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ABSTRACT

This study contains an inventory of Indiana's present library facilities together with projections of the need for future library resources based on the population projections. To facilitate presentation and analysis of the data in this report, 14 state planning regions were used. The relevant geographic regions section defines Indiana's economic regions, discusses administering Indiana's libraries on a regional basis, and the feasible regions for public libraries in Indiana. This is followed by a discussion of the library and information services now available in Indiana's public, school, institutional and business libraries. A look at the future demand for library services precedes the equating of present and future demand for library services. Appendix B states the equation used to predict future circulation. (NH)

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Peter Hiatt
Director and General Editor

REGIONAL SUPPLY AND DEMAND FOR LIBRARY SERVICES

by

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PREFACE

The point of departure for a discussion of Indiana's future library needs and resources is an inventory of the present library facilities in the state and a description of the state's general economic and demographic profile. Before future library needs can be estimated, economic and demographic variables that influence the demand for library services must be projected and estimating equations relating library needs to economic and demographic parameters developed.

The present study contains an inventory of Indiana's present facilities together with projections of the need for future library resources based on the population projections. Because the state's present library facilities cannot be characterized as a system but, rather, are a collection of local, county and state libraries together with university and other specialized libraries, it was necessary to assemble data from a variety of sources. Before the data could be assembled and evaluated, however, it was necessary to establish regional groupings that would facilitate analysis of the data. The rationale of regionalization and a description of the regions prefaces the inventory of Indiana's present library facilities.

The importance of this study for future planning can hardly be overestimated, for projections of the demand for future library resources are essential to efficient, intelligent planning for library facilities. Additionally, a glance at Indiana's present library situation reveals a lack of any uniform system of libraries across the state--some areas have local or township libraries, others county libraries, others no library services at all. If the state of Indiana is to supply all its future citizens with adequate library services both careful planning and improved organization will be required.

Before the reader considers the content of this report he should be forewarned of three serious limitations of the study. First, all projections of library resource needs are exactly that--projections. They are not estimates but rather are projections based on a set, or sets, of assumptions. Only insofar as the assumptions are valid can the projections be expected to materialize. Second, the projections of future library needs are based on the population projections and current library resources only. They are not attempts to forecast the ideal future library service but only take into account extending library services to areas presently lacking library facilities, expanding facilities to accomodate projected increases in population and upgrading present facilities to a level comparable to the better libraries in the state. Finally, the use of the fourteen state planning regions to facilitate presentation and analysis of the data in this report should not be interpreted as endorsing a system of state libraries divided into fourteen regional groupings. As will become apparent in the report, we do favor a state library system, but the precise organization of that system must be determined by future studies.

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REGIONAL SUPPLY OF AND DEMAND FOR LIBRARY SERVICES

The libraries of Indiana may be considered to be nonprofit organizations that need to make decisions and implement policy in much the same manner as any profit-oriented business. To facilitate this process regional groupings are frequently desirable because they provide two benefits:

(1) ease of data collection for analysis; and

(2) ease of implementation of the policy --that is, for general administrative reasons and/or implementation of different policies in different regions.

The reasons for deciding to regionalize the area will naturally determine the method of dividing the area into regions.

Relevant Geographic Regions

For Indiana, the State Government as a decision-making unit comprises ninety-two data collecting agencies at the county level. Accordingly, any political, economic, etc. study undertaken by the state requires assimilation of a large quantity of data. The implementation of policy decisions arrived at by the State Government may also be facilitated by recognizing regional differences (geographic, social, economic, cultural, etc.), and allowing for any such differences at the time of implementation.

In the sixties, the State Government and other interested parties (broadly encompassed by the Indiana Economic Forum) recognized the fact that grouping related counties in Indiana into regions would facilitate decision making and policy implementation at the state level. Subsequent

research and discussion conducted by the above parties resulted in the division of Indiana into regions suitable for their common purposes. These regions are defined below.

Defining Indiana's Economic Regions

Before examining a regional division of the state of Indiana, three traditional approaches to defining regions are noted:[1]

(1) homogeneity with respect to some one or combination of physical, economic, social, or other characteristics;

(2) nodality or polarization, usually around some central urban place;

(3) a policy-oriented approach, concerned mainly with administrative coherence or identity between the area or state being studied and available political institutions for effectuating policy decisions.

It should be obvious that a region must be homogeneous with respect to the implications of the resulting policy decisions, and hence that (2) and (3) may be considered as variations on the homogeneity criterion.

The initial work on Indiana's regions showed that for defined regions there existed discernible migration patterns and differing birth rates.[2] The regions were defined with the primary objective that the resulting grouping should "join counties that share common fates, that is, are likely to display similar responses to relevant stimuli." Criteria for defining the regions were maintained in accordance with the recommendations of the

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[1]J. R. Meyer, Regional Economics: A Survey, Surveys of Economic Theory, Vol. II, St. Martins (1966).

[2]Ann Grossmann, "Defining Indiana's Economic Regions," Indiana Business Review, December (1965).

Indiana Economic Forum. These criteria (as reported by a special subcommittee of the Indiana Economic Forum on April 27, 1967) were that the standard economic regions of Indiana should:

(1) follow county lines;

(2) be related to one or more significant metropolitan cities;

(3) recognize patterns of highways, commuting, economic profile, and coverage by newspaper, radio and television;

(4) be contiguous and relatively compact;

(5) allow combinations into broad zones, that is, northern, central and southern Indiana;

(6) not exceed fifteen in number;

(7) be identified by the major city or cities within the region.

Following extensive research and discussion, the Indiana Economic Forum adopted a fourteen region division of the state of Indiana on November 8, 1967. Furthermore, this division was officially adopted for State Government planning by Governor Branigan on December 4, 1968.

Administering Indiana's Libraries on a Regional Basis

The division of the State of Indiana into fourteen regions was undertaken to facilitate State Government planning and administration. The question arises, then, whether or not the planning and administration of the Indiana public libraries should proceed along similar lines? If the decision to regionalize library service is made, then it follows that the regions of the state for the purpose of library service may or may not coincide with the regions adopted by the State Government and the Indiana Economic Forum.

The justification for imposing a regional "system" on Indiana's libraries must be that the regional system results in better service to the cummunity at no greater cost--more correctly, it can only be justified on the grounds that the value of the increase in service exceeds the consequent increase in cost. The latter criterion raises questions of "value" of library service, which are dealt with elsewhere in this report. For the moment then, it may be concluded that if the benefits of a regional system exceed the costs of implementing the system, then such a system is justifiable economically apart from political considerations. Furthermore, given the conclusion that a regional system can be shown to give better service and achieve economies of scale, then it follows that current political attitudes and institutions should be adapted to serve the greater benefit for the greater number.

The expression "better service" prompts the question of "what are the services rendered by libraries?" This report is not intended to be a detailed examination of what services libraries should provide in the future; however, broad categories of groups benefiting from such services can be identified. These groups may be categorized as individual and community:

(1) Individuals
  (i) in self-teaching pursuits
  (ii) in leisure time pursuits
  (iii) in formal education

(2) Community
  (i) hospital patients and persons otherwise confined
  (ii) special services to children, culturally disadvantaged groups, senior citizens, etc. (e.g. story telling exhibits, discussion programs)

(iii) information services to business, industry, government and the professions.

While this study focuses on the public libraries of Indiana, the benefit groups broadly outlined above are, in some cases, clearly served by other systems, namely the Public School Library system, various special libraries supporting industry and college and university libraries throughout the state. Accordingly, any attempt to better the service of information availability would need to consider the interaction of all these institutions rather than the public libraries in isolation.

The rationale for dividing Indiana into library service regions may be briefly developed along the following lines. The function of any library or set of libraries is to serve the surrounding community. If the community is considered to be a region characterized by:

(1) homogeneity with respect to economic and social profile,

(2) common commuting patterns centralized or polarized around a large urban, metropolitan area,

(3) common service from newspapers, radio, television and other stimuli,

(4) common political bonds and fiscal responsibilities (e.g., taxes, local government);

then library service to that community must be considered in total for the purpose of making decisions to give better library service. Although most citizens may consider the county to represent the largest feasible community surrounding them, commuting patterns between counties may actually indicate a larger community than that bounded by county lines. Consequently, as one of the library's functions is to maximize accessability, it seems natural to pattern library service so it coincides with common commuting patterns.

One is tempted to conclude that "maximizing accessibility" implies that every county should have at least x number of libraries, whereby every citizen in the county is only a maximum of y minutes from a library. An alternative would be to have one major library in the county located in the county's major city, with the outlying areas served entirely by bookmobiles or other mobile service centers. A further logical alternative would be to consider the region (consisting of a number of related counties) as the area within which accessibility has to be maximized--under this plan it may be feasible to serve an entire county by mobile (or fixed) service centers which would have access to a larger range of library materials than is presently available in some county libraries.

This study is not concerned with defining the optimal service method between the various alternatives that exist. However, the implications arising out of the future requirements of library service suggest that a pattern of many autonomous libraries will be too costly, and unable to provide the services that will be demanded of them.

Some problem areas prompting regional rather than local or county solutions are:[3]

(1) rapidly changing library service areas;

(2) increasing demand for a wider variety of library service;

(3) rapidly increasing variety and quantities of library materials;

(4) the increasing impact of a changing technology on the design of library facilities;

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[3]These problem areas were taken from a report titled Comprehensive Library Planning Program Prospectus prepared by the Southeastern Wisconsin Regional Planning Commission. This report also cited as a problem area the lack of regionwide interlibrary cooperation.

(5) replacing existing library facilities;

(6) shortage of qualified staff;

(7) rising costs of library facilities and services, and the consequences for tax base and tax rates or library quality.

For example, with regard to (7) on the above list it appears that substantial economies of scale can be gained by grouping libraries into regions after the pattern of the current I.L.A.-I.L.T.A. district division. Some such cost economies are:

(1) substantial discounts in book buying by the regional group as a total entity, rather than each library in the region as an individual buyer;

(2) centralized book processing and cataloging procedures;

(3) cost allocation of special services over all libraries in the region (e.g., exhibitions, lectures, etc.).

This study has concluded a priori that regional subdivision of libraries, grouped together to serve the surrounding community peculiar to that region, are a necessary sequel to the increasingly sophisticated demands that will be made of library services in the future. Further research may be justified to strengthen or disprove this hypothesis.

Feasible Regions for Public Libraries in Indiana

Having concluded that regional groupings of public libraries will prove necessary for the future supply of library services, the natural consequence is identification of the regions. The criterion for the best regional division must be "best service at the least cost"--where "best service" means best service to the region. This entails no reduction in services offered

by the present autonomous libraries and a substantial increase in the more specialized services to the region, previously omitted due to the problems outlined on pages 6 and 7.

Before proposing how libraries in Indiana should be regionalized, the following constraints are noted:

(1) library regions must consist of areas that may be administered as nearly as possible within the framework of current state and county institutions--this would mean, as a general rule, that library regions should follow county boundaries;

(2) library regions should be related with respect to physical, economic, and other characteristics and with respect to the types of services popularly demanded in a region;

(3) library regions should recognize patterns of highways, commuting, and coverage by newspaper, radio and television--this means each library region should encompass a defined "marketing area," in order that any specialized services peculiar to that market can be provided.

Various bases have been suggested for regionalizing present libraries--some are economic support, political unity, telephone charge areas, mailing areas, processing service to business. The main objection to these criteria must be their lack of scope of the concept of library service, and their infeasibility with regard to the constraints noted above. The current division of the state of the six I.L.A.-I.L.T.A. districts of Indiana libraries cuts across regional boundaries thus violating the marketing (third) constraint,

and it is doubtful whether this particular district division is feasible with regard to the second constraint.

A regional subdivision of public libraries that is feasible with regard to the constraints on library regions is the state planning fourteen regional breakdown outlined above. Therefore, we suggest that feasible library regions of Indiana should:

(1) either follow the fourteen regions of the Regional Planning and Development Program adopted by Governor Branigan on December 4, 1968;

(2) or group the fourteen regions of (1) into a smaller number of library service regions on the basis of ease of administration, political factors, etc.--one possible division on these lines would be to redefine the six I.L.A.-I.L.T.A. districts to conform with the constraints outlined above.

Library and Informational Services Now Available in Indiana

Public Libraries

A broad summary of the present extent of public library resources and library service based on the fourteen regions is outlined in Table 1.[4]

The percentage of a region's population shown as served indicates the percentage of the population that pays taxes towards the support of a county or township library. Presumably there is some correlation between paying taxes for and accessibility to library services, but it would be improper to regard this tax paying percentage for each region as measuring exactly the extent of that region's library service. A more precise account of the extent of a region's library service can be gained from the map in Figure 1. The dots (•) on this map indicate the furthest limits (North, South, East and West) of service provided by either bookmobile or branch/station for each of the responding libraries. Response of the 246 libraries to the questionnaire that forms the basis for this map was limited to 159 or 64.7 percent, and accordingly some libraries offering tangible services by bookmobile, etc. will not be shown as doing so. The libraries responding to the questionnaire are listed alphabetically in Appendix A.

Having noted the limitations of the measure for percentage served in a region, we note from Table 1 that the percentage served ranges from 66.2 percent (Region 4) up to 100.0 percent (Region 1) with the average being 84.2 percent. From Table 1 the nature of each region's pattern of service is broadly apparent. For example, we note that Region 1 has 27 libraries.

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[4]The footnotes to this table indicate the manner in which the various measures were derived--the source for all of the statistics regarding libraries was Statistics of Indiana Libraries 1966, published by the Indiana State Library.

TABLE 1
Library Statistics by Region

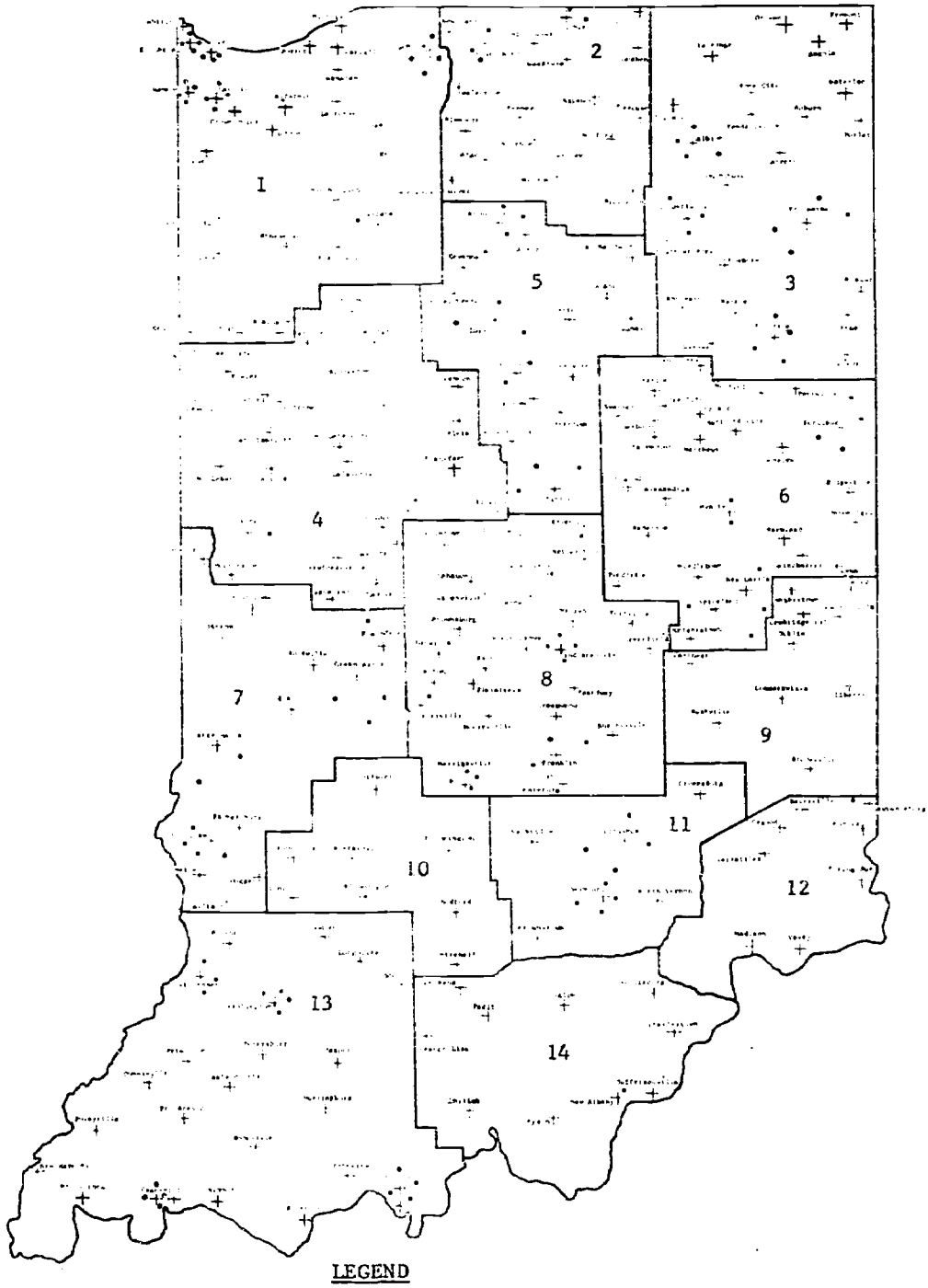
	1 Population (a)	2 Percent Served (b)	3 Population Served (c)	4 Circulation	5 Number of Volumes (d)	6 Circulation Per Capita Served (e)	7 Ranking	8 Book Stock Per Capita Served (f)	9 Ranking	10 Number of Libraries (g)	11 Extensions (h) Branches	Bookmobiles	Schools Hospitals
(1) Gary-Hammond	833	100.0	833	3816	1401	4.58	13	1.68	11	27	80	5	191
(2) South Bend-Elkhart	450	86.8	391	2338	724	5.97	7	1.85	9	19	17	3	115
(3) Ft. Wayne	473	92.4	437	3948	1665	9.03	1	3.81	1	25	32	10	158
(4) Lafayette	239	66.2	158	925	521	5.85	9	3.29	2	28	2	1	59
(5) Kokomo	237	80.2	190	1237	478	6.51	5	2.51	4	15	13	3	76
(6) Anderson-Muncie	458	80.1	367	1827	789	4.97	12	2.14	7	28	25	5	137
(7) Terra Haute	209	88.7	185	1099	403	5.94	8	2.17	8	13	18	3	40
(8) Indianapolis	1035	90.4	936	3612	1370	3.85	14	1.46	14	26	56	3	229
(9) Richmond	146	75.1	110	612	273	5.56	11	2.48	5	10	6	0	39
(10) Bloomington-Bedford	142	89.0	126	825	204	6.55	4	1.61	12	8	4	2	39
(11) Columbus	136	89.1	121	736	222	6.08	6	1.83	10	6	4	2	51
(12) Madison	85	71.5	61	423	192	6.93	2	3.14	3	8	14	2	26
(13) Evansville	392	92.8	364	2457	876	6.75	3	2.40	6	24	31	3	142
(14) New Albany-Jeffersonville	201	76.8	154	867	238	5.63	10	1.55	13	10	7	1	37

Footnotes: Columns 1-9 are based on 1967 data.

(a) Population figures are given in thousands and are based on county estimates from Editor & Publisher, Market Guide - 1967, pps, 156, 162.
(b) Percent served denotes the percentage of the region's population paying taxes towards the support of a county or township library.
(c) Column (3) = column (1) x (column (2)/100).
(d) Three libraries out of 246 did not report these figures. Regions affected are 3, 5 and 8.
(e) Column (6) = column (4) ÷ column (3).
(f) Column (8) = column (5) ÷ column (3).
(g) Number of libraries as of the end of 1968.
(h) Number of extensions as of the end of 1967.

FIGURE 1

Area Served by Responding Libraries



LEGEND

+ denotes a library

• denotes service by bookmobile or branch/station

The number given is the region number

80 branches or stations, and 5 bookmobiles enabling it to increase the accessibility of the public to library materials and giving this region 100 percent service. On the other hand, Region 4, with 28 libraries but only 2 branches, and 1 bookmobile, has a percentage served of 66.2 percent. Regions 3 and 13 (showing 92.4 percent and 92.8 percent service respectively) both have a higher proportion of libraries, branches and bookmobiles to regional population than the average region. Note that circulation per capita served (Column 6) and book stock per capita served (Column 8) are dependent on the percentage of the region regarded as served (Column 2). For example, Region 4 which has the lowest percentage served will have a small denominator in the ratio book stock/population served, and hence appear better served on a per capita basis than other regions (i.e., it ranks second in the state on book stock per capita served). This example shows that the actual extent of a region's service to its public cannot be measured by isolated statistics such as those comprising Table 1. Measurement of library service for a region implies:

(i) estimating the number of people in a region who do not have access to library service, plus

(ii) estimating the quality and quantity of service currently available.

Tables 1 and 2 provide some indications of both (i) and (ii) although the statistics in Table 1 relate mainly to the traditional library function as a book lender to the public. The map in Figure 1 shows the location of libraries by crosses (+) while the dots (•) surrounding various crosses indicate townships served by the library either by bookmobiles or stations and branches. While certain sections of the population in each region may be located some distance from any public library, each region has its libraries

TABLE 2

Survey of Non-Book Materials in Public Libraries, at December 31, 1966

EQUIPMENT								MATERIALS						
16 mm Motion Picture Sound Projector	Projector Screen	Slide and/or Filmstrip Projector	Record Player	Tape Recorder	Microfilm Reader	View-master Stereoscope	Other	Slides	Filmstrips	Microfilm and Microcards	Sound Recordings	Films (Includes Borrowed)	View-master Reels, Stereographs	Uncatalogued Pamphlets Pictures Maps etc.
17	21	10	42	8	17	8	36	450	482	5,618	19,350	2,249	381	105,277
9	10	6	17	1	8	66	6	1,252	680	3,879	7,980	2,803	141	33,261
7	6	5	15	1	37	68	10	11,587	140	17,506	30,936	4,296	10,455	558,099
1	0	0	11	0	3	12	1	600	386	1,447	2,820	28	806	14,782
2	6	8	10	2	7	73	3	0	386	4,346	4,180	483	3,241	21,389
4	6	7	10	1	7	21	2	96	1,737	2,632	8,532	804	5,575	42,013
2	2	2	7	1	4	0	1	0	39	1,565	2,358	121	0	3,507
5	8	5	10	1	11	6	2	614	113	4,703	6,060	477	405	9,685
2	2	1	4	1	4	6	1	726	42	1,356	5,317	19	2,881	30,167
2	2	1	3	0	1	0	2	220	0	88	1,847	2,102	0	6,250
2	2	1	3	1	3	0	1	13	114	896	2,145	386	0	2,964
0	2	2	4	1	0	0	1	0	129	0	1,370	0	0	628
4	7	3	15	3	15	32	14	1,038	175	2,235	6,158	492	312	45,038
5	5	4	4	3	5	11	3	260	118	546	1,824	435	3,410	21,521

dispersed over the whole region. The more populous northern regions show a better coverage of the region through the use of bookmobiles and stations or branches than do the rural, southern regions--for example, Regions 4, 9, 10, and 12 lack extensive bookmobile and/or branch and station coverage. With the exception of Region 4, these regions comprise the rural, less populated regions.

The distance a person should be from a library before he is regarded as not having access to library service (however primitive) will depend on the circumstances of his particular case. However, it is evident from Figure 1 that certain parts of the state do not have "easy" access to library service. This study has not attempted to measure the population of Indiana not having access to library service, as it was felt that each region should establish its own particular service criteria, that would take into account the predominant characteristics of the region (e.g., rural or urban), before measuring the extent of lack of service within the region. For example, a person living in Region 8 (Indianapolis) needing to travel by car for 30 minutes to a library or branch, may be regarded as presently unservered. Conversely, this time of 30 minutes may be regarded as quite acceptable for a person living in Region 10 (Bloomington-Bedford).

Regarding quantity and quality of service, Tables 1 and 2 provide some measures of what is currently available. Table 1 shows availability of libraries, extensions and book stocks on a regional basis. Table 2 shows the current availability of non-book materials. The footnotes to these tables give information on libraries reporting data, sources for figures and other information. Table 2 is further discussed under Special Services.

Drawing conclusions from the data presented in Tables 1 and 2 and Figure 1, we suggest the following:

(i) Each region should endeavor to serve 100 percent of its population--such services should be tangible and not merely the right to contribute taxes.

(ii) Each region should endeavor to expand its book stock per capita served--Fort Wayne (with 92.4 percent of the population served) ranks first in the state with 3.81 books per capita served. Another relevant measure is the volume of new books added to the stock each year.

(iii) Each region should endeavor to extend non-book services to the public, in line with public demand in that region.

With regard to the above conclusions, we make no comment as to the order or priority or as to what standards (if any) should be employed as guidelines. Such priorities and standards should be established, we suggest, after considering the region to be served, as regional differences in demands etc. may be large, leading to differing service problems between regions. For example the service problems of Region 8 (Indianapolis) may be best surmounted by using branches and stations equipped for fast transmitting of information, materials etc. between branches, rather than by using mobile but restricted service centers such as bookmobiles. Conversely, the service problems of the more rural regions may best be met by using mobile service centers, rather than building permanent branches and stations. The approach of a profit making organization to these problems would be to ensure that the design of the service method for each region would best meet the demands of that region--we suggest that the Indiana libraries should have a similar objective.

College, Institutional and Business Libraries

Figure 2 shows the geographic location of college, institutional and business libraries. Clearly the larger urban areas have access to a greater range of materials than the more rural, southeastern part of the state. More detailed statistics on college and institutional libraries are available in Table 8 of Statistics of Indiana Libraries, 1967 (or latest year available).

In order that all Indiana residents may share the informational resources available throughout the state, all libraries (public, college, business, and school) throughout the state should: (1) standardize interlibrary loan procedures and (2) seek to increase the speed with which items are transmitted between participating libraries. The increasing use of teletypewriters throughout the state is providing faster access to information especially for business and the professions.

School Libraries

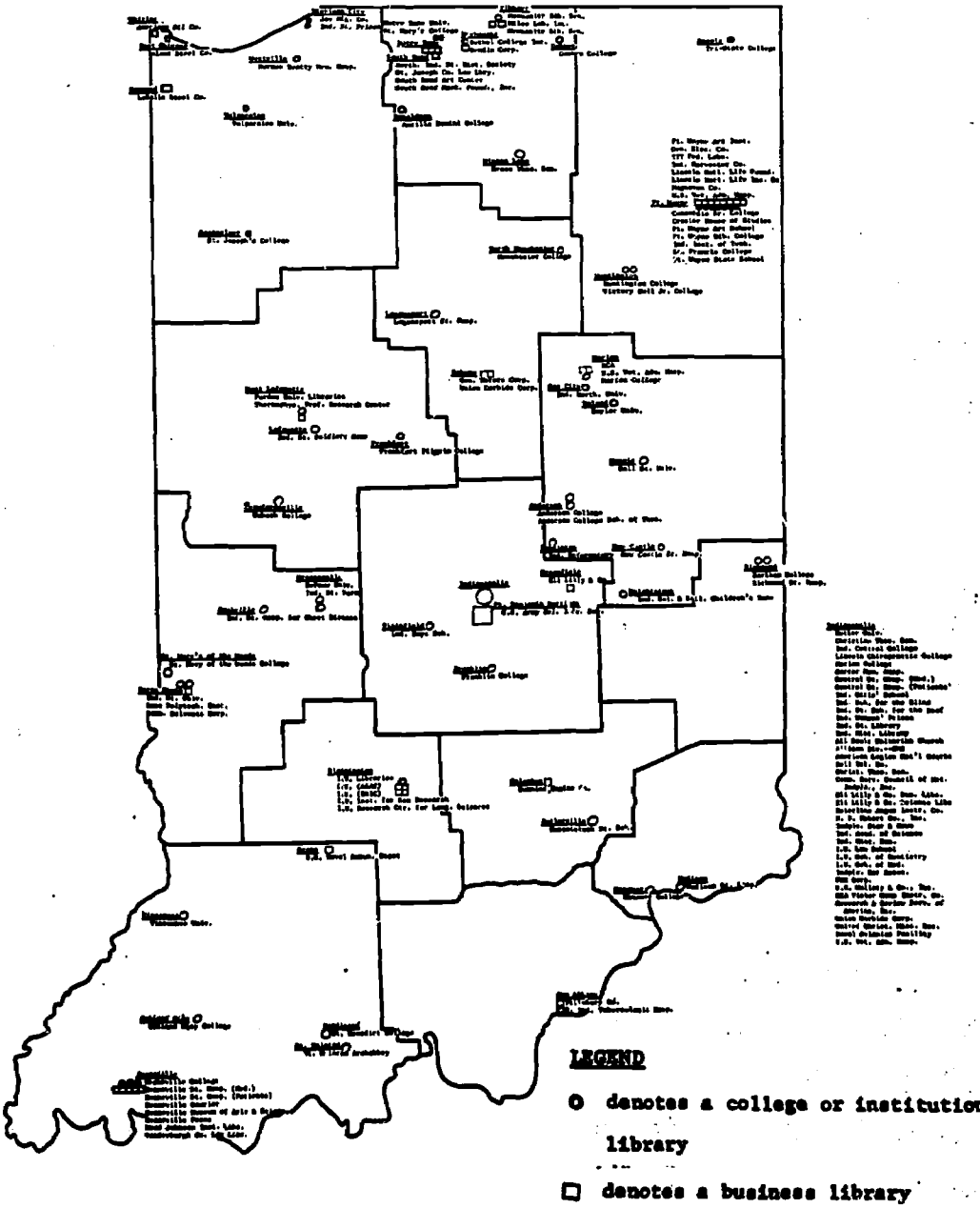
Though they must be considered to be an integral part of the state's total library resources, Indiana's school libraries are too numerous and the data concerning them too widely dispersed to be incorporated into this study. School libraries at present are regarded only as a service available for school children during school hours, resulting from the non-availability of school library personnel after school hours and the reluctance of parents and children to return to school at night. Their operations, however, should be co-ordinated with the operations of other libraries.

Special Services

Table 2 includes the regional totals for non-book materials. Regions 1 and 3 appear to be the best served over-all--Region 1 being ranked first on almost all equipment categories, and Region 3 being ranked first on most materials categories. In absolute numbers of equipment and materials available, Regions 4, 7, 10, 11, and 12 would be the worst served although on a per capita basis other regions (e.g., Region 8) may be just as poorly served.

FIGURE 2

College, Institutional and Business Libraries



No data were available to cost the services of materials listed in Table 2 --also, no data were available on usage of these items. If the function of libraries in the future is to be less of a book lender and more of an audio-visual equipment lender we suggest that adequate cost data and comprehensive, detailed circulation data should be recorded in order that demand and corresponding expenditures may be projected for planning future deployment of library services.

In 1965, the Indiana State Library inaugurated an interlibrary communication system using teletypewriters. As of the first of May, 1969, twenty-two state libraries and seven college libraries comprised the network. Teletypewriter installation and rental, message charges, supplies, and other costs are financed from funds administered under the Library Services and Construction Act--the overall objective of the system is to develop a maximum utilization of Indiana's library resources. Specific purposes as outlined by the Indiana State Library are as follows:

(1) locate materials for interlibrary loan,

(2) request materials for loan or duplication,

(3) request information from other libraries,

(4) transmit urgent and significant professional information to key libraries,

(5) make resources of the Indiana State Library more readily available to citizens of the state,

(6) provide opportunity for increased interlibrary cooperation in Indiana,

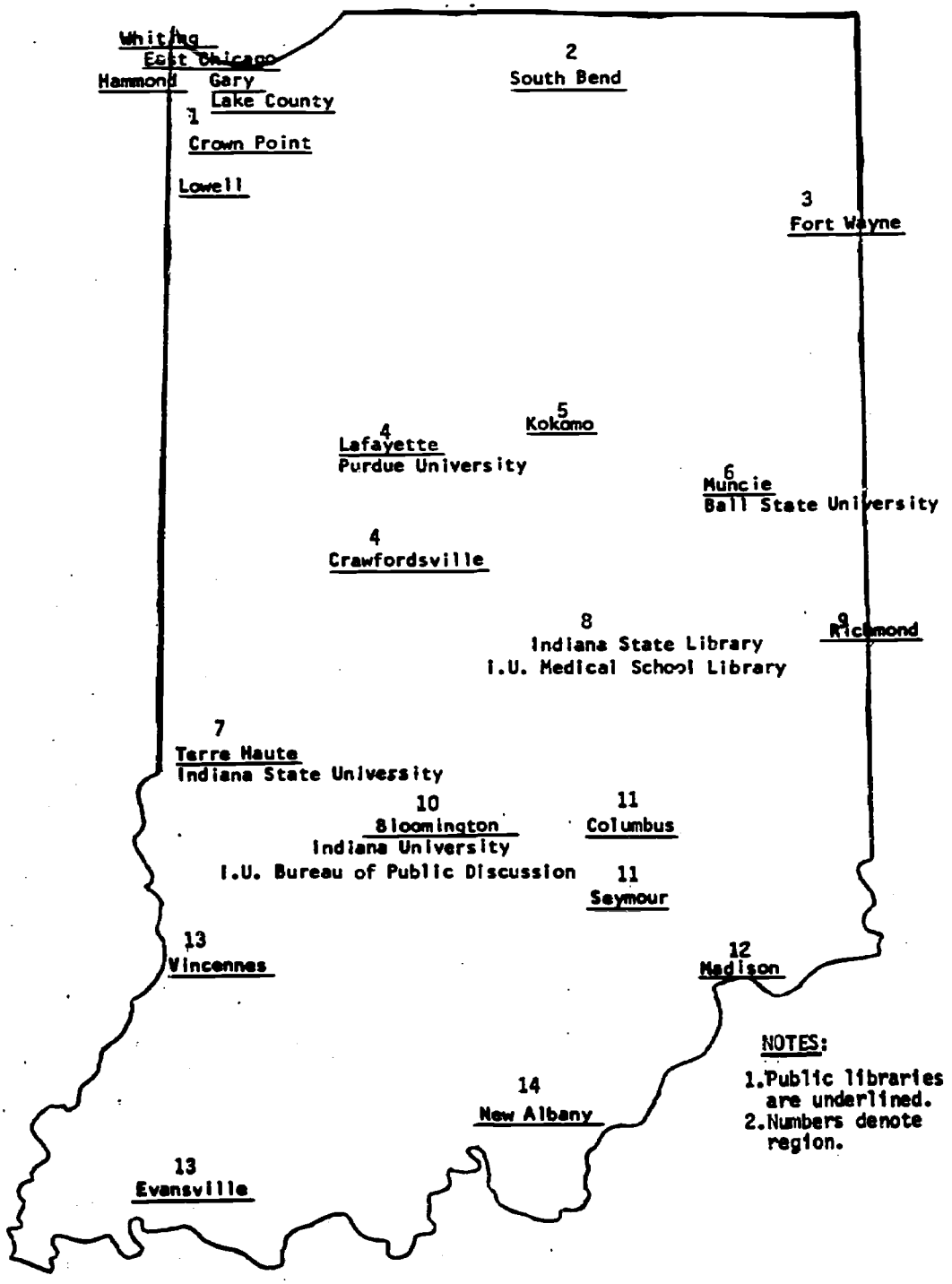
(7) provide data on effect of electronic communication on interlibrary activity.

Figure 3 shows the locations of the teletypewriters--public libraries are underlined, and the region of the location is indicated by the number above the library. Note that each region has at least one teletypewriter terminal. Each library having a teletypewriter has satellite libraries surrounding it that may utilize the service by collect telephone calls--accordingly each region has at least one terminal which can be utilized by all libraries in that region.

The use of the teletypewriters in the transmittal of medical information from the I.U. Medical School Library to the medical community of the state, has been extensively encouraged. The extent of the utilization of this service by medical practitioners indicates that the role public libraries can play in the life of a community can be extended beyond the traditional roles attributed to them by the public at large.

Figure 3

Location of Teletypewriters



Future Demand for Library Services

On the basis of the institutions existing on December 31, 1966, circulation for each library and region was projected at five year intervals from 1970 to 1990. The main factor entering into the projections was population growth--we assumed that as a region's population grew, this growth would be the same for every township in the region. Obviously, however, some township populations in a region will grow more or less quickly than the regional average so that some libraries will attain a greater or lesser circulation than attributed to them in the projections.

Furthermore, the regional circulation estimates are based only on the present libraries serving the public--obviously more libraries will be built in the future (or present libraries expanded) which will extend library services to a greater number of people and thereby increase circulation beyond the above estimates. On the other hand, future projections built on past behavior implicitly assume that future reading habits, leisure habits, learning habits, etc., will not change fundamentally in the future. Anyone predicting such inertia up to 1990 would need to be able to view the future with complete certainty--we make no such claim, and caution that our circulation projections may prove to be considerably off the mark when 1990 and the intermediate dates materialize. A more detailed analysis of the model used to obtain the projections is contained in the Appendix B.

Finally, we note that the projections relate only to circulation of books, and although this is an important function of libraries, circulation projection should be regarded as a proxy variable for projection of the variety of other services provided by libraries. Hence, while the actual circulation figures projected here may not be realized in the future, the increased

demand in other services supplied by libraries may follow the projected percentage increases. Those regions showing a sharp percentage increase in projected circulation will surely be subjected to growing demands of the same dimension for other services.

TABLE 3.

Circulation Projections in 1,000's*

Region	1966	1970	1975	1980	1985	1990	Percentage growth in circulation 1970 to 1990	Percentage growth in population 1970 to 1990
1	3816	4114	4482	4845	5204	5559	35.1%	46.3%
2	2338	2505	2712	2918	3122	3324	32.7	40.9
3	3948	4217	4549	4877	5201	5522	31.0	40.7
4	925	966	1016	1066	1116	1167	20.8	22.8
5	1236	1307	1394	1481	1567	1652	26.4	32.9
6	1827	1911	2016	2121	2225	2328	21.8	26.1
7	1099	1097	1094	1091	1088	1085	-1.1	-1.3
8	3612	3955	4377	4793	5205	5612	41.9	55.6
9	612	624	639	654	669	684	9.6	10.3
10	825	846	872	897	923	949	12.2	14.9
11	736	788	853	917	980	1042	32.3	42.2
12	423	438	456	475	494	512	16.9	18.8
13	2457	2482	2514	2546	2578	2610	5.2	6.1
14	867	908	960	1011	1062	1113	22.6	27.6
	24,721	26,158	27,934	29,692	31,434	33,159		

*As outlined in the text, the accuracy of these projections depends on the realism of the assumptions--these are outlined in detail in the Appendix B.

Generally, growth in circulation (and, we expect, other services) follows growth in population fairly closely. Owing to the mathematics of the model, we expect circulation growth to be lower than population growth as only the smallest libraries (serving up to 6,000 people) have an exponent greater than 1.0 for population in the prediction equation--i.e., as population exponents for the larger libraries are all less than 1.0, circulation growth is always less than population growth.

The above projections in Table 3 were based on the number of libraries in existence on December 31, 1966. These libraries served persons in their respective regions (using percentage of the population served as a measure of service) to the extent indicated by the percentages in column (2) of Table 1. By dividing the percentages of population served (from Table 1) into the projected circulation figures in Table 3, we can derive an approximate circulation level for each region, assuming each region was to be 100.0% served.

For example, consider region 2:

Percentage of population served	=	86.8 (from Table 1)
Projected circulation 1970 in 1,000's	=	2505 (from Table 3)
Approximate circulation level in 1970 if Region 2 were to be 100.0% served, in 1,000's	=	2505 ÷ .868
	=	2886.

The following table gives approximate circulation projections for all regions assuming 100.0% service rates. The expenditure implications for service rates for all regions to 100.0% are examined in the concluding section of this chapter.

TABLE 4

Circulation Projections in 1,000's (Assuming 100% Service)

Region	1970	1980	1990
1	4114	4845	5559
2	2886	3362	3830
3	4564	5278	5976
4	1459	1610	1763
5	1630	1847	2060
6	2386	2648	2906
7	1237	1230	1223
8	4375	5302	6208
9	831	871	911
10	951	1008	1066
11	884	1029	1169
12	613	664	716
13	2675	2744	2813
14	1182	1316	1449
	29,787	33,754	37,649

As the analysis of the model in Appendix B shows, the circulation estimates were derived using a quality variable--the projections in Tables 3 and 4 assumed average quality. If we now assume 100.0% service in each region plus an average quality level attained by the top 25% libraries in each size grouping, then the corresponding circulation projections are given in the following table. The expenditure implications of these assumptions also are outlined later in this chapter.

TABLE 5

Circulation Projections in 1,000's
(Assuming 100% Service and Improvements in Quality)

Region	(1) 1970	(2) 1980	(3) 1990	(4) % Increase Over Table 4 Projections, All Years
1	4567	5377	6167	11.0%
2	3173	3694	4206	9.9
3	5060	5840	6623	10.9
4	1569	1731	1895	7.5
5	1807	2047	2282	10.9
6	2590	2874	3153	8.5
7	1363	1355	1347	10.2
8	4847	5871	6870	10.8
9	889	931	974	7.0
10	1045	1107	1171	9.9
11	980	1141	1296	10.9
12	663	718	774	8.2
13	2972	3049	3115	11.1
14	1289	1435	1580	9.1
	32,814	37,180	41,463	

It is not really feasible for libraries to set the goal of increasing their quality to the level of the top 25% libraries in 1970. Consequently, the projected circulation levels in 1970 will not be fulfilled. The 1980 and 1990 goals, however, are feasible and should be worked toward.

Column 4 in Table 5 shows the percentage increase in circulation for the quality increase over the 100.0% served circulation figures in Table 4.

Should libraries raise their quality rating to that attained by the top 25% libraries in their size class, the corresponding increases in circulation by 1990 would average 9.7% ranging from 7% to 11.1% (regions 9 and 13 respectively).

TABLE 6

Projected Percentage Growth in Circulation 1970-1990

(1) Region	(2) Unchanged Service Rates and Quality of libraries	(3) Ranking of Column (2)	(4) Each Region 100% Served by 1990	(5) 100% Served plus Increased Quality by 1990	(6) Ranking of Column (5)
1	35.1%	2	35.1%	49.9%	11
2	32.7	3	52.9	67.9	6
3	31.0	5	41.7	57.1	9
4	20.8	9	82.5	96.2	1
5	26.4	6	57.6	74.6	3
6	21.8	8	52.1	65.0	7
7	-1.1	14	11.5	22.8	14
8	41.9	1	57.0	73.7	5
9	9.6	12	46.0	56.1	10
10	12.2	11	26.0	38.4	12
11	32.3	4	48.4	64.5	8
12	16.9	10	63.5	76.7	2
13	5.2	13	13.3	25.9	13
14	22.6	7	59.6	74.0	4

Table 6 summarizes the circulation projections under the various assumptions outlined in the table at the head of each column. We suggest that these percentage growth rates for circulation for each region over the

period 1970-1990 should be the basis for future planning of library service, rather than the actual circulation estimates themselves. Two reasons explain this suggestion:

(1) The actual circulation estimates are almost certain to be incorrect, but we feel that the ranked growth rates (Column 3) show where the growth in demand for library services will be highest and lowest.

(2) Circulation has been regarded as a proxy variable for library service, ill defined as this service is. Possibly, circulation of books could cease to become a function of libraries by 1990, but other functions likely will take its place, and in this case, we expect the demand for these "other functions" to show percentage growth in each region in line with the rates outlined in Table 6.

Equating Present and Future Demand For Library Services

In this section we attempt to derive the regional expenditure implications for future library service needs based on the regional circulation projections in the previous section. Such expenditures are taken to be total yearly operating costs which include:

(i) librarians' salaries

(ii) books, magazines and other materials and binding,

(iii) maintenance salaries

(iv) other maintenance costs

These categories will include some capital costs, but exclude the cost of building a library.

Taking the cost of circulating a book for each region, we can apply this cost to three sets of circulation figures up to 1990:

(i) circulation assuming current service rates for each region are unchanged

(ii) circulation assuming each region is 100% served

(iii) circulation assuming each region is 100% served and average expenditures (and hence quality) are raised by 1/6 or 16.67% by each library in the state

The 16.67% rise in expenditures is the approximate increase needed to bring average quality (as defined in Appendix B) up to the level currently enjoyed by the top 25% libraries in each size class. This will be the direct cost effect of increasing quality. As circulation (and other services) increases due to the better quality of libraries there will be the indirect cost effect of serving this increased demand. The direct cost effect is shown by comparing columns (4) and (5) of the following table.

TABLE 7

Cost per Book Circulated by Region

(1) Region	(2) 1966 Circulation	(3) 1966 Expenditure	(4) 1966 Cost/Book Circulated	(5) 1966 Cost/Book Circulated Raised 1/6th
1	3816	$ 2821	$.73925	$.86246
2	2338	1397	.59751	.69710
3	3948	1875	.47492	.55407
4	925	450	.48648	.56756
5	1237	563	.45513	.53099
6	1827	786	.43021	.50191
7	1099	569	.51774	.60403
8	3612	2394	.66279	.77326
9	612	326	.53267	.62145
10	825	243	.29454	.34363
11	736	248	.33695	.39311
12	423	143	.33806	.39440
13	2457	926	.37688	.43969
14	867	333	.38408	.44809
	24,722	$13,074		

For the three sets of circulation and corresponding expenditure figures we use two pricing methods:

(i) expenditures based on 1966 prices--labelled "1966 Prices."

(ii) expenditures assuming a 2.5 percent increase in prices each year, starting in 1967--labelled "Current Prices."[5]

[5]Current prices 1970 then will be 1966 Prices x $(1.025)^4$ and Current prices 1990 will be 1966 prices x $(1.025)^{24}$.

We are making an implicit assumption here that there will be no increase in the efficiency of library staff resulting in lower costs of library operation. To the extent that services demanded of libraries will be more complex in the future, the assumption of no increase in efficiency is reasonable insofar as cost implications are concerned.

TABLE 8
Expenditures for Unchanged Service Rates
(in thousands of dollars)

	1966 Prices			Current Prices		
Region	1970	1980	1990	1970	1980	1990
1	3041	3582	4109	3358	5061	7755
2	1497	1744	1986	1652	2464	3748
3	2003	2316	2623	2211	3273	4949
4	470	520	568	519	733	1071
5	595	674	752	657	952	1419
6	822	913	1002	908	1289	1890
7	568	565	562	627	798	1060
8	2621	3141	3720	2894	4489	7019
9	332	348	364	367	492	688
10	249	264	280	275	373	527
11	266	309	351	293	437	663
12	148	161	173	163	227	327
13	936	960	984	1033	1356	1856
14	349	388	428	385	549	807
	13,897	15,885	17,902	15,342	22,493	33,779

TABLE 9

Expenditures for 100% Service Rates
(in thousands of dollars)

	1966 Prices			Current Prices		
Region	1970	1980	1990	1970	1980	1990
1	3041	3582	4109	3358	5061	7755
2	1724	2009	2288	1904	2838	4318
3	2168	2507	2838	2393	3542	5356
4	710	783	858	784	1107	1618
5	742	841	938	819	1188	1769
6	1026	1139	1250	1133	1610	2359
7	640	637	633	707	900	1195
8	2900	3514	4115	3201	4965	7764
9	443	464	485	489	656	916
10	280	297	314	309	420	593
11	298	347	394	329	490	743
12	207	224	242	229	317	457
13	1008	1034	1060	1113	1461	2001
14	454	505	557	501	714	1050
	15,641	17,883	20,081	17,269	25,269	37,894

In moving from the current service rates (all but one of which are less than 100 percent) to the 100 percent service rates in the projected expenditures, we have implicitly assumed that the marginal cost in serving the unserved portion of a region is equal to the average cost of serving that region. This will probably be incorrect as those persons presently unserved are probably in "hard-to-serve" areas. Furthermore, to the extent that fixed (capital) costs are involved--e.g., building a new library--the current cost of building and financing a new library will probably be greater than in the past, as will the future cost of maintaining the building. We have excluded considerations as to where to locate a new library and the cost of building it from these analyses, as these costs are not directly included in the expenditures per capita currently reported by libraries. However, decisions on these matters will need to be made in the future and the expenditure implications for regions analysed.

To the extent that centralization of public libraries can lower costs, however, the marginal cost of serving the currently unserved part of a region may be below current average cost. On balance then, as we have no way of determining how the marginal costs will move, we have assumed marginal and average costs are equal.

As these expenditure projections are based on projected circulation, the growth rates in expenditures (in 1966 prices) will be the same as the growth rates in circulation under the three different assumptions of unchanged service rates, 100 percent service rates, 100 percent service rate plus increased quality--see Table 6.

We reiterate that the expenditures shown in Tables 8, 9 and 10 relate to total expenditures as defined in Table 3 of Statistics of Indians

TABLE 10

Expenditures for 100% Service and Increased Quality
(in thousands of dollars)

	1966 Prices			Current Prices		
Region	1970	1980	1990	1970	1980	1990
1	3939	4637	5318	4348	6552	10040
2	2212	2575	2932	2442	3638	5532
3	2803	3241	3669	3095	4580	6924
4	891	982	1075	983	1388	2029
5	959	1087	1212	1059	1536	2286
6	1300	1442	1582	1461	2038	2986
7	822	818	813	908	1155	1534
8	3748	4540	5312	4137	6414	10024
9	552	579	605	610	817	1142
10	359	380	402	396	538	759
11	385	449	509	425	634	961
12	261	283	305	288	399	575
13	1307	1341	1374	1443	1894	2593
14	578	643	708	640	909	1336
	20,116	22,997	25,816	22,235	32,492	48,721

Libraries, 1967. These expenditures apparently do include some capital expenditures, but the essential characteristic of these expenditures is that they need to be met out of tax funds and, to the extent that certain minor capital expenditures occur each year, funds will need to be found for such expenditures as well as the usual operating expenditures such as salaries, rent, power, etc.

The following tables, which present information by region and library size, reveal some interesting information about expenditures per capita in the different regions as well as the relative costs of big and small libraries.

TABLE 11

1966 Expenditures per Capita by Region

Region	1966 Expenditure in $1,000's	Simple Average Exp./Capita dollars	Weighted Average Exp./Capita dollars	Range Exp./Capita dollars
1	2,821	3.90	4.06	9.83 - 1.36
2	1,397	3.35	3.86	5.41 - 1.95
3	1,875	2.84	4.93	6.62 - 1.12
4	450	3.45	2.91	6.05 - 1.83
5	563	3.60	3.29	7.39 - 1.77
6	786	2.11	2.57	4.39 - 0.70
7	569	2.55	3.03	6.15 - 1.03
8	2,394	2.91	3.49	4.05 - 1.01
9	326	2.96	3.10	7.95 - 1.09
10	243	1.70	2.05	2.94 - 1.01
11	248	2.25	2.26	3.30 - 1.35
12	143	2.50	2.46	3.37 - 1.96
13	926	2.12	1.92	5.80 - 0.45
14	333	1.90	2.26	3.26 - 0.83

The weighted average was calculated using the population of each library area as the weight. From the weighted averages we would deduce that Regions 3, 1, 2, and 8 enjoy the highest expenditures per capita (for those people having access to library service). This assumes that those libraries having a higher expenditure per capita are offering a better quality of service to their users.

TABLE 12

Expenditures per Capita by Size of Library
(in dollars)

Population Served	Expenditure Range	Simple Average	Weighted Average
50,000 -	6.36 - 0.45	3.67	3.86
18,000 - 50,000	5.41 - 1.21	2.64	2.64
10,000 - 18,000	4.90 - 1.24	2.58	2.54
6,000 - 10,000	9.83 - 0.70	2.47	2.45
2,500 - 6,000	7.95 - 1.01	2.79	2.74
0 - 2,500	9.65 - 0.99	3.18	3.21

The weights used in calculating the weighted average in Table 12 are those of populations served by the libraries. These statistics relate to expenditures libraries are making and are not necessarily the same as the expenditures libraries should be making. Although the larger libraries are more expensive to run, we might expect this to the extent that they offer more services. Furthermore, we would not expect a uniform quality for those services which all libraries, large and small, offer in common. To the extent that the larger libraries offer better quality services, the higher costs of the smaller libraries become justifiably open to question. The question that needs to be answered is whether services currently provided can be supplied

by less expensive means. The answer to this question must, of course, take into account demands that will be made of library services in the future -- what may be the least expensive method at present may prove very costly in the future.

We should also note that the population figures used here are based on the U.S. Census of Population, 1960. The circulation and cost data presented here relate to urban libraries (whose population has increased rapidly). Thus they show these libraries to be spending more per capita than they really are. Conversely, the smaller rural libraries (whose population will probably have increased at a lesser rate) will not be overstated to the same extent. This fact tends to reinforce our suggestion that the smaller autonomous libraries may be too expensive a means of providing library service.

Another revealing statistic is the average cost of circulating a book by size class:

TABLE 13

Average Cost per Book Circulated, by Population of Area Served (in dollars)

Population Served	Expenditure Range	Simple Average
50,000 -	1.36 - 0.32	0.67
18,000 - 50,000	1.02 - 0.17	0.38
10,000 - 18,000	0.83 - 0.16	0.40
6,000 - 10,000	1.03 - 0.07	0.37
2,500 - 6,000	0.94 - 0.09	0.39
0 - 2,500	1.34 - 0.09	0.45

While the largest libraries are on the average more expensive per book circulated, some of the smaller libraries are also costly at $1.34 per book circulated.

We might hypothesize that there are alternative ways of providing the services that the small, autonomous libraries offer. The statistics above suggest some research is called for into ways and means of providing such services and the costs of respective methods.

APPENDIX A

Alphabetical Listing of Libraries Responding to Questionnaire

Akron
Albion
Alexandria
Anderson
Angola
Atlanta
Attica
Auburn
Aurora
Avon
Batesville
Bedford
Beech Grove
Berne
Bicknell
Bloomfield
Bloomington
Bluffton
Bourbon
Bremen
Brook
Brookston
Brookville
Brownsburg
Brownstown
Butler
Carmel
Churubusco
Clayton
Clinton
Coatesville
Colfax
Columbia City
Columbus
Covington
Crawfordsville
Crown Point
Darlington
Decatur
Delphi
Dublin
East Chicago
Elkhart
Elwood
Evansville
Farmland
Flora
Fortville
Fort Wayne
Fowler
Frankfort
Franklin
Ft. Branch
Garrett
Gary
Geneva
Goshen
Grandview
Greencastle
Greenfield
Greensburg
Greentown
Greenwood
Hagerstown
Hamlet
Hammond
Hartford
Huntingburg
Huntington
Indianapolis
Jasonville
Jasper
Jeffersonville
Judson
Kendallville
Kentland
Kewanna
Knightstown
Kokomo
LaCrosse
Lafayette
Lake County
LaPorte
Lawrenceburg
Liberty
Ligonier
Ladoga
Logansport
Lowell
Marion
Martinsville
Matthews
Middletown
Mishawaka
Monon
Monterey
Monticello
Mooresville
Muncie
Nappanee
New Albany
Newbury
New Carlisle
New Castle
Noblesville
North Manchester
North Vernon
Oakland City
Odon
Orleans
Ottesbein
Oxford
Paoli
Pennville
Peru
Plainfield
Plymouth
Porter
Remington
Rensselaer
Richmond
Rising Sun
Roachdale
Roann
Roanoke
Rochester
Rockport
Rome City
Royal Center
Rushville
Seymour
Shelbyville
Sheridan
South Bend
South Whitley
Speedway
Spencer
Sullivan
Syracuse
Tell City
Terre Haute
Thorntown
Tipton
Union City
Valparaiso
Van Buren
Vincennes
Wakarusa
Walton
Warren
Washington
Waterloo
Waveland
West Lafayette
West Lebanon
Whiting
Williamsport
Winamac
Winchester

Note: The reason there are only 159 libraries is that there were two Washingtons listed in the original list and I eliminated one to avoid duplication. Hence, there are only 159. The percentage is now 64 2/3 percent instead of 65 percent.

APPENDIX B

Equation Used to Predict Future Circulation

A model was needed to give realistic projections of circulation figures up to 1990. Rather than deduce a theoretically rigorous model comprised of a system of equations (as would have been necessary in a hypotheses testing exercise for example), we decided to use a single equation model that took into account supply and demand factors simultaneously. The equation postulated to forecast circulation was taken to be

(1) $C = AP^{\alpha}Q^{\beta}$

Where C represents circulation

A is a constant

P represents population

Q represents quality of a library

This equation explained past variations in circulation the best--others tried were linear models of the form

$$C = X + aY + bZ + \ldots$$

where independent variables on the right hand side included numbers of extensions, book stock, and expenditures.

On the demand side, factors such as income level, educational attainment, etc. should theoretically have been used, but the data were unavailable, forcing us to use the population of a library area as the demand factor.

Research showed that circulation was definitely related to some measure which we have labelled "quality." It was apparent that large book stocks and high expenditures were correlated with this "quality" measure, so we derived a quality index based on these two per capita measures, adjusted so that each was equally weighted.

The 246 libraries were divided into four groupings according to the population of the area served. The population groups used were as follows:

TABLE B.1

Size of Population Served	Number of Libraries	Quality Range	Average Quality	Upper Quartile of Quality
18,000 -	40	13.65 - 3.00	6.2	7.16
10,000 - 18,000	30	8.19 - 3.08	5.4	6.60
6,000 - 10,000	31	16.79 - 2.11	5.6	6.40
0 - 6,000	128	21.01 - 3.80	9.5	11.00
	229			

The upper quartile of quality shows the minimum quality level attained by the 25 percent highest quality libraries in each size grouping. The quality rating was assessed for each population group separately as a small library serving up to 6,000 people could not be compared with a library serving upwards of 50,000. Thus, the quality rating for any library is only relative to that group which contains that particular library.

Within each population group we endeavored to select a subset of libraries that seemed representative of the group. This selection was based on fitting a regression to the whole group, then discarding those libraries with large error terms - i.e. the regression curve overestimated or underestimated circulation by a large amount. We feel that this procedure is justified given our objective of determining reasonably accurate projections for circulation by region - hence, we are using the "average" library in the belief that serious underestimates and overestimates for particular libraries will offset each other to such an extent that the resulting errors will be minimal. Reasonable projections are our objective and not tests of various hypotheses regarding sensitivity of circulation.

Final results of the analysis were:

TABLE B.2

Population group	Number of libraries	Number used in regression	A	α	Standard error	β	Standard error
18,000 -	40	29	2.83	.82	.06	.86	.20
10,000 - 18,000	30	17	1.63	.81	.15	1.14	.09
6,000 - 10,000	31	20	1.33	.94	.20	.97	.08
0 - 6,000	128	74	0.82	1.20	.04	.85	.07

Only 229 out of 246 libraries reported sufficient data in Statistics of Indiana Libraries to be included in the analysis. The effect of quality for varying library sizes showed only mild fluctuation - ranging from 0.85 to 1.14 giving a spread of 0.29 - and no trend was apparent in moving from the large libraries down to the small libraries. Population, on the other hand, showed an increasing effect as the libraries got smaller.

Dividing the libraries into size groupings obviously brings into play known and unknown factors - some known factors would be availability of competing college and school libraries, competing leisure pursuits, hours library is open, income and educational level of the public a library serves, etc. These known factors could not be quantified given time and data constraints and their individual effects on circulation levels ascertained, but it should be evident that the differences in the parameters between the size groups reflect the collective impact of these known and unknown factors.

Rather than base our projected estimates on a widely varying quality variable, which might also be expected to show year-to-year fluctuations, we decided to use average quality for projection purposes. This figure appears in Table B.1. Taking the projected linear growth rate in population (see

Table 3 in text), we applied this rate to the population of the area served and derived projected circulation using equation (1).

In order to make the future circulation projections consistent with past figures for circulation, we used equation (1) to estimate circulation for each library in 1966 - using actual circulation in 1966 we derived a factor D for each library such that:

$$D = \frac{\text{actual circulation in 1966}}{\text{estimated circulation in 1966}}$$

We then applied this factor D to all future circulation projections for a particular library (D different for each library) as follows:

$$\begin{pmatrix}\text{adjusted estimate of}\\ \text{future circulation}\end{pmatrix} = \begin{pmatrix}\text{estimate of future circu-}\\ \text{lation using equation (1)}\end{pmatrix} \times D$$

The D factor for each library thus adapts the estimating equation to the particular level of circulation experienced by each library in the past. Furthermore, the affect of the D factor and the average quality assumption is to ensure that projections of circulation for each library are solely dependent on population growth in the area served.

To demonstrate this last statement more clearly we will give an example for a library serving a population upwards of 18,000.

Let 1966 population = P_{66}

Let 1970 population = P_{70}

Let actual 1966 circulation = C_{66}

Then, predicted 1970 circulation for this library will be:

$$\text{Predicted 1970 circulation} = 2.83\ (P_{70})^{.82}(6.24)^{.86} \times D$$

$$= 2.83\ (P_{70})^{.82}(6.24)^{.86} \times \left[\frac{C_{66}}{2.83\ (P_{66})^{.82}(6.24)^{.86}}\right]$$

$$= \left(\frac{P_{70}}{P_{66}}\right)^{.82} \cdot C_{66}$$

Thus, predicted 1970 circulation is merely 1966 circulation multiplied by a factor based on population change between 1966 and 1970.

Using the above procedure we derived the increase in circulation for each library over the period 1966 to 1990. Aggregating libraries in each region then gave us our projections for regional circulation.

There are several flaws in this procedure. Firstly, a region's population growth will not be evenly distributed over the whole region--some cities or townships will grow more rapidly than others. Accordingly, we can expect overestimates and underestimates for future circulation for particular libraries, but aggregating over a region may result in offsetting errors to some extent. Secondly, using average quality rather than actual quality will overestimate and underestimate the future circulation estimates for particular libraries. The implications for financing libraries in the future (see pages 31-5 of this report) indicate that substantially increased finances will be required to even maintain quality at present levels. (We are here assuming quality and expenditure per capita are correlated.) Hence, while there is some justification and method in projecting future population, we felt there was little justification for postulating that our crude measures of quality for each library would hold up to 1990. Changes in population served (e.g. township library becoming a county library) and changing financial conditions will undoubtedly alter our rough quality measures--perhaps overall, the average quality may not change too much, and this is the justification for using the average quality measure. It is well to reiterate that the quality measure affects only those circulation projections where we have postulated an increase in average quality of libraries.

As the population served by a library increases over time, it may be that at some future time it changes groups--for example, a population of 5,800 in 1966 may be over 6,000 by (say) 1980. Strictly speaking, when the library changes its size class, the equation of the new size class should

be used to calculate future circulation projections. However, our calculations for each library up to 1990 were made using the appropriate size class of 1966--accordingly, as the population coefficient decreases for increasing population size, the circulation projections for those few libraries that change size classes before 1990 may be overestimated on this account.

The above indicates some of the shortcomings of our procedure, but we feel the resulting circulation projection and resulting expenditure projections are not biased either too high or too low. Our basic assumption is that the behavior of people with respect to libraries (reading habits etc.) will not change too much in the period up to 1990. We have based the use of our equation (1) on this premise. This is a bold premise, and alongside this premise the technical shortcomings we have outlined above in this Appendix pale into insignificance. Suffice to say that if people do utilize library service in the future as they have in the middle sixties, we expect our projections to be reasonably accurate inasmuch as they are based strictly on population increase. If the quality of library service is sharply upgraded or downgraded, there may be a pronounced change in people's behavior towards libraries that no econometric analysis could reflect. We have, however, tried to derive circulation and expenditure implications for a sharp increase in library quality, but do not claim that our circulation and expenditure conclusions will be completely verified should this quality increase be implemented. We do expect the circulation projections to be somewhat near the mark, and we suspect that expenditures by libraries will need to be increased substantially to effect this quality increase--how much these expenditures will need to increase is very hard to predict.

Summarizing our procedure, we can only reiterate that the results derived are only as good as the validity of the assumptions on which our procedure is based. These assumptions have been articulated above and represent only one set out of many possible sets of assumptions. Only the future will reveal how suitable these assumptions have been.

The Indiana Library Studies

The Indiana Library Studies represent the first statewide exploration of Indiana libraries of all types and of the library and information needs of Indiana's citizens. A federally funded research project of the Indiana State Library, the Studies are directed by Dr. Peter Hiatt, Consultant to the Indiana State Library and Associate Professor of Indiana University's Graduate Library School. Guidance for the project and advice on the reports have been provided by the Indiana Library Studies Advisory Committee:

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This report has been submitted to the following:

Indiana Library and Historical Board
Indiana Library Association
Indiana Library Trustees Association
Indiana School Librarians Association
College and University Roundtable of the Indiana Library Association
Special Libraries Association, Indiana Chapter

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