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THE ILLINOIS VALLEY COMMUNITY COLLEGE OCCUPATIONAL SURVEY, A COOPERATIVE ARRANGEMENT PROGRAM UNDER TITLE III OF THE HIGHER EDUCATION ACT OF 1965.

NORTHERN ILLINOIS UNIV., DE KALB

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THE COLLEGE OF BUSINESS AT NORTHERN ILLINOIS UNIVERSITY AND THE ILLINOIS VALLEY COMMUNITY COLLEGE COLLECTED THIS INFORMATION FOR THE GEOGRAPHIC AREA SERVED BY IVCC, TO DETERMINE THE RELATION BETWEEN OCCUPATIONAL CATEGORIES AND RECOMMENDED TRAINING. QUESTIONNAIRE RETURNS REPRESENT OVER 30 PERCENT OF EMPLOYERS IN THE AREA, INTERVIEWS COVER PROFESSIONALS AND THE EXECUTIVES OF MOST FIRMS WITH OVER 100 EMPLOYEES, AND SPECIAL CONSULTANT REPORTS COVER CERTAIN CRITICAL OCCUPATIONS. THE 11 OCCUPATIONAL GROUPS, RANKED BY NUMBER OF WORKERS, ARE OPERATIVES, CRAFTSMEN AND FOREMEN, FARMERS, CLERICAL WORKERS, PROFESSIONALS, TECHNICIANS, SERVICE WORKERS, MANAGERS, SALESMEN, LABORERS, AND DOMESTICS. THE INDUSTRIAL GROUPS, SIMILARLY RANKED, ARE (1) MANUFACTURING, (2) RETAIL TRADE, (3) SERVICES, (4) TRANSPORTATION AND PUBLIC UTILITIES, (5) CONSTRUCTION, (6) WHOLESALE TRADE, (7) FINANCE, INSURANCE, AND REAL ESTATE, (8) MINING, AND (9) AGRICULTURE. CERTAIN KINDS OF TRAINING CAN BE APPLIED TO SEVERAL INDUSTRIES, WHILE OTHER KINDS (E.G., FARM TRAINING) HAVE ONLY SPECIALIZED USE. EMPLOYERS IN EACH INDUSTRIAL GROUP LISTED THE PREFERRED TRAINING FOR VARIOUS JOBS. THE SPECIAL REPORTS COVER THE FIELDS OF CHEMICAL TECHNOLOGY, OFFICE WORK, FOOD SERVICE, HEALTH SERVICE, METAL WORKING, AND THE ELECTRICAL/ELECTRONICS INDUSTRY. MANPOWER NEEDS, TRAINING CONDITIONS, AND TRENDS ARE SUMMARIZED. (HH)

The Illinois Valley Community College

OCCUPATIONAL SURVEY

a

Cooperative Arrangement Program

Under

Title III of the Higher Education Act of 1965

COLLEGE OF BUSINESS
NORTHERN ILLINOIS UNIVERSITY
DEKALB, ILLINOIS

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FOREWORD

This survey has been conducted through the cooperative efforts of a number of different groups in the area surrounding the Illinois Valley Community College. A real interest in the survey, as a planning tool for the College, has been demonstrated by these business, professional, civic and public groups.

Acknowledgment and appreciation is extended to the managers of business firms and executives of other organizations in the five-county area who were generous with their time in reporting information for the study through interviews and questionnaires. Appreciation is also extended to the Illinois Valley Community College administrative officers who assisted in planning and administering the survey.

Significant contributions were made by the consultants who wrote special reports, the field interviewers and analysts, and the office assistants. The consulting specialists are identified in Chapter III. The field interviewers and analysts for this project are: Larry Arnold, Dale Brown, Jeffrey Greenacre, Ronald Johnson, James Pilarski, Kenneth Pysnka, Richard Schafer and Bankey Sharma. Ann Lawler and Gretchen Arnold prepared the typed copy for the report.

Particular acknowledgment and appreciation is extended to Dr. Kenneth Freeman, President of the Illinois Valley Community College, and Dr. Robert L. Thistlethwaite, Dean of the College of Business, Northern Illinois University, for their support in conducting the survey.

Don W. Arnold
Project Director

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CHAPTER I

INTRODUCTION

This occupational study was undertaken as a Cooperative Arrangement Program under Title III of the Higher Education Act of 1965. The primary responsibility for the collection of occupational data, the analysis of this data, and the reporting of it has been assumed by the assigned staff of the College of Business, Northern Illinois University, in cooperation with Illinois Valley Community College officials.

The Purpose

The purpose of this project is to analyze the occupations represented in the major geographic area served by the Illinois Valley Community College. Special consideration is given to the critical needs, trends, and conditions of employment and training in each major industry and occupational group.

The analysis establishes certain factual information about employing units and numbers of employees broken down by industrial classification and occupational categories. A comparison is made between the data for the IVCC area and the State of Illinois. A rank order of subclasses is established for each major industry by size of employment.

In the analysis a relationship is established between occupational categories and the level of training recommended according to the survey questionnaire returns. Occupational and training needs are summarized from information obtained from the questionnaire and from interviews. Trends and training conditions or methods are presented on a state or national level and where appropriate related and compared with area informations.

Significance of Study

This project is related to the developing program of the Illinois

Valley Community College. Occupational training is assumed to be a major part of the College program. The type and characteristics of the physical facilities, the staff and the curriculum is influenced by the knowledge of the occupations represented in the primary area served by the College

The geographic area served by the College is of economic significance to the State and the Nation as well as to the citizens living in the area. The study is significant in that it provides occupational information that is necessary to effectively utilize manpower resources in the area.

The economic potential for growth and development of the five-county IVCC area is exceptionally favorable. However, economic growth does not develop spontaneously or automatically even if all of the basic economic factors are available. Leadership and coordinated community effort are needed to realize this potential. This study provides community leadership with a planning tool for economic growth. It provides a means for channeling community participation.

Definitions

The technical meanings of terms related to industrial classification are those defined in the Standard Industrial Classifiction Manual. The technical meaning of terms related to occupations are those defined in the Dictionary of Occupational Titles.

The IVCC Area is defined as the area bounded by the outward geographic boundaries of five adjoining counties: Bureau, LaSalle, Lee, Marshall, and Putnam. (See Figure 1). Other definitions are given in the Appendix.

Delimitations

Although the outcome of this study is related to curriculum development, the study itself does not establish or recommend a curriculum. This does not preclude a discussion of fields of training or courses related to occupations in reporting responses to the survey.

FIGURE 1

ILLINOIS VALLEY COMMUNITY COLLEGE FIVE-COUNTY AREA

No attempt is made to project training and occupational needs or industrial trends on the basis of the area survey. Needs and trends are projected on the basis of secondary sources and related to the area.

Questionnaire returns do not represent a probability sample. Projections of the totals or any industrial or occupational segment should not be made in a refined or technical sense. The sample is representative of employing units by geographic location, by size of firms and by industrial classification. The sample is not proportionately representative in terms of employment sources. (See Figure 2)

The questionnaire returns represent over 30 per cent of all employees in the IVCC area. The results may be considered to provide information, clues, and substantiating evidence of judgment factors.

Some objective data are not revealed in detail in the report due to disclosure policy. Some industry classes are represented by a very few firms or a classification may be represented mainly by one large firm. However, some very important planning data are available in the individual questionnaire returns and they are available to College Officials. Data from each return are also punched on cards and a program is written for the IBM 1620 Computer so that more detailed or additional information may be secured.

Procedure

Secondary statistical data have been used to establish the industrial and occupational profile of the IVCC area and to describe and analyze characteristics of each industrial segment. Information from the County Business Patterns, the Census of Mineral Industries, Census of Manufacturers and the Census of Agriculture was used primarily to write a description of each industry in the area. Other sources include the Occupational Outlook Handbook, the Census of Population and recent issues of the Survey of Current Business and the Monthly Labor Review.

Other related studies have been used that relate to manpower and training. A Survey of Information on Vocational and Technical Education in the State of Illinois and the Manpower Report of the President are the two principal sources of related information. A Survey of Technical Needs of Industry and Implications for Curriculum Development in Higher Education and a number of special reports from trade and professional associations are also sources of valuable related information. These and other references are listed in the Bibliography.

A field investigation has been conducted to gain first hand information about occupations in the IVCC area. Several methods were used.

Arrangements were made in advance with most employers of over 100 persons to discuss employment and training with an executive of the firm. In all but a very few cases, interviews were conducted. Discussions centered about employment and training needs, trends, special training conditions in the industry, and the relationship between employment and training needs of the firm and the Community College. In addition to these interviews, other executives from key firms, school officials, representatives from agriculture and labor groups, and officers from professional, trade, civic and government organizations were interviewed.

In areas of high business concentration, field interviewers talked with business and professional people and assisted with the completion of a questionnaire form designed for this purpose. (See Appendix A). A mailed questionnaire was sent to places of employment geographically scattered.

Special reports were prepared by consultants for certain occupational areas considered critical to this study. These areas are office occupations, chemical technicians, food production and food services, health services, metals and machine trades, and electronics and electricity skill occupations.

FIGURE 2

DISTRIBUTION OF QUESTIONNAIRE RETURNS

Industrial Distribution	Units	Percent Of Total	Employees	Percent Of Total
Agriculture Services	8	2.47	228	1.47
Contract Construction	14	4.33	367	2.36
Manufacturing	56	17.33	11,326	73.09
Transportation & Utilities	13	4.02	473	3.05
Wholesale & Retail Trade	120	37.15	1,003	6.47
Finance, Insurance, Real Estate	38	11.76	373	2.40
Services	64	19.81	1,454	9.38
Government	10	3.09	270	1.74
TOTAL	323		15,494	

Percent of employees represented in survey sample to total labor force in area is 31.5%.

Firms engaged in both mining and manufacturing were classified as manufacturing.

By Geographic Location	Number Of Returns
LaSalle	104
Peru	68
Ottawa	25
Streator	18
Oglesby	14
Princeton	14
Mendota	7
Earlville, Leland, Paw Paw, Spring Valley, LaMoille, Marseilles, Sheridan, Toluca	3-5
Bureau, Cedar Point, Clinton, DePue, Hennepin, Ladd, Malden, Minonk, Tiskilwa	1-2

An Occupational Profile

The State - The State labor force can be separated into eleven different broad occupational groups. Each group has similar characteristics such as entrance requirements or potential earnings, and offers a similar way of life and labor.

Operatives engaged in assembling goods in factories, driving trucks and operating machinery make up the largest group. Clerical workers make up the second largest group.

In Illinois, craftsmen, foremen and other skilled workers rank third according to numbers employed. Professional and technically trained persons rank fourth.

Service workers account for the fifth group followed by managers-officials-proprietors in sixth position. The remaining groups by order of size are sales workers, laborers (except farm and mine), farmers and farm managers, private household workers, and farm laborers and farm foremen. (See Figure 3)

IVCC Area - In the IVCC area, operatives make up the largest occupational group followed by the craftsmen and foremen group. In the area, 13 per cent are employed as craftsmen and foremen compared with 14 per cent in the state. Twenty-two per cent are employed as operatives in the area compared with 19 per cent in the state.

Farmers and farm managers rank third in the IVCC area as an occupational group closely followed by clerical workers. Farming as an occupation is shown to be much more important in the area than it is in the state as a whole. Clerical workers make up ten per cent of the total employed in the area compared with 17 per cent for the state.

Professional and technical occupations, and the group described as managers, officials and proprietors are somewhat less important in terms of numbers in the occupational class than they are on a statewide basis. (See Figure 3).

FIGURE 3

OCCUPATION GROUP OF EMPLOYED PERSONS

IVCC AREA AND ILLINOIS - 1960

Occupations	Five-County IVCC Area	Percent Of Total	Illinois	Percent Of Total
Professional & Technical	6,523	8.8	417,477	10.7
Farmers & Farm Managers	8,305	11.2	121,973	3.1
Managers, Officials & Proprietors	4,935	6.6	302,239	7.7
Clerical & Kindred Workers	7,699	10.4	655,033	16.8
Sales Workers	4,617	6.2	276,137	7.1
Craftsmen & Foremen	9,945	13.4	546,428	14.0
Operatives	16,120	21.7	736,099	18.9
Private Household Workers	1,162	1.6	59,019	1.5
Service Workers	6,385	8.6	328,647	8.4
Farm Laborers & Foremen	2,308	3.1	40,169	1.0
Laborers, Except Farm & Mine	4,040	5.4	170,723	4.4
Occupations Not Reported	2,188	2.9	245,536	
TOTALS	74,228		3,899,472	

SOURCE: United States Census of Population, 1960.

An Industrial Profile

Occupations may be analyzed from the point of view of the industrial source of the jobs as well as by occupational classification. Industries are commonly grouped into nine major groups according to their product or service. (See Figure 4)

The State - In Illinois, most persons are employed in manufacturing. Retail trade ranks second as a source of employment followed by services. Wholesale trade is fourth in employment size closely followed by the transportation and public utilities group and by the finance, insurance and real estate group. The remaining industrial groups are in the order of employment size, contract construction, mining, and agricultural services. The importance of the agricultural sector is understated because employees only from agricultural services are counted in the data from the County Business Patterns. When the additional farm operators and regularly hired farm workers are added (from the Census of Agriculture), a total of 139,112 persons may be said to be working on Illinois farms; this adjusted count would place farming after contract construction in order of employment size.

IVCC Area - There are several differences between the state norms and the IVCC area employment figures in the analysis by industry groups. Manufacturing as a source of employemt is more important in the IVCC area than it is for the state. Retail trade in the IVCC area employs more persons proportionately than does the State of Illinois. Agriculture is a much more important source of employment in the IVCC area than it is in the state as a whole, ranking just below retail trade. In addition, there is a greater than average number of farm related processors, wholesalers and retailers. Wholesale trade, the finance, insurance and real estate group, and the services are less important as employment sources in the area than they are for the State.

FIGURE 4

EMPLOYEES BY MAJOR INDUSTRY CLASSIFICATIONS

IVCC AREA AND ILLINOIS - 1966

	IVCC AREA Employees	Percent Of Total	ILLINOIS EMPLOYEES	Percent Of Total
Agricultural Services	158	0.3	5,222	0.2
Farm Operators *	(7,096)		(118,409)	
Hired Farm Workers *	(1,316)		(25,491)	
Mining	887	1.8	22,642	0.7
Contract Construction	2,021	4.1	156,677	4.7
Manufacturing	24,025	49.0	1,364,860	40.7
Transportation & Pub. Utilities	3,413	6.9	214,821	6.4
Wholesale Trade	1,794	3.6	257,355	7.7
Retail Trade	9,939	20.2	588,155	17.5
Finance, Insurance, Real Estate	1,512	3.1	204,876	6.1
Services	5,258	10.7	525,564	15.6
Unclassified	54		14,214	
TOTALS	49,061		3,354,386	

SOURCES: County Business Patterns - 1966 (Employment covered by the Federal Insurance Contributions Act)
* Census of Agriculture - 1964

CHAPTER II

OCCUPATIONS AND TRAINING FOR INDUSTRIES IN THE IVCC AREA

A number of common training and occupation needs were expressed by employers that may be applied to broad occupational areas or to a number of different industries. Employers also recommended certain types of education or training for occupations represented in the survey. These findings are presented in the first part of this chapter.

A more detailed analysis that combines secondary data with survey results, industry by industry, is presented in the second part of this chapter. The statistical characteristics of each industry as a source of employment is followed by a discussion of employment and training needs. The type of education or training recommended for various occupations in each industry is then reported.

Findings Applied Broadly

Service, maintenance and repair of machines and equipment - Machinery and equipment are becoming more complex and sophisticated. Instrumentation and controls particularly require new levels of training. Technicians and industrial craftsmen with knowledge and skills in hydraulics, electricity and electronics, and mechanics are needed to service, maintain and repair machines and equipment. These needs were expressed by employers representing a wide range of industrial areas.

Professionally trained persons and skilled craftsmen - There is a widespread and continuing need for professionally trained persons and skilled craftsmen and technicians. During interviews, these needs often seemed to be taken for granted. At other times the need for professionally trained persons and skilled craftsmen was stated with great emphasis. Employers have lived with these needs for so long and the training period is of such duration, that adjustments have had to be made on a

relatively permanent basis. Needs were more specifically expressed for engineers, physical scientists, management personnel, medical technicians and professionals, electricians, machinists and tool and die makers.

Chemistry - Occupations in a number of industries require skills and knowledge in applications of chemistry. This statement applies particularly to the following industrial groups: food products, plastics, glass, primary metals, and fabricated metal products. It also applies to agriculture, some retail trades, and to the medical and health services. Although there continues to be a need for professionally trained chemists, a commonly expressed need is for technicians who can support the chemistry oriented professions. Skilled operators or craftsmen and supervisors also need an understanding of chemistry in many modern industries.

Mathematics and physics - Occupations in a wide variety of industries are demanding higher levels of industrial application of mathematics and physics. Abilities in mensuration are needed even at the semi-skilled level. Quality control, quantitative analysis, computer applications, data processing and records control are part of the family of applications related to mathematics.

In the field of physics a knowledge of hydraulics, electricity and electronics, and mechanical principles is called upon in occupations from agricultural enterprises to zinc smelters. A basic understanding is needed in an increasingly large number of occupations.

Supervisors - Effective supervisors are in heavy demand in virtually every industry. Executives report that effective supervisors are called upon to use communication skills at high levels with a wide variety of people. They need to apply an understanding of human behavior and group relations. An understanding of the basic processes in their industry is essential.

Analysis and control - Analysis and control through application of clerical, accounting, and statistical processes have become a more pressing need. This is a need that reaches into blue collar plant or field occupations as well as in the office. Information and control systens are set up for processes, materials, inventories, sales and other operations of significance to the firm.

Sales and service - The need for technically trained sales and service representatives was expressed most frequently by wholesale and retail executives but it is common throughout most industries. A substantial portion of product lines in the consumer market includes household durable products, automobiles and other high priced product lines. Most industrial products such as agricultural implements, chemicals and machinery are complex and expensive. To effectively market and service these lines requires technical skills and knowledge of the products, sales training, service orientations and perceptive understanding of the industry.

Office personnel - The need for well-trained secretaries and other skilled office personnel was often expressed either explicitly or implicitly by executives reporting in a wide variety of industries. A combination of maturity, judgment and skill must be brought to the job if the needs of this occupational class are to be met.

I. ANALYSIS OF STATISTICAL SURVEY DATA

Respondents to the occupational survey were asked to identify the job classifications represented in their firm and the number of persons working in each class of jobs. The classifications system outlined by the Dictionary of Occupational Titles was used as a means of matching jobs in the firm with standardized descriptive titles. Two digit subclasses were used in presenting the statistical data. (See Appendix A).

The employer was asked the type of education or training he recommended for each occupational subclass represented in his firm. Five types of education or training were used as choices. They are:

Post-High School, Technical or Skilled Training Programs

Community College Two-Year General Course

Community College Two-Year Program of Basic and Occupationally Related Courses

College Degree in Appropriate Major Field

Professional Degree

These types of education and training programs were described as those which take place off-the-job as opposed to informal or casual training on-the-job. If no off-the-job training was recommended, the choice was indicated as "none".

Interviewers were instructed to include public training programs designed to meet specific technical job requirements, apprenticeship programs, in-the-plant formal training, private school occupational training, and evening school vocational courses under the heading of technical or skill training. Thus, the technical training program choice included evening school courses as well as day programs designed to meet specific technical job requirements taught in a community college program.

Figures 6 through 10 present the data according to questionnaire returns. The analyses are reported in the following sections.

General Statistical Analysis

Either a general or an occupationally oriented community college program was recommended as the proper kind of education or training for over 1,300 jobs represented in the survey. These jobs are concentrated in the professional-technical-managerial and the clerical-sales occupational categories. The manufacturing, wholesale-retail, and services segments of industry are the major sources of these occupations for which a

community college program is recommended. (See Figures 7 and 8).

A technical training program was recommenced for 5,036 jobs in occupational categories identified in the survey. A technical program for the machine trades in manufacturing industries was recommended with the greatest frequency. (See Figure 6).

Four-year college and professional degree programs were recommended for a considerable number of jobs in the professional-technical-managerial occupational classes. The first two years of a four-year college or professional degree program may be taken at a community college.

Therefore, the community college may be considered as occupational preparation for the 1,178 jobs for which a college or professional degree was recommended. (See Figure 9 and 10).

The survey reveals very strong support for formal training as preparation for many occupations represented in the IVCC area. Such training programs are not necessarily related to the community college. However, interview discussions which supplement the questionnnaire statistical data disclosed little reluctance and in most cases a solid interest in the community college as an institution through which efforts can be made to develop effective occupational training. Interest was based upon the expectations that the curriculum, would be up-to-date, effectively taught, and supported with the proper laboratory or shop equipment.

Another finding of the survey is the information that modern industry requires a general upgrading of educational level for many occupations. Even though the specific training may be done informally or on-the-job rather than through formal training, employers have stated on numerous occasions that it is necessary to have a better basic educational background than ever before if specific job training is to be carried out properly on the job. It may be assumed that there are a number of occupational levels that would require the maturity and

educational background that a community college can provide. This educational background would not necessarily be considered recommended training for an occupation but an important link in the process of becoming occupationally proficient.

Statistical Summary

Technical Program (Figure 6). The technical program was recommended most frequently for occupations represented in the survey. The manufacturing industry heavily favors this type of training. Farms as production units were not included in the survey and the statistical table should be considered with this in mind. Also, mining firms were included with manufacturing because all but a few represented in the survey combined manufacturing operations with mining. When these facts are taken into consideration, occupations in government organizations were least apt to have a formal training program recommended.

Community College General Course (Figure 7). The two-year community college general course of study was the least favored by employers as training for occupations represented. This is a general statement and should not be applied to specific occupations. Sales and clerical occupations in manufacturing and services, and management occupations in distribution appear to be the most acceptable as areas for which the two-year general course is recommended by a number of employers.

Community College Occupationally Related Two-Year Program (Figure 8) The occupationally related community college two-year program was recommended for approximately 1,000 jobs represented in the survey. This compares with over 5,000 for which a shorter technical program was represented, and 344 jobs for which a general two-year community college course of study was recommended. This type of education is the most frequently recommended for management-technical and clerical-sales occupations. These occupations are concentrated in manufacturing and service industries.

College Degree or Professional Degree (Figures 9 and 10). The four-year college degree with appropriate major or the professional degree program as the type of education recommended, is heavily concentrated in the manufacturing and services industries at the professional-technical-managerial level of occupations. Since an increasingly large number of young people attend a community college before transferring to a four-year college, a two-year general college program may be considered as related to the four-year college recommendation.

FIGURE 6: TECHNICAL TRAINING RECOMMENDED

	Professional, Technical, & Managerial	Clerical & Sales	Service	Farming & Related Occupations	Processing	Machine Trades	Bench Work	Structural Work	Miscellaneous	TOTAL
Agriculture, Forestry and Fisheries	1	4	0	4	0	4	0	1	0	14
Mining	0	0	0	0	0	0	0	0	0	0
Contract Construction	9	6	10	0	0	7	5	248	2	287
Manufacturing	110	201	15	0	197	2081	758	181	89	3632
Transportation, Communication, Electric, Gas, & Sanitary Services	15	33	1	0	0	16	0	4	158	227
Wholesale & Retail Trade	58	54	20	0	26	53	0	1	2	214
Finance, Insurance, & Real Estate	2	101	0	0	0	0	0	0	0	103
Services	153	59	230	2	0	11	0	0	20	475
Government	4	0	34	0	0	0	0	0	46	84
TOTAL	352	458	310	6	223	2172	763	435	317 =	5036

FIGURE 7: COMMUNITY COLLEGE TWO-YEAR GENERAL PROGRAM RECOMMENDED

	Professional, Technical, & Managerial	Clerical & Sales	Service	Farming & Related Occupations	Processing	Machine Trades	Bench Work	Structural Work	Miscellaneous	TOTAL
Agriculture, Forestry, and Fisheries	0	9	0	0	0	0	0	0	0	9
Mining	0	0	0	0	0	0	0	0	0	0
Contract Construction	8	9	0	0	0	0	0	0	0	17
Manufacturing	22	69	0	0	0	0	0	0	0	91
Transportation, Communication, Electric, Gas & Sanitary Services	5	39	0	0	0	0	0	0	0	44
Wholesale and Retail Trade	50	25	0	4	0	4	0	0	0	83
Finance, Insurance, and Real Estate	10	31	0	0	0	0	0	0	0	41
Services	7	50	0	0	0	0	0	0	0	57
Government	2	0	0	0	0	0	0	0	0	2
TOTAL	104	232	0	4	0	4	0	0	0 =	344

FIGURE 8: COMMUNITY COLLEGE BASIC & OCCUPATIONALLY RELATED PROGRAM RECOMMENDED

	Professional, Technical, & Managerial	Clerical & Sales	Service	Farming & Related Occupations	Processing	Machine Trades	Bench Work	Structural Work	Miscellaneous	TOTAL
Agriculture, Forestry, and Fisheries	1	43	0	0	0	0	0	0	0	44
Mining	0	0	0	0	0	0	0	0	0	0
Contract Construction	15	12	0	0	0	3	0	21	0	51
Manufacturing	89	353	0	0	0	[illegible]	0	0	0	472
Transportation, Communication, Electric, Gas, & Sanitary Services	15	6	0	0	0	0	0	0	0	21
Wholesale & Retail Trade	51	64	0	0	0	2	0	0	0	117
Finance, Insurance, and Real Estate	33	44	0	0	0	0	0	0	0	77
Services	160	31	0	0	0	2	0	0	0	193
Government	3	8	0	0	0	0	0	0	0	11
TOTAL	367	561	0	0	0	37	0	21	0	= 986

FIGURE 9: COLLEGE DEGREE IN APPROPRIATE MAJOR FIELD RECOMMENDED

	Professional, Technical, & Managerial	Clerical & Sales	Service	Farming & Related Occupations	Processing	Machine Trades	Bench Work	Structural Work	Miscellaneous	TOTAL
Agriculture, Forestry, and Fisheries	39	0	0	0	0	0	0	0	0	39
Mining	0	0	0	0	0	0	0	0	0	0
Contract Construction	16	1	0	0	0	0	0	0	0	17
Manufacturing	503	21	0	0	0	0	0	1	0	525
Transportation, Communication, Electric, Gas, & Sanitary Services	26	3	0	0	0	0	0	0	0	29
Wholesale and Retail Trade	49	2	0	0	0	0	0	0	0	51
Finance, Insurance, and Real Estate	64	18	0	0	0	0	0	0	0	82
Services	119	1	0	0	0	0	0	0	0	120
Government	5	0	0	0	0	0	0	0	0	5
TOTAL	821	46	0	0	0	0	0	1	0	= 868

FIGURE 10: PROFESSIONAL DEGREE RECOMMENDED

	Professional, Technical, & Managerial	Clerical & Sales	Service	Farming & Related Occupations	Processing	Machine Trades	Bench Work	Structural Work	Miscellaneous	TOTAL
Agriculture, Forestry, and Fisheries	0	0	0	0	0	0	0	0	0	0
Mining	0	0	0	0	0	0	0	0	0	0
Contract Construction	3	0	0	0	0	0	0	0	0	3
Manufacturing	67	0	0	0	0	0	0	0	0	67
Transportation, Communication, Electric, Gas, & Sanitary Services	1	0	0	0	0	0	0	0	0	1
Wholesale & Retail Trade	12	1	0	0	0	0	0	0	0	13
Finance, Insurance, and Real Estate	0	0	0	0	0	0	0	0	0	0
Services	225	0	0	0	0	0	0	0	0	225
Government	1	0	0	0	0	0	0	0	0	1
TOTAL	309	1	0	0	0	0	0	0	0	= 310

II. AGRICULTURE

There are approximately 8,500 farm operators and regularly hired workers in the IVCC area working on farms. This ranks agriculture as third behind manufacturing and retail trade as a source of employment.

Over one-half of the farms in the area are grain-crop farms; approximately a third are livestock farms. Bureau county, however, is an exception, with more livestock farms than grain-crop farms. There are 61 farms that have recreational income and 126 that have income from forestry products. There are 42 nursery and greenhouse units included in the agriculture sector. (See Figure 11)

Since many of the respondents, representing firms related to farm products, emphasized the importance of a farm background or training, a number of agriculturally related firms will be discussed in this section. Wholesalers and processors of farm raw materials compose one category, while wholesalers and retailers of farm machinery and equipment compose a second.

There are 66 firms in the area employing 298 persons that wholesale farm raw material. This represents less than one percent of employed workers, but it is a more important source of employment in the area than it is on the average for the state. Fifty-four of the sixty-six reporting units employ fewer than eight persons. The remaining 10 firms employ from 8 to 49 persons.*

In the second category, there are 92 reporting hardware and farm implement dealers. These firms employ approximately 540 people. Sixty-five of the 92 firms in the IVCC area are small dealers that employ fewer than 8 persons, but 32 firms employ between 8 and 49 persons. The percentage of workers employed in hardware and farm implement firms relative to total employment in the five-county area is slightly over

*1966 County Business Patterns

one percent; on a statewide basis it is 0.3 percent.

In addition to these wholesale and retail operations directly related to agriculture, there are a number of manufacturing and processing plants. They include the agriculture chemical firms, farm seed plants, feed mills, farm equipment manufacturers, and canning and food processors. Also related are a number of farm services and organizations such as the County Cooperative Extension Service, veterinarians, private farm management services, and Farm Bureau offices.

Farms, as employing units, were not covered directly in the survey so the findings do not include summary statements directly related to on-the-farm occupations.

Findings

Farm Training - Regardless of whether agricultural occupations are on-the-farm, or off-the-farm, according to representatives of the industry, there is a need for employees with farm training or at least a farm background. This is true because of the necessity for people in farm-related occupations to communicate with farm operators and to understand farm operations.

Broad Training - Farm managers and operators need training beyond technical farm operations. Decision making and planning requires a knowledge of agricultural economics and marketing according to farm representatives. Furthermore, the increased use of agricultural chemicals, hybrid seeds, and complex machinery, requires a better understanding of farm sciences. And as a farm unit changes in size and characteristics, an increased emphasis is placed upon communications and supervisory skills.

Specialization - The agricultural industry now calls upon specialized technicians in such fields as dietetics, animal nutrition, agricultural engineering and chemical analysis.

Occupational Gap- In the farm related firms, employers often found the employment of qualified persons difficult due to the levels and combinations of skills required at prevailing wage rates. Many of these positions require people with less than a college or professional degree but with technical training beyond high school.

Trends - There will be considerable amount of occupational change taking place within the agricultural industry; nevertheless, the occupational importance of agriculture is expected to remain as one of the major sources of employment in the area.

In the area studied, the on-farm occupations have been decreasing, but agricultural services and supply occupations have been increasing. The total number of farm operators in this area decreased from 8,248 in 1959 to 7,096 in 1964. The number of regularly hired farm workers has increased from 1,076 to 1,316 during the same period. There were 1,236 fewer farms in 1964 than there were in 1959 but the average size farm increased by 26.4 acres.

In the farm implement sector, there is a trend toward larger and more sophisticated equipment. Diesel and hydraulic types of equipment are becoming more prevalent with the result that mechanics are going to need training in the repair of such mechanized pieces of equipment. There is a further trend toward preventive maintenance of equipment - maintenance that is done periodically, rather than during peak periods.

Education Recommended

Figure 12 is presented to show the type of education or training recommended by employers at the farm-related firms included in the survey. Employers representing these firms recommended a college degree program for the professional-technical-managerial occupations and a community college type of training for clerical and salesworkers.

FIGURE 11

FARM CHARACTERISTICS

IVCC AREA

Number of Farms	
1959	9,267
1964	8,031
Average Size of Farm	
1959	216.4
1964	242.8
Value of Farm Products Sold by Source	
1959	$154,978,163
1964	166,757,831
Number of Farm Operators	
1959	8,242
1964	7,096
Number of Regularly Hired Workers	
1959	1,076
1964	1,316
Farms by Type	
Field Crop	4,441
Livestock	2,280
Dairy	350
General	337
Special Farm Products & Services	
Nursery & Greenhouse	
Farms Producing	42
Income	$635,620
Recreation	
Farms Producing	61
Income	$ 68,050
Forestry Products	
Farms Producing	126
Income	$ 38,223

Source: 1964 U. S. Census of Agriculture

FIGURE 12

AGRICULTURE*

TYPE OF EDUCATION RECOMMENDED FOR OCCUPATIONAL CLASSES

ACCORDING TO JOBS REPRESENTED IN SURVEY RETURNS

Occupations	Professional Or College Degree	Community College	Technical Program	None Beyond H.S.	Total
Professional, Technical, & Managerial	39	1	1	1	42
Clerical & Sales	0	52	4	1	57
Service	0	0	0	6	6
Farming	0	0	4	26	30
Processing	0	0	0	0	0
Machine Trades	0	0	4	4	8
Bench Work	0	0	0	0	0
Structural Work	0	0	1	0	1
Miscellaneous	0	0	0	14	14
Total	39	53	14	52	= 158

Source: Survey Questionnaire

* The values in the table represent the sum of the number of employees, reported in each returned questionnaire, within an occupational class, for which a given type of formal training was recommended.

The statistical data presented for agriculture is not representative of the total agricultural industry because the returns came only from agriculturally related distributors of farm products. Questionnaires were not sent to individual farm units.

III. CONTRACT CONSTRUCTION

There are 394 contract construction firms in the IVCC area. These firms employ approximately 2,000 persons. Four percent of the workers in the area are employed in contract construction. This compares with the state figure of five percent. More of the contract construction firms are small in terms of employment; 364 firms employ less than 20 persons and 18 firms employ more than 20 persons. (See Contract Construction Data, p.30)

Included in the category of contract construction are general building contractors, contractors of construction other than "buildings", and contractors in special trades. There are 113 building contractors with a reported employment of 605 persons. If the employment figures were disclosed for small firms, it is estimated that this figure would at least double to approximately 1,250 persons. There are 21 general contractors of construction other than "buildings" that employ 118 persons.

Contractors in the special trades include those in plumbing-heating-air conditioning, electricity, masonry, carpentry, roofing and sheet metal, and other miscellaneous trade groups. The plumbing, heating and air conditioning trade represents the largest number of employees. Painting, electricity, masonry, and carpentry trades rank next in that order. There are a total of 248 special trade contractors employing 934 tradesmen in the IVCC area.

The employment figures in the contract construction industry are approximations due to the fact that some units do not have employment figures included in the statistics reported because of disclosure policy. The sub-classifications are those reported in the 1966 County Business Patterns.

Findings

Business Operations - Contractors expressed a need for training in applied business operations. These occupational training needs are both broad as in management and finance, and specific as in the office occupations.

Building Trades - There is a general need for craftsmen in all trades. The crafts mentioned most frequently were carpentry, cement finishing, plumbing, sheet metal, roofing, and mechanics. In the building contracting area, a need was also expressed for heavy equipment operators and welders.

Extended Training - A need for people trained beyond the trade skills was expressed. These people should be able to estimate costs, supervise jobs and trouble shoot on-the-job problems.

Traits - A more general need was stated for people in the industry with desirable traits and a basic knowledge of the industry. Desirable traits were identified as responsibility, leadership, understanding and interest in construction and machinery.

Versatile Training - A need for versatile workers with broad training in several construction trades was listed; these workers would be employed in the installations and servicing of building systems, such as air conditioning, that are the result of technological change. Some installation and service jobs were described as needing persons or groups of persons trained in welding, sheet metal, plumbing, carpentry, electronics, and mechanics; a journeyman's skill is not required, but specific and limited application of these skills is needed.

Sales and Service - Firms that sell supplies as well as contract in a trade expressed a need for sales and service personnel.

Trends - Automatic operation through control systems of operating equipment used in buildings illustrates the trend toward complex

equipment and materials. This calls upon more diversified and technical knowledge of the construction industry.

Some of the major contractors are developing techniques of cost and inventory control through computer application. Smaller firms may also take advantage of data processing methods to achieve better planning and control.

Contract Construction Data*

Contractors:	Number of Employees	Total Reporting Units	Number of Reporting Units By Employment Size Class 1-19	20-99	100-Over
Special Trade	934	248	244	4	--
General-Builders	605	113	103	10	--
General-Except Builders	118	21	17	3	1
Undisclosed	364	12	--	--	1
Totals	2021	394	364	17	1

Education Recommended

College level training is recommended for most professional, technical, managerial, sales and clerical jobs reported in the survey. (See Figure 13). Formal technical training is the predominate recommendation for structural work, bench work and machine trades.

IV. MINING

The 1963 Census of Mineral Industries lists 41 mining firms in the area. Six of the firms employ 20 or more persons. A total of 731 persons are employed in mining occupations, 587 of whom are production workers. The principal products mined in the area are crushed and broken stone, sand and gravel, clay and related minerals. (See Mineral Data, p.33)

In describing the characteristics of the mining industry in

* 1966 County Business Patterns

FIGURE 13

CONTRACT CONSTRUCTION

TYPE OF EDUCATION RECOMMENDED FOR OCCUPATIONAL CLASSES

ACCORDING TO JOBS REPRESENTED IN SURVEY RETURNS

Occupations	Professional Or College Degree	Community College	Technical Program	None Beyond H.S.	Total
Professional, Technical, & Managerial	19	23	9	0	51
Clerical & Sales	1	21	6	0	28
Service	0	0	10	0	10
Farming	0	0	0	0	0
Processing	0	0	0	0	0
Machine Trades	0	3	7	0	10
Bench Work	0	0	5	0	5
Structural Work	0	21	248	0	269
Miscellaneous	0	0	2	0	2
Total	20	68	287	0	= 375

the area, there is some overlapping of the data between mining and manufacturing. For example, several plants combine mining with cement manufacturing. In the statistical treatment of the questionnaires all such firms were classified as manufacturers. The summary of findings below treats mining and related manufacturing as a composite group.

Findings

Three major needs were outlined by representatives of area firms mining and processing sand and gravel, crushed stone, and clay and silica; these products are mined in connection with the processing of construction materials and the manufacture of glass and cement.

Engineers - Mining, chemical, mechanical and electrical engineers are critically needed according to area employers in this industry.

Skilled Tradesmen - Industrial tradesmen are needed to service and repair the machinery that is used. In larger firms, technicians are needed along with industrial craftsmen to keep modern machines serviced.

Supervisors - Training for supervisors and foremen is needed. The degree of differences between the professional or skilled occupations and the unskilled occupations causes some special supervisory problems.

Trends - In the IVCC area, there is a trend toward automation and mechanization of mining operation. Process control for improved quality and uniformity of the product is also an integral part of this technological change. More complex machinery with instrumentation and controls will involve more electrical circuitry and refined mechanical and hydraulic systems. Related to this will be an application of computer and data processing technology.

As a source of employment, the mining industry is expected to decline in importance. In the area, a small decline has been

noted in employment between 1958 and 1963

Mineral Industry Data*

Establishments	
Total Number	41
With 20 or More Employees	6
All Employees	
1963	731
1958	769
Production & Development Workers	587
Value Added ($1,000)	$461,558

Education Recommended

Mining Firms were coded with manufacturing firms and therefore do not appear as a spearate industrial class in the tabular presentation of education recommended. Most mining firms included in the survey combined manufacturing with mining. Interview summaries and questionnaire returns from several large mining firms are available to college officials.

V. MANUFACTURING

There are 24,025 persons employed in 269 manufacturing plants located in the LVCC area. This represents 49 percent of the total employment and ranks first as a source of employment. On a state-wide basis, 41 percent of all employment is in the manufacturing occupations.

The 269 manufacturing firms range in size in a typical pattern. There are 145 firms that employ fewer than 20 persons; 70 firms employ between 20 and 99 persons; and 54 firms employ over 100, nine of which employ over 500 workers. (See Figure 14 and 15)

*1963 Census of Mineral Industries

FIGURE 14

RANK ORDER OF MANUFACTURING INDUSTRY BY
MAJOR SEGMENTS ACCORDING TO
REPORTING UNITS
IVCC AREA-1966

	Rank	Total Reporting Units	Number of Reporting Units By Employment Size Class 1-19	20-99	100-Over
Food & Kindred Products	1	49	30	16	3
Machinery (Except Elecrical)	2	27	14	8	5
Stone, Clay & Glass Products	3	27	11	5	11
Fabricated Metal Products	4	25	12	5	8
Printing, Pub. & Allied Prod.	5	24	17	5	2
Chemicals, & Allied Products	6	12	5	4	3
Apparel & Related Products	7	8	-	5	3
Primary Metals	8	8	4	1	3
Lumber & Wood Products	9	7	4	1	2
Electrical Machinery	10	6	1	-	5
Transportation Equipment	11	6	3	1	2
Instruments, & Related Prod.	12	4	1	1	2
Paper & Allied Products	13	4	1	2	1
Rubber & Misc. Plastics	14	3	-	2	1
Leather & Leather Products	15	2	-	1	1
Textile Mill Products	16	1	-	-	1
Unclassified		56	42	13	1
Totals		269	145	70	54

SOURCE: 1966 County Business Patterns

FIGURE 15

FRANK ORDER OF MANUFACTURING INDUSTRY BY MAJOR SEGMENTS ACCORDING TO NUMBER EMPLOYED IVCC AREA-1966

	Ranking	Number Of Employees*
Stone, clay & Glass	1	6,580
Instruments & Related Products	2	3,000
Fabricated Products (Metal)	3	2,200
Food & Kindred Products	4	1,441
Machinery (Except Electrical)	5	1,398
Electrical Machinery	6	1,330
Chemicals & Allied Products	7	880
Primary Metals	8	800
Printing, Publishing, & Allied Products	9	799
Transportation Equipment	10	768
Rubber & Miscellaneous Plastics	11	710
Apparel & Related Products	12	650
Paper & Allied Products	13	450
Lumber and Wood Products	14	400
Leather & Leather Products	15	400
Textile Mill Products	16	175
Unclassified		2,044
Total		24,025

*Numbers of employees in some industries listed are estimates based upon interpolation in tables reporting number of firms by size classes

SOURCE: 1966 County Business Patterns

The manufacturing groups that employ more than 1,000 persons include the following SIC classes:

Stone, clay and glass products

Instruments and related products

Fabricated metal products

Food and kindred products

Machinery (except electrical)

Electrical machinery

Within a year's time it is expected that the primary metals segment will employ an additional 1,500 persons. There is also more plant expansion planned by chemical firms. Paper processing is a secondary product in a number of large plants, but this factor is not included in the statistical data.

The less important segments of manufacturing as employment sources in the area according to County Business Patterns using SIC classifications, are manufacturers of paper and allied products, lumber and wood products, leather and leather products, and textile mill products. Each of these industrial segments employ less than 500 persons.

On a national basis, the stone, clay and glass SIC class ranks eleventh compared to the number one rank in the IVCC area; instrument manufacturers rank second within the IVCC area - thirteenth nationally. Fabricated metal products manufacturers rank sixth compared to an area rank of third.

Machinery manufacturers, both electrical and non-electrical, rank highest as a source of employment nationally. They rank fifth and sixth in the IVCC area.

Basic Findings

Machinists - The most commonly expressed occupational need by

manufacturers is for machinists and related semi-skilled and technical occupations.

The need for up-grading training in this family of occupations was expressed by employers. Sophisticated controls and instruments and new materials call for increased knowledge of basic physical sciences and mathematics as well as manipulative skills. These men need keen insight into the processes and they need theoretical knowledge as problem solvers and trouble shooters.

Engineers - A basic need persists in manufacturing plants for engineers. Specifically mentioned were electrical, ceramic, chemical and industrial engineers.

Mechanics and electricians - Machinery and equipment mechanics and electricians are in demand throughout the manufacturing industry, manufacturing firms running with tight schedules and cost margins cannot tolerate excessive down time. An organized, problem-solving approach is required to repair machinery under these conditions; the trial and error method is too prevalent today.

Applied Science - Training in the modern industrial application of chemistry, hydraulics, and electronics was stressed as a need on numerous occasions. Semi-skilled, skilled and supervisory occupations need men who can discuss and relate to technical terms and concepts even though they are not professionally trained in the physical sciences. An ability to understand basic mathematics is a related need. These needs are especially critical in the stone, clay and glass, primary metals, chemical, and plastic industries. These are generally a requirement for any modern industrial plant.

Drafting - Drafting and blueprint reading were expressed as needs many times. While there is apparently a need for draftsmen as employees in a specific occupation, the ability to use this technical media as a tool was expressed more generally as a basic need for

most manufacturing occupations.

The lack of an ability to read blueprints and layouts is essentially a communication problem in industry. It also relates to technical training in the basic sciences and mathematics up to the level that permits the professionally trained person to communicate with the foreman who in turn must communicate with the operator.

Intermediate Level Technician - Training at the intermediate level for technicians was stressed by employers. The laboratory technician, the electronic technician, the production control analyst, and the semi-skilled operators and assemblers were mentioned a number of times.

Other Special Findings

In addition to the basic needs of manufacturing firms, there are some special conditions in certain classes of manufacturing that result in other more specialized training and occupational needs.

Stone, Clay and Glass - It is difficult to summarize statements made by the several large firms in this group because there is not a concensus as to specific needs. The basic needs are consistent with those described above. Reference may be made to transcribed interviews and questionnaire returns by individual firms for more particular statements.

Instruments and Related Products - While this segment of manufacturing is second in importance as a source of employment in the area, the total number of employees at the Westclox Division of General Time Corporation influences the total for this manufacturing group to such an extent that the findings will not be reviewed in this report. College officials have access to the interview summary and the returned questionnaire.

Fabricated Metal Products - Machinery - Primary Metals - These three classifications of manufacturing firms are considered as a related group and of such potential importance in the area that a special report has been written to complement the field investigation. The specific needs expressed in the questionnaire and interviews are summarized in the following paragraphs.

Professional metalurgists and other plant operators with some training in metalurgy or chemistry are needed in the metals industry. The trend toward the production of special metals and metal coatings for particular uses requires a general upgrading of training for most occupations in the metals industry.

The need for welders and for training in new welding techniques was mentioned specifically by a number of employers.

In addition to the above, there is a common need for trained workers in a number of other occupations as discussed in the opening section of this chapter. The metals industry employers stressed present and future needs for a number of these occupations. They include the following:

Machinists and toolmakers

Engineers

Electricians

Industrial craftsmen for maintenance

Instruments and control system technicians

Supervisors and supervisory training

Stenographers, bookkeepers and other office personnel

Food and Kindred Products - Executives of the food and kindred products industry located in the area expressed a need for food technologists. Other needs within the industry were qualified office help and supervisory personnel for the shop and the sales staff.

A special section on food production and food services is included

in this report to complement the questionnaire returns. This category of manufacturing is an important one for the area; it ranks fourth in importance as an employment source. It is even more important when considered in relation to agriculture and food services.

Chemical & Allied Products - Rubber & Plastics - A particular emphasis was placed upon laboratory technicians and process control technicians. Other general industrial needs were stated that were similar to those that have been previously discussed.

Chemistry and chemical processes are so basic to modern industry that a special report has been prepared; it is included in Chapter III of this report. It may also be noted that the Technician Curriculum Committee of the American Chemical Society makes its recommendations for a curriculum designed for chemistry technicians in the May 22, 1967, issue of Chemistry and Engineering News.

Printing and Publishing - Representatives of the printing and publishing industry in the IVCC area refer to industry needs in terms of a higher level of basic education and a better understanding of the printing industry on the part of those entering the printing trades. Other more specific training needs expressed included the following:

Instructions in principles of machinery and its maintenance

A course for foremen in industrial relations

An up-grading of knowledge and skills on new types of printing

Improved abilities in basic spelling and typing

Several large printing and publishing firms have described their particular needs in interview summaries and questionnaire returns on file.

Education Recommended

Questionnaire returns from manufacturing firms indicate a strong preference on the part of employers for formal training at the college

level in occupations of professional, technical, and managerial levels, as well as those of a clerical and sales nature. The importance of special technical training in these occupations is also indicated.

Formal technical training is the predominate type of education recommended for the machine trades and other manufacturing occupations within the plant. Occupations in the machine trades dominate the major categories listed in Figure 16 supporting the statements made previously about the need for training in the machine trades.

VI.
TRANSPORTATION, COMMUNICATION, ELECTRIC, GAS AND SANITARY SERVICES

There are 252 firms that employ approximately 3,400 persons in this industry. Although most of the firms are engaged in transportation, most of the employees are employed by public utilities.

The transportation industry in the IVCC area is represented by 171 reporting firms; 13 are local passenger transportation companies, 156 are local and long distance trucking firms, and 2 provide water transportation service. Two firms employ over 100 workers and 12 firms employ between 20 and 99 persons. The rest of the firms are very small, with fewer than 20 employees. (See Industry Data, p.43)

The communications industry in the area is represented by 28 reporting firms with approximately 806 employees. Eleven of the 28 firms are telephone companies. Four firms employ over 100 persons. Most of the firms employ between 8 and 19 persons.

The electric, gas and sanitary service group employs 305 persons in ten firms. Five firms employ fewer than 20 persons; two firms employ between 20 and 99; three firms employ more than 100 persons.

Findings

Transportation - Local drivers are in short supply. Applications, however, for long haul truck driver positions indicate that an adequate

FIGURE 16

MANUFACTURING

TYPE OF EDUCATION RECOMMENDED FOR OCCUPATIONAL CLASSES

ACCORDING TO JOBS REPRESENTED IN SURVEY RETURNS

Occupations	Professional Or College Degree	Community College	Technical Program	None Beyond H.S.	Total
Professional, Technical, & Managerial	570	111	110	95	886
Clerical & Sales	21	422	201	286	930
Service	0	0	15	88	103
Farming	0	0	0	0	0
Processing	0	0	197	674	871
Machine Trades	0	30	2,081	679	2,790
Bench Work	0	0	758	1,051	1,809
Structural Work	1	0	181	40	222
Miscellaneous	0	0	89	124	213
Total	592	563	3,632	3,037	= 7,824

number of qualified people are attracted to this field. Employers expressed a need for business management training and for shop welding and mechanics courses.

Utilities - Employers from telephone, gas, and electric utilities stated a need for evening training programs. Mathematics, physics, electronics, and data processing were subjects specifically mentioned.

Telephone - In the telephone industry, there is a continuous training program carried on for the skill occupations and for communication technicians. These occupations include the lineman, cable splicers, technical transmissionmen, and servicemen.

Office - Central office people are needed in the utilities. Specifically mentioned were stenographers, data processing operators, and customer relations representatives.

Individual questionnaire returns from major utilities provide more specific occupational and training needs.

Industry Data* Type of Service:	Number of Employees	Total Reporting Units	Number of Reporting Units By Employment Size Class 1-19	20-99	100-Over
Trucking & Warehousing	931	156	146	8	2
Communication	806	28	22	2	4
Local Passenger Transportation	(D)	13	11	2	-
Electric, Gas & Sanitary Service	305	10	5	2	3
Water Transportation	(D)	2	-	2	-
Undisclosed	313	43	-	-	-
Total	3,413	252	184	16	9

(D) Refers to data not disclosed.

*1966 County Business Patterns

Education Recommended

The information in Figure 17 suggests a heavy concentration of training through special technical programs. Although much of this training is done by utilities through their own programs, interest was shown for evening programs in basic courses. Answers to open-end questions combined with statistical data from the questionnaires implies that management and office occupations are other occupational categories in which college training is recommended.

VII. WHOLESALE AND RETAIL TRADE

Firms in the wholesale and retail industrial classification employ over 11,000 persons or 24 percent of all employed persons in the area. This compares with 25 percent employed in this sector at the state level. Wholesale and retail trade as a source of employment ranks second after manufacturing in the area.

The majority of the 1,899 firms are small in size; 1,787 of these firms employ fewer than 20 persons. Stores that employ twenty or more persons number 112, three of which employ over 100. (See Retail Trade Data, p.48)

At the retail level, the most important types of stores according to rank by employment size are: eating and drinking places, food stores, automotive dealers and service stations, general merchandise stores, and building materials and farm equipment stores.

At the wholesale level, the most important sources of employment are in order of rank: wholesalers of farm products, motor vehicle and automotive equipment, groceries, and electrical goods.

Findings

Salespersons - There is a need for qualified persons in the sales and sales-related occupations who are trained in the marketing of

FIGURE 17

TRANSPORTATION & UTILITIES

TYPE OF EDUCATION RECOMMENDED FOR OCCUPATIONAL CLASSES

ACCORDING TO JOBS REPRESENTED IN SURVEY RETURNS

Occupations	Professional Or College Degree	Community College	Technical Program	None Beyond H.S.	Total
Professional, Technical, & Managerial	27	20	15	2	64
Clerical & Sales	3	45	33	54	135
Service	0	0	1	3	4
Farming	0	0	0	0	0
Processing	0	0	0	0	0
Machine Trades	0	0	16	0	16
Bench Work	0	0	0	0	0
Structural Work	0	0	4	0	4
Miscellaneous	0	0	158	82	240
Total	30	65	227	141 =	463

specific lines of merchandise. The level of training needed for these occupations varies from the professional degree for sales-engineers to intensive training for sales-technicians and sales-consultants. Employers stated an almost limitless need for qualified and productive sales representatives.

Physical Skills - There is a need for craftsmen, technicians, and tradesmen in retail stores. Specifically mentioned were such diverse examples as mechanics, butchers, jewelry craftsmen, tailors, upholsterers, and installers of floor coverings.

Wholesale and retail establishments are often engaged in processing, fabricating, installing, servicing, and repairing as well as in marketing activities. They often call upon a number of occupational skills not commonly thought of as related to distribution. The most commonly mentioned occupational needs that require physical skills were for tractor or auto mechanics, body repairmen, butchers, and persons able to prepare food and beverages.

Technicians - Technicians are needed to install, service and repair products sold to customers. In the larger stores, there is also a need for craftsmen or technicians to maintain the physical plant and equipment. These skills include those in the fields of electronics, hydraulics, electricity, chemistry, and mechanics.

Business Management - The many small retail shops require management personnel with a broad business training. The larger stores call upon functional specialists and middle management people. The management functions of planning, organization, directing and control are of primary importance to these occupations. Employers stated that the major barrier to expansion is the lack of trained management personnel.

General Need - Employers in the wholesale and retail industry expressed a general need for employees at all levels. The lower than average unemployment rates in the area, the large number of competing

firms, and the comparatively low wage scales for many entry jobs in the industry are stated as reasons behind the present general need for personnel.

Trends - Questionnaire returns and interviews reveal a number of trends that relate to occupations and training. The operation of a retail or wholesale establishment will require more precision and scientific operation of management practices. Control and analysis of sales and inventory are becoming particularly important and often make use of data processing equipment. Some stores in the area are making use of punched tape equipment with cash register operation for unit control.

In the automotive trade, it has been suggested that master technicians may replace some journeymen mechanics. Electronic diagnostic testing will become more important as automobile systems become more complex. Specialized technicians in such fields as air conditioning, transmission assemblies, exhaust emmission, control systems, and electrical systems may be replacing some general auto mechanics.

In some retail fields, price competition is becoming less important and service competition more important. The occupational training of effective sales representatives becomes more critical under these conditions.

Wages are expected to increase generally in wholesale and retail trade as more specialists are employed and as productivity increases. There are indications both of more product specializations and, on the other hand, broader product lines in the distributive trades. This, apparently, depends upon the needs of particular segments of the market.

Education Recommended (Figure 18)

A community college program is recommended for 200 jobs represented in the survey in the wholesale and retail industry. Most of this number of jobs fall in the professional-technical-managerial and the

Retail Trade Data:*

Type of Service:	Number of Employees	Total Reporting Units	Number of Reporting Units By Employment Size Class 1-19	20-99	100-Over
Eating and Drinking Places	2,257	394	374	19	1
Food Stores	1,594	189	168	20	1
Automotive Dealers & Service Stations	1,508	302	290	12	-
General Merchandise	1,244	68	47	20	1
Building Materials & Farm Equipment	985	164	159	5	-
Apparel & Accessories	605	120	113	7	-
Furniture & Home Furnishings	25	80	80	-	-
Misc. Retail Stores	1,264	264	255	9	-
Unclassified	457	36	34	-	-
Totals	9,939	1,617	1,520	92	3

Wholesale Trade Data:

Type of Service:	Number of Employees	Total Reporting Units	Number of Reporting Units by Employment Size Class 1-19	20-99	100-Over
Farm Products - Raw Material	298	66	65	1	-
Motor Vehicle & Automobile Equipment	141	19	17	2	-
Groceries & Related Products	132	19	17	2	-
Electrical Goods	84	11	11	-	-
Machinery, Equipment, & Supplies	28	11	11	-	-
Misc. Wholesalers	744	86	76	10	-
Unclassified	367	72	70	2	-
Totals	1,794	284	267	17	-

*1966 County Business Patterns

FIGURE 18

WHOLESALE & RETAIL

TYPE OF EDUCATION RECOMMENDED FOR OCCUPATIONAL CLASSES

ACCORDING TO JOBS REPRESENTED IN SURVEY RETURNS

Occupations	Professional Or College Degree	Community College	Technical Program	None Beyond H.S.	Total
Professional, Technical, & Managerial	61	101	58	106	326
Clerical & Sales	3	89	54	286	432
Service	0	0	20	57	77
Farming	0	4	0	0	4
Processing	0	0	26	10	36
Machine Trades	0	6	53	32	91
Bench Work	0	0	0	69	69
Structural Work	0	0	1	0	1
Miscellaneous	0	0	2	3	5
Total	64	200	214	563 =	1,041

clerical-sales occupational categories. A technical program was recommended for an additional 214 jobs scattered throughout most of the occupational classes. A college degree was recommended for 64 other jobs in the wholesale and retail trade.

VIII. FINANCE, INSURANCE, AND REAL ESTATE

There are 292 firms represented in the finance, insurance and real estate industry in the IVCC area. These firms employ approximately 1,500 persons or approximately three per cent of the total number employed. This percentage figure compares with six per cent for the state of Illinois.

Most of the firms are typically small in terms of numbers employed; 277 out of the total of 292 firms employ fewer than 20 persons. Fifteen firms employ between 20 and 100 persons. (See Industry Data,p.52)

The finance segment of this industry is represented primarily by banks although there are almost as many personal and commercial credit agencies, other than banks, that are represented. There are 596 persons employed in banks located in the area.

Insurance carriers, insurance agents, and brokers employ 366 persons and rank second in importance among the segments of this industry. There are 100 insurance offices located in the area.

Also included in this industry are 49 real estate offices with 130 employees. Most of the offices are small although one real estate office employs over 20 persons.

Findings

Office occupations - The most commonly expressed needs in this industry are in office occupations. Bookkeepers and other record-keeping machine operators are the most critically needed. Secretaries and stenographers were also mentioned many times as critical occupations.

The banks and other larger offices are using data processing equipment and need operators and systems people.

Employers also stated a need for sales and service representatives. These occupations usually require a considerable amount of formal training commonly carried out on the job. It is, therefore, very important to select trainees carefully. Business background in such courses as finance, commercial law, and economics are considered important. These courses help in the self-selection process and provide a background for more effective training on the job.

Employers expressed a concern for improving the general business education of workers in all occupational areas reported in the industry. Basic business courses in office management and courses related to finance, insurance and real estate were mentioned. In addition, they expressed a need for skill training to keep abreast of new methods, systems, and equipment in use in the offices.

Trends - There has been a trend towards mechanizing many of the office functions, particularly in banks. This trend will likely continue with the possibility that some of the data processing and computer work now contracted for off the bank premises will be done on the premises.

Real estate offices, credit agencies, and insurance offices are also becoming more oriented toward the use of electronic data processing equipment. There is also a trend in the direction of higher requirements for insurance and real estate employees. More professional type training programs will be needed to meet the new standards.

Industry Data*

Type of Firms:	Number of Employees	Reporting Units	Number of Reporting Units 1-19	20-99	100-Over
Banking	596	42	33	9	-
Insurance Carriers	171	14	11	3	-
Insurance Agents-Brokers	195	86	85	1	-
Credit Agencies	139	32	32	-	-
Real Estate	130	49	48	1	-
Unclassified	281	84	83	1	-
Totals	1512	292	277	15	

*1966 County Business Patterns

Education Recommended (Figure 19)

A technical program is most heavily favored as the type of training recommended for clerical and sales employees in the finance-insurance-real estate industry. A college program, either community college or four-year college, is recommended for about an equal number of other jobs in the same occupational category. Some type of college training is recommended for 107 of the 109 jobs represented in the professional-technical-manager occupational class.

SERVICES

The services area in the State of Illinois is the source of 16 per cent of all persons employed. In the IVCC area, services are the source of employment for 11 per cent of all persons employed.

There are 920 firms in the area that represent the services industry. These firms employ 5,258 persons. A large majority of these firms are small with fewer than 20 employees. Thirty firms are of moderate size and employ from 20 to one hundred employees. Six firms in the services industry employ more than one hundred. (See Figure 20)

The service industry is rated by the U.S. Department of Labor as an area of rapidly increasing employment trend. It is

FIGURE 19

FINANCE, INSURANCE, REAL ESTATE

TYPE OF EDUCATION RECOMMENDED FOR OCCUPATIONAL CLASSES

ACCORDING TO JOBS REPRESENTED IN SURVEY RETURNS

Occupations	Professional Or College Degree	Community College	Technical Program	None Beyond H.S.	Total
Professional, Technical, & Managerial	64	43	2	0	109
Clerical & Sales	18	75	101	95	289
Service	0	0	0	6	6
Farming	0	0	0	0	0
Processing	0	0	0	0	0
Machine Trades	0	0	0	0	0
Bench Work	0	0	0	0	0
Structural Work	0	0	0	0	0
Miscellaneous	0	0	0	0	0
Total	82	118	103	101	= 404

FIGURE 20

RANK ORDER OF SERVICES INDUSTRY BY

MAJOR SEGMENTS ACCORDING TO

REPORTING UNITS
IVCC AREA-1966

	Number of Employees	Total Reporting Units	Number of Reporting Units By Employment Size Class		
			1-19	20-99	100-Over
Medical Services	2,315	193	176	11	6
Non-Profit Services	593	173	172	1	-
Personal Services	598	157	153	4	-
Legal Services	116	64	64	-	-
Amusement & Recreation	215	46	44	2	-
Auto Repair Services	146	45	44	1	-
Hotels,Rooming House, Camps	380	28	22	6	-
Educational Services	114	18	17	1	-
Misc. Business Services	62	18	18	-	-
Misc. Repair Services	45	16	16	-	-
Unclassified	674	162	158	4	-
Totals	5258	920	884	30	6

Source: 1966 County Business Patterns

The services industry is rated by the U. S. Department of Labor as an area of more than average projected employment growth. It is now regarded as a key industry in the U. S. economy (See "Services Now Key Economy" in the Chicago Daily News for August 16, 1967, p.47)

The major divisions of the services industry are the hotels and lodging places, personal services, automobile repair services, amusement and recreation services, medical and health services, legal services, and other miscellaneous repair and business services.

The medical and health service area is by far the most important with 2,315 persons employed in 193 offices or health service organizations. Personal services and non-profit organizations each with approximately 600 persons rank next in importance.

Findings

Health Services - A special report has been prepared for the health and medical service group of occupations. It is presented in Chapter III with other special reports. Since the IVCC area needs are very similar to a pattern of occupational and training needs generally throughout the country, no special mention will be made at this point about the health and medical service needs for the area. An interview summary and questionnaire from a large hospital pinpoint some of the specific hospital needs.

The American Hospital Association recently completed an inventory of current employees, shortages and future requirements for 32 occupations. (American Hospital Association, Manpower Resources in Hospitals, 1966). The Illinois Statistics are reported in the Supporting Data Section. Data on punched cards are available for each county.

Personal Services - The needs expressed by managers of personal services establishments were diverse and are difficult to state generally. There is a overall employment shortage of competent persons in the

personal service area. The semi-skilled and skilled occupations typically require specialized post high school training commonly acquired through private schools or on the job.

Legal Services - The most commonly expressed need by the legal profession was for well-trained legal secretaries. In addition to a high level of shorthand skill in legal terminology, lawyers expect the legal secretary to possess above-average human relations talents to be able to work with clients. A general knowledge of legal processes is also necessary.

Automobile Repair and Service - Garage managers, almost without exception, were quick to express a need for mechanics. Other occupations needed include: upholsterers, body and fender men, and sales and service representatives.

Miscellaneous Groups - There was reported a need for power mechanics including those with training in turbine engines and hydrostatic drive machinery. In the hotels and lodging establishments, the need for employees skilled in human relations was stressed. Business services are looking for trained personnel in general business and finance. Trained librarians and teachers need a college degree but the community college was mentioned a number of times as a logical institution for college courses in the first two years and for refresher and specialized courses.

Education Recommended (See Figure 21)

The heavy concentration of health and medical services in this section is reflected by the large number (345) of professional-technical-and managerial jobs for which a professional or college degree is recommended. A Community college education is recommended for 250 jobs in the services sector and formal technical training is recommended for 475 jobs covered by the survey in the services industry.

FIGURE 21

SERVICES

TYPE OF EDUCATION RECOMMENDED FOR OCCUPATIONAL CLASSES

ACCORDING TO JOBS REPRESENTED IN SURVEY RETURNS

Occupations	Professional Or College Degree	Community College	Technical Program	None Beyond H.S.	Total
Professional, Technical, & Managerial	344	167	153	58	722
Clerical & Sales	1	81	59	53	194
Service	0	0	230	159	389
Farming	0	0	2	0	2
Processing	0	0	0	0	0
Machine Trades	0	2	11	0	13
Bench Work	0	0	0	3	3
Structural Work	0	0	0	0	0
Miscellaneous	0	0	20	0	20
Total	345	250	475	273 =	1,343

CHAPTER III

SPECIAL REPORTS

A number of persons with competency in a specialized field were asked to contribute a brief paper relative to occupations and training in a given industry. They were asked to consider occupations and training broadly relative to critical needs, trends and training conditions. In most cases their comments are based upon national and state data rather than upon area information.

The consultants used for reporting the information in this chapter are on the faculty and staff at Northern Illinois University. The section on the Chemical Process Industry was prepared by Dr. Joe W. Vaughn, Associate Professor of Chemistry.

Dr. James C. Warner prepared the Metals Industry report and Dr. Erwin C. Hamm prepared the Electrical Machinery, Equipment, and Supplies Industry section. Both of these consultants are Associate Professors in the Department of Industry and Technology.

The Health and Medical Service report was written by Dr. Annette Lefkowitz, Professor and Head of the School of Nursing. The Food Service section was prepared by Mr. Robert Buchanan, Associate Director of Auxiliary Services.

Dr. Doris Crank, Associate Professor of Business Education, wrote the Office Industry report.

I. CHEMICAL TECHNICIANS -CHEMICAL PROCESS INDUSTRY

The chemical process industry (cement, paint, plastics, adhesives, steel and custom blended chemicals) has several critical needs at the present time. These needs stem from increased production in these specific fields, from new products and from a steady increase in the demand for the industry's end products. Although the end products of these various industries are widely divergent, all of them make use of technical personnel with rather similar backgrounds.

Occupational Needs

With increased growth in the chemical process industry, one of the most pressing needs will be for more chemical technicians. For the purpose of this discussion a technician will be defined as a person intermediate between a professional chemist and a routine laboratory worker or operator. These technicians must have sufficient chemical background to enable them to be placed in responsible positions in a specific company with a minimum amount of on-the-job training. These technicians must be able to direct the operations of a number of routine laboratory workers, carry out non-routine analyses, treat raw data and be able to recognize errors in these data. For such a position, people with only one year of high school chemistry probably would not have sufficient background to develop into good technicians. These people could do routine work but simply would not have enough technical background to depart from the standard methods.

Occupational Training

It would appear that about the only sources of such technicians would be the vocational schools and junior colleges. The senior colleges are training people for graduate school, research and sales positions, and can not be considered a profitable future source of technicians. However, it

is true that a person with an advanced degree from a four year institution could perform the duties of a chemical technician. This, however, would be a waste of manpower. Some companies have been forced into this position due to the lack of adequately trained technicians. This situation will probably get worse before it improves.

It should be stressed that these technicians are not going to come from the four year schools because the background required for these jobs is different from that required for graduate school or research jobs. To state the problem another way, most graduates of a four year school are heavy on theory and short on practice. (See "Chemistry Core Outlined For Techniciars" in Chemical and Engineering News for May 22, 1967).

One area which is rapidly becoming critical is that of qualified electronics repairmen. These people are needed to maintain equipment both in the laboratory and on the production line.

With increased automation on the production lines, the problem of data storage and processing becomes apparent. This will require people adequately trained in electronic data storage and retrieval. Programmers, computer operators and people trained in the use of cards, tape, and discs are currently in short supply.

Since the trend of increasing automation will continue, the need for trained chemical operators will increase. This will require people who can make minor modifications in existing methods and can correctly use data supplied to them. These people will be very important in the field of custom blended chemicals or speciality products.

Although the end products of the chemical process industry differ, the technical background necessary for their personnel are quite similar. However, it is to be stressed that all have certain specific training requirements and regardless of what institution supplies personnel to these industries, on-the-job training cannot be eliminated.

A common complaint among employers of chemists and chemical technicians is that there isn't enough cooperation between industry and college in setting up the course work in laboratory sections. It would appear that close cocperation between industry and the training institution would be necessary to prepare qualified people for responsible positions in the chemical process industry.

Trends

Indications are that demand for chemical technicians in the chemical process industry will continue to be favorable. It would appear that most companies will continue to expand. A recent survey indicated that companies with 30 per cent of the industry's gross capital assests figure they need more plants and equipment than they have at the present time. (See Chemical and Engineering News, September 4, 1967). The Department of Commerce and the Securities and Exchange Commission indicate the spending for new chemical plants and equipment will total $3.07 billion in 1967.

The polymer field is expected to continue its expansion with out-put increasing in the fields of plastics, resins, elastomers, coatings, and some fibers. The U. S. plastics producers manufactured 13.5 billion pounds of plastics in 1966. This was 16 per cent more than 1965 and poly-styrene was at 100 per cent of plant capacity. In the area of organic chemicals, the current outlook is very favorable.

Inorganic chemicals are growing at a rapid rate and economic growth would indicate new production records during the current year.

II. THE OFFICE INDUSTRY

The office industry as defined in this report includes male and female clerical, secretarial, and data processing jobs in a wide range of industry sectors, including manufacturing, retailing, wholesaling, banking, insurance, and professional services.

Growth in Office Employment*

Employment of clerical and secretarial workers increased almost steadily between 1947 and 1967, rising about 48 per cent. This rapid increase in employment of clerical workers can be attributed to growth of the economy, growth in size and complexity of modern business organizations and governments, and the rapid increase in the amount of communications conducted through mail, telephone, and telegraph.

Clerical and secretarial workers comprise the largest group of all white-collar workers and are employed in manufacturing, wholesale and retail trade, public administration, insurance companies, finance and real estate firms, educational institutions, and professional service organization.

Future Demands in Office Employment

Technological developments are expected to affect growth in employment requirements for clerical and secretarial workers. The use of electronic computers, bookkeeping and calculating machines, and other mechanical devices for the purpose of processing routine and repetitive work is expected to result in substantial reductions in the number of clerks employed in such routine jobs as filing, sorting bank checks, making up payroll, keeping track of inventories, and billing customers.

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*The material regarding national growth and trends in office employment has been adapted from The Outlook for Technological Change and Employment, February, 1966.

Growth in the requirements for secretaries, receptionists, and other office workers whose duties require initiative, judgment, and contact with the public is not expected to be significantly affected by technological innovations.

STENOGRAPHERS, SECRETARIES, AND TYPISTS

Employment of stenographers, secretaries, and typists increased by more than two-thirds between 1950 and 1964, rising from nearly 1.6 million to about 2.7 million. Expansion of economic activity and growth in the complexity of modern business tended to increase the volume of paperwork and, thus, employment requirements for these workers.

Stenographers, secretaries, and typists represent the largest group of clerical and kindred workers. Workers in this field are employed by public and private organizations of every size and type. Particularly large numbers work in manufacturing firms, government agencies, schools and colleges, banks, and insurance companies.

Employment requirements for stenographers, secretaries, and typists are expected to increase by more than one-third by 1975, rising to approximately 3.7 million in 1975. The increase in requirements will result from the continued expansion of general economic activity and, in particular, the continued rapid expansion of those industries employing large numbers of clerical personnel, such as finance, insurance, real estate, and banking. Furthermore, as modern business organizations continue to grow in size and complexity, the volume of paperwork also is expected to expand.

Effects of Technological Developments on Future Employment - Technological developments are not expected to limit significantly growth in employment requirements for stenographers, secretaries, and typists as a group during the decade ahead. However, the increased use of duplicating machines, Flexowriters, dictating machines, and other mechanical equipment

is expected to increase output per employee, particularly of workers who perform the more routine tasks.

BOOKKEEPING WORKERS

Employment of bookkeeping workers increased from about 725,000 in 1950 to an estimated 1.1 million in 1964, or by 55 per cent. This increase resulted primarily from expansion of economic activity and growth in the complexity of modern business, which tended to increase bookkeeping activity.

Employment requirements for bookkeeping workers are expected to increase more slowly than they did during the 1950-1964 period, primarily as a result of the increasing use of laborsaving technological innovations. Nevertheless, by 1975, employment needs for these workers may reach 1.4 million, 25 per cent above the number employed in 1964. The increasing use of laborsaving technological innovations will limit the requirements for workers performing the more routine bookkeeping tasks, but there will continue to be many opportunities for bookkeepers capable of assuming responsibility for a full set of books.

Effects of Technological Development on Future Employment - The increasing use of automatic data-processing and other mechanized bookkeeping operations is expected to limit growth in employment requirements for bookkeeping workers. Many types of machines, including posting machines, punch-card machines, and electronic computers, can process accounting and bookkeeping data more accurately, rapidly, and cheaply than it can be done manually. Electronic data-processing machines are expected to be used by more and more establishments for accounting and bookkeeping work, although the application of such equipment will remain far from universal.

OFFICE MACHINE OPERATORS

Employment of office machine operators (excluding typists) increased from an estimated 142,000 in 1950 to about 420,000 in 1964. Although the growing use of electronic computers limited the growth in requirements for

operators of conventional office machines, it resulted in a rapid increase in the employment of operators of computers and auxiliary equipment. The major reason for the employment growth was a tremendous increase in the paperwork requirements of an expanding economy and growth in the size and complexity of modern business.

Office machine operators are employed mainly in firms with sizable recordkeeping requirements. Roughly one-third of all office machine operators work for manufacturing companies. Other large groups work for banks and insurance companies, government agencies, wholesale and retail firms, and transportation and public utility companies. Some office machine operators are employed in "service centers," agencies that contract to handle such tasks as preparing monthly bills and mailing circulars to lists of prospective customers.

Employment requirements for office machines operators are expected to more than double between 1964 and 1975, to about 900,000 workers. The projected increase in employment of office machine operators is based on continued growth of recordkeeping requirements in both the public and private sectors of the economy. Such large employers of office machine operators as manufacturing, insurance, and banking firms are expected to experience significant increases in paperwork volume, as both their volume of sales and number of customers continue to grow.

Effects of Technological Developments on Future Employment - Although employment requirements for office machine operators are expected to increase rapidly in the years ahead, technological developments are expected to limit growth in employment requirements for operators of certain types of office machines. The spread of automated recordkeeping processes may displace some tabulating and billing machine operators, since electronic computers generally perform these functions more efficiently. In addition, as automatic reading devices become a more common component of computer

systems, requirements for keypunch operators to prepare material for use in computers may be adversely affected.

DATA PROCESSING AND INFORMATION PROCESSING WORKERS

As more sophisticated computer systems are introduced in the future, the number of computer and auxiliary equipment operators needed per machine may decline. However, the spread of computer service centers and increasing use of time sharing, which will enable many firms to gain access to automated recordkeeping procedures for the first time, along with the increased applications of computers to more varied functions, should result in a rapid overall increase in the employment of computer operating personnel.

Furthermore, advances in inceroffice communications and electronic computer technology should enable many large private firms and government agencies to consolidate recordkeeping functions at a central location; reducing requirements for office macine operators in many small branch offices without a corresponding increase in requirements for such workers in the central offices.

Analysis--deciding what the computer is to do and designing appropriate procedures--will grow the fastest in the next decade. By 1970, the numbers of people engaged in analysis may be three times what is is today. Next fastest will be programing--writing out the instructions for the computer. This function will be increasingly carried out by the computer itself so that the number of programers will not grow as fast as it has in the past. However, it will likely double by 1970.

On the other hand, the function of computer console operators will almost cease to exist in the computer utility of tomorrow, and consequently their numbers can be expected to increase only through 1970 and then level off. One of the jobs created by office automation is that of keypunch operator, and the demand has never been higher than it is today.

The use of optical character-recognition devices, the capturing of data at its source, computer-to-computer communication, plus other factors leading to better productivity, should eventually cause the growth of keypunch job opportunities to level off. Through 1970, however, continued rapid expansion of computer use should offset jobs lost to mechanization.

SPECIALIZED AREAS MOST GREATLY AFFECTED BY TECHNOLOGICAL CHANGE

Banking - Technological change is expected to be a significant factor affecting employer requirements in banking through the mid-1970's. The major impact of technology will be on employment of clerical workers, where the more widespread use of electronic computers and other technological innovations are expected to reduce unit labor requirements.

In the years ahead EDP is expected to be extended to additional functions, including consumer credit, check account reconciliation, and customer payroll activities, which should add to the volume of banking business with little increase in requirements for clerical workers. Although the automation of banking operations is expected to adversely affect requirements for workers in some occupations, it should increase requirements in others. For example, the growing use of computers, including the peripheral equipment used with them.

Insurance - Insurance employment is not expected to rise as fast as insurance activity. One important reason is the increasing computerization of insurance operations, which is expected to adversely affect the need for clerical workers. In addition, employment growth in clerical and sales occupations may be reduced somewhat by the increasing importance of policies that combine several types of coverage.

Increasing use of data processing and data transmission equipment for home office clerical operations is expected to have an adverse effect on insurance employment growth. The number of routine clerical jobs will probably be reduced significantly. On the other hand, again requirements may

increase for personnel skills in the operation of computers and peripheral equipment.

The banking and insurance industries were among the first to adopt the computer to large-scale operations of a clerical nature. The increasing use of computers has slowed employment growth in these industries in recent years, particularly of clerical workers. In the future computers will be applied to additional management oriented functions and to a greater range of customer services and conveniences. These new applications should in turn continue to adversely affect requirements for clerical workers but create a need for increased numbers of management and professional employees to supervise and operate both the new services and the increased amount of automated equipment necessary to provide them.

Specialized Areas Not Greatly Affected By Technological Change

Real Estate - Technological change is not expected to affect employment growth significantly through the mid-1970's because of the small size of the average real estate firm and because the business is service oriented.

State Government - Although automatic data processing will be increasingly used, it is not expected to be a significant factor in limiting growth in State government employment requirements through the mid-1970's. Employment requirements of State governments are expected to almost double between 1964 and 1975. The projected employment increase will result primarily from the need to expand existing services to meet the needs of a rapidly growing population, especially educational services.

Technological developments are not expected to have a significant effect on employment requirements in the State government through mid-1970's. However, the growing use of automatic data processing equipment for an ever increasing number of functions is expected to affect the occupational characteristics of many jobs in State government. Although fewer routine clerical workers will be needed for such activities as checking, posting, and main-

taining records, the increasing use of automatic data processing equipment for more sophisticated purposes is expected to result in an increased need for management analysts and operators of this equipment.

Local Government - Because of the personal nature of many local government services, technological change is not expected to be a significant factor in limiting employment growth. The increase in employment in local government functions is due to the increasing concentration of population in urban and suburban areas; hence, increasing the need for additional utility services, police and fire protection, additional streets and highways, sewerage and other sanitary services, public housing, correctional services, and health and welfare services, etc.

Employment in administrative and financial functions, however, increased only three per cent reflecting the growing application of automatic data processing equipment in these areas where it reduces the need for employees in such repetitive clerical tasks as posting, checking, and maintaining records.

Major technological changes expected to affect employment in local government functions include the increasing use of automatic data processing equipment. The increasing use of electronic data processing equipment for more sophisticated functions should boost employment requirements for computer operating personnel.

Office Employment in the Illinois Valley Community College Area

A recent study ** by Loraine Lehto contains the distribution of office workers in various types of office, the job classifications and the number of office workers in each classification, the annual job openings in these classifications, and the anticipated future demand for office employees in the LaSalle-Peru area. The material in Table V from Mrs. Lehto's study identifies the types of businesses and the total office employees in each business. Mrs. Lehto further identifies the job classifications, number of

employees in each classification, and number of annual job openings in each classification (Table VIII). Mrs. Lehto projected a demand for an additional 85 to 285 new office positions in industrial firms, firms which have the heaviest density of office employment. Although no projections were made for other types of businesses, it is expected that the demand for office workers will increase to a similar degree in all businesses in the Illinois Valley Community College area.

SOURCES OF TRAINING FOR OFFICE WORKERS

The Lehto study indicated that about half the employers desired office workers who had junior college training and the remainder of the employers indicated they would hire beginning office workers from high school. It is quite commonly accepted that the training for clerical and secretarial positions can be obtained in high school, but the positions that require initiative, judgment and contact with the public may need higher levels of training than can be attained in high school. Secretarial and clerical programs in junior college prepare office workers to fulfill all of the clerical and secretarial positions.

A few of the positions in data and information processing can be filled by high school graduates. The greater percentage of positions in these areas, however, require some post-high-school preparation. Programmers, computer operators, analysts, and other technical workers need post-high-school training for employment in these positions.

**Loraine M. Lehto, A Study to Determine Employment Opportunities, Entry-Job Requirements, and Student Interest in Secretarial and Kindred Office Occupations, LaSalle-Peru, Illinois. Unpublished thesis, Northern Illinois University, (1966).

III. THE FOOD SERVICES INDUSTRY

The most telling justification for a two-year training program in the food services industry lies in the fact that whereas 25,000 new managerial and supervisory positions will be needed in the United States for each of the next ten years according to current projections, the four-year institutions preparing students for the industry will produce only 500 to 600 each year.* Need can be determined in the five-county area through local health agencies and other sources to find out the number of people employed in eating establishments, the number of seats, the dollar volume, the number of eating establishments under construction, the capital investment for the eating establishments, employment figures identified by job classification, and any expansion plans.

The Food Service Industry

The food service industry includes not only all commercial restaurants, but also all those businesses in which food is served as a secondary activity, e.g., drug stores, bars, hotels, department stores and variety stores, and all offices as well as industrial plant food service. institutional and charitable eating places.

At present, there are about 367,600 away-from-home eating establishments. This amounts to one eating place for every 538 people in the country. About 38 billion meals are served by these establishments each year. Approximately 3,250,000 persons are employed in the industry.

The food service industry uses about 20 per cent of all the food produced in the United States. Half of all separate restaurants are primarily table service operations. Twenty-two percent offer predominately counter service. Drive-ins represent 11 per cent and carry-outs are 10.8 per cent. The remainder five per cent are cafeterias and caterers. Classified by

* National Restaurant Association, Facts About the Food Service Industry, 1967.

types of food specialty, most eating places (40 per cent) offer varied American foods, 31 per cent serve mainly sandwiches and refreshments, 11 per cent foreign foods. The remaining 19 per cent of restaurants specialize in steaks, seafood, chicken, and other limited menu selections.

The composition of employees working in the industry by occupation is as follows:

A. Managerial, supervisory, professional positions -- 20 per cent

B. Technical jobs and special skills, e.g., bartenders, cooks, and bakers -- 28 per cent

C. Non-technical jobs involving no special training
   1. Related to food service, e.g., waiters, kitchen helpers -- 46 per cent

   2. Unrelated to food service, e.g., clerical workers, hostesses, charwomen -- 6 per cent.

Restaurant Trends

Based on annual growth rates of the food service industry, it is estimated that by 1970 the industry will need 3,500,000 employees. By 1975, demand for employees will approach 4,000,000. In the next decade, the food service industry will require 250,000 additional employees per year. Seventy per cent of these new workers are needed to replace those who die or retire. The remainder are required to fill newly created jobs due to the increase demand for meals.

At present, there is no indication that the public favor will be given to restaurants with completely automated services and eliminated personal attention from waiters and waitresses. There is, however, strong indication that assault will be made on the problem of kitchen productivity in the restaurant. Dishwashing, work in the maintenance area, some food preparation, and to some extent clerical and office functions will be the first areas in which automation will be felt.

Manpower changes taking place within the restaurant industry will tend

to increase the efficiency of employees. Restaurants, particularly those serving thousands of meals daily, have achieved substantial reductions in manpower requirements during recent years as managers have centralized the purchasing of foods supplies, introduced self-service, made use of pre-cooked meats, modern mechanical equipment, use of convenience foods, use of prepared heat and serve entres, use of limited menus, and otherwise increased efficiency of operation.

Although further improvements of this kind can be expected, the number of restaurant employees is likely to increase rapidly as the volume of business continues to expand to meet the populations need for restaurant service. Employment outlook for all job classifications is excellent.

Training Conditions

Training for supervisory and management occupations in food services is often combined with similar occupations in hotel, resort and motel operations. The food and lodging enterprises are often referred to as the hospitality industry. Two-year training programs have been designed for supervisory and management positions in the industry. The training includes a combination of basic classroom work, laboratory courses and directed practice in simulated or commercial operations.

Other technical and skill training programs in the specialized areas of the industry are organized. They may use some of the same core courses and laboratory facilities.

Working one's way up the employment ladder in food and restaurant service establishments over a period of years is no longer attractive to enough ambitious people to fill the need yearly for 25,000 management and supervisory personnel and 40,000 technical or skilled food service workers. An alternative is to organize modern post-high-school training programs in cooperation with trade associations and local firms in the industry.

IV. HEALTH SERVICES

The area served by the Illinois Valley Community College has had a history of a need for personnel prepared to function within the medical services area. Many self studies were done and consultation obtained in regard to the feasibility of establishing a program for the preparation of nurses with an associate degree. The Health Services Section of the Corplan Associates report* has significant components which could be applied to the Illinois Valley Community College as this institution plans for meeting the health service needs of the greater community which it serves.

Occupational Needs

The hospitals and physicians as well as the professional nurse population in this area have been concerned about the provision of adequately prepared personnel to meet the demand for health needs of the community. The Illinois Department of Registration and Education recommended that it would be feasible to provide a course for associate degree nursing through the junior college. The community college encountered great difficulty in attracting qualified personnel for their program. However, the first students are being admitted to this program this September. It should begin to provide adequate numbers of bedside nurses to meet the needs of this five-county area.

Training

Hospitals in this area share the generalized shortage of other personnel who assist in the provision of medical and ancillary services and this is a field in which the junior colleges can function most effectively. There have been several curricula in the health careers which have been designed and implemented by community colleges and Illinois Valley Community College can make a contribution here as well as in the preparation of R.N.'s

*Corplan Associates, Survey of Information on Vocational and Technical Education in the State of Illinois. Illinois Board of Vocational Education and Rehabilitation (1966).

from the associate degree program. It is possible to train or prepare nursing aides on the technical level, though this is feasible through a program in the high school, it does not reach those persons who would be most effective in a job of this nature. It is much more effective if it is carried out through an organized program of the community college technical and vocational group. The notion of a core curriculum for the preparation of a variety of these personnel is possible, provided a person who has a comprehensive knowledge of the various needs of the personnel in this field can be employed.

It would seem entirely feasible that an approach to the establishment of a curriculum to meet the medical needs of this area could be planned and possibly organized through the utilization of the professionally prepared people in the community as an advisory committee. Most of the medical institutions in this area would have qualified general physicians and specialists in a variety of medical areas who would be delighted to work up programs and assist in their implementation.

Medical laboratory assistants, oxygen therapists, x-ray technicians, ward clerks, medical record assistants, etc., can be prepared in a community college utilizing the vast majority of the course offerings already available and with the institution of technical courses so that their background and preparation would be adequate. From this report, it is not possible to judge whether or not any of the local hospitals or physicians are involved in "on the job" training programs. I do know there are no diploma programs in the area which would prepare R.N.'s, but there is one practical nurse program which does prepare people in one year to meet the requirements for licensure examination in Illinois.

Occupational Relationships

Vocational and technical preparation of personnel for placement in health careers is a vital need in the Illinois Valley Community College

area. However, the assumption sometimes made that career inflexibility at the technical level is a deterrent to youth and adults as they contemplate entering the health field, has questionable validity. Many students enter schools of nursing after having been several years in jobs as nursing aides or practical nurses. There has been no credit given for previous experience and interested competent people are not necessarily discouraged by the lack of "ladder concept".

A good source of recruitment into active practice in the health fields in which the junior college can play a large role is the offering of refresher courses for retired professional nurses. Another group of persons in the community who provide a resource are those individuals who received "training" under the American Red Cross during World War II. These two above mentioned groups of members of the community would probably fill many of the gaps, at least among nursing and ancillary personnel. An adequate refresher course which should update their previous experiences should have a tremendous appeal. This is another aspect of the community college serving to meet the larger community needs.

An interesting component of another study at some future date might involve questionnaires directed to professional people in regard to experience during youth as nurses aides, orderlies, practical nurses, laboratory assistants, etc., as motivation for enrollment in professional type programs.

V. METAL WORKING INDUSTRY

The primary occupations within the metal working industry (SIC classifications 34 and 35) are those of tool and die maker, machinists, machine set-up men, machine operators, and in some cases, machine equipment repairmen. Probably the most significant trend in the metal-working industry which is affecting these occupations, at the present time is the changing emphasis away from manual or human control of conventional equipment toward automated control of highly sophisticated metal machining equipment.

Numerical Control

One form of automation that is rapidly growing in usage in the metal- working industry is that of numerical control of manufacturing processes. With this technique, the skill requirements are no longer concentrated in the manipulative aspects of an individual's performance, but rather it is concentrated in the technical knowledge necessary to implement, control and maintain the automated process.

It should be noted that because of this shift in control responsibility, production planning and management procedures are changing and new occupations are evolving. This might be illustrated by comparing the production flow used with conventional production with that used in automated manufacturing.

In the case of conventional production, the design intent is interpreted on an engineering drawing and transmitted to the production planner for scheduling of the job, tooling, materials, etc. Then it is sent to the shop facility, where the shop foreman schedules the particular job, machine, and operator. The operator takes the engineering drawing and manually performs the necessary operations on the material to produce the desired part.

In the case of numerically controled manufacturing, we find the

design intent may or may not be recorded in the form of an engineering drawing. The production planner may still schedule the job as it enters the shop. However, we find at this point the N/C supervisor and programmer entering the production picture.

The primary responsibility of the part programmer is to convert the design intent, which may be a sketch, a table of coordinates, or an engineering drawing, into the proper coded form necessary to produce the control tape. The control tape may be produced either by manual techniques such as through the use of a Flex-o-writer or it may be produced as the out-put of a computer program.

New Occupations

While the manually prepared punched tape may not require specialized skills for its preparation, the computer assisted program does create the need for new positions. They are: the computer programmer, systems analyst, and computer operator.

Regardless of the method of tape preparation, the next step is the installation of the control tape upon the machine tool control system and subsequent machine operation. In the case of numerical control manufacturing, however, machine operation by a highly skilled machinist or machine operator is not an absolute necessity since nearly all of the machine functions are controlled by the punched tape.

Because of the highly technical and specialized nature of the control system and the numerically controlled machine tools, a specially trained maintenance technician is often needed. It is becoming increasingly evident that in large installations we can expect to see a subdivision of the specialities within the N/C maintenance group.

Maintenance responsibilities will be divided among the electrical-electronic N/C specialist, the mechanical N/C specialist and the

hydraulic N/C specialist. Where such specialization occurs it is likely that the occupation of the N/C maintenance diagnostician will also appear. His responsibility includes the diagnosis of the problem by technical speciality and the scheduling of the proper maintenance specialists.

In review, it can be seen that the conventional machining-manufacturing methods utilized the skills of the machinist, the master machinist, the tool maker and the single machine operator. In the case of numerical control, we find the new occupations of N/C part programmer, N/C supervisor, computer technologists, N/C machine tool operator, and the N/C maintenance technician or technicians.

Other Processes

In addition to numerical control, there are many other machining and manufacturing processes that are having a significant effect upon the "old" method of metal machining. These include electro-chemical machining, electrical discharge machining, and the use of optical-digital read out divices. It is interesting to note that most of the newer processes are based primarily on electronic principles and often require a substantially different method of operation than the conventional machining methods employed. As pointed out earlier greater technical knowledge will be needed to augment manipulating skills.

Trends

All of the above mentioned manufacturing techniques have reached a state of development that has made it economically feasible for nearly all low, medium, and high volume industries to use these processes. Furthermore, sufficient time since the inception of these processes has passed to provide objective evidence of the

fact that they are applicable to be a wide range of industry types. For example, N/C may be used economically in the small machining job shops, in tool and die job shops, in the automotive industry for the construction of sheet metal form dies, and for the speciality machinery manufacturer.

It should be noted that although these processes are heavily used throughout the country, there are relatively few of these applications currently found in Illinois machining industries. However, it is safe to say that we will see an increasing use of all of these processes in the near future in Illinois metal working industries.

In 1955, the number of numerically controlled machines that were manufactured was approximately 100 costing some $35,000,000. In 1960, there were approximately 600 of these machine tools in the country. By 1964, there were something like 3,500 such machines. And in 1966, slightly over 8,000 were in use.

To look at it in another way, in 1965 numerical control machine tools sales totaled approximately 160 million dollars. In 1966, they were approximately 270 million dollars and in 1967 it is estimated by the Numerical Control Society that they will probably exceed 300 million dollars in sales.

Training Needs

The increased usage of automated equipment does not imply that the conventional manufacturing processes will substantially diminish or disappear in the near future. On the contrary, because of the increased productivity which is potentially available through these processes, more machinists, tool and die makers, and highly skilled machine operators will be needed to augment the production capabilities of these other processes.

One of the most critical training needs of Illinois employers will be in relation to changing the attitude of the older and more conservative worker. If the potential productivity that is inherent in these new processes discussed is going to be realized, an organized and concerted educational effort must be made to prepare the employees to accept and exploit the new procedures.

The various manufacturing technologies are evolving and developing at such a rapid pace it is often difficult for the worker to change his attitude or point of view. And it is understandable that there is often considerable fear associated with the process because of lack of understanding. It is for this reason that education programs whether they are organized within a formal school setting or within the in-plant training program, must initially address themselves to the problem of general information dissemination concerning these processes and toward the changing of attitudes. Only then can programs realistically be started to provide the current employee with the technological skills necessary to function in today's manufacturing community.

Because of the relative newness of most of the equipment and the fact that the technologies are still evolving, few trained personnel are available for employment. The short supply of trained personnel combined with the growing use of the new processes results in a serious shortage of technically competent workers throughout the country. Therefore, employers must initially assume the obligation of training for the new technologies.

A substantial contribution can be made toward the alleviation of the shortage in these technologies through the efforts of local community colleges and technical institutes by providing specialized short term courses in the new technologies as well as by establishing a long-term curriculum designed to educate the entry worker.

VI. ELECTRICAL MACHINERY, EQUIPMENT AND SUPPLIES INDUSTRY*

There are four sectors of the electrical machinery, equipment, and supply industry that will affect the occupations, training, and employment needs of entry and current workers.

1. The electrical power industry that is primarily engaged in the generation and distribution of electrical energy.
2. The radio and television industry which, in general, originates and transmits home entertainment.
3. The field of manufacture of electrical-electronic equipment that is employed in the home and farm.
4. The electronics industry manufacturing equipment for sensing, recording and/or transmiting units of intelligence and data to include data processing and instrumentation.

Each sector will be affected somewhat differently.

General Trends

The electrical power industry will probably show little or no gain in the total number of people employed. Growth in the electrical power industry may be adequately coped with through the normal national productivity gain of 2.5 per cent to 3 per cent per year. The generation and distribution machineries are likely to improve but change little in principle. However, the control and instrumentation is likely to be more reliable and exact through employment of increasingly sophisticated electronic equipment with less reliance on human judgment. This suggests that the workers will need to be more highly trained and educated technically though there need not be an increase in numbers.

The radio and television industry employment is not likely to show increases greater than the national average due to population increases and increased consumption. This applies to the manufacturing industry, not the programming and production of radio and television entertainment.

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* The U. S. Occupational Handbook and Corplan Associates, Survey of Information on Vocational and Technical Education in the State of Illinois were used to identify trends on a national and state scale respectively.

Equipment for the radio and television industry is not likely to change in basic principles of operation, but it will utilize more sensing and control accessories to reduce reliance on human judgment. Improved equipment and methods may accommodate the growth which will probably approximate the national average growth rate. This suggests that the total number of technical persons employed in the manufacture of equipment for the radio and television industry may not increase, but will need increasingly more technical training and/or education in a manner not unlike the electrical power industry.

The industry trend for manufacturing home and farm electrical-electronic equipment is less clear. It is likely that the present products will be improved and consumed in greater quantities. General productivity gains may be adequate to compensate for the growth in consumption of present-day equipment. There is some uncertainty about the equipment that will be employed in this sector in the forseeable future. It is very likely that a number of the data processing, data storage, and instrumentation or control systems that have been developed for business and industry will be modified and adapted to home and farm use.

The electronics industry is the sector that will show the most significant trends and rapid growth. The concepts of data processing, instrumentation and control, and transmitting intelligence are the most dynamic. Present impressions suggest that the methods and equipment for these operations will be improved and expanded as a result of considerable government and private research.

The miniature vacuum tube came into wide use about two decades ago and was supplanted to a large degree, by the transistor about one decade ago. In 1967, integrated circuits are being used for applications that had used printed circuits and semi-conductors. Integrated circuits achieve more miniturization, greater dependability, lower power requirements and as they

become further developed may afford an opportunity to automate production methods to a greater degree. It appears that the electronics industry will grow at a rapid rate, as it develops and employs more advanced equipment in greater quantities. Much of the improved production technologies in all types of manufacturing will place greater reliance on electronic equipment for instrumentation and control.

Training and Employment Needs

The most critical need is to attract and retain well qualified technical manpower in the numbers required. As industry continues to utilize the fruits of research with new products and new methods of manufacturing, it will need more technical manpower. The needs will be in terms of the number of technical workers, their education and training, and the problem of continuous upgrading to keep abreast of developing technologies and new products. The need in terms of numbers of technical manpower entering the industry suggests a minimum annual growth rate of six or seven per cent for the next decade or two. This growth rate is predicated on approximately three per cent due to annual growth in the work force in the industry and a minimum of three per cent due to deaths, retirements, and quits who leave the industry.

The amount of technical knowledge needed will increase for technical workers from the skilled through the professional. All will be working with more advance and more complex equipment and manufacturing methods. The semi-skilled and skilled workers will be a smaller part of the work force while the technicians and professionals will become an increasingly larger part of the work force in the industry. Persons entering the industry's work force will need improved education and training. The occupational competency required for many electrical technicians today might have been adequate for an engineer a generation or two ago.

A third aspect of the critical need is a need for accelerated training and education in order to keep workers up-to-date in their technologies and jobs. Available data suggest there will be many new scientific applications resulting in new products, new manufacturing methods, and further expansion of emerging occupations. Greater technical competency will be required to enter a technical occupation. Continuous upgrading within occupations to keep abreast of new products and new applications will require considerable training effort.

Summary

1. The use and production of instrumentation, control, data processing, and other scientific products will increase as the results of research are applied.
2. New and more complex manufacturing methods will evolve as a result of the application of new systems designed to automate production even further.
3. The new products and their applications will require an upgrading of both entry and current workers.
4. Indications are that the required number of skilled and professional workers will increase while the required number of unskilled and semi-skilled workers will remain constant or decrease.
5. The job competency requirements for technical occupations will increase at an accelerated rate.
6. Many of the vacancies in the emerging and new occupations will be filled by upgrading existing workers in related occupations through training and education using present knowledge and skills for a foundation upon which to build.
7. Industry should increase its efforts to upgrade and retrain its workers as new occupations and products emerge. Schools and colleges must cooperate with industry to transmit the new knowledge and technologies.

(cont.)

7. These demands will accelerate and require greater liaison between employers and schools.

CHAPTER IV

MANPOWER NEEDS, TRAINING CONDITIONS AND TRENDS

This chapter will consider the major occupational needs, the training conditions and industry trends in the nation and the State of Illinois as they are related to the IVCC area. The information was compiled primarily from secondary sources.

The Nation's Occupational Needs

The nation's most widespread shortages existed in early 1967 for industrial workers such as machinists, machine operators, toolmakers, aircraft mechanics, model and pattern makers, assemblers, electricians, and welders, and for engineers, draftsmen, mathematicians, and health service workers.*

Shortages of professions personnel have been among the most serious in the economy. Many of these shortages are of long standing but have been intensified in recent years. Several engineering specialties are in this category. Long-term need for personnel in human service professions has become more acute during the past few years as new programs in medical care, education, and social welfare have increased the demand for physicians, nurses, teachers and social workers.

A serious shortage of draftsmen currently exists in many of the industrial centers. This trend has been evident since 1964.

There has also been a steady increase in recent years for tool and die makers and machinists, as well as for highly skilled workers in the metalworking industries. The boom in the machinery, electrical

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* Information in this section is taken largely from the 1967 Manpower of the President. United States Department of Labor

equipment and other metalworking industries has been at the core of the economic expansion during the past six years and has resulted in a soaring demand for these craftsmen.

The rapid growth of manufacturing industries, particularly structural metal products, has increased the demand for skilled arc and combination welders in many of the nation's industrial centers. Rising maintenance and repair requirements in the metal working industry have also been a major factor in the demand in this occupation.

Some occupational shortages have been reduced due to decreased demand and remedial programs of training. In contract construction, for example, a shortage at the beginning of 1966 eased in 1967 due to a reduction in homebuilding rates.

A few industries have experienced skill shortages that cut across occupational lines. Metal working, manufacturing, and health services are among the industries which have had particularly serious general shortages of manpower. In the metalworking industry, these shortages include assemblers, machine operators, draftsmen, and programmers. Equally serious and widespread personnel shortages exist in health service establishments, which include private and public hospitals, medical and dental laboratories, nursing homes, physicians' and dentists' offices, and associations providing health services to members.

The State's Occupational Needs

A recent survey of information on vocational and technical education in the State of Illinois was completed for the Illinois Board for Vocational Education and Rehabilitation.** Occupational

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** Corplan Associates, Survey of Information on Vocational and Technical Education in the State of Illinois (1966)

and training needs were projected in the primary metals industry, in the health service jobs, the printing and publishing industry and the electronics and electrical equipment industry. In addition, occupational gains and shifts in training for occupations were outlined for agri-business, food processing, chemical process, metal working, and office occupations. These occupations were considered to be the key Illinois employment sectors.

This section of the report will review the emerging, expanding and changing occupations in the key Illinois employment sectors as identified by the Corplan report.

Primary Metals

In the basic primary metals industries, the increasing complexity and more pervasive use of instrumentation and control devices has resulted in a job entitled control specialist. Instrument repair and electronic equipment maintenance skills are combined to enable a single individual to service all the subsystems of control devices in blasting, converting, and rolling operations.

Other emerging steel industry occupations include:

Closed-loop Control Technician
Automated Strip Mill Record Keepers
Powder Metallurgical Technician
Metallurgical Technicians
Continuous Casting Technicians
Oxygen Furance Operator

Occupations that are conidered to be changing within the steel industry include:

Roughing Mill Operator
Furnace Operator
Coiler Mill Operator
Melter
First Helper
Millwright

Health Services

In the health services industry, the report indicates that the

the emerging occupations are:

Medical Engineering Technician
Electromedical Service Technician
Nuclear Medical Technologist
Medical Illustrator
Biomedical Telemetry Equipment Operator
Medical Record Assistant

Expanding technical occupations are:

Medical Technologist
Inhalation Therapist
Physical Therapist
Occupational Therapist
Radiology Technologist

Printing

In the printing industry, the emerging occupations are:

Electronic Color Separator Operator
Electronic Composing Equipment Maintenance Technician
Electronic Phototypesetter Operator
Linofilm Machine Operator
Photon Machine Operator
Press Maintenance Technician

The expanding occupations are:

Color Separation Cameraman
Fotosetter Machine Operator
Offset Press Operator
Stripper
Web Offset Press Operator

Electronic

The most significant impact of changes in the electronic industry will be on technical jobs and to a lesser extent on skilled and semi-skilled jobs. The most important technological changes that will affect occupations include:

Industrial Control Electronics
Microelectronic Devices and Circuitry
Electronic Telephone Transceivers and Switchboards

Occupations that are emerging, expanding and changing are said to be the following, grouped according to the two upper-skill levels:

Advance Technology
Electronic Systems Technician
Electronic Instrumentation Technician
Electromedical Laboratory Technician
Microelectronics Research Technician
Electromechanical Technologist

Technical (Upper Skill Level)
Electromedical Service Technician
Graphic Arts Maintenance Technician
Electronic Switchgear Technician
Printed Circuit Design Technician
Electrical Design Draftsman
Electromechanical Maintenance Technician

Agriculture

Although the data for the farm occupations show a decline, there is a need for off-farm occupations related to agriculture. Farm related occupations may be identified in groups as follows:

Technical
Field Technician - Dairy
Field Technician - Crop Treatment
Field Technician - Agricultural Chemicals
Agricultural Implement and Tractor Mechanic

Sales
Feed and Seed Salesman
Agricultural Chemical Salesman
Petroleum and TBA Salesman
General Line Salesman

Other
Farm Service Company Personnel
Livestock Buyer
Farm Machinery Setup Man
Farm Checker

Food

In the food processing industry, four major parts of the industry employ a majority of workers and are experiencing a number of technological changes. The occupations that are most vitally affected are shown below.

Meat
Commercial Home Economist
Construction Technologist
Maintenance Electrician
Hide Puller
Splitter
Butcher

Bakery Goods
Specialty Baker
Quality Control Technician
Quality Control Assistant
Chemical Technician

Canned and Frozen Foods
Commerical Home Economist
Refrigeration Maintenance Technician
Pressure Chamber Operator
Freezing Equipment Maintenance Technician
Quality Control Assistant

Dairy Products
Microbiological Quality Control Technician
Instrumentation & Control Technician
Route Salesman
Quality Control Assistant

Chemical

The survey of information on vocational and technical education in the State of Illinois groups the chemical, petroleum, rubber, plastics, stone-clay-and glass industries together as one having commonalities in the similarity of manufacturing processes. A common classification used is referred to as the chemical process industries. The trends toward automation and instrumentation increases the demand for higher levels of skill in maintenance and operating occupations as:

Instrument Repairmen
Pipefitters and Millwrights
Electricians
Maintenance Machinists
Process Equipment Operators

Metalworking

In the metalworking industry, two breakthroughs stand out as important developments in metalworking technology. The most important techniques developed to handle new metals are plasma-arc metal cutting, melting and welding, electron and laser beam welding, and magnetic forming. Although these new processes may eventually supplement or replace conventional metal working techniques, they presently apply to only a few specialized applications and the conventional machine operations and occupations in most firms are not likely to change greatly in the near future in respect to these processes.

Another significant new development in manufacturing technology is that of numerically controlled machine tools. Although numerical control has received a great deal of publicity, the Illinois report suggests that its impact is not likely to affect occupations greatly in the near future. The numerical control machine operations call upon persons in occupations referred to as:

Machine Tender
Parts Programmer
Toolmaking Technician
N/C Electromechanical Maintenance Technician

Office

In the office industry, studies reveal a constant growing demand for both the conventional and the newer office occupations. Three major technological changes that will affect office occupations are the electronic computers, the optical scanner and direct data collating and distribution. A reduction in demand for semi-skilled and skilled workers can be expected. At the same time, a critical need will arise for computer personnel, data processing maintenance workers, and office and related white collar workers with a technical background.

Training Conditions

Historically, the establishment of land grant colleges, and the vocational programs developed through the Smith-Hughes Act, gave direction to non-professional types of education in support of industry and agriculture. Professional schools, private technical schools, apprenticeship programs, in-service formal training within business and industry, and the technical training in the armed services complemented vocational and technical programs in public schools and colleges that were developed under the Federal Acts. New training methods and programs have developed from time to time, but they usually were initiated to meet crises or special problems and conditions.

In recent years, occupational training has received renewed emphasis. It has been approached from many new and different sectors. Under these conditions an opportunity presents itself for effective programs to be developed for occupational training. A key to the success of such programs is the basic concept of a total approach to training through the coordinated efforts of labor, educational institutions and employers with the support of government.

Many of the present training arrangements in industry in which informan and casual training dominates are likely to become increasingly inad-

equate as a source of work skills. The inability of informal training to meet occupational needs and the inadequacy of much of this training has led to an increased emphasis on new and innovative approaches to technical and vocational training.

A few examples of some of the current programs illustrate the concern to increase the amount and effectiveness of occupational training.

Apprenticeship is considered to be one of the best types of formal skill training conducted by industry. Yet, apprenticeship training supplies only a small portion of the work needed in the skilled crafts. For example, according to the 1967 Manpower Report of the President, the total number of persons completing apprenticeship as machinists and tool and die makers has recently been less than 1,500 per year. In contrast, it is estimated that an average of 10,500 new career openings for machinists will become available each year between 1965 and 1975 and that an average of 4,500 openings per year will be available for tool and die makers. A stepped up program increased the number of machinist apprenticeships by 18 per cent between 1965 and 1966. Federal and state apprenticeship agencies are endeavoring to expand the program generally.

There has been a trend toward the retraining of workers, under labor-management arrangements, when some job skills become obsolete because of automation. Some employers have analyzed jobs and organized new job classifications with more limited skills required for each job in order to make effective use of highly skilled and semi-skilled scarce manpower.

Through the Manpower Development and Training Act, 230,000 persons were trained for shortage occupations during 1966. These programs are now carried out both through institutions and on-the-job training(OJT). Labor and trade associations have assisted in OJT training in a number of cases. Since early 1964, a project sponsored by the Department of Labor and conducted by the National Tool, Die, and Precision Machine

Association has provided for apprenticeship training. A similar arrangement was made recently with the Association of Home Builders for entry training of 1,000 carpenters and with the International Association of Machinists, a trade union, for the training of 2,000 truck mechanics.

Programs which expand and modernize technical education in the schools, which are by far the largest source of formal occupational training, have been encouraged and supported by the Vocational Act of 1963. Particularly rapid growth in enrollments has been realized in business education, training for health occupations, and technical training at post-secondary levels.

Training for professional occupations that normally require a college degree has been supported financially by a number of programs. Major focus has been on medical, engineering, science teaching, social work, and public administration occupations. The dynamic nature of these professions is such that there is a constant need for up-dating the skills and knowledge of experienced persons as well as to train the replacements and to provide expansion in the number of workers in these provisions.

Adjustments are being made in training for farm and farm related occupations. Vocational agricultural courses may now include training in production, processing, distribution, and service activities in addition to the more traditional training for on-farm practices.

Expanded occupational training is promoted through work-study programs in established diversified occupations, distributive occupations, and trade and industry occupations. These cooperative work-study programs are typically carried out in comprehensive local high schools. In addition, area vocational schools are being expanded to meet the need for technically trained persons and to make more effective use of specialized instructors and physical facilities.

Formal training for the white collar occupations by corporations and trade associations is well established. Intensive training programs con-

ducted by banking, insurance, real estate and other similar services industries are expanding. Supervisory and middle management training programs conducted within the business firm have also expanded.

An increasing number of industrial firms have organized in-plant training programs along more formal lines in order to meet the need for workers at all levels of skill and occupational areas. The findings of a recent study conducted by the Department of Labor revealed that the largest number of adult programs within business firms were very short orientation types of instruction. Most of the present occupational needs require more than an orientation to the job; the trend is to increase the amount of formal training beyond orientation to the job.

In the IVCC area, the field investigation revealed that employers have used virtually every avenue open for training that has been mentioned in this section. These training programs include the following:

1. Local school programs for occupational training at the high school, junior college, and college levels. Particularly mentioned were business education, diversified occupations, agriculture, trades, industry, and health services training programs.

2. Apprenticeship programs.

3. Evening school courses including cooperative programs with private industry and labor.

4. MDTA - Both institutional and on-the-job.

5. In-plant formal training.

6. In-plant informal training.

7. Training directed by trade and professional associations.

Trends

No attempt is made to establish occupational trends in the area in a formal sense. It is assumed that the area will follow basic national and regional trends outlined below. However, field interviews were held with local Chamber of Commerce managers, employment office officials, public officials, school administrators, and a Jones & Laughlin Employment

Officer for the purpose of becoming familiar with the thinking and planning that is being done for the economic development of the area.

There is certainly an expectation of a greater than average economic growth in the area. Present economic facts support this expectation. There remains a need to establish the nature of the economic growth that can be expected.

The following section describes the nature of occupational changes that are projected for the nation. Similar occupational trends are expected for the area.

The 1967 Manpower Report of the President states that occupational groups in which employment is likely to rise most rapidly are the professional, service, clerical, managerial, private household, skilled and sales categories. (See Figure 22). When the results of a 1963 Labor Department survey of the formal occupational training of adult workers are combined with the information about occupational growth categories, a significant relationship is revealed. The same growth industries - with the exception of private household employees -- were the ones with the highest percentages of workers who had learned their jobs through formal training. (See Figure 22).

In the goods producing industries, only contract construction is expected to exceed the average 25 per cent increase in employment of non-agricultural wage and salary workers from 1965 and 1975. (See Figure 23). In the service producing industries, all sectors except transportation-public utilities and finance, insurance, and real estate are expected to exceed the average percentage increase.

Total non-farm employment increased steadily from 54.2 million in 1960 to 63.9 in 1966. (See Figure 24). Manufacturing firms were the source of greatest increase with durable goods firms accounting for larger gains than non-durable goods firms. Mining lost ground and the transpor-

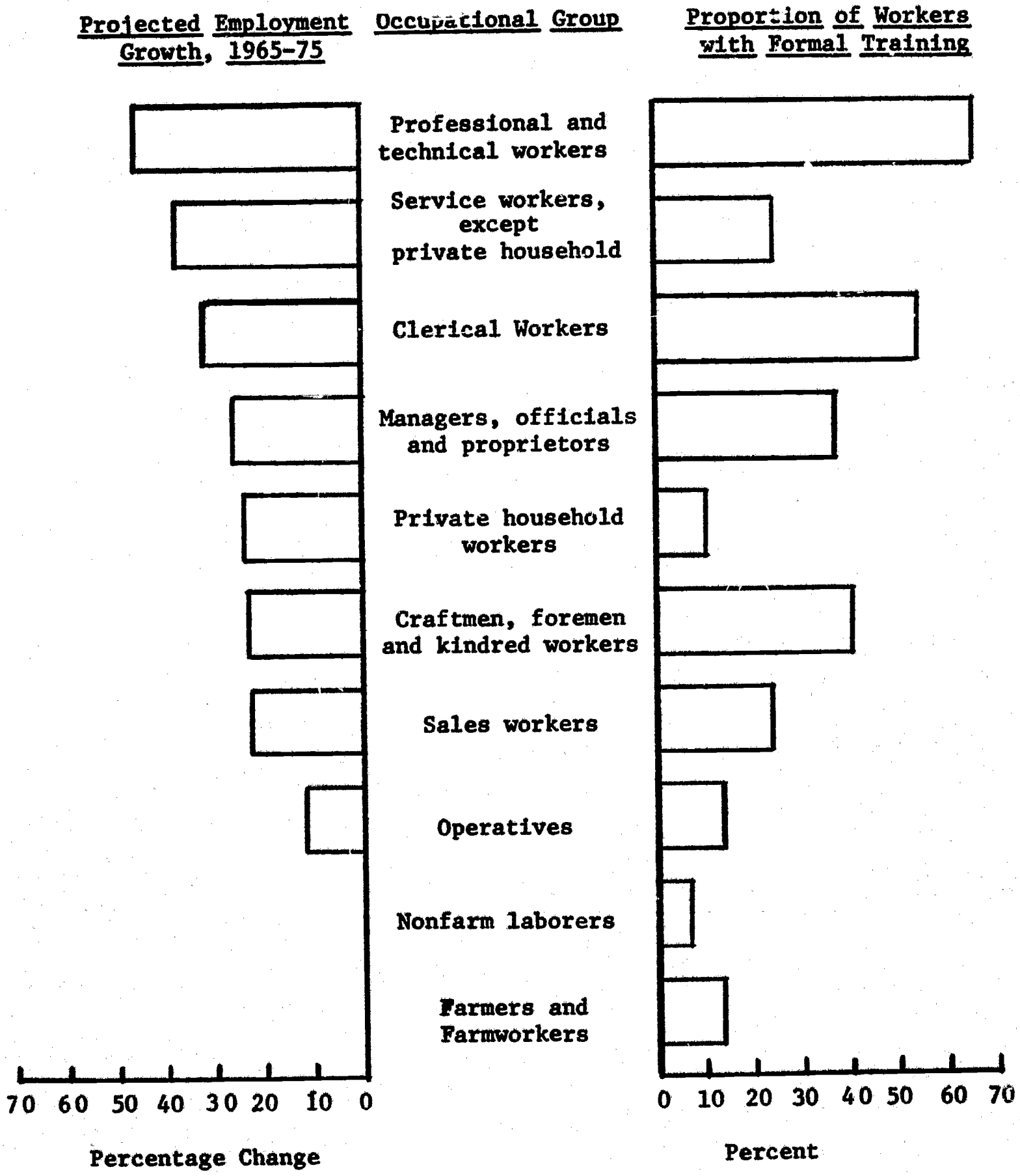
tation and public utilities industry employed slightly more workers in 1966 than in 1960. (See Figure 25).

The services producing sector has provided the bulk of the job expansion recently (See Figure 26). This sector includes the wholesale and retail trades, finance, insurance and real estate, service and miscellaneous, and federal, state and local government. Since 1947, the services producing sector has accounted for more than three-fourths of the jobs created in the non-farm economy. Wholesale and retail trade have accounted for an increase of 1,828,000 jobs since 1960 and the service firms (principally personal services) added 2,158,000 persons to the payrolls. The largest increase in jobs during the 1960's has been in government--a total of 2,496,000 between 1960 and 1966. State and local government accounted for the largest portion of this number.

The number of persons working on farms declined by 1,138,000 persons between 1960 and 1965. This decline in agricultural employment has been persistent since 1948 (See Figure 27). While the number of farms in the IVCC area has decreased, the number of hired farm workers has increased between 1959 and 1964 according to the 1964 U.S. Census of Agriculture.

FIGURE 22

FORMAL TRAINING RELATED TO GROWTH OF OCCUPATIONAL GROUPS



SOURCE: 1967 Manpower Report of the President

FIGURE 23
ACTUAL AND PROJECTED EMPLOYMENT BY INDUSTRY DIVISION, 1965 to 1975
(Numbers in Thousands)

Industry Division	Actual 1965		Projected 1975		Change, 1965-75	
	Number	Percent Distribution	Number	Percent Distribution	Number	Percent
Agriculture	4,585	-----	3,745	-----	--840	--18.3
Total Nonagricultural Wage and Salary Workers	60,770	100.0	75,875	100.0	15,105	24.9
Goods-Producing Industries	21,845	35.9	24,530	32.3	2,685	12.3
Mining	632	1.0	620	.8	--12	---1.9
Contract Construction	3,181	5.2	4,190	5.5	1,009	31.7
Manufacturing	18,032	29.7	19,720	26.0	1,688	9.4
Durable Goods	10,386	17.1	11,480	15.1	1,094	10.5
Nondurable Goods	7,645	12.0	8,240	10.9	595	7.8
Service-Producing Industries	38,924	64.1	51,345	67.7	12,421	31.9
Transportation and Public Utilities	4,033	6.6	4,520	6.0	487	12.1
Transportation	2,528	4.2	2,970	3.9	442	17.5
Communication	880	1.4	925	1.2	45	5.1
Electric, Gas, and Sanitary Services	625	1.0	625	.8	-----	------
Wholesale & Retail Trade	12,683	20.9	16,115	21.2	3,432	27.1
Wholesale	3,317	5.5	4,135	5.4	818	24.7
Retail	9,366	15.4	11,980	15.8	2,614	27.9
Finance, Insurance,and Real Estate	3,019	5.0	3,725	4.9	706	23.4
Service and Miscellaneous	9,098	15.0	12,950	17.1	3,852	42.3
Government	10,091	16.6	14,035	18.5	3,944	39.1
Federal	2,378	3.9	2,635	3.5	257	10.8
State and Local	7,713	12.7	11,400	15.0	3,687	47.8

Source: 1967 Manpower Report of the President

FIGURE 24

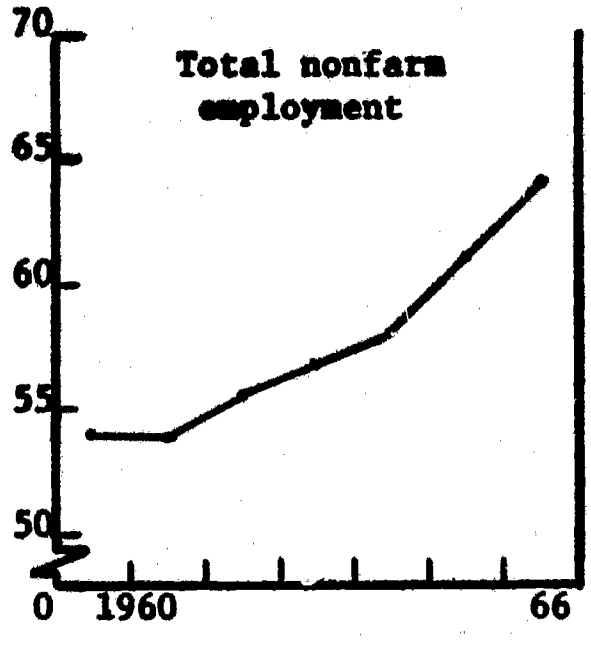
TOTAL EMPLOYMENT ON PAYROLLS OF NONAGRICULTURAL ESTABLISHMENT, BY INDUSTRY DIVISION: ANNUAL AVERAGES, 1947-66

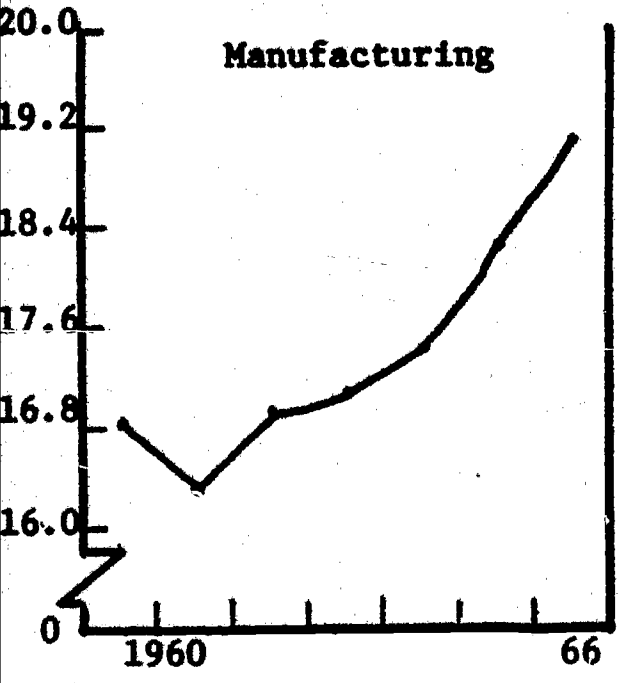
Year	Total	Mining	Contract Construction	Manufacturing	Transportation & Public Utilities	Wholesale & Retail Trade	Finance, Insurance & Real Estate	Service & Miscellaneous	Government
1947	43,881	955	1,982	15,545	4,166	8,955	1,754	5,050	5,474
1950	45,222	901	2,333	15,241	4,034	9,386	1,919	5,382	6,026
1955	50,675	792	2,802	16,882	4,141	10,535	2,335	6,274	6,914
1960	54,234	712	2,885	16,796	4,004	11,391	2,669	7,423	8,353
1965	60,770	632	3.181	18,032	4,033	12,683	3,019	9,098	10,091
1966	63,863	628	3,281	19,084	4,136	13,219	3,085	9,581	10,849
				Percent Distribution					
1947	100.0	2.2	4.5	35.4	9.5	20.4	4.0	11.5	12.5
1950	100.0	2.0	5.2	33.7	8.9	20.8	4.2	11.9	13.3
1955	100.0	1.6	5.5	33.3	8.2	20,8	4.6	12.4	13.6
1960	100.0	1.3	5.3	31.0	7.4	21.0	4.9	13.7	15.4
1965	100.0	1.0	5.2	29.7	6.6	20.9	5.0	15.0	16.6
1966	100.0	1.0	5.1	29.9	6.5	20.7	4.8	15.0	17.0

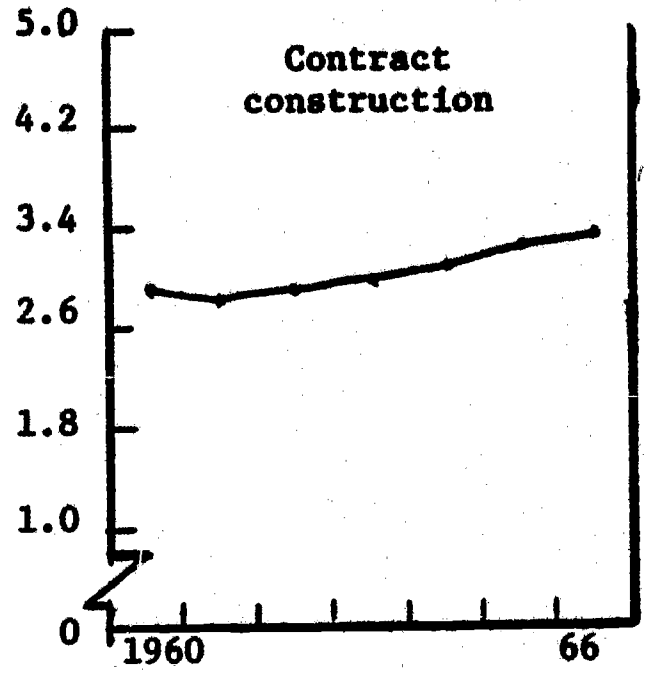
Source: 1967 Manpower Report of the President

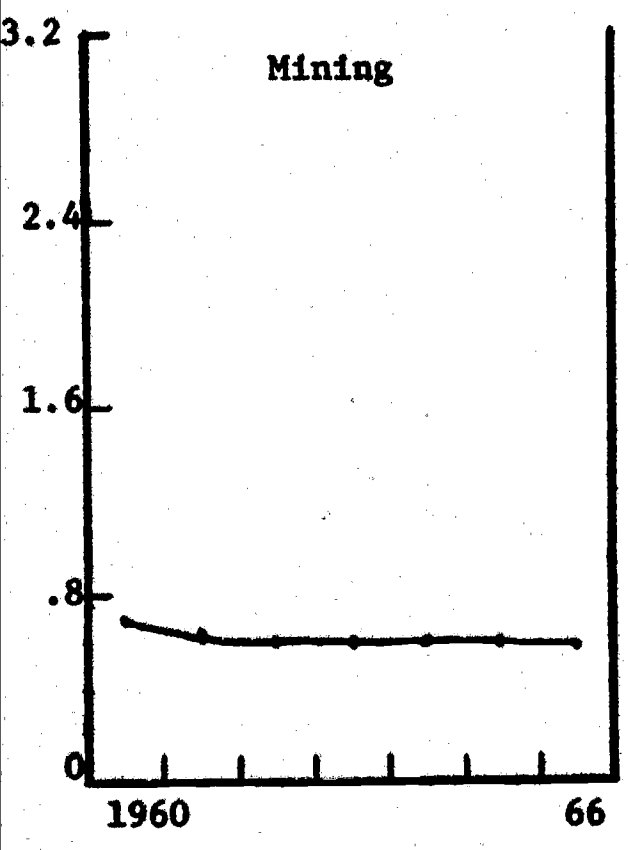
FIGURE 25

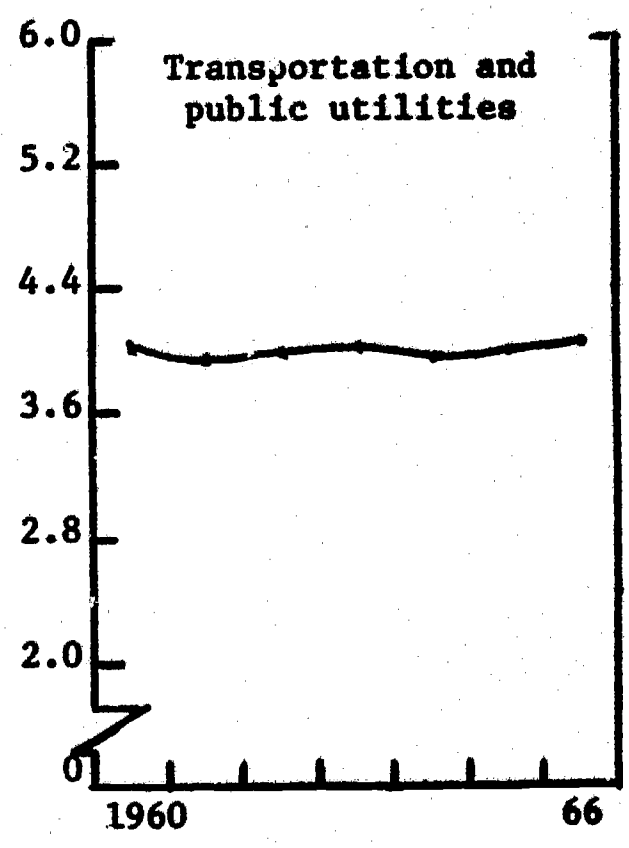
EMPLOYMENT IN THE NONFARM INDUSTRIES
UNITED STATES 1960-1966
(Employment in millions)











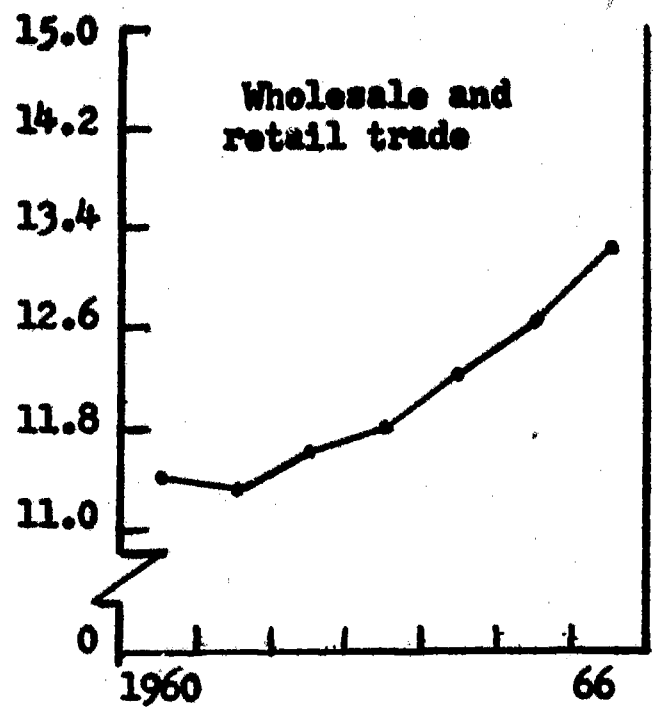
Source: 1967 Manpower Report of the President
U.S. Department of Labor

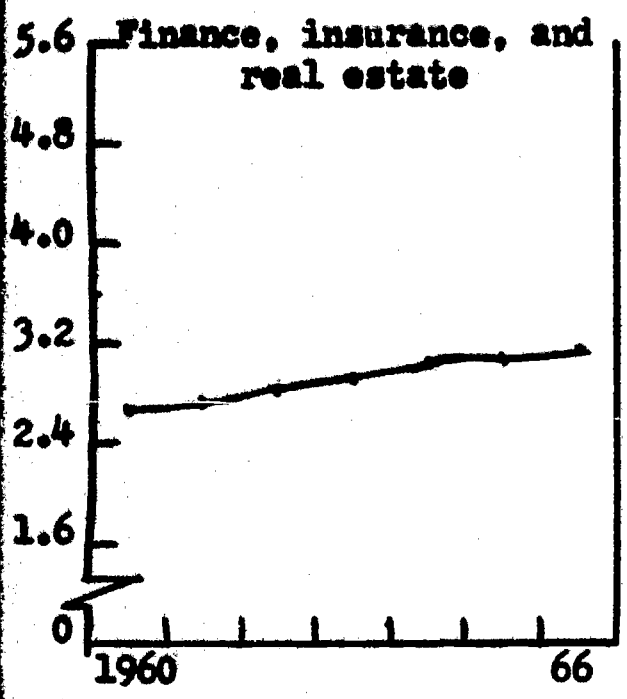
FIGURE 26

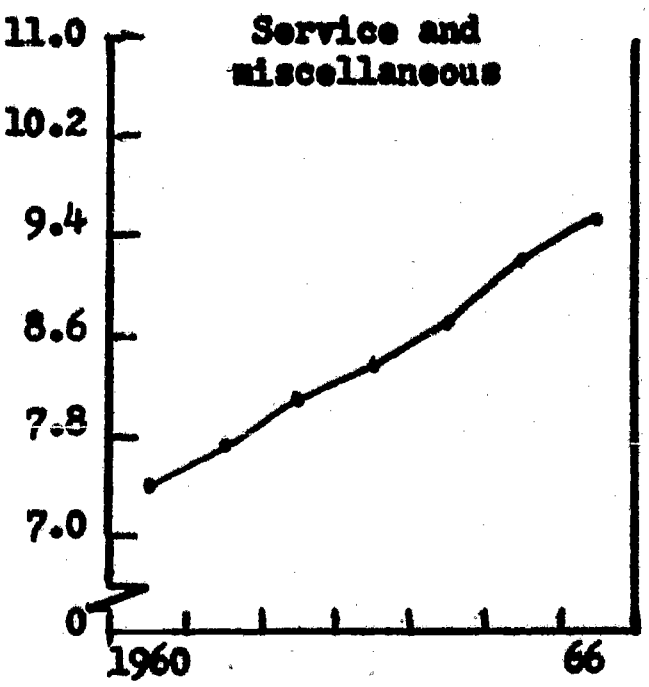
EMPLOYMENT IN THE SERVICES SECTOR

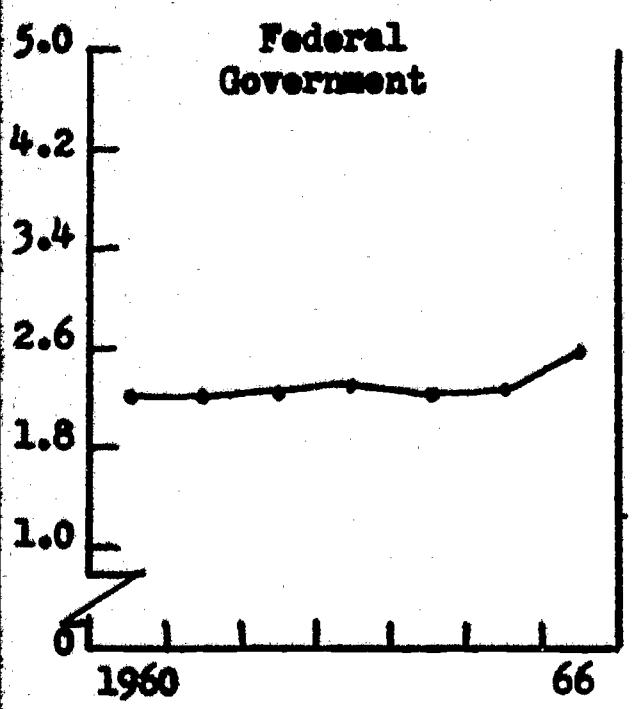
UNITED STATES, 1960-1966

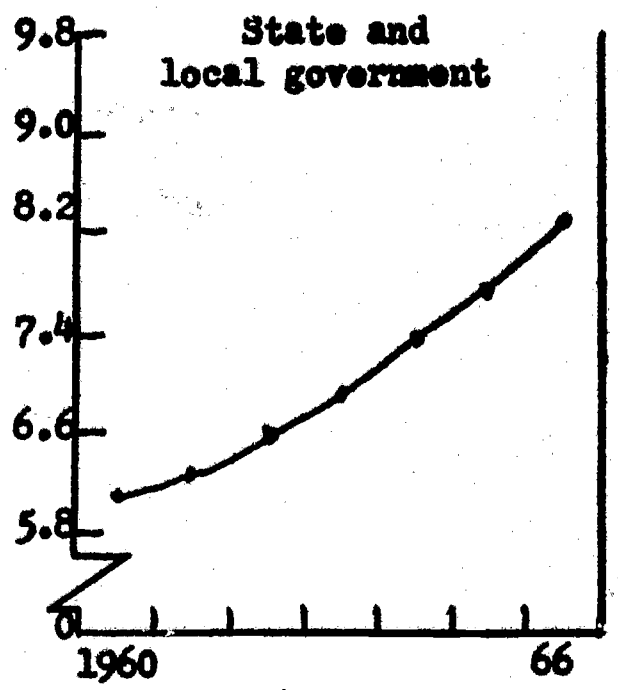
(Employment in millions)







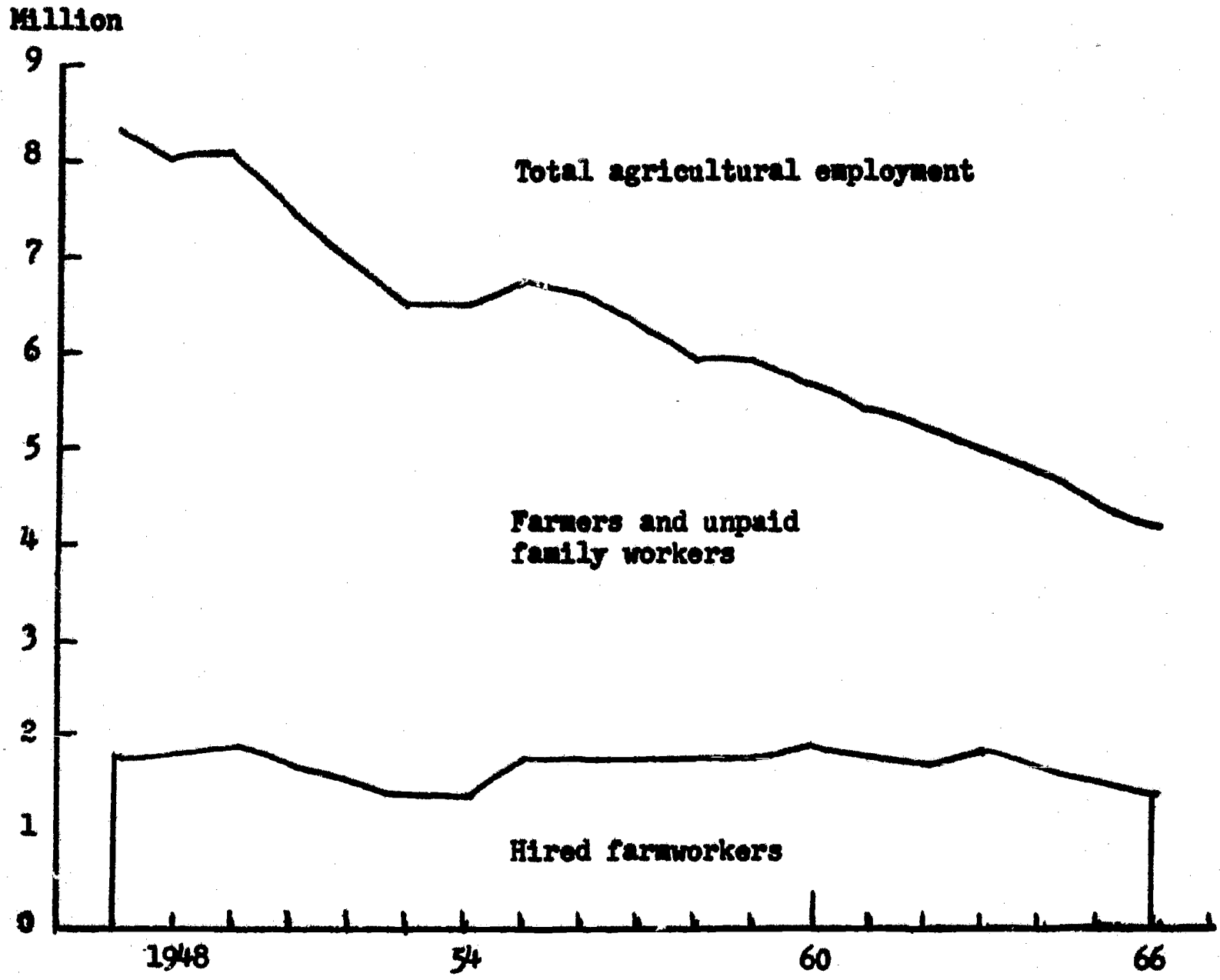




Source: 1967 Manpower Report of the President
U.S. Department of Labor

FIGURE 27

AGRICULTURAL EMPLOYMENT IN THE UNITED STATES, 1948-1964



Source: 1967 Manpower Report of the President
U.S. Department of Labor

CHAPTER V

SUMMARY

The purpose of this survey is to analyze the occupations and sources of employment represented in the geographic area served by the Illinois Valley Community College. The type of education or training recommended by employers is also reported.

This study uses three sources of information. Census data are used to describe and compare occupations and industries with-in the five-county area of Bureau, LaSalle, Lee, Marshall and Putman counties. Information obtained from employers through interviews and questionnaire returns is used to determine the critical needs and trends of employment and training. This source of information also provides judgments about the type of training and education recommended for different occupational groups.

National and state studies related to the area occupational survey are a third source of information. Several consultants have written reports complementing these related studies.

A profile of occupations in the Illinois Valley Community College area when compared with State of Illinois norms, indicates that the area has relatively fewer persons employed in the professional technical, managerial, clerical and skilled craft occupations. On the other hand, there are larger percentages of persons employed in the operatives, services, farmers and farm managers, and farm laborers and foremen occupational categories.

In terms of industry, the Illinois Valley Community College area has a larger percentage employed in manufacturing, mining, and retail trade than is true for the state. Relatively fewer are employed in the wholesale trade, service, and finance-insurance-real estate categories.

The results of the open-end questions in the questionnaire and the structured interviews suggests that the critical needs in the IVCC area correspond in general to the manpower needs of the industrial centers in the United States. There is a wide-spread and continuing need for professionally trained persons and skilled craftsmen and technicians. There is a need for technicians and industrial craftsmen with knowledge and skills in hydraulics, mechanics and electricity who can service and repair machines and equipment.

Modern industry needs manpower at less than professional levels who are trained, nevertheless, beyond high school in the applied physical sciences and mathematics. These people provide the technical support for the professionally trained people. There is a need for trained supervisory personnel and certain specialized middle management persons in virtually every industrial classification.

Analysis for control through application of clerical, accounting, and statistical processes has become a more pressing need. Industry needs information and control systems people who have background and training to work in the plant as well as in the office. Skilled sales and service technicians are in short supply. The need for well-trained secretaries and other skilled office personnel was often expressed.

The more specific findings of the United States Department of Labor were verified in the area when applied to various classifications of manufacturing firms. Engineers, machinists and tool makers, mechanics, electricians, instrument technicians, draftsmen and welders are in short supply

In the business areas that are characterized by relatively large numbers of small firms, as in the case of services, wholesale

and retail trade, and finance-insurance-real estate classifications, there is an expressed need for trained personnel in the occupational areas of clerical workers, sales workers and managers. The area findings for contract construction also call for training in the area of business operation. Hospitals reported a critical need for nurses and trained persons in other related medical and health service occupations.

When the questionnaire returns are analyzed statistically with respect to the type of training and education recommended for various occupations within the industrial classifications, a strong support is provided for various kinds of community college training programs. A technical program is recommended with the greatest frequency for occupations found within the plant. Community college or college degree programs are recommended with greatest frequency for the vast majority of occupations in the professional-technical-managers and clerical-sales occupational classes throughout all of the major industrial groups.

The survey results imply that a community college training program for various technical and skill occupations would receive the most support if it were organized and designed to meet certain job requirements through occupationally related courses supported by appropriate shops or laboratories. For many occupations additional job requirements must be met through directed job experience. Other adult courses are urgently needed for the purpose of up-grading the present employees with new knowledges and skills.

A largepercentage of jobs represented in the survey call for two years or more of training in the clerical-sales and professional technical-managers occupational categories. Finally, the survey indicates that several basic core programs emphasizing industrial applications of chemistry, physics, and mathematics are needed.

In the case of medical and health services, and the food and agricultural related industries, appropriate biological sciences would be added.

The interest and cooperation demonstrated during this survey suggests the feasibility of establishing an occupational information and training research center for the area. Such a center would be able to develop and direct a programmed information system and focus attention upon the most effective training methods.

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APPENDIX A

NORTHERN ILLINOIS UNIVERSITY

DEKALB, ILLINOIS 60115

Office of the

ASSISTANT TO THE DEAN
COLLEGE OF BUSINESS

Area Code 815

Telephone 753-1325

Summer, 1967

Gentlemen:

Information from the attached occupational questionnaire is to be used in a study for the Illinois Valley Community College. An analysis of the information from the survey will be used in the planning and development of the college.

In the first part of the questionnaire, you are asked to identify your firm in terms of the Standard Industrial Classification syste.. In the second part, you are asked to group your employees into the appropriate occupational classes according to the Standard 1965 Dictionary of Occupational Titles. Space is also provided for you to explain employment and training conditions not covered by the statistical treatment.

According to Gene Graves, State Director of Business and Economic Development, "The Illinois River corridor is the hottest industrial section of the state." A shortage of technically qualified employees has been pointed out as a dark lining to the silver cloud. Community college training programs can help to brighten the picture.

Your Illinois Valley Community College has accepted the challenge to develop its facilities and curriculum in line with opportunities to serve the area from which it draws its students. The factual information you can provide us and your comments about training and employment in the occupational areas represented in your firm will be greatly appreciated.

Cordially,

Don W. Arnold

Don W. Arnold
Project Director

DWA/al

Occupational Survey

Illinois Valley Community College Research Project

The purpose of this questionnaire is to obtain basic information about occupations represented in the five-county area surrounding the Illinois Valley Community College. Plans for curriculum development will be based in part upon an analysis of the data.

If you have questions about the questionnaire, please phone collect, D. W. Arnold, Director of the Project, at 815-753-1325. Please return the completed questionnaire in the attached self-addressed envelope. Thank you.

- -

Name of Firm: _____

Address: _____

1. Describe briefly the nature of the firm or organization in terms of its products, function, processes or services.

_____

_____

_____

_____

2. Total number employed (full time): _____

3. Please check the appropriate Standard Industrial Classification(s) for your firm. When more than one numbered classification appears on the same line, underline the one that applies.

☐ A. AGRICULTURE, FORESTRY, AND FISHERIES

☐ B. MINING

☐ C. CONTRACT CONSTRUCTION

D. MANUFACTURING

☐ 19 Ordnance and accessories

☐ 20 Food and kindred products; 21 - Tobacco manufactures

☐ 22 Textile mill products

☐ 23 Apparel and other finished products made from fabrics

☐ 24 Lumber and wood products; 25 - Furniture and fixtures

☐ 26 Paper and allied products

☐ 27 Printing, publishing, and allied industries

☐ 28 Chemicals and allied products

☐ 29 Petroleum refining and related industries

☐ 30 Rubber and miscellaneous plastics products; 31 - Leather products

☐ 32 Stone, clay and glass products

☐ 33 Primary metal industries

☐ 34 Fabricated metal products, except ordnance and machinery

☐ 35 Machinery, except electrical

☐ 36 Electrical machinery, equipment, and supplies

☐ 37 Transportation equipment

☐ 38 Professional, scientific and controlling instruments; photographic and optical goods, watches and clocks

☐ E. TRANSPORTATION, COMMUNICATION, ELECTRIC, GAS, AND SANITARY SERVICES

F. WHOLESALE AND RETAIL TRADE:

☐ 50 Wholesale trade

☐ 52 Retail trade - Building materials, hardware, and farm equipment; 53 - General merchandise; 54 - Food

☐ 55 Automotive dealers and gasoline service stations

☐ 56 Retail trade - Apparel and accessories; 57 - Furniture, home furnishings

☐ 58 Retail trade - Eating and drinking places

☐ G. FINANCE, INSURANCE, AND REAL ESTATE

H. SERVICES:

☐ 70 Hotels, rooming houses, camps, and other lodging places

☐ 72 Personal services

☐ 73 Miscellaneous business services

☐ 75 Automobile repair, automobile services, and garages; 76 - Miscellaneous repair services

☐ 78 Motion pictures; 79 - Amusement and recreation services

☐ 80 Medical and other health services

☐ 81 Legal services

☐ 82 Educational services

☐ 86 Nonprofit membership organizations

☐ I. GOVERNMENT

☐ J. OTHERS: _____

OCCUPATIONAL INFORMATION

INSTRUCTIONS:
(1) For each major occupational group, identify the occupational subdivision represented in your firm by writing the code number(s) in a box below. If there is a need to refine the classification identify the occupation by description.

(2) Opposite each code number listed write the number of people that are employed by your organization on a continuing basis. Part-time or seasonal workers should not be included.

(3) For each occupational class represented in your organization, indicate the type of training and education (off-the-job) you recommend or that is required for the occupation. Use the following code:

PD..... Requires professional degree
CD..... College degree in appropriate major field recommended
CC-1.... Community college two-year program of basic and occupationally related core courses
CC-2.... Community college two-year general course not necessarily related to occupation
TP..... Post High School technical or skill training program

(4) On the final page of this questionnaire, space is provided for you to write about critical training needs, major occupational trends or special training and occupational conditions not revealed otherwise in this survey form.

A. PROFESSIONAL, TECHNICAL, AND MANAGERIAL OCCUPATIONS

01 - OCCUPATIONS IN ARCHITECTURE AND ENGINEERING, architecture (001); Engineering, electrical (003), civil (005), ceramic (006), mechanical (007), draftsmen (017), surveyors (018), other _____

02 - OCCUPATIONS IN MATHEMATICS AND PHYSICAL SCIENCES, mathematics (020), chemistry (022), physics (023), geology (024), other _____

04 - OCCUPATIONS IN LIFE SCIENCES, agricultural sciences (040), psychology (045), other _____

07 - OCCUPATIONS IN MEDICINE AND HEALTH, medicine and surgery (070), denistry (072), veterinary medicine and surgery (073), pharmacy (074), nursing (075), dietetic work (077), medical and dental technology (078), medicine and health, n.e.c. (079), other _____

(1) OCCUPATION CLASSIFICATION CODE	(2) NUMBER EMPLOYED	(3) TYPE OF EDUCATION/TRAINING RECOMMENDED
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐

A. PROFESSIONAL, TECHNICAL, AND MANAGERIAL OCCUPATIONS (Continued)

09 - OCCUPATIONS IN EDUCATION, college and university education (090), secondary school education (091), primary school and kindergarten education (092), education of the handicapped (094), home economics, agriculture, and related education (096), vocational education (097), other _____

10 - OCCUPATIONS IN MUSEUM, LIBRARY, AND ARCHIVAL SCIENCES

11 - OCCUPATIONS IN LAW AND JURISPRUDENCE

12 - OCCUPATIONS IN RELIGION AND THEOLOGY

13 - OCCUPATIONS IN WRITING

14 - OCCUPATIONS IN ART, commerical art (141), designing (142), photography (143), other _____

15 - OCCUPATIONS IN ENTERTAINMENT AND RECREATION, dramatics (150), dancing (151), music (152), athletics and sports (153), other _____

16 - OCCUPATIONS IN ADMINISTRATIVE SPECIALIZATIONS, accounting and auditing (160), budget and management analysis (161), purchasing management (162), sales and distribution management (163), advertising management (164), public relations management (165), personnel and training administration (166), inspecting and investigating, managerial and public service (186), other _____

18 - MANAGERS AND OFFICIALS, agriculture, forestry and fishing industry managers and officials (180), mining industry managers and officials (181), construction industry managers and officials (182), manufacturing industry managers and officials (183), transportation, communication, and utilities industry managers and officials (184), wholesale and retail trade managers and officials (185), finance, insurance, and real estate managers and officials (186), service industry managers and officials (187), public administration managers and officials (188), other _____

19 - MISCELLANEOUS PROFESSIONAL, TECHNICAL, AND MANAGERIAL OCCUPATIONS

(1) OCCUPATION CLASSIFICATION CODE	(2) NUMBER EMPLOYED	(3) TYPE OF EDUCATION/TRAINING RECOMMENDED
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐

CODE FOR COLUMN (3):

PD..... Requires professional degree
CD..... College degree - major field
CC-1..... Comm. College - basic and occupationally related
CC-2..... Comm. College - general
TP..... Technical or skill training

B. CLERICAL AND SALES OCCUPATIONS

20 - STENOGRAPHY, TYPING, FILING, AND RELATED OCCUPATIONS, secretarial work (201), stenography (202), typing (203), correspondence work (204), personnel work (205), filing (206), duplicating-machine work (207), miscellaneous office machine work (208), other _____

21 - COMPUTING AND ACCOUNT-RECORDING OCCUPATIONS, bookkeeping (210), cashiering (211), teller service (212), automatic data processing (213), billing-machine work (214), bookkeeping-machine work (215), computing-machine work (216), other _____

22 - MATERIAL AND PRODUCTION RECORDING OCCUPATIONS, clerical work, production (221), clerical work, shipping and receiving (222), stock checking and related work (223), weighing (224), material and production recording (229), other _____

23 - INFORMATION AND MESSAGE DISTRIBUTION OCCUPATIONS, mail sorting, stamping, recording, routing, and related work (231), clerical work, post office (232), mail delivery (233), telephone work (235), reception and information dispensing work (237), other _____

24 - MISCELLANEOUS CLERICAL OCCUPATIONS, collecting (240), adjusting (241), other _____

25 - SALESMEN, SERVICES - Indicate type of services _____

26 - SALESMEN AND SALESPERSONS, COMMODITIES (26-28) - Indicate class of commodities _____

29 - MERCHANDISING OCCUPATIONS, EXCEPT SALESMEN, sales clerking (290), route work (292), canvassing and soliciting (293), other _____

(1) OCCUPATION CLASSIFICATION CODE	(2) NUMBER EMPLOYED	(3) TYPE OF EDUCATION/TRAINING RECOMMENDED
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐

CODE FOR COLUMN (3):

PD..... Requires professional degree
CD..... College degree - major field
CC-1..... Comm. College - basic and occupationally related
CC-2..... Comm. College - general
TP..... Technical or skill training

C. SERVICE OCCUPATIONS

31 - FOOD AND BEVERAGE PREPARATION AND SERVICE OCCUPATIONS, food and beverage service except ship stewards (310), food serving (311), bartending (312), chefs and cooks (313), kitchen work (318), other _____

32 - LODGING AND RELATED SERVICE OCCUPATIONS

33 - BARBERING, COSMETOLOGY, AND RELATED SERVICE OCCUPATIONS

34 - AMUSEMENT AND RECREATION SERVICE OCCUPATIONS

35 - MISCELLANEOUS PERSONAL SERVICE OCCUPATIONS

36 - APPAREL AND FURNISHINGS SERVICE OCCUPATIONS, laundering service, (361), dry cleaning service (362), pressing service (363), dyeing and related services (364), other _____

37 - PROTECTIVE SERVICE OCCUPATIONS, guard and related services (372), fire protection service (373), police and related work, public service (375), police and related work, except in public service (376), law enforcement work (377), other _____

38 - BUILDING AND RELATED SERVICE OCCUPATIONS

(1) OCCUPATION CLASSIFICATION	(2) NUMBER EMPLOYED	(3) TYPE OF EDUCATION/TRAINING
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐

D. FARMING, FISHERY, FORESTRY, AND RELATED OCCUPATIONS

40 - PLANT FARMING OCCUPATIONS

41 - ANIMAL FARMING OCCUPATIONSS

42 - MISCELLANEOUS FARMING AND RELATED OCCUPATIONS

43 - FISHERY AND RELATED OCCUPATIONS

46 - AGRICULTURAL SERVICE OCCUPATIONS

☐	☐	☐
☐	☐	☐

CODE FOR COLUMN (3):

PD..... Requires professional degree
CD..... College degree - major field
CC-1..... Comm. College - basic and occupationally related
CC-2..... Comm. College - general
TP..... Technical or skill training

E. PROCESSING OCCUPATIONS

50 - OCCUPATIONS IN PROCESSING OF METAL, electroplating services (500), dip plating services (501), melting, pouring, casting, and related services (502), pickling, cleaning, degreasing, and related services (503), heat-treating services (505), other _____

51 - ORE REFINING AND FOUNDRY OCCUPATIONS

52 - OCCUPATIONS IN PROCESSING OF FOOD, TOBACCO, AND RELATED PRODUCTS

53 - OCCUPATIONS IN PROCESSING OF PAPER AND RELATED MATERIALS

54 - OCCUPATIONS IN PROCESSING OF PETROLEUM, COAL, NATURAL AND MANUFACTURED GAS, AND RELATED PRODUCTS

55 - OCCUPATIONS IN PROCESSING OF CHEMICALS, PLASTICS, SYNTHETICS, RUBBER, PAINT, AND RELATED PRODUCTS

56 - OCCUPATIONS IN PROCESSING OF WOOD AND WOOD PRODUCTS

57 - OCCUPATIONS IN PROCESSING OF STONE, CLAY, GLASS, AND RELATED PRODUCTS, crushing, grinding, and mixing services (570), separating services (571), melting services (572), baking, drying, and heat-treating services (573), impregnating, coating, and glazing services (574), forming services (575)

58 - OCCUPATIONS IN PROCESSING OF LEATHER, TEXTILES, AND RELATED PRODUCTS

(1) OCCUPATION CLASSIFICATION	(2) NUMBER EMPLOYED	(3) TYPE OF EDUCATION/TRAINING
☐	☐	☐
☐	☐	☐
☐	☐	☐
☐	☐	☐

CODE FOR COLUMN (3):
PD..... Requires professional degree
CD..... College degree - major field
CC-1..... Comm. College - basic and occupationally related
CC-2..... Comm. College - general
TP..... Technical or skill training

F. MACHINE TRADES OCCUPATIONS

60 - METAL MACHINING OCCUPATIONS, machinists and related services (600), toolmakers and related services (601), gear machining occupations (602), abrading services (603), turning services (604), milling and planning services (605), boring services (606), sawing services (607), other _____

61 - METALWORKING OCCUPATIONS, hammer forging services (610), press forging services (611), forging services, n.e.c. (612), sheet and bar rolling services (613), extruding and drawing services (614), punching and shearing occupations (615), fabricating machine services (616), other _____

F. MACHINE TRADES OCCUPATIONS (Continued)

62 - MECHANICS AND MACHINERY REPAIRMEN

64 - PAPERWORKING OCCUPATIONS

65 - PRINTING OCCUPATIONS

66 - WOOD MACHINING OCCUPATIONS

67 - OCCUPATIONS IN MACHINING STONE, CLAY, GLASS, AND RELATED MATERIALS

68 - TEXTILE OCCUPATIONS

(1) OCCUPATION CLASSIFICATION	(2) NUMBER EMPLOYED	(3)* TYPE OF EDUCATION/TRAINING

G. BENCH WORK OCCUPATIONS

70 - OCCUPATIONS IN FABRICATION, ASSEMBLY, AND REPAIR OF METAL PRODUCTS

71 - OCCUPATIONS IN FABRICATION AND REPAIR OF SCIENTIFIC AND MEDICAL APPARATUS, PHOTOGRAPHIC AND OPTICAL GOODS, WATCHES AND CLOCKS, AND RELATED PRODUCTS

72 - OCCUPATIONS IN ASSEMBLY AND REPAIR OF ELECTRICAL EQUIPMENT

73 - OCCUPATIONS IN FABRICATION AND REPAIR OF PRODUCTS MADE FROM ASSORTED MATERIALS

74 - PAINTING, DECORATING, AND RELATED OCCUPATIONS

75 - OCCUPATIONS IN FABRICATION AND REPAIR OF PLASTICS, SYNTHETICS, AND RUBBER

76 - OCCUPATIONS IN FABRICATION AND REPAIR OF WOOD PRODUCTS

77 - OCCUPATIONS IN FABRICATION AND REPAIR OF SAND, STONE, CLAY, AND GLASS PRODUCTS

78 - OCCUPATIONS IN FABRICATION AND REPAIR OF TEXTILE, LEATHER, AND RELATED PRODUCTS

(1) OCCUPATION CLASSIFICATION	(2) NUMBER EMPLOYED	(3)* TYPE OF EDUCATION/TRAINING

* For Column (3) Code - See previous page.

H. STRUCTURAL WORK OCCUPATIONS

80 - OCCUPATIONS IN METAL FABRICATING, riveting (800), fitting, bolting, screwing, and related work (801), sheet metal work (804), boilermaking (805), other ___

81 - WELDERS, FLAME CUTTERS, AND RELATED OCCUPATIONS

82 - ELECTRICAL ASSEMBLING, INSTALLING, AND REPAIRING OCCUPATIONS

84 - PAINTING, PLASTERING, WATERPROOFING, CEMENTING, AND RELATED OCCUPATIONS

85 - EXCAVATING, GRADING, PAVING, AND RELATED OCCUPATIONS

86 - CONSTRUCTION OCCUPATIONS, carpentry and related work (860), brick and stone masonry and tile setting (861), plumbing, gas fitting, steam fitting (862)

(1) OCCUPATION CLASSIFICATION	(2) NUMBER EMPLOYED	(3) TYPE OF EDUCATION/TRAINING

I. MISCELLANEOUS OCCUPATIONS

90 - MOTOR FREIGHT OCCUPATIONS

91 - TRANSPORTATION OCCUPATIONS, railroad transportation (910), water transportation (911), other _____

92 - PACKAGING AND MATERIALS HANDLING OCCUPATIONS

93 - OCCUPATIONS IN EXTRACTION OF MINERALS

95 - OCCUPATIONS IN PRODUCTION AND DISTRIBUTION OF UTILITIES

97 - OCCUPATIONS IN GRAPHIC ART WORK

(1) OCCUPATION CLASSIFICATION	(2) NUMBER EMPLOYED	(3) TYPE OF EDUCATION/TRAINING

CODE FOR COLUMN (3):
CC-1..... Comm. College - basic and occupationally related
CC-2..... Comm. College - general
TP..... Technical or skill training

EVALUATION AND COMMENT:

1. What are the most critical needs of your firm at the present time with reference to training and employment?

2 What occupational <u>trends</u> seem to be developing in your industry?

3. What special or unique occupational and training <u>conditions</u> are there in your industry?

4. In what ways can the Illinois Valley Community College program relate to training and employment in your industry?

Name of Person Completing the Questionnaire:_____

Title:_____

APPENDIX B

PROJECTED EMPLOYMENT GROWTH BY INDUSTRY

Decline	Industry	Projected Employment Growth			
		No Change	Less Than Average	Average	More Than Average
	Government				→
	Services				→
	Contract Construction				→
	Wholesale and Retail Trade			→	
	Finance, Insurance and Real Estate			→	
	Manufacturing		→		
	Transportation & Public Utilities		→		
←	Mining				
←	Agriculture				

Projected Employment Growth by Occupation

Decline	Major Occupational Group	Projected Employment Growth			
		No Change	Less Than Average	Average	More Than Average
	Professional, Technical, and Kindred Workers				→
	Service Workers				→
	Clerical Workers				→
	Skilled Workers			→	
	Managers, Officials, & Proprietors			→	
	Sales Workers			→	
	Semiskilled Workers		→		
	Laborers (Nonfarm)	→			
←	Farm Workers				

Source: United States Department of Labor, 1966-67 Occupational Outlook

APPENDIX C
PERSONNEL IN HOSPITALS
Present Staff and Additional Needs, April 1966
ILLINOIS

	Present Staff	Additional Needs
	Reporting Hospitals	Reporting Hospitals
ALL CATEGORIES - TOTAL	102,069	.....
All professional and technical - total	62,194	12,619
Nursing service		
Professional nurses	12,734	3,460
LPN's or vocational nurses	4,225	1,721
Surgical technical aide	713	169
Aides, orderlies, attendants	21,926	3,966
Diagnostic services		
Medical technologist	2,410	423
Laboratory assistants	613	188
Cytotechnologists	64	20
Histologic technicians	208	38
Electrocardiographic technicians	278	41
Electroencephalographic technicians	78	21
Therapeutic services		
Occupational therapists	191	78
Occupational therapy assistants	169	27
Physical therapists	515	141
Physical therapy assistants	302	78
Social workers	659	293
Social work assistants	32	30
Recreation therapists	332	142
Inhalation therapists	385	184
Speech pathologists and audiologists	52	35
Radiology		
Radiologic technologists	1,127	187
X-ray assistants	257	38
Radiation therapy technologists	48	10
Radiation therapy assistants	9	2
Medical records		
Medical record librarians	291	74
Medical record assistants	349	98
Dietary		
Dietitians	508	152
Food service managers	200	47
Pharmacy		
Pharmacists	411	94
Pharmacy assistants	220	36
All other professional and technical	12,888	826

SOURCE: Manpower Resources in Hospitals - 1966, Public Health Service and the American Hospital Association

APPENDIX D
Average Weekly Gross Earnings Per Production Worker
Manufacturing Establishments
1965 - 1966

	1965	1966
All manufacturing establishments	$107.53	$111.92
Durable goods industries	117.18	121.67
Ordnance and accessories	131.57	135.36
Lumber and wood products	88.54	92.62
Furniture and fixtures	87.98	91.08
Stone, clay, and glass products	110.04	114.24
Primary metal industries	133.88	138.09
Fabricated metal products	116.20	121.69
Machinery	127.58	134.90
Electical equipment and supplies	105.78	108.77
Transportation equipment	137.71	141.86
Instruments and related products	108.47	113.40
Miscellaneous mfg. industries	85.39	88.80
Nondurable goods industries	94.64	98.49
Food and kindred products	99.87	103.82
Tobacco manufactures	79.21	84.97
Textile mill products	78.17	82.12
Apparel and related products	66.61	68.80
Paper and allied products	114.22	119.35
Printing, publishing, and allied industries	118.12	122.61
Chemicals and allied products	121.09	125.46
Petroleum refining and related industries	138.42	144.58
Rubber and miscellaneous plastics products	109.62	111.72
Leather and leather products	71.82	74.88

Source: Survey of Current Business, June 1967

APPENDIX E

CLASSIFICATION OF BUSINESSES BY RANK AND TOTAL OFFICE EMPLOYEES ACCORDING TO 135 REPLIES RECEIVED IN RESPONSE TO PRELIMINARY SURVEY CARD IN THE IMMEDIATE AREA OF SCHOOL DISTRICT NO. 120

Rank	Classifications Of Business	Number Of Replies	Per Cent Of Total	Total Employed In Offices	Average Employees In Offices
1	Industrial	22	16.3	372	17.0
2	Medical	18	13.3	22	1.2
3	Insurance	14	10.4	27	1.9
4	Legal	12	8.8	29	2.4
5	Retailers	11	8.1	25	2.3
6	Government	8	5.9	17	2.1
7	Finance	6	4.4	15	2.5
8	Coal-Oil-Lumber	6	4.4	11	1.8
9	Wholesalers	5	3.7	7	1.4
10	Auto Sales	5	3.7	9	1.8
11	Banking	4	3.0	61	15.3
12	Hospitals	3	2.2	53	17.7
13	Realty	3	2.2	4½	1.5
14	Contractors	3	2.2	3	1.0
15	Services	3	2.2	5	1.7
16	Community Agencies	3	2.2	5	1.7
17	Publishers	2	1.5	22	11.0
18	Utilities	2	1.5	15	7.5
19	Hotel-Motel	1	0.8	10	10.0
20	Plumbing	1	0.8	4	4.0
21	Transportation	1	0.8	1	1.0
22	Red Cross (Volunteers)	1	0.8	(15)	(15.0)
23	Illegible	1	0.8	1	1.0
Totals		135	100.0	718	-

SOURCE: A Study to Determine Employment Opportunities, Entry Job Requirements and Student Interest in Secretarial and Kindred Office Occupations, LaSalle-Peru, Illinois.

APPENDIX F

NUMBER OF EMPLOYEES IN JOB CLASSIFICATIONS AND NUMBER OF ANNUAL VACANCIES OPEN TO GRADUATES ACCORDING TO 60 EMPLOYERS IN THE IMMEDIATE AREA OF SCHOOL DISTRICT NO. 120

Job Classification	Number Reported	Per Cent Of Total Reported	Number Of Annual Job Openings	Jobs Open To High-School Graduates	Jobs Open To Junior-College Graduates
Office Clerk	172	32.6	10	14	7
Typist	120	22.8	2	5	4
Secretary	102	20.0	8	14	8
Stenographer	42	8.0	3	3	2
Bookkeeper	31	6.0	5	6	8
Receptionist	23	4.6	2	6	4
Office-Machines Operator	18	2.4	4	-	-
Professional Assistant	10	1.9	-	1	1
Others	9	1.7	-	1	1
Totals	527	100.0	34	49	34

SOURCE: A Study to Determine Employment Opportunities, Entry Job Requirements and Student Interest in Secretarial and Kindred Office Occupations, LaSalle-Peru, Illinois.