural machinery; micrographics; and biomedical equipment. Five additional categories will be added to the target industries list each year.

For each of these sectors BIC plans to make available to commercial banks computerized lists of existing or potential exporters and comprehensive market research studies that include past data on production, consumption, imports and exports and forecasts for the next 5 years; products with highest sales potential, and factors affecting their demand; industry market characteristics, sales development techniques, distribution systems, trade practices and competitive factors; and identifying promotional activities such as major trade exhibitions, seminars, congresses, and workshops.

Bank Automation Grows

Steady growth of computer use by commercial banks over the past decade is vividly revealed by some preliminary returns from a 1972 survey conducted jointly by The American Bankers Association and the Bank Administration Institute. The survey indicated that 56 percent of all banks had on or off premise computer facilities last year compared with only 7 percent in 1963 and 38 percent of the Nation's banks are now without plans to automate, compared with 84 percent in the similar survey conducted in 1963. Of the banks using off premise computers, 72 percent obtain service from correspondent banks.



1972 Profile [1]
Commercial Banking

SIC Code	60
Number of banks	13, 876
Number of offices in United States	37, 639
Number of foreign branches [2]	577
Employment (thousands)	1, 105
Assets (billions)	$717
Loans (billions)	$392
Investments (billions)	$187
Demand deposits (billions)	$277
Time deposits (billions)	$319

[1] Estimated.
[2] 1971 data.

For banks offering automated services to customers, payroll is the service most frequently offered, followed by account reconciliation, correspondent services, and accounts receivable. However, the leading revenue producer is correspondent bank services, 41 percent, followed by payroll services, 30 percent. A breakdown of payroll and correspondent services by size of bank reveals that for the smallest banks (those with under $100 million in deposits), payroll services are the largest income producer with 41 percent of income derived from automated services, compared with 26 percent for medium size banks (those with $100 million to $500 million in deposits) and 32 percent for the largest (over $500 million in deposits). The medium size bank reports correspondent services more profitable, with 49 percent of income from automated services, compared with 39 percent for the largest banks and 22 percent for the smallest.

Continued conversion of some banking functions to electronic data processing is likely to change bank employment patterns in the next several years. According to the Bureau of Labor Statistics' *Occupational Outlook Handbook*, the number of workers in some occupations will be reduced while there will be an increase in job openings in occupations which are new to banks. Also, increased banking services to customers will add to banking services employment.

In those banks which install modern electronic equipment, fewer check sorters and bookkeeping machine operators will be required. However, employees affected by automation may possibly be retrained or reassigned in order to cope with the growth in volume of work created by new bank facilities and services.

Last year, banking employment rose 3 percent to top 1.1 million. A similar increase is anticipated in 1973.

A Blueprint for the Future

In mid-1970, President Nixon appointed a Commission on Financial Structure and Regulation to formulate recommendations to improve the functioning of private financial institutions in the United States. In late 1971, the Commisison released its report, which included the following major recommendations:

- The Federal Reserve System should be concerned mainly with conducting monetary policy and be relieved of examining and supervisory functions except for interest rate regulation, holding company regulations, Edge Act and other foreign bank operations, and enforcement of margin requirements.
- Creation of two new regulatory agencies, one headed by an Administrator of National Banks and the other by an Administrator of State Banks; the present supervisory activities of the Federal Deposit Insurance Corporation should be transferred to the latter agency and its insurance function should be made a part of a new Federal Deposit Guarantee Administration which would also include the present insurance functions of the Federal Savings and Loan Insurance Corporation and the National Credit Union Administration. In other respects the Federal Home Loan Bank Board and the National Credit Union Administration should remain unchanged.
- Phaseout interest rate ceilings on time and savings deposits of all institutions in 10 years and abolish reserve requirements on time and savings deposits, share accounts and certificates of deposit. Permit all deposit institutions to offer third-party payment services (checking accounts and credit cards) although credit unions would be limited to "line of credit" third-party payment services. Require savings and loan associations and mutual savings banks inaugurating these services to observe the same regulations and receive the same tax treatment as commercial banks, and become members of the Federal Reserve System. Reserve requirements on demand deposits would eventually become uniform for all institutions.
- All deposit institutions should be free to convert to other institutional types of charters, from Federal to State charter and vice-versa, from stock to mutual forms or reverse. This would permit the creation of mutual commercial banks. Also, states should be urged to amend their laws in order to permit commercial banks, savings and loan associations, and mutual savings banks to branch on a statewide basis.
- To improve the performance of the mortgage market, establish a special tax credit based on gross interest income from residential mortgages for all investors in such loans, thus placing the tax incentive on mortgage lending rather than on any institution. Eliminate interest rate ceilings and fixed mortgage rates on FHA and VA mortgages and prohibit points and discounts. Variable interest rate FHA and VA mortgages, with consumer safeguards, should be authorized.—*Wray O. Candilis, Office of Business Research and Analysis.*

Commercial Banking: Trends and Projections 1967–80

[In billions of dollars except as noted]

	1967	1968	1969	1970	1971	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73	1980 [1]	Percent increase 1972–80*
Assets	451	501	531	576	640	717	12	803	12	1,649	11
Loans	236	265	296	313	347	392	13	447	14	970	12
Investments	124	136	126	148	170	187	10	204	9	372	9
Demand deposits	211	230	241	248	263	277	5	291	5	379	4
Time deposits	184	204	194	233	275	319	16	364	14	790	12
Employment (thousands)	870	916	983	1,046	1,078	1,105	3	1,138	3	1,380	2.8

[1] Estimated by Bureau of Domestic Commerce.
*Compound annual rate of growth.

Source: Board of Governors of the Federal Reserve System, Bureau of Labor Statistics, Bureau of Domestic Commerce.

SECURITY MARKETS

The security markets throughout 1972 operated under a series of foreign and domestically induced influences that affected interest rates, money supply and business financing patterns.

Although the economy was recovering in 1971 from the sluggishness of 1970, the pace of recovery lacked necessary vigor, and the resulting Presidential announcement in mid-August 1971 of the new economic policy started a chain of events that has since dominated business and finance.

Institution of the wage-price freeze and Phase II of the Economic Stabilization Program tended to stabilize prices and reduce inflationary expectations. Termination of the agreement to redeem foreign central banks' dollar holdings in gold, and imposition of a surcharge on imports, paved the way for a reorganization of the international monetary system to replace the Bretton Woods agreement of 1944.

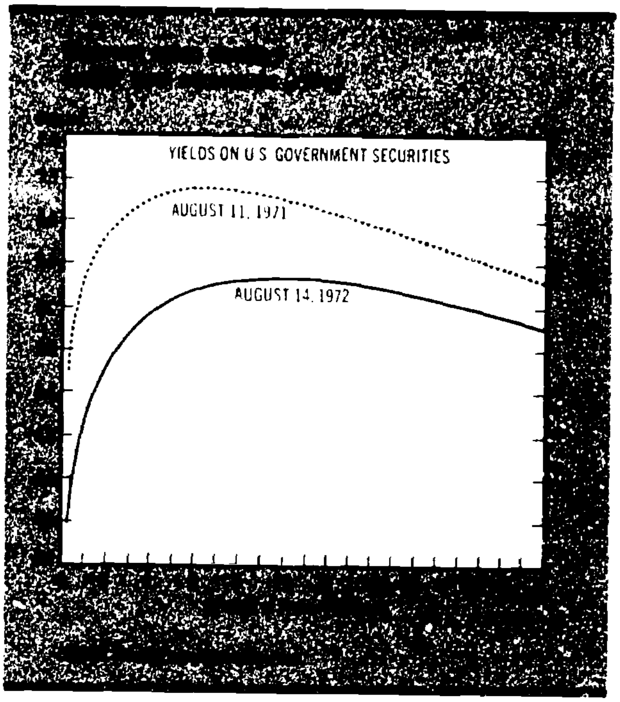
As a result of the Smithsonian Agreement reached in December 1971 by the Group of Ten countries, Congress enacted legislation devaluing the dollar by raising the price of gold from $35 to $38 an ounce. Other major industrial countries announced revaluations of their own currencies in terms of dollars.

Early in 1972, world money markets were influenced by flurries of speculation in various currencies including the dollar, while the price of gold in the free market exceeded $70 an ounce. As speculation subsided, however, the price of gold declined.

It had been expected that following the Smithsonian Agreement the return flow of American dollars would be rapid. When such a flow did not materialize, the domestic money market was affected and interest rates fluctuated for short periods of time. In the second half of 1972, discussions were resumed on the nature of future international currency arrangements in conjunction with problems of world trade. No major decisions appear likely in the near future.

Effect on Interest Rates

The effect of the August 15, 1971 economic program on the level of interest rates was powerful. Both short-term and long-term rates declined. One year after the new economic policy went into effect, rates on prime commercial paper notes of 4–6 months were 4.85 percent compared with 5.73 percent in August 1971. Aaa corporate bond yields



dropped from 7.59 to 7.19, while Baa corporates declined from 8.76 to 8.19 percent during the same period.

Rates of 3-month Treasurys fell from 5.08 percent in August 1971 to 4.01 percent a year later, 3–5 year U.S. Government issues from 6.39 to 5.92 percent, and long term U.S. Government taxable bonds from 5.78 to 5.59 percent. High-grade municipal bond yields also dropped during the same period from 5.95 to 5.29 percent while FHA new home mortgage yields decreased from 7.97 to 7.54 percent.

Developments in 1973

Probably the most dramatic events in 1973 will relate to the international field. Underlying those events the need will still exist for a relatively stable price level with a concurrent effort to support the economic recovery through the proper mix of monetary, credit, and fiscal measures.

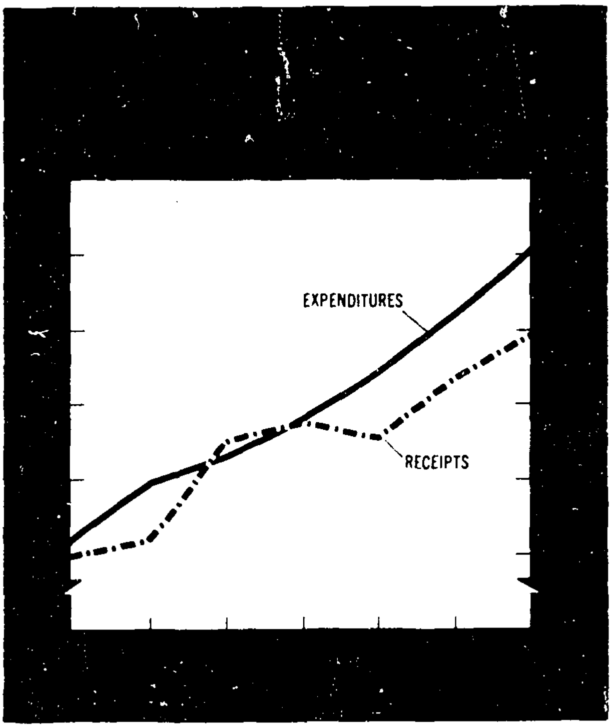
Since business expansion is expected to continue into 1973, interest rates in most sections of the market probably will remain firm. However, the peaks reached in 1969 are not expected to be challenged: Domestic inflation is being brought under control, an international financial crisis is believed to be unlikely, and corporations will generate internally a substantial part of the funds required for capital investment.

Under these circumstances, some changes in phase II controls may be made when the present authorization ends in April 1973. In any event, the trend of interest rates will undoubtedly continue to be observed closely by governmental authorities, as will prices generally. Meanwhile, reappearance of inflation abroad is likely to discourage the outflow of foreign-owned capital regardless of interest rate differentials.

Federal Finance

Efforts by the Administration to bolster the economy were the prime reasons behind the budget deficit of $2.8 billion in fiscal year 1970 and the substantial deficit of $23.0 billion in fiscal year 1971. A deficit of $38.8 billion for fiscal 1972 projected by the administration in January 1972, did not materialize, because of overwithholding of individual income taxes and the impressive gain in economic activity. Consequently the deficit for fiscal 1972 was $23 billion. A somewhat larger deficit has been estimated by administration officials for fiscal 1973.

Throughout most of the first half of 1972, Government securities fluctuated within a very narrow range, reflecting in part the lack of a heavy demand for funds. The second half saw modest changes in the level of prices as business expansion grew stronger. Generally the advance in rates



was slower than many had expected. Since economic activity is expected to rise in 1973 and demand for funds to become stronger, a further advance in Government security yields should be expected.

Municipal Securities

After piling up a large backlog of needs during the 1969–70 period, State and local governments in 1971 and 1972 took full advantage of low-interest rates and strong demand for tax-exempts by commercial banks to issue bonds at an average of about $2 billion a month.

As business continued to expand, prices of municipal securities began to decline slightly during the second half of 1972. However, the decline was less than usual in periods of economic recovery, when commercial banks generally withdraw from the municipal bond market. Bank loan demand was moderate enough that the banking industry was able to continue to provide a market for municipal issues. Also, with the price of goods and services advancing at a much slower rate, investors are generally increasingly attracted to fixed investments.

Offerings of long-term bonds by State and local authorities are expected to decline in 1973, mainly because revenue sharing legislation will transfer from the Federal Government large amounts of funds to financially pressed States and localities.

The volume of municipal securities may be further reduced if, as proposed, the Federal Government should subsidize borrowings of political subdivisions that find it difficult to float their own securities at reasonable interest rates. In addition, the trend toward careful scrutiny by budget-minded State and local officials of welfare payments, funds for education, and other expenditures is most likely to continue.

The Corporate Sector

Plant and equipment expenditures during 1972 are estimated at 9.7 percent above 1971, slightly lower than the 10.3-percent increase projected earlier in 1972. Apparently business has curtailed capital spending plans as a result of a relatively low ratio of operations to capacity. A more optimistic picture is shaping up for 1973 with capital expenditures expected to rise about 13 percent over 1972, principally because consumer spending and rebuilding manufacturing inventories will produce sizable gains in the economy.

During most of 1972 prices of corporate securities fluctuated within a relatively narrow range then began declining slightly towards the end of the year. Despite strong business activity and sharply increasing short-term rates, prices of corporate securities did not drop substantially because demands on the public bond market were moderate in 1972 compared with 1971. Corporations were able to generate more funds internally than in previous years.

With business activity expected to continue to rise through a large part of 1973, there may be a somewhat greater volume of corporate financing than in 1972. However, demand for long-term funds is not expected to be great enough to produce corporate interest rates much higher than in 1972.

Stock Market

The trend of the stock market was affected considerably by the realignment of U.S. domestic and international economic policies in August 1971. While prices were weak during the wage-price freeze, after clarification of phase II details, a rally in late 1971 carried the Standard and Poor's composite price index for 500 common stocks above the 100 level (1941–43=10) in 1972 and the index continued its small but steady uptrend.

Although the stock market moves up and down in response to many pressures—some no more fundamental than technical adjustments—the basic trend is dominated by business prospects. Near the end of 1972 the continuing business expansion and rosy profit picture resulted in a breakthrough of the 1,000 point ceiling of the Dow-Jones Industrial Average. The feeling of well-being that permeated the stock market throughout most of 1972 will probably continue in the early part of 1973.—*Wray O. Candilis, Office of Business Research and Analysis.*

CHAPTER 43

Life, Property and Liability Insurance

LIFE INSURANCE

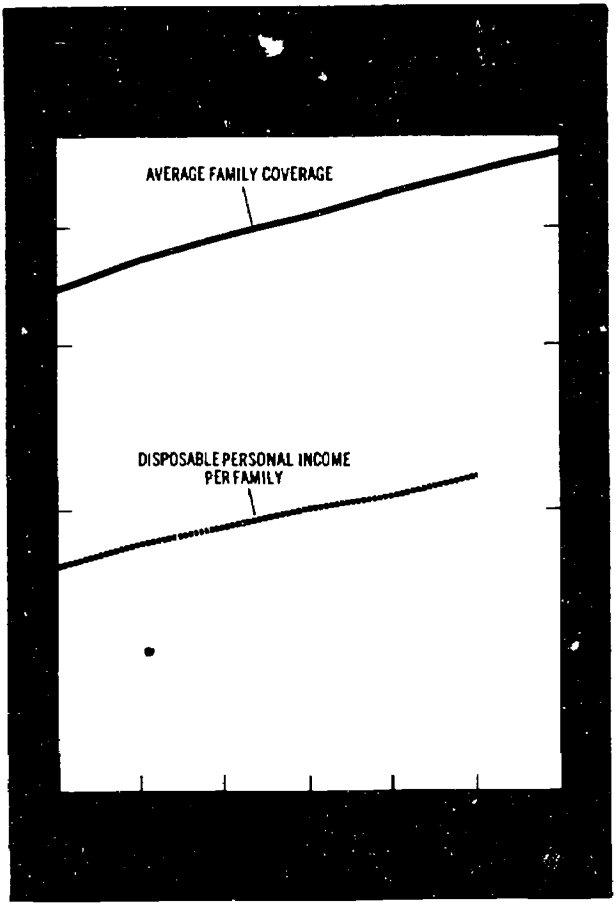
At the start of 1972, some 145 million Americans were insured by one or more life policies. In 1973 new purchases of life insurance in the United States may exceed $225 billion, about 9 percent above the estimated $206 billion in 1972. Insurance in force could approach $1,800 billion, up about 9 percent from the year before. Total benefit payments may expand to $19 billion or more, a projected gain of almost 6 percent. Life insurance company assets, rising almost 6 percent annually, could stretch to $250 billion. Premium receipts, accounting for three-fourths of the industry total income, may approach $48 billion, up just under 9 percent from 1972.

Life Policies Can Convert To Cash

In 1971, 9 out of 10 ordinary life insurance policies—providing financial protection in case of death—consisted of whole life or endowment policies that build cash values, which policyholders may claim for their own use. Straight life and limited payment policies accounted for slightly more than half of the purchases of new ordinary life insurance. The average amount of coverage for each insured family was $25,700—slighty more than 2 years of disposable personal income per family at the end of 1971. Total ordinary insurance in force at the end of 1971 was $789.2 billion, accounting for 52 percent of all life insurance in force.

Group Life Coverage Up

Accounting for almost 40 percent of all life insurance in force in 1971, group life insurance—mostly covering employer-employee groups—totalled $581.4 billion, close to 7 percent above the year-earlier figure. Many group life plans provide coverage on the lives of dependents of members, as well as coverage in reduced amounts of retirees. Some plans include provisions for annuities to survivors.



Premium Receipts Rising Sharply

Life insurance company income is derived from premiums paid by policyholders and earnings on investments. In 1971, gross income of all U.S. life insurance firms was $54.2 billion—75 percent from premium receipts, 20 percent from investment earnings and the remainder from other sources.

Life insurance company premium receipts during 1971 totalled $40.7 billion, 11 percent more than a year earlier. Receipts showed an annual average increase of 9.2 percent since 1967. Health insurance sold by life companies accounts for a rising share of premium receipts—32 percent in 1971, compared with 28 percent in 1967. Life insurance companies provided an estimated $8.5 billion of the health benefits paid to Americans in 1971, mostly under group contracts.

Operating Costs Rising

Operating costs, rising with receipts, continued to consume 17 percent of income. High levels of business raise operating expenses, although improved computer operations and more efficient office management limit increases to some extent.

Policy Reserves Increasing

By the end of 1971, policy reserves of U.S. life insurance companies—amounts set aside to meet future obligations to policyholders and their beneficiaries—grew to $179.3 billion, up 7 percent from 1970. State laws require each firm to maintain reserves at levels that assure payment of policy obligations. The amount required is determined actuarially on the basis of anticipated funds from future premium payments and interest earnings.

Life insurance companies in 1971 held $121.6 billion in reserves for life policies, $3.9 billion for health insurance policies, and $53.8 billion for annuity payments and payments under supplementary contracts.

Insurance Assets Usually Invested

Assets of U.S. life insurance companies reached $222.1 billion in 1971, an increase of more than $14.8 billion over the preceding year. Investment of those assets provides capital for the domestic economy. Among 13 major domestic sources of funds, life insurers last year ranked third, supplying 7 percent of the funds flowing into financial markets, according to the Institute of Life Insurance. These investments are channeled into corporate securities, nonfarm mortgages, policyholder loans, government securities and real estate and into financing of homes, farms, apartment buildings, stores, hotels, and motels, hospitals and clinics, industrial plants and equipment and utilities. Earnings on investments help hold down the cost of life insurance to policyholders.

More than 90 percent of the 1,805 life insurance companies are owned by stockholders. However, 154 mutual life firms—generally older and larger than the stock companies—hold about 65 percent of the assets of all life companies, and account for a little more than half of life insurance in force.

Life Insurance Benefit Payments

During 1971, policyholders and beneficiaries received $17.2 billion in payments from life policies and annuities, 4.4 percent more than in 1970. Benefits from annuities, endowments, et cetera, accounted for $9.8 billion, up 3.4 percent from 1970, while death benefits amounted to $7.4 billion, 5.8 percent higher than the year previous.

Although these payments have increased steadily from year to year, the industry expects more rapidly rising payments in future years, when the impact of heavy life insurance purchases of the last 20 years is felt.

Continuing efforts of the life insurance business to improve private pension systems have resulted in earlier vestings, more liberal pensions, and provisions for employees' dependent spouses. Pension plans administered by life insurance companies as 1971 ended numbered 334,880, covering 11.5 million people.

Employment in Insurance

The insurance industry employs almost 1.5 million workers, mostly in clerical and sales positions. About a third of all insurance workers are sales people—agents and brokers—who sell policies directly to individuals and business firms. Clerical workers, including claims adjusters and claims examiners, outnumber the sales force. They have been assisted in recent years by the use of electronic computers, to process the large volume of paperwork involved in handling insurance billing and claims. The life insurance industry alone employs more than 560,000 workers.

Prospects for 1980

Life insurance will continue to emphasize financial protection for the families of deceased policyholders, and assets of life insurance companies will continue as a major source of capital investment.

Life-Property-Liability Insurance: Trends and Projections 1967-80

[In billions of dollars except as noted]

	1967	1969	1970	1971	1972 [1]	Percent increase 1971-72	1973 [1]	Percent increase 1972-73	1980 [1]	Percent increase 1972-80 [2]
Life insurance:										
New life insurance purchases [3]	132.6	159.3	179.5	189.2	206.2	9	224.8	9	411.0	9
Premium receipts	28.7	34.0	36.8	40.7	43.5	9	47.3	8		
Life insurance in force in the United States	1,080.0	1,284.5	1,403.0	1,505.0	1,640.2	9	1,754.0	9	3,268.2	9
Ordinary	583.0	678.9	731.1	789.2	852.3	8	920.5	8		
Group	391.1	483.2	545.1	581.4	639.5	10	703.4	10		
Employment (thousands)	501.0	525.1	544.0	557.4	560.0	1				
Property and liability insurance premium receipts	23.8	29.2	32.9	36.0	39.6	10	43.6	10	85.0	10

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth.
[3] Excludes Federal Employees' and Servicemen's Group Life Insurance.

Source: Institute of Life Insurance, Insurance Information Institute, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Since life insurance companies provide a significant share of the Nation's health coverage, they are increasingly concerned about improving health care. Life and health insurance firms have proposed a program called Healthcare, involving a joint effort by the Federal Government and the private insurance sector to improve the quality and distribution of health care facilities and personnel and to encourage out-of-hospital treatment and preventive medical treatment.

The special life insurance urban investment program to help people living in inner city neighborhoods has neared completion. Of the $2 billion pledged by insurance companies for the program, $1.8 billion had been allocated at year-end 1971 to finance housing, job development programs, and medical and community facilities for slum and ghetto residents.

The life insurance industry is reviewing its effort in other areas of social responsibility—health, environment, employment, and community development. A permanent Committee on Corporate Social Responsibility was established last year by four major associations—the American Life Convention, the Life Insurance Association of America, the Health Association of America, and the Institute of Life Insurance—to oversee the program.

By 1980, new life purchases may exceed $411 billion a year, raising life insurance in force to about $3,300 billion.

PROPERTY AND LIABILITY INSURANCE

Net premiums written for all lines of property and liability insurance—providing protection against financial loss from a variety of perils and uncertainties—have increased yearly over the last two and a half decades. Further gains in premiums expected in 1973 may bring the total to $44 billion, about 10 percent above the estimated $40 billion of 1972. Growth from 1971 was about 11 percent.

Coverage and the Premium Dollar

The property and liability insurance business spreads its protection for individuals and commercial enterprises over a variety of areas: automobile insurance; multiple-peril insurance, which includes formerly separate lines such as fire and liability; insurance against burglary and theft; workmen's compensation; surety and fidelity bonds; business failure; and catastrophe (wind, hailstorm, tornado and hurricane) insurance.

Buyers of business insurance accounted for about 54 percent of the $36 billion in property and liability insurance premiums written in the United States in 1971. Direct commercial insurance premiums amounted to an estimated $19.3 billion, with the heaviest concentrations in workmen's compensation, automotive fleet coverages, general liability and commercial multiple-peril package policies. Accident and health premiums accounted for about $1 billion of the total premiums written. Individual buyers of property and liability insurance, including homeowners' policies, accounted for $15.7 billion in new premiums in 1971, about 44 percent of the total.

Automobile insurance is by far the largest single classification of the property and liability business. Premium volume of about $15.4 billion in 1971, embracing commercial and individual auto policies, was up nearly 12 percent from a year earlier.

Multiple-peril insurance for homeowners and commercial properties is an innovation. Until a few years ago while most homeowners bought fire insurance, relatively few of them bought extended coverage, theft, or personal liability policies. Then the insurance industry developed homeowners' and commercial package policies.

Proof of the growing popularity of the homeowners' policy is reflected by the increase in premium volume from $1.8 billion in 1967 to an estimated $2.8 billion in 1971. Success of the package policies has had a pronounced effect on the amount of insurance written in recent years on separate lines like fire and extended coverage, liability other than auto, burglary and theft, inland marine, and glass. Because of extended coverages in the package policies, total premium volume for the separate lines, other than fire insurance has been relatively static.

Although fire insurance is generally available in homeowners' and commercial multiple-peril policies, fire insurance premium volume has risen every year for the last 7. A 3 percent increase in 1971 pushed volume to an estimated $2.3 billion, a new record.

Workmen's Compensation Insurance

Workmen's compensation insurance provides medical care and weekly payments to injured employees or to dependents of persons killed in work-connected accidents, without determining fault. Scope of this coverage has broadened considerably in recent years, in part because of liberal interpretations of its application. Premium volume in 1971 reached a new high of $3.7 billion, a 5 percent advance from the year before.

FAIR Plan Insurance

Fair Access to Insurance Requirements (FAIR) Plans, now operating in 26 states, the District of Columbia and Puerto Rico, provide insurance to property owners in the Nation's inner cities and other high-risk areas. Store owners and residents in high-risk areas had been unable to obtain insurance because their property was exposed to exceptional hazards, until the FAIR Plan program was established under the Omnibus Housing Act of 1968. The law provides for a Federal Government backup through the sale of reinsurance to the companies.

From 1968 through the end of 1971, FAIR Plans issued 1,086,105 original and over 520,000 renewal policies, and at the end of 1971 were providing more than $23 billion of insurance coverage.

Credit Insurance

Credit insurance protects businesses from losses due to business failure. A credit insurance policy assures the manufacturer or wholesaler payment for merchandise delivered to a customer who does not pay for it. Such liabilities in 1971 reached nearly $2 billion.

Flood Insurance

Low-cost flood insurance is widely available today under a program developed jointly in 1968 by the insurance industry—represented by the National Flood Insurers Association—and the Federal Insurance Administration. Before a community's citizens qualify for the coverage, the community must be declared eligible for participation by the Federal Government, and must promise to set certain construction standards and to enforce land-use measures designed to guide future development away from flood-prone areas.

According to the National Flood Insurers Association, some 1,201 communities in 50 States and Puerto Rico had qualified for the coverage through May 1972. A reported 92,590 policies had been sold, providing more than $1.48 billion of insurance.

Assets and Surplus

At the end of 1971, assets of property-liability insurance companies amounted to about $66 billion, an increase of more than $7 billion from the year before. Most of those assets are invested in Government bonds, transportation and utility bonds, high grade stocks and real estate.

Policyholders' surplus stood at an estimated $21.5 billion. This sum, consisting of paid-in capital and net reported surplus plus special voluntary reserves, is the difference between assets and liabilities.

Changing Insurance Trends

In the next several years, brokerage houses may be writing a substantial amount of the large commercial risks as smaller insurance companies are acquired through mergers. Member firms of the New York Stock Exchange are now allowed to sell life insurance. Large companies with complex computer systems will be better equipped than individual agents to handle the voluminous paper work involved in issuing policies, collecting premiums, and handling endorsements and renewals. Direct selling by companies will increasingly replace sales by individual insurance agents.

Mounting interest by state legislatures and Congress in no-fault auto insurance will have an impact on both insurance companies and policyholders. Under no-fault auto insurance, the motorist's insurance company pays the property damages, medical expenses and lost income resulting from an accident, rather than leaving the question of fault to the courts. Acceptance of the no-fault concept would reduce spending by companies and policyholders on expensive litigation.

In Massachusetts, where no-fault auto insurance legislation has been in effect since early 1971, the number of claims was reduced 36 percent, the average amount paid out per claim was reduced 21 percent, and the insurance companies' cost of operation was 13 percent lower than a year earlier. As a result, the auto insurance industry was ordered to return $37 million to 1971 policyholders. About half a dozen other state legislatures now have passed similar no-fault insurance legislation.

Rising consumer complaints have prompted increased government interest in product safety and focused attention on product liability and product recall insurance. Product liability lawsuits are approaching a half million a year and increasing rapidly.

Dollar losses resulting from crime against property have continued to climb. A Federal crime insurance program, serviced by private insurance companies and agents, began in mid-1971 to make burglary and robbery insurance available to small businesses and individual homeowners and apartment dwellers in high-crime areas, as a move to stem deterioration of business in those communities.

By 1980, total net premium income of the property liability sector of the insurance industry may reach $85 billion.—*Jacob H. Bennison, Office of Business Research and Analysis.*

CHAPTER 44

Selected Services

Spending for services continues to grow more rapidly than spending for consumer goods; a trend that is expected to continue throughout the decade. By 1980, services are expected to account for over two-fifths of all personal consumption expenditures. Service industries in this chapter include advertising agencies, automobile services, hotels and motels, and motion picture theaters.

Continued growth in automobile usage is expected to bolster receipts of parking lots, auto leasing, car washes, and auto repair shops. Receipts of hotels and motels should continue to follow the upward trend established several years ago, prompted by more leisure time, increased business travel, and greater mobility of the population. Advertising gains are anticipated, with local advertising expenditures likely to outpace national ads in a few years. Movie attendance is now growing and the new concepts and resurgence of theaters and film productions should continue to boost box office receipts.

Annual average rates of growth expected for these service industries for the remainder of the decade range from 5.7 to 7.4 percent.—*Dorothy L. Noble, Office of Business Research and Analysis.*

Older hotels continued to experience a declining occupancy rate in 1972, particularly those in downtown areas and near railroad depots. Less hard hit were newer or newly refurbished establishments in large cities, motor hotels and motels on the fringes of cities or along major traffic arteries, and hotels located near airports which cater to air

HOTELS AND MOTELS

Receipts of hotels, motels and motor hotels in 1973 are expected to expand 5 percent to reach \$7.9 billion, compared with an increase of 4 percent growth for an estimated \$7.5 billion attained in 1972. Occupancy rates will continue to average about 59 percent, the same rate attained in both 1970 and 1971.

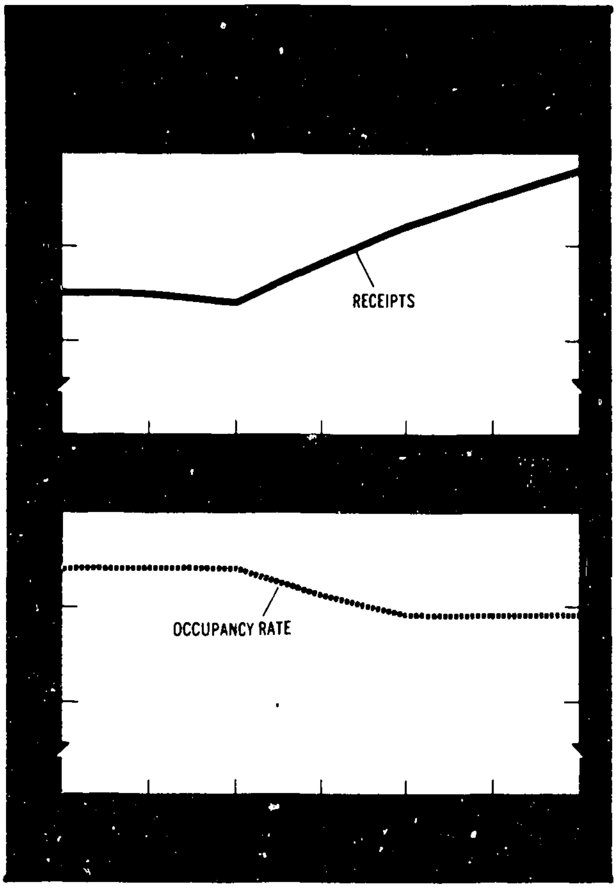
Selected Services: Projections 1972–80[1]

[Value of receipts in millions of dollars except as noted]

SIC Code	Industry	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80[2]
7011	Hotel and motel receipts	\$7, 495	4	\$7, 795	4	\$12, 500	6. 6
731	Advertising agency billings	9, 536	7	10, 380	9	15, 600	6. 3
75	Automobile services receipts	12, 220	10	13, 440	10	21, 585	7. 4
78	Motion picture box office receipts	1, 335	10	1, 425	7	2, 200	6. 4

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.



travelers. These changes are some major effects from the shift in transportation away from the railroads to the private automobile and airplane.

Employment in 1972 averaged 662,000, very little changed from the 1971 level.

The distinctions among hotels, motels and motor hotels are not clear-cut. A hotel is generally an older establishment, located in or near the business district of a city, which offers extensive services to guests. Motor hotels are similar to hotels, but are generally newer, offer fewer services to guests, and have facilities for free, on-the-premises parking. Motels are generally smaller than motor hotels, farther away from densely settled areas, less elaborate, and offer fewer services. They are seldom more than three stories high, and access may be had to guest rooms without going through the lobby. However, some motels are self-contained resorts, offering all the services and luxury of resort hotels.

The newness of motels and motor hotels and their nearness to heavily-traveled highways have enabled them to attract a larger share of the lodging market. Although occupancy rates are declining in all sectors of the industry, they are declining faster for hotels than for motor hotels and motels.

Hotels now account for less than half of the rooms available to travelers. Because of the sharp decline in business, owners of some older hotels have been forced to convert them to other uses. A well-known establishment in mid-town Manhattan is being converted to a hospital, while a transient hotel in Washington, D.C., is being renovated to provide apartments for permanent residents.

Marketing Innovations

Faced with declining occupancy and rising costs, operators are taking novel approaches to marketing their hotels. More than 27 percent of the rooms available to travelers are located on properties affiliated with chains. Such affiliation, through ownership or franchise, gives the operator a strong marketing advantage because travelers can readily recognize the name and logotype, know the type of accommodation to expect, and approximate prices they will be charged. Membership in a chain also gives the hotel operator access to a reservations system, which can be important in raising the occupancy rate. As a consequence, several affiliations consist of independent hotels which have

Hotels and Motels: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969 [1]	1970 [1]	1971 [1]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Industry:								
Receipts	6,533	6,418	6,801	7,184	7,495	4	7,895	5
Employment (thousands)	626.2	673.8	676.9	664.3	662.0	−1		

[1] Estimated by Bureau of Domestic Commerce.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

Advertising Industry: Trends and Projections 1967–73

[In millions of dollars except as noted]

	1967	1969	1970	1971	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Advertising expenditures	$16,886	$19,482	$19,600	$20,600	$22,520	9	$25,000	11
Ad agency billings	$7,587	$8,754	$8,809	$8,900	$9,530	7	$10,380	9
Ad agency gross income	$1,317	$1,418	$1,427	$1,442	$1,545	7	$1,682	9
Employment (thousands)	117.1	121.4	123.0	118.4	119.0	1	122	3

[1] Estimated by Bureau of Domestic Commerce.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce, Advertising Age/McCann-Erickson, American Association of Advertising Agencies.

joined together to form reservation referral groups, thereby obtaining one of the major advantages of chain operation, while maintaining their independence.

Individual motel operators as well as chains are establishing recreational vehicle parks, sometimes adjacent to existing motels, to profit from the rapid growth of interest in camping, instead of losing customers to campground operators.

In an effort to attract more foreign visitors, many hotel and motel operators are participating in the language certification program of the American Hotel and Motel Association (AHMA), so as to staff front desks, switchboards, restaurants and other places of personal contact with employees who speak a foreign language. The AHMA also sponsors a plan whereby hotels in four gateway cities—New York, Chicago, San Francisco, and Washington—offer special low summer rates to visitors from Europe.

Several new chains feature low-cost rooms, formerly the exclusive province of the older and smaller independent establishments. Operators of these properties feel that high room costs have kept some potential customers away. Costs in such motels are minimized through use of modular construction; smaller, less elaborate guest rooms, permitting more revenue-producing units per acre; elimination of swimming pools and other nonrevenue producing activities; and smaller, more functional lobbies.

More Travel To Boost Receipts

Reflecting an annual rate of growth between 6 and 7 percent from 1972, hotel, motel and motor hotel receipts should approach $13 billion by 1980. Expectations of a higher growth rate are based on continued gains in personal income, a greater amount of leisure time, an increasing business tempo, and a younger, more mobile population.

The 3-day holiday weekend has already increased travel time available to most workers and the 4-day week—a reality in a number of companies—has had favorable results in the firms where it has been tried. Also, longer vacations that are now possible for many enable families to travel farther, and elaborate new tourist attractions and resorts are enticing them to do so.

Managers will have to be alert to opportunities to keep costs down. Over the past several years such methods as the use of guest-provided services, no-iron and soil-resistant fabrics, disposable room supplies, such as glasses and bath mats and spot-resistant carpets and rugs, have helped to reduce costs, particularly of labor. Centralized buying, advertising, reservations and other management services have made it possible for members of chains and franchise groups to keep room rate rises to a minimum.

Lower room rates will enable hotels and motels to better face the competition from campgrounds, second homes and stay-at-home vacations, and will attract more people who would not otherwise travel.—*James C. Kingsbury, Office of Business Research and Analysis.*

ADVERTISING

Increased economic activity in 1972 led to a total advertising outlay of $22.5 billion, more than 9 percent above the 1971 figure. That was the largest gain in several years. Expenditures may top $25 billion in 1973, a projected increase of 11 percent.

All major media gained in advertising revenue in 1972, with 1973 expected to show a similar pattern. Local advertising continues to grow faster than national advertising; it now accounts for 44 percent of all expenditures. Local advertisers in 1972 were quick to respond to rising retail sales with higher ad budgets. National advertisers were more cautious.

Advertising agency billings (domestic only), covering the total of media space, time and charges for inside and outside services, should top $10 billion in 1973; an increase of 9 percent over 1972 billings. Agency gross income—the total of media commissions, plus inside and outside service charges—is projected to approach $1.7 billion, a corresponding 9 percent rise.

Consumerism pressure for accuracy in product claims continues. Mounting pressure from the Federal Trade Commission for "truth in advertising" reinforces this trend.

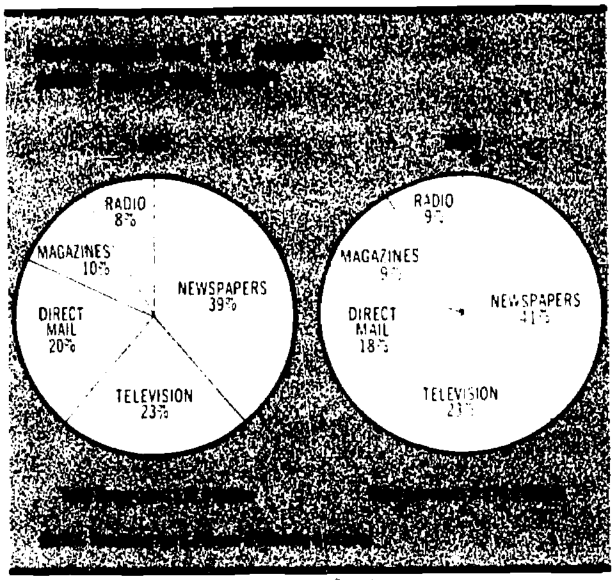
Agency-Client Relationships Changing

Traditional full service agencies—the ones that perform a full range of services for their advertiser clients—are faced with increased competition from inhouse agencies and specialized service firms such as creative and media-buying shops. Many advertisers now absorb more of the promotional activities usually contracted to agencies. Others apportion advertising tasks among competing agencies on an "à la carte basis," instead of relying on a single full service agency. This technique, naturally, creates more special service agencies.

Most agencies offering a full range of client services will continue to operate on a full service basis, particularly the larger agencies that maintain large diversified staffs. However, the future of the 15-percent-of-billings commission that full service agencies traditionally charge their clients may be in jeopardy, as negotiated fees for actual services performed become more common, and "à la carting" gains in popularity.

Review Board Established

In response to mounting public and private criticism of advertising content, the advertising industry voluntarily established a National Advertising Review Board (NARB) in 1972. A cooperative effort of several trade associations, the NARB will act upon complaints dealing with truth and accuracy in national advertising. Voluntary solutions will be sought whenever possible, with regulatory agency referral a last resort should the advertisements in question go uncorrected and the complaint be found justified. Complaints on the



general content of advertising, relating to matters of taste, morality and social responsibility, will not be adjudicated. Prompted by the NARB initiative, a number of local self-regulatory agencies have been set up.

Newspapers Top Ad Medium

Newspapers continue as the most popular advertising medium, commanding a 41-percent share of the major media market. As newspaper readership rises and retail sales expand, retail advertising in newspapers is rising also. More national advertising dollars have shifted to newspapers to get closer to targeted markets. Preprinted inserts are gaining favor for special promotions and new product introductions. Direct mail dollars are being diverted to such inserts.

Following a growth year in 1972 when advertising expenditures in newspapers registered a 9-percent gain, another 9-percent gain is projected for 1973, with expenditures climbing to $7.4 billion. Some of the cost increases have resulted from higher prices; newspaper printing costs have been rising along with advertising demand.

Broadcasters Register Sharp Gains

Rebounding from the loss of cigarette advertising in 1971, revenues of television advertising grew an estimated 9 percent in 1972, and are likely to show a similar gain in 1973, approaching $4.2 billion. Network TV advertising increased substantially last year despite a 30-minute inventory reduction demanded by the prime time access rule. With new accounts replacing the $250 million yield of cigarette advertising, networks now offer fewer advertising bargains, and commercial time is selling out early.

Spot TV advertising revenues are growing fast, reflecting spilled-over network demand. Increasing product introductions benefit spot TV; new products require heavy promotional outlays in specific markets until sufficient consumer acceptance is attained to justify a national promotional effort. As automobile sales picked up in the last 2 years, automobile dealers, traditionally heavy users, kept spot TV ad revenue very strong. They should continue to do so in 1973.

Local TV sales continue to be fueled by rapidly expanding retail advertising outlays.

Radio advertising revenues continued to grow steadily, recording a 7 percent gain in 1972. A similar increase is projected for 1973, to a total of $1.6 billion.

Magazine Ads Increase

Advertising in magazines increased an estimated 6 percent in 1972. They will probably post a similar gain in 1973, to approach $1.6 billion in expenditures. Last year magazines gained in ad revenues from convenience goods and consumer durable producers, who began spending more as business activity increased. Advertising in monthlies, especially women's, was brisk. Packaged goods producers are finding the popular women's magazines an excellent medium.

Postal Increases Affect Direct Mail Ads

Direct mail advertising expenditures should reach $3.3 billion in 1973, a 6 percent rise from 1972. The increase in costs will result largely from a 25 percent increase in third class mail rates, which went into effect in 1971 and became permanent in mid-1972. Actual volume of direct mail will probably decline or remain unchanged, as advertisers shift some direct mail dollars to preprinted inserts in magazines and newspapers.

Despite higher postal rates, such advantages of the direct mail technique as high market selectivity and controlled exposure assure direct mail's continuance as an effective medium for many advertisers.

A Look Ahead

The advertising industry's strong growth in 1972 and its expected gains for 1973 are reminiscent of the massive advances of the middle 1960's. However, expenditures for the period 1972–80 should grow at a more moderate annual rate of around 6 percent, to reach $37 billion at the end of the decade.

Sophisticated research techniques, such as analyses of consumer behavior, and improved selection and placement of media, made possible the productivity increases of the advertising industry during the 1960's. Further refinements of computer and mathematical techniques to assure and measure advertising program effectiveness should provide opportunities for productivity gains in the future.

Larger, full service advertising agencies will probably continue to expand their international activities and diversify their income sources. Specialized service agencies will continue to grow, as will the trend toward the advertiser's assuming more control of advertising activity. Government controls will probably increase, along with the industry's self-policing.—*Gary R. Boss, Office of Business Research and Analysis.*

AUTOMOBILE SERVICES

Receipts of auto service establishments totaled over $12.2 billion in 1972 and are expected to top $13.4 billion in 1973, a gain of 10 percent. In 1972,

Automobile Repair and Service: Trends and Projections 1967–73

[Receipts in millions of dollars except as noted]

	1967	1969	1970	1971	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Auto services	7, 028	8, 973	10, 040	11, 113	12, 220	10	13, 440	10
Auto repair shops	4, 086	4, 307	4, 518	4, 667	5, 040	8	5, 540	10
Auto parking	484	718	904	1, 111	1, 220	10	1, 330	9
Auto and truck leasing	2, 091	2, 871	3, 213	3, 556	4, 005	13	4, 420	10
Car wash	286	449	602	778	855	10	940	10
Other auto services	103	628	803	1, 001	1, 100	10	1, 210	10
Employment (thousands)	340	368	384	385	390	1	400	3

[1] Estimated by Bureau of Domestic Commerce.

Source: Bureau of the Census, Bureau of Labor Statistics, Bureau of Domestic Commerce.

auto repair accounted for 41 percent, auto and truck leasing and rentals for 33 percent, parking lots for 10 percent and car washes for 7 percent of total receipts. The fastest growing sectors are leasing and car washing, although prospects are bright in 1973 for all auto services. Industry employment has been growing at about 3.5 percent a year since 1967, and is expected to reach 400,000 in 1973.

Auto Repair Receipts Rising

Auto repair shop receipts rose to over $5 billion in 1972 and should increase 10 percent to $5.5 billion in 1973. These figures exclude most repair work performed by new car dealers and service stations.

Licensing and Certification

In response to widespread dissatisfaction with auto repair practices, governments and private organizations are moving to protect customers and raise the status of competent repairmen.

Many States are considering legislation to require licensing of auto shops. In California, legislation was enacted requiring annual shop licensing by its Bureau of Auto Repair. This Bureau also monitors repair work performed, focusing on deceptive practices and fraud. Connecticut and Rhode Island Legislatures have enacted licensing statutes, and 11 other States are considering similar legislation. Groups in other States support similar government regulation.

A number of auto industry groups offer voluntary repairman certification. To be eligible for such certification, applicants must pass standard tests and fulfill prior experience requirements. One program offers training as well as testing and certifying.

Maintenance and Monitoring

The Federal Government's requirement of a 90-percent reduction of most auto emission pollutants by 1975 will increase auto service industry receipts. Older models will require frequent maintenance to prevent excessive emissions of pollutants. New models will have emission control equipment that will probably require frequent servicing. In future years, many auto service centers may specialize in emission control, safety monitoring, and correction of defects.

Parking Lots Expand

In recent years commercial offstreet parking has expanded into over a $1 billion industry with 1973 receipts expected to reach $1.3 billion and a yearly growth of about 10 percent to 1980. Need for parking services will grow with the decline in curb parking and the expansion of airports, shopping centers, colleges and hospitals, as well as the increase of vehicles on the road. The Bureau of Roads forecasts that by 1975, 1.5 million additional spaces may be needed.

In-Building/Self-Service Trends

As urban land values rise, more and more parking facilities are being integrated into office buildings, retail establishments, motels and other multipurpose structures.

Self-service parking is increasing much faster than attendant-service parking lots. Turnover is high in commercial areas, so lots with attendants must hire more people or make customers wait. Self-service lots curtail manpower and reduce customer inconvenience. Self-service operators pay more for lot maintenance, including lights, signs and security, to attract customers. Some self-service parking lots provide elaborate directional signs and such security precautions as closed circuit TV, sound monitoring of elevators, and glass-enclosed stairwells.

Improving Parking

A popular program to increase parking lot use is the park and shop plan. Merchants pay parking lot operators for one or more free hours of parking for their customers.

To help relieve commercial congestion, Federal highway funds have been available since 1968 for fringe-area parking lots, where motorists may leave their cars and take connecting buses to town.

A proposed method to eliminate parking delays is a car rental-car parking system. The customer would drive to work in a rented car and park it in a nearby facility. In the evening, he would rent the first car in line and drive it home.

Auto and Truck Leasing Soars

Estimates are that over 2 million autos were commercially leased in 1971, 3 percent more than in 1970 and 30 percent over 1968 levels. In addition, over 300,000 autos were rented on a daily basis. About 1 million new vehicles for leasing were registered in 1971, 18 percent more than in 1970, but only 7 percent more than in 1969. The 1970 decline was charged to strikes in the auto industry and the slowdown in business activity.

Of the 720,000 trucks leased and rented in 1971, almost 20 percent were daily rentals. Many of those moved household effects. Although the number of new trucks registered has decreased slightly each year since 1969, truck leasings are rising. In 1971, 584,000 trucks were leased, a 5-percent gain over 1970 and a 46-percent gain over 1968.

Leasing by dealers, service centers, and independent lessors offers several important advantages over outright purchases of vehicles. One is low capital tie-up, allowing customers to put resources into other investment. Another advantage is availability of specialized services. Many leasing firms provide a variety of services, including auto repair and maintenance as well as fleet management.

"Specialized" legal, managerial, and financial services are growing fast in popularity. In business fleets of 25 cars or more, finance and management leases covered over 732,000 cars in 1971, 30 percent more than in 1968. Partial- or full-maintenance leases covered 373,000 cars in 1971, a 6-percent gain over 1968.

Individual and small fleet leasing are growing faster than large fleet leasing. Since 1968, the share of individual car leasing of all leased vehicles increased from about 20 to 30 percent and fleet leasing decreased from about 80 to 70 percent. Companies with large transportation needs acquire their own fleets; those needing fewer cars less often are increasingly using the specialized services of leasing firms.

The 1973 outlook is bright for this new industry. Auto and truck leasing is rebounding from a slowdown in 1970. Nearly 3 million cars and trucks are expected to be commercially leased in 1973. Total receipts are estimated to reach $4.4 billion in 1973, a 10-percent increase over 1972.

Carwashes Prosper

Carwash industry receipts totaled nearly $900 million in 1972, several times the average annual volume of the sixties. Industry sources indicate 1972 receipts of nearly $2 billion when facilities associated with gasoline stations are included. Carwash outlets, including full service, automatic and self-service establishments, numbered 22,000 in 1972. The National Carwash Council predicts another doubling of outlets by the mid-1970's.

A Look Ahead

With continued increases in auto registrations and more complicated automobiles equipped with emission controls and safety features, receipts of automobile service establishments should continue upward. Changes in engine and component design to solve pollution problems will add to the need for mechanical services.

The advent of electronic testing and trouble shooting equipment, and better recruitment and training of mechanical service personnel, should provide the auto service industry with significant productivity gains in the late 1970's.

The parking and leasing industries will continue to grow, and may assume an important and integral role with future mass transit systems.

Auto service industry receipts are expected to reach $21.5 billion by 1980, for an annual gain of 7 percent.—*Gary R. Boss, Office of Business Research and Analysis.*

MOTION PICTURES

Box office receipts are expected to reach more than $1.4 billion in 1973, almost 7 percent over 1972 levels. Last year's audiences for many exhibitors were larger than expected, with receipts up 10 percent compared with 1971. The summer season was particularly strong. Even large-city downtown cinemas—which had been losing ground to neighborhood theaters—enjoyed increased business helped by the nature of top box office attractions.

Motion Pictures: Trends and Projections 1967–73

	1967	1969	1970	1971	1972	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Gross box office receipts (millions of dollars)	989	1,130 [1]	1,216 [1]	1,214 [1]	1,335 [1]	10	1,425	7
Consumer price index for indoor admissions, 1967=100	100.0	118.6	130.7	137.6				

[1] Estimated by Bureau of Domestic Commerce.

Source: Bureau of the Census, Bureau of Labor Statistics. Bureau of Domestic Commerce.

Higher admission prices rather than increased movie patronage accounted for rising box office receipts in recent years. However, ticket price increases halted during the past year while attendance increased. In late 1971 and throughout 1972, there were declines or minimal advances in prices for both indoor and drive-in admissions.

Lower admission prices result from theater owners' efforts to hold down inflation, fewer "roadshow" attractions which typically are higher priced reserved-seat admissions, increased usage of discounts for students and senior citizens, and experiments with reduced price offers such as "dollar nights" at the beginning of the week.

With box office receipts continuing to rise at a faster rate than admission prices, the gradual decline in movie attendance appears to have bottomed out. It is not yet clear whether long term revitalization of the industry will result, but some recent developments could stimulate further movie attendance.

Promotions designed to increase attendance encourage patrons to develop a theater-going habit. Most of the newly built theaters are located in shopping centers that attract large numbers of people and offer ample parking. The multi-auditorium theaters offer a choice of films by featuring more than one movie at staggered times. This is particularly advantageous for a family whose members have differing tastes and in attracting patrons who are shopping in the area.

Number of Theaters Growing

Emphasis in new construction continues to be on mini and multi-auditorium theaters. These new theaters highlight many cost saving concepts including automated equipment and common ticket-selling lobbies.

About $188 million was invested in 540 new theaters in 1971. Construction last year was also reported to be brisk, and there are now over 14,000 theaters including about 4,500 drive-ins. These additional theaters create increased demand for films.

Feature Production Up

For some years, theater owners have complained of the lack of features with strong box office appeal. However, the future looks more promising. Production starts of feature films for the major companies during the first 9 months of 1972 were up 14 percent over 1971. Figures on film starts were more impressive for the independents—up over 30 percent over 1971.

Growth of the "indies" has been particularly significant. According to trade sources, independent production has gained 500 percent over the past 5 years.

Financial Situation Improved

The financial picture for major companies last year was much improved. Huge inventories—an expensive burden—are now half the level of several years ago. Debt has also been reduced substantially and profits are higher for a number of companies.

Even though independent and minor companies are now making a larger contribution to film production, the majors still represent the economic mainstay of the industry. The majors currently distribute most films.

Unusual success of several films last year—"The Godfather" has become the highest grosser to date—should provide a boon in obtaining financial backing and stimulating further production. Financing can be vital to producers and distributors since feature films often do not realize a profit until years after release.

Film Trends

Realism continues to characterize today's movies but films focusing on relevant social issues are not necessarily box office successes. Entertainment films designed for the mass market may be a stronger influence on box office receipts in the next few years.

The frequent request for more family-type pictures is being heeded. The Motion Picture Association of America, in its newly revised coding system, rated a higher proportion of films "G" and "PG" last year. While it is likely that there will always be some market for "X" rated films, the trend away from these films may continue to grow, particularly since fewer have been high grossers recently. Some exhibitors now maintain a policy of no "X" rated films, and the more explicit pictures have been both an audio and visual problem for drive-in theaters because of their semipublic construction. Increasingly, "X" and "R" films are being shown only in specific theaters, mostly in downtown areas.

Last year witnessed a large increase in the number of films geared to black audiences. While some segments of the black community have expressed concern over the characterizations portrayed in some of these films, many have been smash box-office hits, prompting stepped-up production. A recent survey indicated that around 50 more black-oriented films are being developed. Of these, probably about half should be released during 1973–74. Blacks include some of the most frequent and avid filmgoers, and constitute about 25 percent of the national movie-going public, according to trade sources.

Lower Budget and On Location Filming

The trend toward lower budget films continued throughout 1972. Major, minor, and independent companies now regularly produce films budgeted at half the cost of several years ago.

Technological improvements and the necessity for reducing high overhead costs of studios have spearheaded the trend toward shooting on location. Over 90 percent of features are now filmed on location, according to estimates.

U.S. Overseas Filming Stable

Production of U.S. films in foreign countries has remained fairly stable during the past two years, while filming in the U.S. has surged, resulting in a decline in the ratio of overseas to domestic production.

The film industry today is an international market with the United States in the number one position. In 1971, U.S. films generated $305 million in remittances from overseas. U.S. films are very popular in almost every foreign country, ranking second only in those countries that have strong domestic film industries. U.S. motion pictures account for about half the film trade in the world, a share which has remained stable in the past few years. Protectionist measures of many countries, such as remittance restrictions, film rental price controls. local printing and dubbing requirements, taxes, screen and television quotas, and government-controlled buying monopolies curb the trade potential of U.S. films.

Outlook Good

With the increased popularity of mini and multi-auditorium cinemas, boxoffice receipts will probably continue rising throughout the seventies. Increasing numbers of young adults who traditionally constitute the bulk of audiences should bolster theater attendance. Also, the trend toward more leisure time and early retirements should favorably affect boxoffice receipts in the years ahead. Receipts may reach $2.2 billion by 1980, reflecting an average growth rate of 6.4 percent annually.—*Dorothy L. Noble, Office of Business Research and Analysis.*

CHAPTER 45

Personal Services

Receipts from personal services are expected to reach over $15.6 billion in 1973, a 6-percent gain from 1972, with growth varying among the laundry and drycleaning services, photographic studios, beauty and barber shops, shoe repair shops, funeral homes and crematories, and miscellaneous personal services. For 1972, receipts averaged about 5 percent over 1971.

Employment in this sector in 1972 averaged about 1 million, 60 percent of whom are women. About half of personal service workers are employed in laundry and drycleaning.

Prompted by increased labor costs and labor shortages, and in an effort to hold down inflation, many personal services industry managers have instituted methods for increasing services with fewer employees.

Increases in prices for personal services slowed.

LAUNDRY AND DRYCLEANING

Receipts for laundry, drycleaning, and garment services performed by power laundries, diaper services, linen suppliers, coin-operated laundries and drycleaners, drycleaning plants, rug cleaning, industrial launderers, and garment repair and storage establishments are expected to total $6.8 billion in 1973, a gain of 6 percent over 1972 receipts of $6.4 billion which, in turn, averaged 4 percent over 1971.

Diversification continued to be the keynote throughout 1972. Today there is no longer a clear distinction between the type of work handled by laundry and drycleaning establishments. In this rapidly changing industry—both in markets and technology—it has become increasingly necessary

Personal Services: Trends and Projections 1967–80

[Receipts in millions of dollars]

SIC code	Industry	1967	1971 [1]	1972 [1]	1973 [1]	Percent increase 1972–73	1980 [1]	Percent increase 1972–80 [2]
72	Total personal services	11, 750	14, 075	14, 800	15, 675	6	24, 500	6. 5
721, 727	Laundry, drycleaning, and garment services	5, 432	6, 175	6, 425	6, 810	6	11, 000	6. 8
722	Photographic services	745	1, 300	1, 375	1, 480	8	2, 800	9. 3
723	Beauty shops	2, 354	3, 150	3, 300	3, 485	6	5, 500	6. 6
724	Barber shops	1, 020	1, 000	1, 100	1, 150	4	1, 500	3. 9
725	Shoe repair shops	208	248	257	265	3	330	3. 2
726	Funeral homes and crematories	1, 517	1, 600	1, 665	1, 725	4	2, 250	3. 9
729	Miscellaneous personal services	474	600	678	760	12	1, 120	6. 5

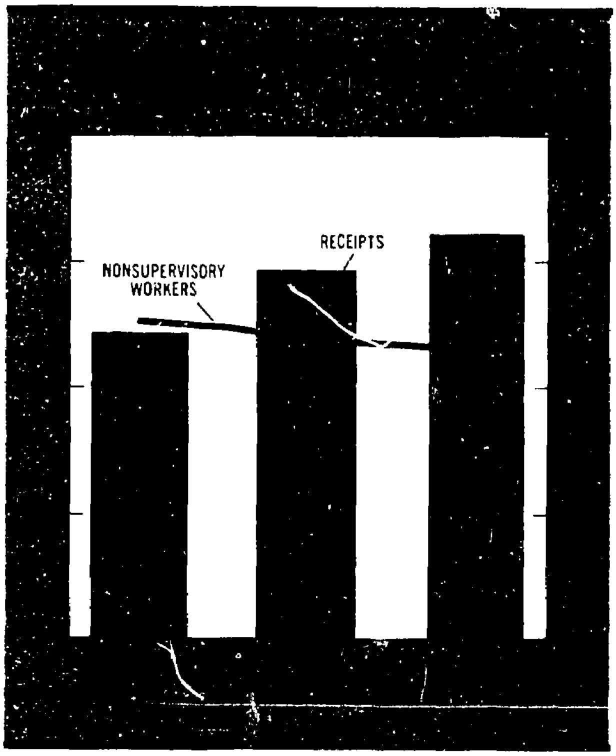
[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

for firms to tailor services to customers' changing needs.

Rapid advances in fabrics have created challenges for the fabricare segment of this industry. Many plants have responded by offering a variety of services designed to capitalize on the advantages of these fibers. Family laundries are increasingly entering other markets. Disposables, initially a threat to industrial launderers, linen suppliers, and diaper services, are now being supplied by rental laundries. In most areas, disposable diapers are not priced competitively with diaper services. Supplying of career apparel or uniforms offers opportunity for increased receipts for many portions of the industry.

Although hospital and hotel-motel on-premise laundry facilities reduced linen suppliers' flatwork market, some of this is being recaptured because of the greater sanitation and more finished appearance provided by the professional laundries. Also, expansion in career apparel, wet and dry rental mops, wiping cloths and other rental services are providing opportunities. Expected increases in hospitals and nursing homes should help future growth.



Career Apparel Expanding

Some trade sources estimate that by 1980 the career apparel market will include 10–12 million persons employed in transportation, banking, food service, lodging, retailing, and utilities. Use of career apparel has already greatly expanded in financial institutions and in transportation-oriented industries. So far, career apparel has been accepted more readily by male employees.

New career apparel no longer has the "uniform" look. Mix and match combinations for both men and women are in demand. Most career apparel packages coordinate many pieces—skirt, slacks, tunic, blouse, hot pants, and sweater or blazer, pants, shirts—often with the company's logo inscribed. The wearer is then free to mix the items and the company's image is still retained.

Consumer Price Indexes for Personal Services 1968–72

[1967=100]

Item	1968	1969	1970	1971	1972 [1]
Drycleaning, suits and dresses	103.6	108.4	112.9	117.1	117.6
Automatic laundry	103.3	106.8	110.7	112.8	114.9
Laundry, men's shirts	103.9	108.8	115.0	119.3	121.6
Tailoring, hem adjustment	105.5	112.8	119.9	127.7	132.9
Shoe repair, women's heel lift	101.4	102.7	107.5	113.0	115.6
Laundry, flatwork	106.5	115.5	124.3	133.6	139.0
Men's haircuts	106.3	112.9	119.0	122.2	125.3
Beauty shop services	104.7	109.5	113.9	118.4	121.2
Women's haircuts	106.2	110.5	115.0	119.4	121.2
Women's shampoos and sets	105.5	111.5	116.5	121.6	125.1
Permanent waves	101.6	104.1	107.2	110.4	112.6
Funeral services	104.3	108.6	112.9	116.8	121.3
All items	104.2	109.8	116.3	121.5	125.5
All services less rent	105.7	113.8	123.7	130.6	136.2

Source: Bureau of Labor Statistics.
[1] As of July 1972

Successful testing of career apparel and uniform rental ventures without inventory will enable some smaller firms to enter the market.

Boosted by both increased use of rental uniforms and greater economic activity, growth of industrial launderers is expected to accelerate. Industrial laundry work—primarily uniform rental, wiping cloth and dust control rental—is the most rapidly growing area of the industry. This segment of the industry, dominated by large businesses, has distribution networks and established markets that enable it to profit from career apparel.

Productivity Improvements

New technology is both improving working environments and increasing productivity in laundry and drycleaning plants.

New washers and washer-extractors are designed with material-handling devices and automatic controls that save labor. Several processing steps have been integrated into one automatic sequence that is particularly useful for flatwork finishing. Tilt loading and unloading facilitate the use of larger capacity washers, while the new speedier and more powerful washers have stepped up output.

Wider use of steam tunnels has contributed to drycleaning productivity. Also, garment cleaning takes less time because the new polyesters weigh less and require a shorter machine cycle.

These advances are expected to alter future employment needs. Although the Bureau of Labor statistics predicts total employment will reach 730,000 workers in 1980, the proportion of operatives and laborers is expected to decline.

Because home washing of easy-care fabrics has increased, some drycleaning establishments have responded to diminishing volume by diversifying. They are offering clean-and-steam—especially applicable to washable garments, coin-op drycleaning and laundry units, and bulk cleaning. The latter in particular increases profits and attracts new customers with "by-the-pound" rates for washable garments. Pound cleaning requires the least risk and investment and appeals to all income levels.

Knits and easy-care fabrics will continue to have a strong impact upon the industry, especially in men's shirts. Enterprising businesses are promoting drycleaning as contributing to their longer life and "economy" services—priced between coin-op and professional service—are luring some easy-care garments away from home washing machines. Since knits and easy-care fabrics require very little finishing, they lend themselves very well to the lower priced services.

Despite some problems that have arisen in the past few years, the outlook is good for the drycleaner who adapts to customers' changing needs.

Increased use of carpeting has provided opportunities for expansion for rug cleaning specialists. On-location cleaning in particular is growing along with diversification into drapery and upholstery cleaning.

View of Coin-Ops

Although coin-operated drycleaning is increasing, coin-op laundry represents about two-thirds of total coin-op receipts. The industry is still growing rapidly and young adult families should continue to provide expanded markets. To meet the needs of this convenience-oriented group who will be receiving a higher proportion of the Nation's family income by 1980, many coin-op drycleaning establishments offer services ranging from do-it-yourself, coin-operated pressing with a dry pressing unit, to steam cabinet finishing. Dropoff cleaning in coin-ops is increasing, probably because of finishing and spotting services now offered by many such coin-ops.

Coin-op laundering has remained at about the same price—2½ cents a pound—throughout the past 10 years, primarily because of larger and more efficient equipment.

Coin-op establishments have a low failure rate. Many establishments augment their receipts by installing vending machines for drinks and snacks while others offer free coffee and magazines.

Pollution Problems

Laundries are facing tougher antipollution standards. However, most commercial laundries use solutions that contain no phosphates, although there is divided opinion in the industry as to whether the banning of phosphate detergents would have a deleterious effect on laundry sanitation. The industry is working on waste water treatment programs. More laundries are recycling water, a process that reduces both the amount of pollutants and operating costs.

Disposing of disposables continues to be a problem, causing many hospitals to return to the use of linens—a trend that should be a boon to commercial laundries.

Markets to Grow

Increasing numbers of working women and desire for more leisure time will create a greater market for total garment care. Competitively priced, complete fabric care will be the keynote throughout the remainder of the 1970's. Expected increases in births should help diaper services and the rise in young families may accelerate the demand for convenience and quick service. Expanding institutional and business needs should provide a larger market for commercial laundries. In addition, more widespread use of career apparel will further boost volume for the industry. Receipts may total $11 billion in 1980, representing increases from 1972 averaging 7 percent annually.

PHOTOGRAPHIC STUDIOS

Receipts of photographic services are expected to be approximately $1.5 billion in 1973, up 8 percent over $1.4 billion in 1972. Receipts from 1971 to 1972 increased about 6 percent. Portraiture accounts for over half of total receipts. About half of all photographic studios are exclusively portrait, about a fourth are commercial studios only, and the remainder are both combined. Commercial photography is also performed by many advertising agencies. One of the fastest growing areas is photographic services in retail stores.

Employment Now Stable

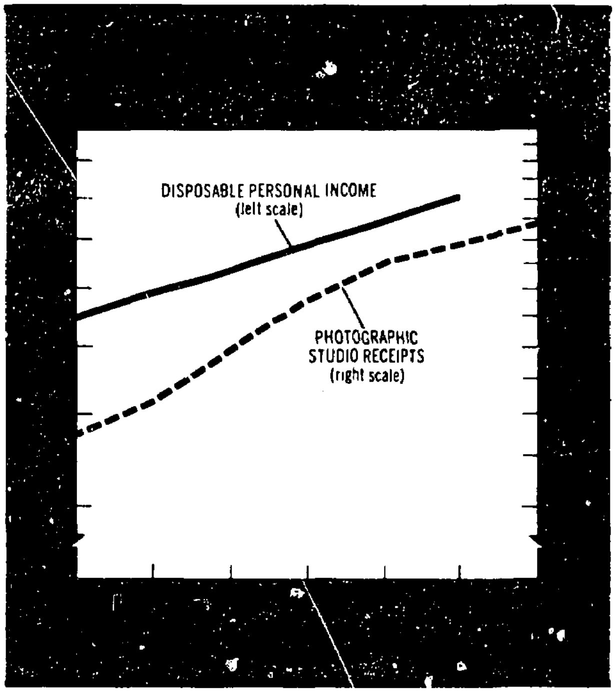
Studios account for about half of the approximately 100,000 professional photographers, either as employees or self-employed proprietors. The remainder are employed in industry, government, and journalism. Although employment of photographers in industry is reported to have declined in the last 2 years, employment in studios remained fairly steady.

Professional photographers are trained in vocational schools, colleges, and in the military and many are now entering portraiture with college degrees in art.

Firms Vary in Size

Since investment is not necessarily large, there are opportunities in this industry for all sizes of studios. According to the latest Census of Business, studios with annual receipts from $100,000 to $500,000 predominate.

One seventh of total receipts are accounted for by a few studios with receipts of over $1 million



per year each. At the other end of the scale, about 50 percent of establishments have receipts of less than $10,000 per year, indicating some part-time operations. According to trade sources, lower income studios are either moving into the higher brackets or going out of business.

Commercial Photography Prospects

Advertising continues to provide an expanding market for many types of illustrations and catalog work is increasing. Architectural photography and aerial photography have also experienced substantial gains.

Microfilming is expected to continue its strong upward trend. The information explosion shows no signs of diminishing and need for the advantages afforded by microfilming will increase.

Perhaps the most significant change in professional photography over the past few years is the phenomenal increase in use of color film. According to the Professional Photographers of America, over 60 percent of portraits were black and white as recently as 1965. Today almost all are in color.

Picture of Portrait Studios' Markets

Many portrait studios concentrate on certain markets, such as specializing in weddings, schoolchildren, and customized portraits.

Graduating seniors represent about 30–40 percent of business for many studios. According to an industry survey, almost all high school seniors were photographed in 1971 as well as about 70 percent of the other high school students, representing a total market of approximately 8.5 million. The speculative school package photography offered to elementary schoolchildren by a small number of companies is also profitable—about 80–90 percent of the 36 million children are photographed. Moreover, 80–90 percent of the packages are purchased at an average price of $4. However, use of college yearbooks is declining.

Traditional portrait studios have been losing a large proportion of the baby portraiture market to department stores and other retailers. Studios, particularly the smaller esablishments, are finding it difficult to meet retailers' competition of more extensive advertising and lower prices. The family portrait market, however, has been less affected and studios may benefit from a trend toward photographing family groups in the home.

Despite growing numbers of amateurs doing candids for weddings, more marriages per year should provide a larger market for the innovative professional. As with portraiture, wedding pictures are becoming less stylized and demand is increasing for wedding motion pictures—often supplemental to the wedding album package. Photographic studios also are being called upon increasingly for movies of other family events.

Promotion of the use of portraits as gifts is expected to provide further impetus to the industry in the future.

There is a distinct trend toward a natural look in all types of portraiture. Outdoor portraiture—currently very popular—provides a casual, informal feeling. While "classic" portraiture is declining, the contemporary type of portraiture is likely to become more prevalent in the future, particularly since a large segment of today's portrait market is the under-30 population. This age group prefers less formal, less rigid compositions that more closely reflect their lifestyle.

Receipts for photographic services should continue to increase from 1972 at an annual rate of 9.3 percent, reaching $2.8 billion in 1980.

BEAUTY AND BARBER SHOPS

Beauty Shop Receipts Rising

The professional beauty industry is expected to benefit from the continued economic upswing in 1973, showing stronger growth than that of 1972. Beauty shop receipts are expected to reach almost $3.5 billion in 1973, an increase of 6 percent over 1972. Receipts in 1972 totaled an estimated $3.3 billion, up about 4 percent over the year before. While historically the beauty industry is not adversely affected by economic conditions, some shops showed declines in the 1970–71 slowdown, with medium priced shops suffering the greatest loss of business. Featuring lower prices during the normally slack days at the beginning of the week resulted in increased bookings for many shops in 1972.

The beauty shop business is predominantly a small business industry and most shops are owner-operated. Less than 25 percent of establishments have more than 10 employees.

Beauty Shop Receipts

By receipts size	(Percent)	By employment size	(Percent)
Total establishments	100.0	Total establishments	100.0
Annual receipts of:		With no paid employees	19.5
$1,000,000 or more	0.4	1 paid employee	10.4
$750,000 to $999,000	0.3	2 paid employees	9.5
$500,000 to $749,000	0.5	3 paid employees	9.0
$300,000 to $499,000	1.6	4 or 5 paid employees	12.7
$100,000 to $299,000	13.3	6 or 7 paid employees	9.1
$50,000 to $99,000	20.1	8 or 9 paid employees	6.6
$30,000 to $49,000	16.8	10 to 14 paid employees	10.0
$20,000 to $29,000	12.2	15 to 19 paid employees	4.9
$10,000 to $19,000	17.2	20 to 49 paid employees	6.8
$5,000 to $9,000	9.7	50 to 99 paid employees	1.1
Less than $5,000	7.9	100 or more paid employees	0.4

Source: 1967 Census of Business.

Hair Styles Require More Permanents

Permanent wave volume continued to increase in 1972 and should rise throughout 1973. Trade sources also expect an upswing in haircoloring, with permanent coloring favored over semipermanent color and rinses. Although the most frequently performed service remains shampoos and sets, permanent waving and coloring account for high dollar volume.

The industry is promoting the full service concept, striving to increase patronage with a variety of services. Many salons have found profitability in individual eyelash application. There is also a comeback of singeing to remove split ends and paper curling to achieve a full, very curly look. Most salons have not yet offered more services, although licensed cosmetologists have most of the training required to perform many beauty services. More shops in the future will probably offer extensive beauty treatments, including makeups and facial treatments.

Shop Retailing Expanding

Retailing in shops continues to spread but still on a fairly small scale. Cosmetic retailing in beauty salons is probably only 10 percent of total cosmetic sales, indicating opportunities for expansion. Salons typically retail hair ornaments, hair and nail care products, cosmetics, hairgoods, and boutique items. Some shops have recently added apparel to their boutiques, profiting from the high markups this affords.

Wig Sales Down, Hairpieces Up

Because of declining wig sales, many shops now retail wigs on an order-only basis. Significantly, fewer beauty salons than other outlets were hurt in the past two years by the glut of the market with inexpensive wigs. Meanwhile, many shops continued to enjoy growth in wig servicing.

Some trade sources estimate that wig sales have bottomed out, and that 1973 sales will be stronger. Instead of a great increase in volume, sales will be of higher quality and medium priced goods of restylable, lightweight, capless wigs, with natural looking synthetic fibers. The new synthetics withstand humidity and are easier to care for than human hair. Improvements in wigs made specifically for black women should stimulate these sales considerably.

Beauty salons currently account for a fourth of wig sales, and should maintain a stable portion of future sales because of several factors. Wigs are often a repeat item and service is frequently a factor in sales.

Sales of many types of synthetic hairpieces appear to be increasing. These creative fashion pieces—braids, chignons, ringlets and falls in natural and fashion colors—are mostly high style items. Retailing of these hairgoods by beauty shops should increase, since professionals are capable of creating high fashion styles with these versatile pieces.

Productivity Up

Several recent innovations have increased operator productivity. Hot roller setting requires comparatively little time. In addition, new hair colorings have a faster action, thus increasing customer turnover. Shampoo machines that practically eliminate the need for operator assistance have just been introduced. Do-it-yourself manicuring has also been successful for many shops. Patrons' acceptance has been generally good and these innovations have been a boon to salons that advertise fast beauty service.

Many shops have restructured business hours to accommodate the working woman. "Quick service" salons have sprung up, capturing additional customers. A favorite technique—blow waving—makes styling faster and is suited to the popular natural look. The "Mod Salon," a supplement to the regular salon, is tailored to the needs of the younger generation and offers all basic services on a first-come, first-served basis without appointments.

Unisex Hair

The unisex trend has recently been given a boost by the repeal of some State laws that prohibited cosmetologists from servicing male patrons. About three-fourths of the States now permit beauty salons to style men's hair. Unisex shops usually cater to the very young, mostly featuring unisex cuts. However, it is unlikely that many shops will adopt the unisex concept as the industry is sharply divided regarding it.

Beauty Shops Cater to Working Women

Future growth of beauty salons mainly lies in offering the patron complete beauty services. With an expanding market, more working women, and a changing population mix consisting of more women over 35 years of age, estimates are for beauty shop receipts to reach $5.5 billion in 1980. Growth averaging 6.6 percent a year from 1972 is expected.

Long Hair Trend Affects Barber Industry

In 1973, barber shop receipts are expected to accelerate the gradual upward trend of 1972, growing about 4 percent to a level of $1.15 billion. Most of the industry's growth will come from the men's styling shops and from those that offer a complete range of services. Between 1971 and 1972, receipts increased about 3 percent to an estimated $1.1 billion.

The professional barber industry is still in a transitional stage, which initially suffered from the long-hair trend. Some trade sources estimate that between 1967–71, many barbers went out of business. Most barbers are self-employed and have no paid employees.

Growth of Men's Hairstyling

Many shops that capitalized on the trend and featured styling for longer hair have had solid bookings. The typical styling shop has a different look from the traditional shop—innovative decors prevail with many cubicles designed to insure privacy. The full service salon—one offering haircutting and styling, haircoloring, hair and scalp cleansing and treatments, hair straightening, manicuring, skin care, selling and servicing hairgoods, and retailing of toiletries—is increasingly reaping the largest share of profits. Haircutting alone is not providing adequate income for today's barbers.

Changing Styles for Men

Reflecting today's modern pace, men's hairstyles are changing as rapidly as men's fashions.

New techniques and equipment have been introduced that facilitate these styles, and record numbers of barbers are receiving advanced training in men's hair design. Also, more women are entering the barbering profession—once almost exclusively dominated by men—and specializing in styling.

The longer hair trend is continuing to contribute to barber shop retailing of men's hair grooming aids. Most shops do at least some retailing of toiletries but the barber-stylist merchandises a higher proportion.

Hairpiece Sales

So far, men's wig sales have been less than spectacular and the bulk of the men's hairgoods business has been in the hands of men's stylists. Their professional skill has boosted hairpiece sales. There have been great improvements in both appearance and wearability of men's hairpieces. New see-through bases and skin parts give a more natural looking hairline. Most are made of human hair but synthetic blends and synthetics are being tested. Since selling, servicing, and repairing of hairgoods is profitable, this is expected to provide an increasing source of receipts in the future.

Better Days Ahead

Barber shops have historically been plagued by lagging productivity. However, the picture for both productivity and profitability is brightening, aided by the increased trend toward appointments, more retailing in shops, and by emphasis on the more profitable services.

With the trend toward a groomed youthful appearance, trained barber-stylists should enjoy a growing market. Also, men increasingly recognize that styled hair is not necessarily excessively long hair but hair styled for their individual features and personality. By 1980, shops that offer the fullest range of services to the discerning male should become more prevalent, and barber shop receipts should reach $1.5 billion in 1980, the growth rate averaging 3.9 percent annually.

SHOE REPAIR SHOPS

Receipts of shoe repair shops should reach $265 million in 1973, an increase of 3 percent over 1972. This is about the same growth rate as 1972 compared with 1971. Personal consumption expenditures for shoe repair have grown steadily, at a rate averaging 3 percent per year for the past several years.

Although replacing soles and heels has traditionally been the "bread and butter" of the shoe repair business, shoe craftsmen clean and dye shoes; repair and alter all types of leather garments, belts, handbags, luggage and sporting goods; and create high-quality custom leather work. Many shops also offer valet and shoeshine services.

Expanding Additional Services

Lessened shoe repair needs created by the proliferation of inexpensive shoes as well as by longer wearing materials used both in manufacturing and repairing have prompted shoe repair shops to expand their auxiliary services.

Fashion has created a need for some services that shoe shops can best perform. Leather and vinyl garments have provided a growing demand for both alteration and repair. Boots, now an established part of the fashion scene, offer a continuing source of receipts since many wearers find that some alterations are necessary to assure maximum fit and comfort. Also, the cost of quality leather boots encourages repair. The current popularity of suede and two-toned shoes should help dyeing volume this year.

Expected growth in sporting goods and recreational equipment should increase repair needs for these items.

Many skilled craftsmen augment their receipts by making orthopedic shoes. The Shoe Service Institute of America maintains a certification program for shop owners who qualify.

Retailing Expanding

Shops are increasingly turning to retailing as a way to increase receipts without a corresponding increase in costs. According to a recent survey, some owners of especially large shops reported that repairs accounted for less than half of their total receipts. Merchandising includes shoe cleaners and polishes, shoelaces, shoe trees, footcare needs, and occasionally shoes and custom-made sandals.

Employment and Productivity

About half of the country's [illegible]0,000 shoe repairmen are self-employed. Since it is possible to operate on a very small scale, some are moonlighters and retired persons supplementing their incomes. While training can be obtained in vocational schools and on the job, the shortage of trained repairmen that has existed for some time will continue, since enrollment in vocational programs has been declining. This labor shortage, coupled with higher wages, has forced many shopowners to work long hours. In a recent industry study, even some fairly large shops reported no employees.

Several years are usually required for shoe craftsmen to be productive. Profitable shoe servicing requires considerable skill, and while there have been some labor-saving techniques introduced, productivity for this type of service is limited. However, the trend toward larger establishments can boost productivity somewhat as more specialization is possible.

With the number of shops declining, healthier receipts have resulted for the remaining shops.

Shop Evolution

Although most repair establishments still operate a dropoff type business, more are swelling volume with pickup service, usually with another establishment—often a drycleaner or barber. Such an arrangement is advantageous for both, increasing customer service and creating additional business. Others have arrangements with shopping center retailers. The trend toward while-you-wait service also continues to spread, particularly in downtown business districts.

Advertising and credit are increasing and will probably play an even greater role in the future. Credit is particularly important to the shops that retail.

Growth in supplemental services and limited but steady demand for shoe servicing should increase receipts of shoe repair shops to $330 million in 1980, representing an average gain of 3.2 percent per year from 1972. Shops which stress the total service concept will likely be the most successful.

FUNERAL HOMES AND CREMATORIES

Receipts of funeral homes and crematories are expected to increase to $1.7 billion in 1973, a gain of nearly 4 percent over 1972; slightly higher than the 3 percent gain of 1972 compared with 1971.

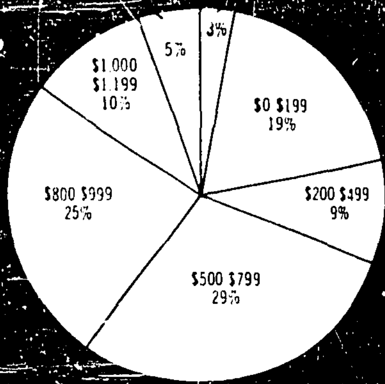
Cremation is increasing steadily, particularly on the west coast, but this means of final disposition is used in less than 5 percent of total deaths. A smaller number of bodies is cremated in the East, and very few cremations occur in the Midwest. Cremation is expected to increase, as views regarding it become more accepted.

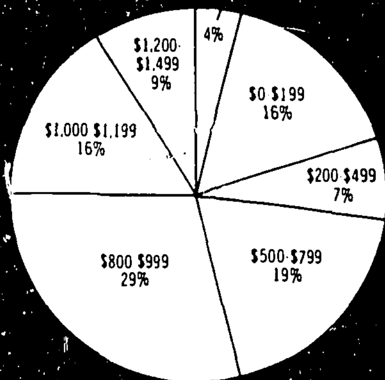
Total Expenditures for Death

Personal consumption expenditures for death—which include cemetery costs, monuments, and flowers in addition to funeral home receipts—have increased an average of about 3 percent per year for the past 5 years. Higher costs rather than increases in the death rate have been responsible.

Prices of Funerals Vary

In 1971, the average adult funeral service cost about $983, according to the National Funeral Directors Association. This included preparation and transportation of the body, the casket, use of funeral home staff and facilities, preparation of required legal forms, and the funeral service. Type and quality of the casket are primary determinants





in funeral price. Of all funerals selected last year, about half were priced in the $500–$1,000 price range. Another 16 percent of funeral services cost less than $200.

Employment Steady

About 62,000 persons are employed in funeral homes. Employment has grown very slowly—about 1–2 percent per year for the past few years. Although funeral service licensees have traditionally been men, more women are entering the field.

Funeral home ownership is divided almost evenly between individual proprietorships or partnerships and private or public corporations. About 75 percent of all establishments have a payroll, and for these, salaries are their largest expense item. Last year, salaries accounted for almost a third of the average funeral home's expenses.

The trend toward mergers and acquisitions in funeral homes was reduced somewhat during 1971–72. The future of acquisitions on a national scale is difficult to predict although the combining or merging of some firms serving the same areas will likely continue as small communities lose their identity.

Slight Trend Toward Advertising

Although funeral homes have traditionally advertised on a limited scale, the trend today is toward more advertising. Most associations that represent funeral directing are encouraging institutional ads.

Declining Ambulance Service

Today, less than 25 percent of all funeral homes provide an ambulance service. The percentage has shrunk over the past decade because of increased costs and shifts in the purposes of an ambulance. When provided by funeral directors, ambulances are a community service, mostly in small towns and rural areas.

Receipts To Go Up

The number of deaths is expected to increase at about 1.4 percent a year throughout the decade and will number between 2.2 and 2.3 million in 1980. Funeral and crematory receipts should continue to grow steadily, and may reach $2.25 billion in 1980, reflecting annual gains from 1972 averaging 3.9 percent.

MISCELLANEOUS PERSONAL SERVICES

Receipts for miscellaneous personal services, including such activities as babysitting, dressmaking, rug and furniture cleaning, massage parlors, and slenderizing salons, are expected to reach $760 million in 1973, and may top $1.1 billion in 1980, increasing at an annual rate averaging 6.5 percent.

(Dorthy L. Noble, Office of Business Research and Analysis.)

CHAPTER 46

Health and Medical Services

Continued population growth, expanding public and private health insurance programs, and the steadily rising level and broadening scope of medical services resulting from new techniques have all contributed to the growing consumer demand for more and improved health care. Although spending on health and medical services continued at high levels in 1972, the rate of price increases slowed significantly.

While expenditures for health and medical services reached an estimated $88 billion in 1972—10 percent over year-earlier levels—costs of medical care services rose only 4 percent. Thus, higher spending reflected more increased services than price rises. In 1973, expenditures are expected to rise 10 percent further and top $97 billion.

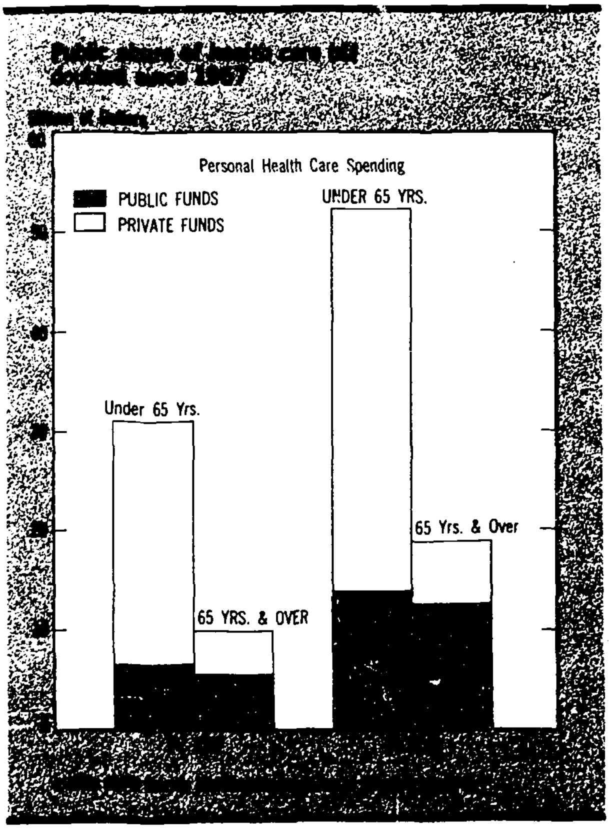
More Beds Are Vacant

Spending on hospital care reached an estimated $34 billion in 1972, more than 10 percent over a year earlier, and accounted for 42 percent of all health services and supplies expenditures. Data on community hospital utilization for the first half of 1972 indicated a continuation of lower occupancy rates and shorter stays. There was a significantly increased use of hospital emergency rooms in lieu of family physicians.

Lower hospital occupancy has resulted in financial problems in some hospitals since maintenance costs do not decline appreciably with vacant beds. Among the factors contributing to declining bed occupancy are medical advances, which have tended to shorten stays, more stringent regulations for reviewing Medicare and Medicaid claims, and less use of maternity facilities as birth rates decline.

Inflation Rate Slows

Mounting concern over the rising prices of medical care services led to the formation late in 1971 of the Committee on the Health Services Industry, as a part of the Economic Stabilization Program,



Medical and Health Services: Projections 1972–80[1]

[In billions of dollars]

Type of expenditure	1972	Percent increase 1971–72	1973	Percent increase 1972–73	1980	Percent increase 1972–80
Total	$88.0	10	$97.1	10	$168.5	8.5
Health services and supplies	81.5	10	89.7	10	158.9	8.7
Hospital care	34.4	11	38.0	11	74.3	10.1
Physicians' services	17.0	8	18.4	8	31.9	8.2
Dentists' services	5.4	9	5.8	8	9.9	7.9
Other professional services	1.7	7	1.8	7	2.6	5.5
Drugs and drug sundries	8.1	5	8.5	5	14.0	7.1
Eyeglasses and appliances	2.1	6	2.2	5	3.2	5.4
Nursing home care	3.7	6	3.9	6	7.3	8.9
Expenses for prepayment and administration	3.1	20	3.6	13	4.5	4.8
Government health activities	2.3	24	2.7	15	6.0	12.8
Other health services	3.8	27	4.6	22	5.2	3.9
Research and medical facilities construction	6.5	12	7.3	12	9.6	5.0
Research	2.1	10	2.3	10	3.1	5.0
Construction	4.3	14	4.9	13	6.3	4.8

[1] Estimated by Bureau of Domestic Commerce.

[2] Compound annual rate of growth.

charged with enlisting the cooperation of the health industry in restraining cost and price increases. The committee has representatives of the medical profession, consumers, hospitals, related health occupations and industries, and the health insurance industry. The committee issued regulations limiting increases in physicians' fees to 2.5 percent and limiting institutional providers of services to 6 percent increases, unless a special exception was granted by the Internal Revenue Service. During the first 9 months of 1972, medical care prices increased only 3.6 percent over the corresponding months of 1971. Prices during the first 9 months of 1971 were 7.8 percent above those of the like period of 1970.

Increases in hospital service charges slowed during 1972. Data for the first 9 months of 1972 indicate an increase of 6.5 percent over the corresponding months of 1971. By comparison, there was a rise of 12.5 percent during the first 9 months of 1971, over the corresponding period of 1970.

Medical Bills Outpace Insurance Benefits

Third-party payments—mostly government, private, and industry health insurance plans—covered almost two-thirds of personal care outlays in 1972, compared with less than half in 1966. Third parties in 1972 paid about three-fifths of the medical costs for people under age 65 and about three-fourths for those aged 65 and over. However, the growth in third-party payments has not kept pace with increased use of services and rising expenditures. The average out-of-pocket payment by the aged declined only fractionally from 1966 to 1972, while out-of-pocket medical expenses for those under 65 increased more than 30 percent.

With increased public funds available for medical care since the enactment of Medicare legislation in 1966, outlays for the elderly—about 10 percent of the population—account for more than 50 percent of all public expenditures for health and medical services.

Medical care bills for different types of services vary widely by age group. Average physician and hospital care expenditures for the aged are more than twice as great as for persons between 19 and 65 years of age. Nursing-home care accounts for almost 20 percent of medical spending for the aged. For people under 19 years of age, largest outlays are for physician services.

Health Care Innovations

The high cost of hospitalization, and the emphasis of most health insurance coverage on hospital treatment rather than outpatient treatment or services in physicians' offices or patients' homes, have led to the expansion of reimbursable treatment and preventive care under health insurance plans.

In an effort to reduce expensive in-hospital care a North Carolina hospital, in cooperation with Blue Cross-Blue Shield, began using a surgical unit for uncomplicated outpatient surgery on ambulatory patients. A year's operation realized a saving of 25 percent in hospital costs and 2 days of care per patient for operations performed on an outpatient basis. Other health insurers in the state have also begun offering benefits for care in the unit.

Health Maintenance Organizations (HMO's) are another possible solution to some of the problems of health care delivery. Although operations of HMO's vary, most of them provide comprehensive medical services for a fixed prepaid annual fee. Cutting costs through shared facilities, equipment, medical personnel and business staff, HMO's also encourage early diagnosis and treatment, reducing the incidence of serious illness resulting in costly hospital care as well as loss of income to the patient. The Department of Health, Education and Welfare has provided technical assistance and funding to help establish approximately 100 HMO's as pilot projects. Data from the Social Security Administration on medicare HMO enrollees' experience show that some HMO's are saving their members as much as 15 percent on Medicare costs compared with traditional modes of practice.

Day Care for the Elderly

A relatively new concept—day care for the elderly—offers an alternative to institutional living arrangements. It has been estimated that about half of persons 65 or older who are in nursing homes or custodial facilities are there because families were unable to attend to their needs on a 24-hour basis. Initial interest in day care for the elderly began among voluntary groups and in State health departments. In June, 1972, HEW made funds available to several facilities offering day care for the elderly. In the Washington metropolitan area, one center currently operating has a director and an assistant, both of whom are registered nurses. Using the services of volunteer workers, the center charges $7 per day per client. Card games, checkers, handicrafts, outdoor walks, and conversation keep clients active and alert. The operation of such projects will be studied to determine whether funding of additional facilities is warranted.

Medical Services Industry: Trends and Projections 1968–73

[In billions of dollars, except as noted]

Type of Expenditure	1967	1969	1970	1971	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73
Total	$50.7	$64.1	$71.6	$79.8	$88.0	10	$97.1	10
Health services and supplies	47.0	59.4	66.4	74.0	81.5	10	89.7	10
Hospital care	18.1	24.1	27.6	31.1	34.4	11	38.0	11
Physicians' services	10.3	12.9	14.3	15.7	17.0	8	18.4	8
Dentists' services	3.3	4.0	4.4	4.9	5.4	9	5.8	8
Other professional services	1.2	1.3	1.5	1.6	1.7	7	1.8	7
Drugs and drug sundries [2]	5.7	6.8	7.3	7.7	8.1	5	8.5	5
Eyeglasses and appliances	1.6	1.8	1.9	2.0	2.1	6	2.2	5
Nursing home care	1.9	2.6	3.1	3.5	3.7	6	3.9	6
Expenses for prepayment and administration	1.9	2.1	2.1	2.6	3.1	20	3.6	13
Government health activities	.9	1.3	1.6	1.9	2.3	24	2.7	15
Other health services	2.1	2.6	2.7	3.0	3.8	27	4.6	22
Research and medical facilities construction	3.7	4.8	5.2	5.8	6.5	12	7.3	12
Research [2]	1.7	1.8	1.8	1.9	2.1	10	2.3	10
Construction	2.0	3.0	3.4	3.8	4.3	14	4.9	13
Medical care services cosumer price index (1967 = 100)		116.0	124.2	133.3	138.1	4		

[1] Estimated by Office of Research and Statistics of the Social Security Administration and Bureau of Domestic Commerce.

[2] Research expenditures of drug companies included in expenditures for drugs and drug sundries and excluded from research expenditures.

Source: Office of Research and Statistics, Social Security Administration; Bureau of Labor Statistics; Bureau of Domestic Commerce.

The Doctor Shortage

Although the number of physicians in the United States is the highest ever, heightened demand for medical services coupled with increasing specialization has resulted in shortages of family physicians—especially in rural areas. Although there are currently 162 physicians per 100,000 persons in the United States, the intensifying trend toward specialization—estimated at 75 percent in 1971—has created a scarcity of physicians in general practice. Even if pediatricians and internists are added to the category of "general practice," there are still 5,000 fewer physicians engaged in general practice than there were 15 years ago. With the concentration of doctors and dentists in cities and large towns, many rural communities have no physician at all. Imbalances also exist among areas within cities.

Implementing the Health Manpower Act of 1971, $375 million in Federal funds were made available in the first 8 months of 1972 to schools for the training of doctors, nurses, dentists, and other health workers. Some of the funds were earmarked to help start new medical and dental schools, to assist existing medical schools in financial distress, and to initiate a program to increase the number of family doctors. A special program involving $1.4 million designed to train minority health workers was also funded.

Another approach being used to combat the shortage of family physicians is the formation of nonprofit health education corporations, a cooperative effort of medical schools and individual communities. Medical facilities and staff physicians are provided by the community and the medical school sends faculty supervisors and students for training. These organizations offer additional community health care resources and, at the same time, provide medical students interested in general practice with that kind of experience.

A new organization, the American Academy of Family Physicians, has certified more than 3,200 physicians (mostly former general practitioners) as specialists in family medicine. It is hoped that the recognition of family practice as a new specialty will attract more students into the field.

Several medical schools have undertaken programs which enable persons holding doctoral degrees in the biological, physical, or engineering sciences to become M.D.'s or dentists with shorter periods of training than are normally required.

Improving Health Care Delivery

Much of the hope for quality health care for all Americans at a reasonable cost lies in reducing hospital costs, increasing preventive care, and improving routine services with automation.

Technological innovation—frequently associated with productivity increases—sometimes has the opposite effect in health care delivery. Improved hospital technology may raise the quality of care, but the complexity of the equipment used in treatment may require the hiring of more specially trained personnel. Yet, some technological advances do increase efficiency. One example is a computerized system which can perform 20 tests on each of 150 five-drop samples of blood within one hour with a minimum of operator involvement.

Increased use of computer technology has eliminated a great number of hospital clerical tasks and is beginning to be used to automate physical examinations. The growing use of disposables, tray assembly lines, and contract laundry and food services will reduce the demand for supportive workers.

One possible key to improving physician productivity is through the utilization of individuals trained to perform duties which do not require the skills of a doctor. Increasingly, veterans with medical experience are being trained as physicians' assistants.

Prognosis for the Decade

The volume of health care spending in the future will depend largely on the extent of preventive medicine practice, the growth and success of comprehensive health care centers, new regulations on publicly financed medical care programs, and even possibly on research breakthroughs which could eliminate such diseases as cancer.

By 1980 health care expenditures are expected to reach almost $169 billion, reflecting an annual increase of 8.5 percent in the next several years.—*Anne Turner, Office of Business Research and Analysis.*

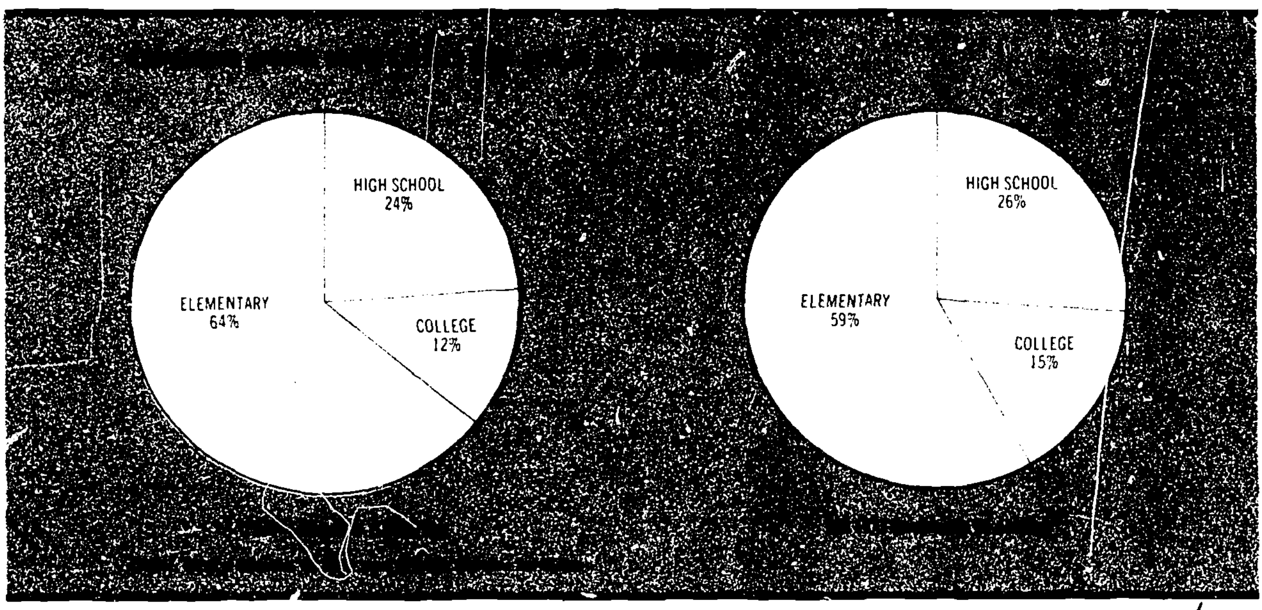
CHAPTER 47

Educational Services

Educational expenditures in 1972 were less than previously anticipated, reflecting declining elementary school enrollments and school austerity programs in many communities as well as the recent decline in 4-year college applications. Educational spending in public and private schools (including colleges) was estimated at almost $90 billion in the 1972-73 school year. 7 percent higher than a year earlier. In 1973-74, educational expenditures are expected to rise 8 percent further to more than $96 billion.

Notwithstanding high levels of educational spending, many of the Nation's schools and colleges are coping with inadequate budgets and curriculum offerings as well as teaching techniques that have proved ineffective for many students. Educators, school boards, legislators, and community groups continue their efforts toward spending every educational dollar more effectively through increased reliance on technology, innovative teaching programs geared to less advantaged youngsters, and increased emphasis on meaningful career education to prepare today's students for tomorrow's jobs. In many areas, the business community is very involved with the local school systems both as equipment suppliers to schools and as future employers of new graduates.

Increasingly, modern technology is being adapted to school needs. Because of unlimited channel capacity of cable television and its 2-way interaction capabilities, potential exists for delivery of a wide variety of programs to meet indi-



vidual school needs—to replay educational television lessons during school hours, to teach foreign languages, to provide sign language programs for deaf students, to offer bilingual teaching programs, and to implement career education programs through taped sequences of on-the-job activities.

In 1974, a Federally funded educational experiment based in Denver, Colo., will be inaugurated when a communications satellite is scheduled to begin broadcasting educational programing tailored to the needs and interests of thousands of young people living in remote areas of the Rocky Mountains. This diverse population includes Indian groups and non-English speaking populations.

Because of the downward trend in birth rates during the mid- and late sixties, elementary school enrollments have been declining since 1969. However, enrollment increases continue at the high school and college levels.

In the fall of 1972, elementary school enrollments totaled 35.6 million, 2 percent fewer than a year earlier. In 1973, elementary school enrollments will decline 2 percent further to 35 million—1.7 million below 1970 levels. In contrast, high school enrollmen rose 2 percent in 1972 to 15.4 million and are expected to rise to 15.7 million in 1973—1.1 million above 1970 levels. Enrollments in degree credit college programs totaled 8.3 million in the fall of 1972 and are expected to rise to 8.7 million in 1973, with most of the growth occurring in 2-year college programs.

The number of students enrolled in nonpublic elementary and secondary schools declined from 6 million in 1967 to 5.1 million in 1972, largely reflecting financial problems of church-related schools which account for a major share of private school enrollments. Catholic schools now enroll about 80 percent of all nonpublic elementary and secondary students compared to more than 90 percent in the early 1960's.

The Education Amendments of 1972 (Public Law 92-318) enacted by the 92d Congress provided for the establishment of a National Institute of Education to expand educational research and ex-

Educational Services: Educational Expenditures, Public and Nonpublic, by Instructional Level,[1] Selected Fiscal Years

[In billions of dollars except as noted]

	1967–68	1969–70	1970–71	1971–72	1972–73 [2]	Percent increase 1971–72	1973–74	Percent increase 1972–73
Total	57.0	70.3	77.9	83.6	89.7	7	96.7	8
Elementary and Secondary	37.1	45.4	49.8	53.7	57.2	7	61.0	7
Public	33.0	40.6	44.4	48.7	52.1	7	55.8	7
Operating Expenditures [3]	27.7	34.5	38.0	41.9	44.9	7	48.3	8
Capital Outlays [4]	4.3	4.9	5.1	5.1	5.5	8	5.8	5
Interest payments	1.0	1.2	1.3	1.7	1.7	0	1.7	0
Nonpublic	4.1	4.8	5.4	5.0	5.1	2	5.2	2
Operating expenditures [3]	3.5	4.1	4.6	4.3	4.3	0	4.4	2
Capital outlays [4]	.5	.6	.6	.5	.6	20	.6	0
Interest payments	.1	.1	.2	.2	.2	0	.2	0
Higher Education	19.9	24.9	28.1	29.9	32.5	9	35.7	10
Public	12.3	16.1	18.5	19.9	21.8	10	24.2	11
Student education	6.2	8.7	10.0	11.4	12.8	12	14.4	13
Organized research	1.4	1.3	1.5	1.6	1.7	6	1.9	12
Other operating expenses	2.4	3.4	3.9	4.1	4.5	10	4.9	9
Capital outlays	2.3	2.7	3.1	2.8	2.8	0	3.0	7
Nonpublic	7.6	8.8	9.6	10.0	10.7	7	11.5	7
Student education	3.4	4.3	4.8	5.2	5.6	8	6.1	9
Organized research	1.3	1.0	1.1	1.0	1.1	10	1.2	9
Other operating expenses	1.8	2.6	2.9	3.1	3.3	6	3.7	12
Capital outlays	1.1	.9	.8	.7	.7	0	.5	−29

[1] Includes public and most nonprofit nonpublic elementary and secondary schools (K–12) plus institutions of higher education offering degree credit courses and small number of technical and professional schools.

[2] Estimates by Office of Education, HEW, and Bureau of Domestic Commerce.

[3] Excludes repayment of loans.

[4] Construction costs, expenditures for land acquisition and plant equipment.

Source: National Center for Educational Statistics, Office of Education, HEW, and Bureau of Domestic Commerce.

Educational Services Expenditures: Projections 1972—80 [1]

[In billions of dollars]

Industry	1972-73	Percent increase over 1971-72	1973-74	Percent increase over 1972-73	1980-81	Percent increase over 1972-80 [2]
Total	89.7	7	96.7	8	141.4	5.8
Elementary and Secondary	57.2	7	61.0	7	85.0	5.1
Public	52.1	7	55.8	7	78.8	5.3
Non-public	5.1	2	5.2	2	6.2	2.5
Higher Education	32.5	9	35.7	10	56.4	7.2
Public	21.8	10	24.2	11	39.3	7.7
Non-public	10.7	7	11.5	7	17.1	6.0

[1] Estimated by Bureau of Domestic Commerce.
[2] Compound annual rate of growth.

Source: National Center for Educational Statistics, Office of Education, HEW.

perimentation efforts. Emergency school aid provisions of the legislation will provide financial assistance—$2 billion in fiscal years 1973 and 1974—to local school districts to aid children of disadvantaged minority groups through such special programs as bilingual teaching, educational television, remedial services, recruitment of teacher aides, minor school remodeling, etc. The law also establishes a National Commission on the Financing of Post-secondary Education to assess the dimensions and extent of the financial crisis confronting higher education and will provide grants to assist postsecondary occupational education programs and grants for undergraduate students to help defray college costs.

School Financing Reform Needed

Since the largest single source of public school revenues continues to be local property taxes, the quality of schools largely depends on the affluence of the local community. Recent court decisions in California, Texas, Minnesota and New Jersey declared local school financing systems discriminatory and unconstitutional. One school expenditure case—*Rodriguez v. San Antonio, Texas School District*—was argued before the U.S. Supreme Court in October 1972. The Court ruling on the constitutionality of basing school financing primarily on local property taxes will significantly affect school financing decisions throughout the Nation.

Many communities are exploring alternative methods of financing public schools. However, in November's elections, voters in four States—Michigan, Colorado, California, and Oregon—rejected school finance reform proposals that would eliminate or limit the use of property taxes as a major source of funds for public schools and other public services.

Teaching Jobs Scarce

A record number—310,000—of college graduates completed preparation to enter public school teaching in 1972 and an estimated 110,000 teacher education graduates were seeking but did not find teaching positions in September. Also, the increasing number of qualified beginning teachers heightened unemployment among experienced teachers who sought teaching jobs in 1972 after having interrupted their careers earlier.

According to the National Education Association's annual survey on national teacher supply and demand, only one state reported a shortage of teacher applicants in fall of 1972. An excess of applicants was reported from 29 states and 20 states reported shortages of applicants in some subject areas and surpluses in others. Low supplies of qualified applicants were most frequently listed for special education, technical industrial courses, remedial reading, and special assignments directed toward educationally disadvantaged children.

Demand for teachers, however, is related to current budget and staffing schedules and does not reflect the actual teacher needs essential to provide quality education for youngsters. According to the NEA research staff, more than 600,000 additional teachers would be required if maximum class size were 24 in elementary schools and a maximum teacher load of 124 daily students were standard in secondary schools.

New Focus on Career Education

In today's complex society, young people completing high school or college without work skills or professional competence are experiencing difficulty in finding meaningful and rewarding jobs. Although a greater variety of job-related courses has been introduced in the Nation's high schools in recent years, many established vocational curriculums have not kept pace with the changing job market.

Several school systems are introducing the concept of continuing career education starting in the early grades to acquaint students with the variety of occupational opportunities in modern society. Federal funds have been made available to states to develop and operate innovative career education projects which would serve to ensure that each student would leave high school with a tentative career selection, qualified for some type of job or for advanced education toward a career profession.

Career education would revolve around such broad occupational clusters as health, public service, transportation, manufacturing, communications media, business and office, and the environment. At the secondary level, academic work would be combined with specific training for actual jobs. For example, in one large high school in Dallas, aeronautics students work on actual airplanes on school grounds while horticulture students grow flowers in the school's greenhouse and construction-trades students learn carpentry, glazing and other construction skills from instructors in the unions' apprentice programs. Similarly, the newly established Academy for Career Education in Philadelphia offers a program which includes both academic and job related training in a variety of occupational fields. For example, with the cooperation of employers, students electing the finance occupational cluster have opportunities to spend one day a week at a bank or an insurance company.

Such public school career programs may also include educational opportunities for adults to upgrade skills, learn new skills, or retrain for new jobs when their occupations have become obsolete.

Empty Spaces in 4-Year Colleges

Empty student spaces in 4-year colleges are increasing, mostly in high-tuition private colleges but also in State-supported schools. Applications for freshman places in baccalaureate programs in colleges and universities across the country declined in the fall of 1972, intensifying financial problems for colleges. With faculty positions already filled and the need to maintain facilities, student vacancies result in higher costs per pupil. Contributing to declining applications were changes in the draft law that had exempted college students, the high cost of a college education, and the weak job market for recent college graduates.

In the fall of 1972, an estimated 6.5 million students were enrolled in degree-credit programs at 4-year colleges, 200,000 more than a year earlier. Since 1970, these enrollments have been rising 2 to 3 percent each year compared with a 8-percent growth rate from 1967 to 1970.

Enrollment in Public and Nonpublic Schools, by Instructional Level, Fall

[In millions]

	1967	1968	1969	1970	1971 [1]	1972 [1]	Percent increase 1971–72	1973 [1]	Percent increase 1972–73	1980 [1]	Percent increase 1972–80
Total	56.3	57.6	58.6	59.2	59.4	59.3	−1	59.4	−0	60.2	2
Elementary [2]	36.2	36.6	36.8	36.7	36.2	35.6	−2	35.0	−2	34.5	−3
Public	31.6	32.2	32.6	32.6	32.3	31.8	−2	31.3	−2	31.5	−1
Nonpublic	4.6	4.4	4.2	4.1	3.9	3.8	−3	3.7	−3	3.0	−21
Secondary [3]	13.7	14.1	14.3	14.6	15.1	15.4	2	15.7	2	14.8	−4
Public	12.3	12.7	13.0	13.3	13.8	14.1	2	14.4	2	13.5	−4
Nonpublic	1.4	1.4	1.3	1.3	1.3	1.3	0	1.3	0	1.3	0
Higher education degree credit	6.4	6.9	7.5	7.9	8.1	8.3	2	8.7	5	10.9	31
4-year colleges	5.3	5.6	6.0	6.3	6.4	6.5	2	6.7	3	8.0	23
2-year colleges	1.1	1.3	1.5	1.6	1.7	1.8	6	2.0	11	2.9	61

[1] Estimates by Office of Education, HEW.
[2] K through 8th grade.
[3] Grades 9–12.

Twelve State legislatures have enacted laws to aid private colleges, sometimes offering $400 or $500 grants for State residents obtaining a bachelor's degree from a private college. Many colleges are seeking more older students through part-time course offerings. The University of California voted to lower entrance requirements for transfer students in order to attract more applications.

Cost-sharing among neighboring colleges is increasing. For example, four Maryland liberal arts colleges—Franklin and Marshall, Gettysburg, Dickinson, and Wilson—now share one computer. Elsewhere, students are permitted to register for courses at neighboring local colleges to avoid duplication of courses in one community.

More than 300 colleges now offer work-study programs in all or some departments, enabling students to earn money for part of the year and attend schools for the remainder of the year. These programs are designed to offer students career-related experiences and, at the same time, provide earnings which cut costs of a college education.

Rapidly Growing 2-Year Colleges

Full-time enrollments at community and junior colleges—mostly commuter colleges with low-tuition fees—are expected to reach 2 million in 1973, 11 percent above a year earlier and almost twice the enrollment level in 1967. An additional 900,000 students will be enrolled in nondegree programs.

Increasing numbers of States—including Michigan, Illinois, Florida, New York, Virginia, California, Colorado, and North Carolina—have developed community college systems as part of the State higher education program. About one-third of the students completing 2-year college programs transfer to 4-year colleges. For the remaining students, 2-year colleges offer preparation for many technical and semiprofessional jobs in such fields as law enforcement, fire science, food service management, data processing, and practical nursing and allied health fields. In the next several years, full-time enrollments are expected to grow at an annual rate of 6.2 percent, reaching almost 3 million by 1980.

Increasing numbers of working mothers plus the growing recognition of the contribution of early childhood education to later schooling have resulted in a sharp increase in preprimary schools and enrollments. Independent public and private nursery schools and kindergartens now enroll an estimated 1.9 million youngsters compared with 1.2 million in 1967.

Industry sources indicate that outlays for equipment for preprimary schools and day care centers—playground equipment, tables and chairs, cots, cushion seating equipment for toddlers, TV sets, and toys—total about $80 million annually. Increasingly, day care centers are being financed and operated by factory managements, unions, and hospitals. Many companies are setting up chains of day care centers under the franchise system which allows operators to use the franchisor's name, instructional and educational programs, and building plans.

In January 1973, 10 federally funded pilot projects were started to train "child development associates." After completion of certain nondegree courses, students will be qualified to work as professionals in day care centers and other preschool programs.

Outlook for 1980

Educational spending is expected to reach $141 billion by the 1980–81 school year, an annual increase of 5.8 percent. While elementary school enrollments will decline by almost 2 million from 1972 to 1980, high school enrollments will continue upward until 1978 and then drop sharply in 1979 and in 1980 to levels below current enrollments. In contrast, an additional 2.6 million students will be enrolled in degree-credit college programs in 1980, with the fastest rise occurring in 2-year colleges. School finance reform will be needed to keep pace with rising costs of school services and costly innovative projects necessary to effectively educate the Nation's diverse school population.

Changing school trends in the next several years will probably include further changes in traditional curricula and teaching methods in order to stimulate and motivate all students toward learning and achievement, increased public high school work-related experiences in cooperation with employers, and improved utilization of existing school facilities through year-round use. By the end of the decade, school children may be learning metrics in arithmetic lessons. A national changeover to the metric system would involve new textbooks and equipment as well as the retraining of teachers not familiar with the metric system—*Renee Gallop, Office of Business Research and Analysis.*

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Appendix A. Value of Industry Shipments and Estimated Percent Increase 1972–73 by SIC Industry Code [1]

SIC Code	Industry description	Millions of dollars 1972	Millions of dollars 1973	Percent increase
	MANUFACTURING			
1925	Complete guided missiles	4,245	3,570	−16
2011	Meatpacking plants	19,870	21,065	6
2013	Sausages and other prepared meats	3,975	4,210	6
2015	Poultry dressing plants	3,700	3,925	6
2022	Cheese, natural and processed	3,027	3,602	19
2023	Condensed and evaporated milk	1,820	2,129	17
2024	Ice cream and frozen desserts	1,194	1,224	3
2026	Fluid milk	8,612	8,827	3
2032	Canned specialties	1,830	1,945	6
2033	Canned fruits and vegetables	4,060	4,190	3
2035	Pickles, sauces, and salad dressings	1,315	1,425	8
2037	Frozen fruits and vegetables	3,565	3,875	9
2041	Flour and other grain mill products	2,545	2,647	4
2042	Prepared feeds for animals and fowls	6,013	6,374	6
2051	Bread, cake, and related products	5,909	6,145	4
2052	Cookies and crackers	1,745	1,850	6
2062	Cane sugar refining	1,707	1,784	5
2071	Confectionery products	2,082	2,186	5
2072	Chocolate and cocoa products	717	785	10
2082	Malt liquors	4,510	4,920	9
2084	Wines, brandy, and brandy spirits	873	1,013	16
2085	Distilled liquor, except brandy	1,925	2,020	5
2086	Bottled and canned soft drinks	5,450	5,995	10
2087	Flavoring extracts and sirups, n.e.c.	1,416	1,515	5
2092	Soybean oil mills	3,033	3,215	6
2095	Roasted coffee	2,419	2,490	3
2096	Shortening and cooking oils	2,122	2,228	5
2111	Cigarettes	3,805	4,020	6
2121	Cigars	380	388	2
2131	Chewing and smoking tobacco	210	220	5
2141	Tobacco stemming and redrying	1,425	1,440	1
2421	Sawmills and planing mills, general	5,285	5,650	7
24322, 24323	Softwood plywood	1,625	1,720	6
2511	Wood household furniture, except upholstered	3,448	3,655	6
2512	Upholstered household furniture	1,983	2,082	5
2514	Metal household furniture	810	842	4
2515	Mattresses and bedsprings	1,056	1,109	5
2621, 2631, 2661	Papermills, excluding building paper; Paperboard mills; Building paper and board mills	10,400	10,900	5
2647	Sanitary paper products	1,810	1,940	7
2651	Folding paperboard boxes	[1] 1,325	[1] 1,390	5
2653	Corrugated and solid fiber boxes	4,200	4,600	9
2654	Sanitary food containers	1,300	1,360	5
26552	Fiber cans and tubes	453	480	6
2711	Newspapers, receipts	7,840	8,250	5
2721	Periodicals, receipts	3,460	3,655	6
2731	Book publishing, receipts	2,880	3,050	6
2732	Book printing, receipts	985	1,045	6
2751, 2752	Commercial printing	9,231	10,096	9
2761	Manifold business forms	1,386	1,510	9
2791	Typesetting	530	576	9
2812	Alkalies and chlorine	800	850	6
2813	Industrial gases	715	760	6
2815	Cyclic intermediates and crudes	2,200	2,380	8
2816	Inorganic pigments	718	775	8
2818	Industrial organic chemicals, n.e.c.	8,800	9,800	11
2819	Industrial inorganic chemicals, n.e.c.	4,785	5,070	6
2821	Plastics materials and resins	4,875	5,330	9
2822	Synthetic rubber	1,125	1,170	4
2831, 2833, 2834	Biological products; Medicinals and botanicals; Pharmaceutical preparations	7,946	8,660	9
2841	Soap and other detergents	3,170	3,330	5
2844	Toilet preparations	3,860	4,170	8
2851	Paints and allied products	3,774	4,032	7
3011	Tires and inner tubes	5,625	6,050	8
3021	Rubber footwear	525	530	1
3031	Reclaimed rubber	30	30	0
3069	Fabricated rubber products, n.e.c.	3,800	4,000	5
3079	Miscellaneous plastics products	8,400	9,200	10
3151	Leather gloves and mittens	[2] 73	[2] 75	3
3161	Luggage	[2] 283	[2] 297	5
3171	Women's handbags and purses	[2] 266	[2] 274	3
3172	Personal leather goods	[2] 280	[2] 296	6
3221	Glass containers	2,180	2,280	5
3241	Hydraulic cement	1,700	1,850	9
3261	Vitreous plumbing fixtures	300	350	17
3271	Concrete brick and block	825	875	6

Appendix A. Value of Industry Shipments and Estimated Percent Increase 1972–73 by SIC Industry Code—Cont.

SIC Code	Industry description	Millions of dollars		Percent increase
		1972	1973	
3272	Concrete products, except brick and block	1, 900	2, 100	11
3273	Ready-mixed concrete	3, 600	3, 850	7
3312 3315 3316 3317	Steel mill products	[2] 19, 200	[2] 20, 100	5
3321	Gray iron foundries	[2] 3, 400	[2] 3, 640	7
3322	Malleable iron foundries	[2] 535	[2] 575	7
3323	Steel foundries	[2] 1, 240	[2] 1, 355	9
3334 3352 3361	Primary aluminum and rolling and drawing	[2] 5, 900	[2] 6, 500	10
3351	Copper rolling and drawing	3, 150	3, 370	10
3357	Nonferrous wire-drawing and insulating	4, 200	4, 500	7
3411	Metal cans	4, 600	4, 900	7
3431	Metal sanitary ware	500	525	5
3432	Plumbing fittings, brass goods	650	725	12
3433	Heating equipment, exc. electric	1, 800	1, 950	8
3441	Fabricated structural steel	3, 650	4, 000	10
34433	Power boilers and nuclear reactors	521	493	−6
3451	Screw machine products	1, 145	1, 250	9
3491	Metal barrels, drums and pails	450	475	6
3494	Valves and pipe fittings	3, 070	3, 375	10
3511	Steam engines and turbines	2, 200	2, 465	12
3519 (part)	Internal combustion engines, industrial	[2] 990	[2] 1, 035	5
3522	Farm machinery	4, 965	5, 165	4
3531	Construction machinery	5, 292	5, 610	6
3532	Mining machinery	927	1, 020	10
3533	Oilfield machinery	1, 143	1, 234	8
3534	Elevators & moving stairways	520	550	6
3535	Conveyors & conveying equipment	795	845	6
3536	Hoists, cranes, and monorails	450	485	8
3537	Industrial trucks and tractors	945	1, 050	11
3541	Machine tools, metal-cutting types	825	1, 050	27
3542	Machine tools, metal-forming types	375	450	20
3544	Special dies, tools, jigs, and fixtures	[2] 2, 500	[2] 2, 750	10
35451	Metal cutting tools	690	780	13
35483	Gas welding and cutting equipment	105	110	5
3551	Food products machinery	965	1, 020	6
3552	Textile machinery	809	850	5
3555	Printing trades machinery	775	822	6
3561	Pumps and compressors	2, 640	2, 770	5
3562	Ball and roller bearings	1, 410	1, 525	8
3572	Typewriters	720	756	5
3573	Electronic computing equipment	5, 965	6, 740	13
3574	Calculating and accounting machines except electronic	588	647	10
3579	Office machines, n.e.c.	634	666	5
3585	Refrigeration machinery	4, 740	5, 130	8
3611	Electric measuring instruments	1, 300	1, 370	5
3612	Transformers	1, 455	1, 540	6
3613	Switchgear and switchboard apparatus	2, 100	2, 205	5
3621	Motors and generators	2, 625	2, 730	4
3622	Industrial controls	1, 235	1, 285	4
3623	Electric welding apparatus	[2] 550	[2] 620	13
3631	Household cooking equipment	826	876	6
3632	Household refrigerators and freezers	1, 783	1, 908	7
3633	Household laundry equipment	1, 310	1, 376	5
3634	Electric housewares, fans, and heaters	1, 399	1, 469	5
3635	Household vacuum cleaners	418	443	6
3636	Sewing machines	150	158	5
3639	Household appliances, n.e.c.	636	681	7
3641	Electric lamps (bulbs)	1, 051	1, 135	8
3642	Lighting fixtures	2, 400	2, 590	8
3643	Current carrying wiring devices	1, 060	1, 130	7
3644	Noncurrent carrying wiring devices	865	930	8
3651	Radio and TV receiving sets	4, 320	4, 360	1
3652	Phonograph records	520	530	2
3661	Telephone and telegraph apparatus	4, 300	4, 900	14
3662	Electronic systems and equipment	9, 170	9, 540	4
3671	Electron tubes, receiving type	[2] 200	[2] 195	−2
3672	Cathode ray picture tubes	[2] 535	[2] 560	5
3673	Electron tubes, transmitting	[2] 310	[2] 325	5
3674	Semiconductors	[2] 1, 600	[2] 1, 675	5
3679	Electronic components, n.e.c.	[2] 3, 105	[2] 3, 260	5
37111	Automobiles	[2] 23, 900	[2] 24, 400	2
37112 37113	Truck and bus chassis, retail sales	9, 400	10, 000	6
3713	Truck and bus bodies	[2] 700	[2] 755	8
3715	Truck trailers	987	964	−3
3721	Aircraft	9, 350	10, 475	12
3722	Aircraft engines and engine parts	4, 090	3, 800	−7
3723 3729	Aircraft propellers and parts; Aircraft equipment, n.e.c.	3, 580	3, 600	1

Appendix A. Value of Industry Shipments and Estimated Percent Increase 1972–73 by SIC Industry Code—Con.[1]

SIC Code	Industry description	Million of dollars 1972	Million of dollars 1973	Percent increase
3731	Shipbuilding and repairing (value of work done)	2, 855	3, 460	21
3742	Railroad and street cars	1, 231	1, 306	6
3791 (part)	Mobile homes (retail value)	3, 900	4, 400	13
3811	Laboratory and engineering instruments	1, 150	1, 215	6
3821	Mechanical measuring and control devices	1, 700	1, 800	6
3822	Automatic temperature controls	700	735	5
3831	Optical instruments and lenses	405	425	5
3841	Surgical and medical instruments	855	940	10
3842	Surgical appliances and supplies	1, 355	1, 450	7
3843	Dental equipment and supplies	305	335	7
3861	Photographic equipment and supplies	5, 230	5, 750	10
3911	Jewelry, precious metal	1, 030	1, 120	9
3941	Games and toys	[2] 1, 328	[2] 1, 386	5
3942	Dolls and stuffed animals	[2] 241	[2] 252	5
3943	Children's vehicles, except bicycles	[2] 131	[2] 137	5
3949	Sporting and athletic goods	1, 150	1, 210	5
3961	Costume jewelry	505	545	8
	NONMANUFACTURING			
15, 16, 17	Construction (value put in place)	122, 000	130, 000	7
4811, 4821	Domestic telephone and telegraph	25, 500	29, 000	14
4811, 4821	International telephone and telegraph	730	900	23
4832	Radio broadcasting (revenues)	1, 356	1, 465	8
4833	Television broadcasting (revenues)	3, 015	3, 290	9
4899	Cable television (CATV) subscriber revenues	390	470	20
	WHOLESALE TRADE—SALES			
501	Motor vehicles and automotive equipment	27, 690	31, 000	12
502	Drugs, chemicals and allied products	11, 750	12, 810	9
503	Dry goods apparel	13, 100	14, 280	9
504	Groceries and related products	58, 440	63, 110	8
505	Farm products, raw materials	17, 320	18, 870	9
506	Electrical goods	18, 930	20, 880	10
507	Hardware—plumbing and heating equipment and supplies	13, 470	15, 090	12
508	Machinery equipment and supplies	35, 080	38, 590	10
5091	Metals, metalwork	13, 590	14, 810	9
5094	Tobacco	6, 890	7, 300	6
5095	Beer, wine and spirits	15, 060	16, 110	7
5096	Paper, paper products	8, 060	8, 540	6
5097	Furniture, home furnishings	6, 220	6, 470	4
5098	Lumber, construction materials	15, 860	19, 040	20
	RETAIL TRADE—SALES			
5311	Department stores	45, 540	50, 090	10
5331	Variety stores	7, 550	8, 080	7
5411	Grocery stores	88, 770	94, 010	6
5611	Men's, boys' apparel stores	5, 060	5, 260	4
5621, 5631	Women's apparel and accessory stores	8, 440	8, 775	4
5712	Furniture stores	9, 495	10, 350	9
5722	Household appliance stores	4, 480	4, 840	8
5812, 5813	Restaurants and bars	32, 730	34, 690	6
5912	Drug stores	14, 800	15, 835	7
60	Banking (time deposits)	319, 000	364, 000	14
631	Life insurance (premium receipts)	43, 500	47, 300	8
633	Property and liability insurance (new premium receipts)	39, 600	43, 600	10
7011	Hotels and motels (receipts)	7, 495	7, 795	4
721-727	Laundry, drycleaning, garment services	6, 425	6, 810	6
7221	Photographic studios	1, 375	1, 480	8
7231	Beauty shops	3, 300	3, 485	6
7241	Barber shops	1, 100	1, 150	4
7251	Shoe repair and valet shops	257	265	3
7261	Funeral homes and crematories	1, 665	1, 725	4
7299	Miscellaneous personal services	678	760	12
7311	Advertising agencies (billings)	9, 535	10, 380	9
75	Automobile services (receipts)	12, 218	13, 440	10
78	Motion pictures (box office receipts)	1, 335	1, 425	7
80	Health and medical services (expenditures)	88, 000	97, 100	10
82	Educational services (expenditures)	89, 700	96, 700	8

[1] Estimated by Bureau of Domestic Commerce.
[2] Value of product shipments.
m.e.c.=not elsewhere classified.

Appendix B. Part I. Value of Shipments of Selected Manufacturing Industries Ranked by Estimated Percent Increase 1972—73 [1]

Rank	SIC code	Industry description	Millions of dollars 1972	Millions of dollars 1973	Percent increase
1	3541	Machine tools, metalcutting types	825	1,050	27
2	3731	Shipbuilding and repairing (value of work done)	2,855	3,460	21
3	3452	Machine tools, metal forming types	375	450	20
4	2022	Cheese, natural and processed	3,027	3,602	19
5	2023	Condensed and evaporated milk	1,820	2,129	17
6	3261	Vitreous plumbing fixtures	300	350	17
7	2084	Wines, brandy, and brandy spirits	873	1,013	16
8	3661	Telephone and telegraph apparatus	4,300	4,900	14
9	3573	Electronic computing equipment	5,965	6,740	13
10	3791 (part)	Mobile homes (retail value)	3,900	4,400	13
11	35451	Metal-cutting tools	690	780	13
12	3623	Electric welding apparatus	[2] 550	[2] 620	13
13	3721	Aircraft	9,350	10,475	12
14	3511	Steam engines and turbines	2,200	2,465	12
15	3432	Plumbing fittings, brass goods	650	725	12
16	2818	Industrial organic chemicals, not elsewhere classified	8,800	9,800	11
17	3272	Concrete products, except brick and block	1,900	2,100	11
18	3537	Industrial trucks and tractors	945	1,050	11
19	3079	Miscellaneous plastics products	8,400	9,200	10
20	3334 3352 3361	Primary aluminum and rolling and drawing	[2] 5,900	[2] 6,500	10
21	2086	Bottled and canned soft drinks	5,450	5,995	10
22	3861	Photographic equipment and supplies	5,230	5,750	10
23	3441	Fabricated structural steel	3,650	4,000	10
24	3494	Valves and pipe fittings	3,070	3,375	10
25	3351	Copper rolling and drawing	3,150	3,370	10
26	3544	Special dies, tools, jigs, and fixtures	[2] 2,500	[2] 2,750	10
27	3532	Mining machinery	927	1,020	10
28	3841	Surgical and medical instruments	855	940	10
29	2072	Chocolate and cocoa products	717	785	10
30	3574	Calculating and accounting machines, except electronic	588	647	10
31	2751 2752	Commercial printing	9,231	10,096	9
32	2831 2833 2834	Biological products; Medicinals and botanicals; Pharmaceutical preparations	7,946	8,660	9
33	2821	Plastic materials and resins	4,875	5,330	9
34	2082	Malt liquors	4,510	4,920	9
35	2653	Corrugated and solid fiber boxes	4,200	4,600	9
36	2037	Frozen fruits and vegetables	3,565	3,875	9
37	3241	Hydraulic cement	1,700	1,850	9
38	3323	Steel foundries	[2] 1,240	[2] 1,355	9
39	3451	Screw machine products	1,145	1,250	9
40	3911	Jewelry, precious metals	1,030	1,120	9
41	2791	Typesetting	530	576	9
42	3011	Tires and inner tubes	5,625	6,050	8
43	3585	Refrigeration machinery	4,740	5,130	8
44	2844	Toilet preparations	3,860	4,170	8
45	3642	Lighting fixtures	2,400	2,590	8
46	2815	Cyclic intermediates and crudes	2,200	2,380	8
47	3433	Heating equipment, except electric	1,800	1,950	8
48	3562	Ball and roller bearings	1,410	1,525	8
49	2035	Pickles, sauces, and salad dressings	1,315	1,425	8
50	3533	Oilfield machinery	1,143	1,234	8
51	3641	Electric lamps (bulbs)	1,051	1,135	8
52	3644	Noncurrent carrying wiring devices	865	930	8
53	2816	Inorganic pigments	718	775	8
54	3713	Truck and bus bodies	[2] 700	[2] 755	8
55	3961	Costume jewelry	505	545	8
56	3536	Hoists, cranes, and monorails	450	485	8
57	2421	Sawmills and planing mills, general	5,285	5,650	7
58	3411	Metal cans	4,600	4,900	7
59	3357	Nonferrous wiredrawing and insulating	4,200	4,500	7
60	2851	Paints and allied products	3,774	4,032	7
61	3273	Ready-mixed concrete	3,600	3,850	7

Appendix B. Part I. Value of Shipments of Selected Manufacturing Industries Ranked by Estimated Percent Increase 1972-73—Continued [1]

Rank	SIC code	Industry description	Millions of dollars 1972	Millions of dollars 1973	Percent increase
62	3321	Gray iron foundries	[2] 3, 400	[2] 3, 640	7
63	2647	Sanitary paper products	1, 810	1, 940	7
64	3632	Household refrigerators and freezers	1, 783	1, 908	7
65	3842	Surgical appliances and supplies	1, 355	1, 450	7
66	3643	Current carrying wiring devices	1, 060	1, 130	7
67	3639	Household appliances, n.e.c	636	681	7
68	3322	Malleable iron foundries	535	575	7
69	3843	Dental equipment and supplies	305	335	7
70	2011	Meatpacking plants	19, 870	21, 065	6
71	2042	Prepared feeds for animals and fowls	6, 013	6, 374	6
72	3531	Construction machinery	5, 292	5, 610	6
73	2819	Industrial inorganic chemicals, not elsewhere classified	4, 785	5, 070	6
74	2013	Sausages and other prepared meats	3, 975	4, 210	6
75	2111	Cigarettes	3, 805	4, 020	6
76	2015	Poultry dressing	3, 700	3, 925	6
77	2511	Wood household furniture except upholstered	3, 448	3, 655	6
78	2721	Periodicals (receipts)	3, 460	3, 655	6
79	2092	Soybean oil mills	3, 033	3, 215	6
80	2731	Book publishing (receipts)	2, 880	3, 050	6
81	2032	Canned specialties	1, 830	1, 945	6
82	2052	Cookies and crackers	1, 745	1, 850	6
83	3821	Mechanical measuring and control devices	1, 700	1, 800	6
84	24322, 24323	Softwood plywood	1, 625	1, 720	6
85	3612	Transformers	1, 455	1, 540	6
86	3742	Railroad and street cars	1, 231	1, 306	6
87	3811	Laboratory and engineering instruments	1, 150	1, 215	6
88	2732	Book printing (receipts)	985	1, 045	6
89	3551	Food products machinery	965	1, 020	6
90	3631	Household cooking equipment	826	876	6
91	3271	Concrete brick and block	825	875	6
92	2812	Alkalies and chlorine	800	850	6
93	3535	Conveyors and conveying equipment	795	845	6
94	3555	Printing trades machinery	775	822	6
95	2813	Industrial gases	715	760	6
96	3534	Elevators and moving stairways	520	550	6
97	26552	Fiber cans and tubes	453	480	6
98	3491	Metal barrels, drums, and pails	450	475	6
99	3635	Household vacuum cleaners	418	443	6
100	3172	Personal leather goods	[2] 280	[2] 296	6
101	3312, 3315, 3316, 3317	Steel mill products	19, 200	20, 100	5
102	2631	Paperboard mills	10, 400	10, 900	5
103	2711	Newspapers	7, 840	8, 250	5
104	3069	Fabricated rubber products, not elsewhere classified	3, 800	4, 000	5
105	2841	Soap and other detergents	3, 170	3, 330	5
106	3679	Electronic components, not elsewhere classified	[2] 3, 105	[2] 3, 260	5
107	3561	Pumps and compressors	2, 640	2, 770	5
108	3221	Glass containers	2, 180	2, 280	5
109	2096	Shortening and cooking oils	2, 122	2, 228	5
110	2613	Switchgear and switchboard apparatus	2, 100	2, 205	5
111	2071	Confectionery products	2, 082	2, 186	5
112	2512	Upholstered household furniture	1, 983	2, 082	5
113	2085	Distilled liquor, except brandy	1, 925	2, 020	5
114	2062	Cane sugar refining	1, 707	1, 784	5
115	3674	Semiconductors	[2] 1, 600	[2] 1, 675	5
116	2087	Flavoring extracts and sirups, not elsewhere classified	1, 416	1, 515	5
117	3634	Electric housewares, fans, and heaters	1, 399	1, 469	5
118	2651	Folding paperboard boxes	1, 325	1, 390	5
119	3941	Games and toys	[2] 1, 328	[2] 1, 386	5
120	3633	Household laundry equipment	1, 310	1, 378	5
121	3611	Electric measuring instruments	1, 300	1, 370	5
122	2654	Sanitary food containers	1, 300	1, 360	5
123	3949	Sporting and athletic goods	1, 150	1, 210	5
124	2515	Mattresses and bedsprings	1, 056	1, 109	5
125	3519 (part)	Internal combustion engines, industrial	[2] 990	[2] 1, 035	5
126	3552	Textile machinery	809	850	5

Appendix B. Part I. Value of Shipments of Selected Manufacturing Industries Ranked by Estimated Percent Increase 1972-73—Continued [1]

Rank	SIC code	Industry description	Millions of dollars 1972	Millions of dollars 1973	Percent increase
127	3572	Typewriters	720	756	5
128	3822	Automatic temperature controls	700	735	5
129	3579	Office machines, not elsewhere classified	634	666	5
130	3672	Cathode ray picture tubes	[2] 535	[2] 560	5
131	3431	Metal sanitary ware	500	525	5
132	3831	Optical instruments and lenses	405	425	5
133	3673	Electron tubes, transmitting	[2] 310	[2] 325	5
134	3161	Luggage	[2] 283	[2] 297	5
135	3942	Dolls and stuffed animals	[2] 241	[2] 252	5
136	2131	Chewing and smoking tobacco	210	220	5
137	3636	Sewing machines	150	158	5
138	3943	Children's vehicles, except bicycles	[2] 131	[2] 137	5
139	35483	Gas welding and cutting equipment	[2] 105	[2] 110	5
140	3662	Electronic systems and equipment	9, 170	9, 540	4
141	2051	Bread, cake, and related products	5, 909	6, 145	4
142	3522	Farm machinery	4, 965	5, 165	4
143	3621	Motors and generators	2, 625	2, 730	4
144	2041	Flour and other grain mill products	2, 545	2, 647	4
145	3622	Industrial controls	1, 235	1, 285	4
146	2822	Synthetic rubber	1, 125	1, 170	4
147	2514	Metal household furniture	810	842	4
148	2026	Fluid milk	8, 612	8, 827	3
149	2033	Canned fruits and vegetables	4, 060	4, 190	3
150	2095	Roasted coffee	2, 419	2, 490	3
151	2024	Ice cream and frozen desserts	1, 194	1, 224	3
152	3171	Women's handbags and purses	[2] 266	[2] 274	3
153	3151	Leather gloves and mittens	[2] 73	[2] 75	3
154	37111	Automobiles	[2] 23, 900	[2] 24, 400	2
155	3652	Phonograph records	520	530	2
156	2121	Cigars	380	388	2
157	3651	Radio and TV receiving sets	4, 320	4, 360	1
158	3723 3729	Aircraft propellers and parts Aircraft equipment, not elsewhere classified	3, 580	3, 600	1
159	2141	Tobacco stemming and redrying	1, 425	1, 440	1
160	3021	Rubber footwear	525	530	1
161	3031	Reclaimed rubber	30	30	0
162	3671	Electron tubes, receiving type	[2] 200	[2] 195	−2
163	3715	Truck trailers	987	964	−3
164	34433	Power boilers and nuclear reactors	521	493	−6
165	3722	Aircraft engines and engine parts	4, 090	3, 800	−7
166	1925	Complete guided missiles	4, 245	3, 570	−16

[1] Estimated by Bureau of Domestic Commerce.

[2] Value of product shipments.

Appendix B. Part II. Selected Nonmanufacturing Industries Ranked According to Estimated Increase 1972–73 in Sales or Other Measures as Indicated [1]

Rank	SIC code	Industry description	Millions of dollars 1972	Millions of dollars 1973	Percent increase
1	4811, 4821	International telephone and telegraph (revenues)	730	900	23
2	5098	Lumber, construction materials (wholesale)	15, 860	19, 040	20
3	4899	Cable television (CATV) subscriber revenues	390	470	20
4	4811, 4821	Domestic telephone and telegraph (revenues)	25, 000	29, 000	14
5	60	Banking (time deposits)	319, 000	364, 000	14
6	501	Motor vehicles and automotive equipment (wholesale)	27, 690	31, 000	12
7	507	Hardware-plumbing and heating equipment and supplies (wholesale)	13, 470	15, 090	12
8	7299	Miscellaneous personal services	678	760	12
9	80	Health and medical services (expenditures)	88, 000	97, 100	10
10	5311	Department stores	45, 540	50, 090	10
11	633	Property and liability insurance (new premium receipts)	39, 600	43, 600	10
12	508	Machinery equipment and supplies (wholesale)	35, 080	38, 590	10
13	506	Electrical goods (wholesale)	18, 980	20, 880	10
14	75	Automobile services (receipts)	12, 218	13, 440	10
15	505	Farm products, raw materials (wholesale)	17, 320	18, 870	9
16	5091	Metals, metalwork (wholesale)	13, 590	14, 810	9
17	503	Dry goods apparel (wholesale)	13, 100	14, 280	9
18	502	Drugs, chemicals and allied products (wholesale)	11, 750	12, 810	9
19	7311	Advertising agencies (billings)	9, 535	10, 380	9
20	5712	Furniture stores	9, 495	10, 350	9
21	4833	Television broadcasting (revenues)	3, 015	3, 290	9
22	82	Educational services (expenditures)	89, 700	96, 700	8
23	504	Groceries and related products (wholesale)	58, 440	63, 110	8
24	631	Life insurance (premium receipts)	43, 500	47, 300	8
25	5722	Household appliance stores	4, 480	4, 840	8
26	7221	Photographic studios	1, 375	1, 480	8
27	4832	Radio broadcasting (revenues)	1, 356	1, 465	8
28	15, 16, 17	Construction (value put in place)	122, 000	130, 000	7
29	5095	Beer, wine and spirits (wholesale)	15, 060	16, 110	7
30	5912	Drug stores	14, 800	15, 835	7
31	5331	Variety stores	7, 550	8, 080	7
32	78	Motion pictures (box office receipts)	1, 335	1, 427	7
33	5411	Grocery stores	88, 770	94, 010	6
34	5812, 5813	Restaurants and bars	32, 730	34, 690	6
35	5096	Paper, paper products (wholesale)	8, 060	8, 540	6
36	5094	Tobacco (wholesale)	6, 890	7, 300	6
37	721—727	Laundry, drycleaning, garment services	6, 425	6, 810	6
38	7231	Beauty shops	3, 300	3, 485	6
39	5621, 5631	Women's apparel and accessory stores	8, 440	8, 775	4
40	7011	Hotels and motels (receipts)	7, 495	7, 795	4
41	5097	Furniture, home furnishings (wholesale)	6, 220	6, 470	4
42	5611	Men's, boys' apparel stores	5, 060	5, 260	4
43	7261	Funeral home and crematories	1, 665	1, 725	4
44	7241	Barber shops	1, 100	1, 150	4
45	7251	Shoe repair and valet shops	257	265	3

[1] Estimated by Bureau of Domestic Commerce.

Index

U.S. GOVERNMENT PRINTING OFFICE : 1973 O - 477 -78