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IDENTIFICATION OF TARGET INDUSTRIES FOR INDUSTRIAL DEVELOPMENT IN MICHIGAN

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by

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I. Introduction

The process of matching regional resources and economic goals with industry characteristics can be approached from the perspectives of both industrial expansion and regional economic development. Industry can use the region-industry matching process in its search for profitable business locations. Regional development groups can use the region-industry matching process to determine which industries might have the most favorable impact on regional economic development.

Industry might approach industry-region matching with a region-screening method: given a specific industry (and firm) all possible regions would be studied to determine their appropriateness as a location for the business. These possible regions could be reduced by successively eliminating the less favorable potential locations until a small group of favorable regional locations remained. Such a complete screening approach is unlikely to be used in the selection of a specific industrial site because the number of possible sites is infinite. This approach could be used, however, to select a general regional location within a given country.

Regional development groups might match industry and region through an analogous industry-screening approach: given a specific region, all possible industries (defined in groups) would be studied to determine their appropriateness for industrial development. Again, the larger set of possibilities is reduced by eliminating less appropriate industries until a select group of industries remains.

A. Limitations to the Industry-Screening Process

The success of industry-screening processes used in the past[1] has been limited by three factors:

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[1] Battelle Memorial Institute, Columbus Laboratories, Industries Suited for the Upper Great Lakes Region (Columbus, Ohio, n.d.) presents an example of such screening.

1. Criteria selected for use in the industry elimination process have reflected a regional point of view of the desirability and feasibility of an industry's location without accounting for the practical difficulties involved in promoting industrial development.

2. Industries are examined and eliminated in groups such as those defined by three-digit and four-digit Standard Industrial Classification (SIC) codes. As a result of the interindustry averaging effect inherent in such a procedure, some acceptable industries are rejected because of their association with an unacceptable industry group, and some unacceptable industries are accepted because of their association with an acceptable industry group.

3. Industries have not been identified in enough detail to facilitate follow-up and implementation of promotional activities once the screening process has been completed.

The Michigan Department of Commerce (MDC) and the Division of Research (DOR) of the Graduate School of Business Administration at the University of Michigan are cooperating in an industry-screening project which, it is hoped, will deal with the first and third limitations listed above and which will result in selection of an industry suitable to MDC promotional efforts as well as in the further refinement of industry-screening methods.

In the MDC/DOR project, industry-screening criteria have been chosen for their reflection of "practicality" — the practical difficulties involved in industrial promotion efforts — as well as for their reflection of industry desirability and feasibility in Michigan. In attempting to overcome the third limitation, the project is designed to develop its own follow-up. When the basic screening process for industry groups is complete, specific product groups within the selected

industry groups are studied. One product group is then selected for a detailed study of feasibility and analysis of economic impact. The feasibility study and economic impact analysis are designed for use in a specific promotional campaign.

The second limitation of past industry-screening studies, that of interindustry data aggregation, has not been overcome in the MDC/DOR project, because the data available for screening industry groups are not defined more specifically than by four-digit SIC codes.

B. The MDC/DOR Industry-Screening Project

The stated goal of the MDC for the 1975 fiscal year is the creation of 2,000 new jobs in Michigan. MDC plans to encourage industrial expansion with three-month promotional campaigns (blitzes) directed at each of four specific industries. Each of the four industries are envisioned as providing 500 new jobs to Michigan residents.

The industry-screening process is designed in three major stages, meeting three objectives:

Stage 1: Identify industry groups which are desirable and feasible in Michigan; group industries by one-digit, two-digit, or three-digit SIC codes.

Stage 2: Starting with those groups identified in Stage One, identify industry groups appropriate for the second of the four promotional campaigns planned by MDC; group industries by four-digit SIC codes.

Stage 3: Starting with those groups identified in Stage Two, identify specific product(s) which can comprise the output of a single establishment and which are appropriate for a detailed feasibility study and economic impact analysis.

II. Stage One: Identification of Desirable and Feasible Industry Groups

This operation was performed by the MDC using methods similar to those used in earlier industry-screening processes. The original, unscreened list of "all possible" industries can be defined by Standard Industrial Classification codes. At the most general level, the one-digit level, these industry groups include:

SIC No.	
0	Agriculture, Forestry, and Fisheries
1	Mining and Contract Construction
2	Manufacturing
3	Manufacturing
4	Transportation and Communication
5	Wholesale and Retail Trade
6	Finance, Insurance, and Real Estate
7	Services
8	Government
9	Nonclassifiable Establishments

The first step in the MDC industry-screening process was selecting those industries which begin with SIC numbers 2, 3, 6 or 7 and which currently are identified with a Michigan location in the U.S. Department of Commerce economic censuses, such as The Census of Manufactures.

As a second step, twelve basic industrial characteristics were selected as indicators of the industry groups' desirability and feasibility in Michigan (see Table 1). Data for each of the twelve indicators were collected for each remaining industry group (with each industry group being defined at the one-digit, two-digit or three-digit level) and were aggregated at the state level. Frequency distributions of the data by industry group were then examined. For each of the twelve

indicators, every industry group was ranked by an order number (0, 1, 2, 3, 4 or 5) indicating its position in the distribution. The rank order numbers were then weighted as to the relative importance of the various indicators on the basis of job development criteria established by the MDC. (The weights which were used are given in Table 1.) The products resulting from multiplication of each rank-order number with its corresponding weight were added to provide a single index of desirability and feasibility for each industry group. This procedure also was followed using Detroit data for all indicators and industry groups which yielded a second set of industry group indices. In most cases the Detroit data corresponded with the Michigan data. Industry groups having the highest indices were determined especially worthy of further consideration. Where Michigan and Detroit indices differed, the particular industry group was examined in more detail.

Table 1

STAGE ONE SCREENING INDICATORS AND WEIGHTS

Indicators	Weights
Value added by manufacture	1.5
Percentage change in value added by manufacture	1.5
Number of employees	2.0
Percentage change in number of employees	2.0
Change in number of establishments	.5
Ratio: Capital expenditures/shipments	.5
Labor intensiveness	2.0
Wages per hour	1.0
Value of shipments	2.0
Percentage change in value of shipments	2.0
Capital expenditures	.5
Percentage change in capital expenditures	.5

The third, and final, step in the MDC industry-screening process was identifying particularly stable industry groups from among those groups with high indices. A regression analysis of employment growth was performed for industries grouped at the SIC two-digit level. Industries whose employment growth was not closely associated with national business cycles were placed on a final list of screened industry groups at the end of Stage One. These groups (see Appendix 1) were the starting point for Stage Two. (A list of the four-digit industry groups for manufacturing industries appears in Appendix 2, and for service industries in Table 6.)[2]

[2]The term service industries will refer to nonmanufacturing industries for the remainder of this paper.

III. Stage Two: The Identification of Industry Groups Appropriate for MDC Promotion

A. General Description

This stage was performed by the DOR using methodology similar to that used in Stage One with the following exceptions:

1. Data were collected for industry groups in the United States, rather than in Michigan, and at the four-digit SIC level, rather than at the one, two, or three-digit levels.

2. Industries were screened by individual indicators rather than by a single index representing all indicators simultaneously.

3. Industrial characteristics selected as indicators included practicality criteria as well as desirability and feasibility criteria.

4. Manufacturing and service industries did not receive identical treatment.

This fourth point deserves further discussion. Manufacturing screening differed from service industry screening in four respects: (1) design of screening procedure, (2) selection of screening variables, (3) collection of data for the variables, (4) determination of cut-off points to be used with the variables.

The design of the screening procedure differed in order to allow exploration of two basic approaches to industry screening. The first of these was the industry-filtering approach; the second was the simultaneous-consideration approach.

The filtering approach involves eliminating nonqualifying industries at each step of the screening process. Thus, after the industry-group data for a given variable have been examined, those industries which do not qualify according to the standard (cut-off point) established

for that variable are eliminated from all further consideration. In this fashion, a successively smaller set of qualifying industry groups is considered at each step in the process. This type of procedure was used in screening manufacturing industries in Stage Two.

The simultaneous-consideration procedure was used to screen service industries. At each step in this screening process the data for all industry groups are examined. Industry groups are eliminated only at the final step, after data for all of the screening variables have been considered. The filtering approach and the simultaneous-consideration approach produce identical lists of qualifying industries whenever qualifying industries are required to meet all standards established during the screening process. The principal difference between the two approaches lies in the amount of information available once the screening process has been completed. The filtering approach provides enough information to identify when and why an industry has been eliminated according to the one variable which caused its elimination. The simultaneous-consideration approach provides enough information to identify all of the screening-variable standards an industry group is unable to meet. (One may see this difference in graphic form by comparing Table 4, which summarizes manufacturing industry screening, with Table 6, which summarizes service-industry screening.) Additional data which were not required for the manufacturing industry filtering process are supplied in Appendix 5.

The second difference between the treatment of manufacturing and service industries lies in the area of selecting variables. Variable selection for manufacturing and service industries is identical, with one exception: for service industries it is necessary to distinguish potential impact on Michigan's trade balance of payments; such an impact is not a distinguishing feature within the manufacturing sector. This will be discussed in more detail in Section III B.

The third way in which treatment of the manufacturing and

service sectors differs relates to data collection. Data availability is a greater problem for service industries than for manufacturing industries. It is necessary to refer to a greater number of sources for service industry data. Furthermore, it is necessary to derive estimates for certain of the service industry statistics, while the manufacturing-industry counterparts of those statistics are directly available from published sources. (For example, the U.S. Department of Commerce Economic Development Administration publishes data on the growth rates of manufacturing industries at the four-digit SIC code level in Growth and Labor Statistics of Manufacturing Industries, while the service-industry counterparts of these statistics are derived from employment level data available in County Business Patterns.) For a thorough comparison of manufacturing and service industry data availability, see Appendices 3 and 4.

The final way in which the two screening processes differ is in the selection of cut-off points for the purpose of eliminating industry groups. Wherever possible, the cut-off points used in eliminating manufacturing and service industries are identical. A high degree of consistency is desirable in order to simplify the final comparison of the manufacturing and service industries which pass all of the tests in the screening process. For two of the seven variables used in screening both sectors, however, the cut-off points used for service and manufacturing industries are different. Cut-off points for 1972 employment level differ, because the variable is intended to indicate the relative importance of specific manufacturing industries within the manufacturing sector per se, and of specific service industries within the service sector per se. Cut-off points for average-employment-per-establishment also differ, because an effective cut-off point for the manufacturing sector eliminates virtually all service industries when applied to the service sector, while an effective cut-off point for the service sector eliminates few if any manufacturing industries

when applied to the manufacturing sector. The cut-off points for establishment size are, therefore, determined independently.

It is important to note the practical implications of relaxing the equal cut-off point rule. In effect, service industries can qualify for consideration even when their typical establishment size is smaller than that of all qualifying manufacturing industries. Therefore, the number of establishments required to meet the 500-employee goal may be greater for a qualifying service industry than it is for a qualifying manufacturing industry. As a result, MDC may need to put forth a greater promotional effort in attracting a selected service industry.

B. Selection of Screening Variables and Cut-Off Points

Screening variables were selected with the goal of the MDC in mind: to identify each industry which could be expected to provide Michigan with 500 new jobs. Consequently, selection emphasized employment-related variables and "practicality" variables, which are designed to indicate potential gains per promotional effort of the MDC.

The variables which were used in the screening process are listed in Table 2. Of these, variables 2 through 7 are quantified. (The specific statistics obtained appear in Appendix 5 for the manufacturing industries and in Appendix 6 for the service industries.) The first seven variables listed in Table 2 were used in screening manufacturing industries; all eight were used in screening service industries.

A certain degree of homogeneity is required for any industry group which is to be chosen for industrial expansion. This is required because an industry group defined at the four-digit SIC code level can be so diverse that the statistics acquired for the group as a whole are relatively meaningless when applied to the more specific industries

Table 2

SCREENING VARIABLES USED IN STAGE TWO

Number	Description
1	Homogeneity of industry group
2	Projected increment to employment level in 1975
3	Employment growth rate
4	Employment level in 1972
5	Average employment per establishment
6	Average wage
7	Average total assets per employee
8	Potential effect on Michigan's trade balance of payment

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within the group. For example, an average employment growth rate for SIC code #7319 (advertising, not elsewhere classified) would be the average of employment growth rates for such diverse activities as skywriting and coupon distribution. One would hesitate to assume that a high employment-growth rate for "advertising not elsewhere classified" implies a high employment growth rate for skywriting.

Admittedly, this problem of data averaging is present to a certain degree for all industries defined at the four-digit level. As previously mentioned, this was unavoidable because the data required for industry-screening are not available in more specific breakdowns than those supplied by the four-digit SIC codes. It is possible, however, to eliminate those four-digit level industry groups which present the most serious data averaging problem by eliminating all industry groups which are collections of products or services termed "miscellaneous" or "not elsewhere classified."

The projected increment to employment level in 1975 reflects the combined effect of the employment growth rate (Variable 3) and

the employment level (Variable 4).[3] It is therefore one of the most important screening variables. As an indicator of practicality, the employment increment can identify the relative degree of promotional effort which would be required to attract the specified 500 jobs to Michigan. For example, if industry A is expected to have additional employment of 10,000 jobs in the United States in 1975, and if industry B is expected to offer 2,000 additional jobs, then obtaining the requisite 500 jobs in Michigan would require capturing 25 percent of the incremental industrial expansion market for industry B but only 5 percent of the increment for industry A. The assumption underlying use of this variable is, of course, that a heavier promotional effort is required in order to capture a larger percentage of the increment to the market.

The specific test, or cut-off point, used in screening the employment-increment variable is the same for manufacturing and service industries. To pass the test, an industry group must be predicted to produce at least 4,000 additional jobs in the United States in 1975 so that Michigan should have to attract no more than 12.5 percent of the new employment in the industry in order to meet the employment goal of 500 jobs. This may seem somewhat optimistic in light of Michigan's average share of a 3 to 5 percent of both manufacturing and service-industrial employment in the United States. However, the MDC's promotional campaign plans justify a target share of the increment considerably larger than the 3 to 5 percent which could be expected to develop spontaneously--hence the 12.5 percent target.

The employment-growth-rate indicator is used on its own, in addition to the employment-increment indicator, because once the

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[3] The projected increment is derived by multiplying the 1972 industrial employment level by $g(1 + g)^2$, where g is the annual employment growth rate for the industry group.

targeted 500 jobs are created in Michigan rapid expansion of the new employment is desirable. Whether a declining, static, or slow employment growth rate is caused by a slowing of growth in output or an increase in capital intensiveness, the effect, from the MDC's point of view, would be similar: fewer jobs. Therefore the employment growth rate itself is used rather than indicators of change in output level or of change in capital (or labor) intensiveness.[4]

The cut-off point used for the employment growth variable was determined implicitly by use of the U.S. Department of Commerce, Economic Development Administration (EDA), growth rate classifications in Growth and Labor Statistics of Manufacturing Industries (1972). Manufacturing industries whose growth was classified as "declining," "static," or "moderate" in the EDA report were screened out. This effectively eliminated those manufacturing industries which had annual growth rates below 3.6 percent (see Appendix7). Therefore, 3.6 percent was selected as the cut-off point for service industries as well, in order to make the screening procedures as consistent as possible.

The fourth screening variable, 1972 employment level, is a practicality criterion. This indicator is used to eliminate those industries which seem unimportant in terms of employment volume. It was felt that the MDC should direct its promotional efforts to those industries which are of average or large size when measured by a total-number-of-jobs criterion. Therefore, an industry which can meet the new-jobs-per-year criterion must also meet the employment level criterion.

The cut-off point used in screening manufacturing industries was determined by an estimate of the modal production employment

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[4] Further research should consider net capital formation as well as employment growth and use these variables jointly. See section on capital formation.

level for all manufacturing industries at the four-digit SIC code level. This estimate was derived through an examination of a frequency distribution of industries by production employment level, for a random sample of twenty-five industry groups selected from the entire manufacturing sector (see Appendix 8). The resulting production employment level mode was 10,640 employees. Therefore, a cut-off point of 11,000 employees was used in the screening of manufacturing industries.

The cut-off point used in screening service industries was determined in a similar, but not identical, manner. A modal employment level is determined by examining a frequency distribution of industries by employment level (see Appendix 9). The elements in the frequency distribution, however, were derived from an entire population rather than a sample, and the population used was the set of four-digit SIC code groups being considered in the service industry screening process. Interestingly enough, the resulting cut-off point of 10,000 is very close to the cut-off point derived for the manufacturing industries.

Average employment per establishment, the fifth screening variable, is clearly a practicality criterion. If the typical establishment size (in terms of employment) within a given industry group is very small, then a very large number of new establishments must be opened to create 500 new jobs in Michigan. Consequently, a much larger promotional effort must be expended per job created.

The cut-off point used in screening industries for size of establishment was more stringent for manufacturing than for service industries. As explained in Section III A, this allowed for the possibility of a greater promotional effort directed at service industry expansion. For a service industry to pass the establishment size test, more than 10 percent of the establishments in that industry must employ at least twenty people. (It is noteworthy that even with such

a lenient test as this, forty-nine of the 100 service industry groups were eliminated on the basis of establishment size [see Table 6]. For a manufacturing industry to pass the establishment size text, at least 20 percent of the establishments in that industry must employ 100 people or more.

The next indicator appearing in Table 2 is the average wage for each industry group. In an industry-screening process for Michigan this indicator works as a criterion of both feasibility and desirability. Because industries with particularly low average wages (and high labor intensiveness) are not likely to choose to locate in Michigan, wage levels are a feasibility criterion. Because higher-wage industries are likely to have a stronger economic impact per new job created, wage levels also operate as a desirability criterion. The cut-off point used in wage-level screening was $2.50 per hour. This cut-off point was selected on the basis of the definitions of "low wage" and "very low wage" industries in the EDA's Growth and Labor Statistics of Manufacturing Industries (1972). Thus, all industry groups whose average hourly wage was less than $2.50 were eliminated in this step of the screening.

The book value of assets per employee is an indicator of capital intensiveness. This is a practicality criterion selected because industries with very large asset requirements per employee could require much time and promotional expenditure before the capital investment required to support the 500-employee goal would be made. This is a particularly important consideration in a period of capital shortage such as the early 1970s.

The cut-off point for screening out industries with high assets per employee was $20,000--i.e., an industry group with over $20,000 for its average book value of assets per employee was eliminated at this step. The selection of the $20,000 point was based on the MDC's past experiences in attracting to Michigan industries having varying

degrees of capital intensiveness.

The final variable, used only in screening the service industries, is potential effect on Michigan's trade balance of payments. It is not necessary to use this variable for the manufacturing industries because all would have a potentially positive effect on the trade balance. Among the service industries, however, are some services which are seldom exported from one state to another (except to in-state tourists or in border communities). Examples of such services are sports clubs, amusement parks, and detective agencies. Such services are likely to follow population movements and could be expected to develop spontaneously, without benefit of the state's promotional efforts. They were therefore eliminated.

C. Screening the Manufacturing Industries

At the outset, the Medical Instruments and Supplies category (SIC 384) was eliminated to avoid superfluity of effort. Michigan's Department of Commerce is undertaking the detailed analysis of this SIC category to support its first promotional campaign. Miscellaneous industry categories (i.e., industries representing some collection of miscellaneous industries) were eliminated early in the screening for the rather obvious reason that interpreting statistics for a collection of miscellaneous and heterogeneous industries presented insurmountable difficulty. In keeping with this policy, the Toys, Amusements, and Athletic Goods Industry (SIC 394) was eliminated. The initial manufacturing set provided by MDC (see Appendix 1) was thus reduced from thirteen to eleven three-digit SIC industry categories. The remaining eleven three-digit SIC industry categories contain 50 industries that comprised the four-digit SIC category set (see Appendix 2).

This method differs from the "simultaneous single index" used by the MDC. As previously mentioned, the screening procedure involved examining a selected set of feasibility, desirability and

practicality indicators individually and analyzing the data using the filtering approach.[5] Table 3 briefly outlines the screening variables and the cut-off points.

Table 3

QUANTIFIED VARIABLES AND CUT-OFF POINTS
USED IN SCREENING MANUFACTURING INDUSTRIES

Variables	Cut-Off Points (Minimum Requirement)
Growth in employment (long term)	M*
Average industry wage levels	M*
Book value of assets per employee	$20,000
Employment level	11,000
Expected employment	4,000
Percent of firms employing more than 100 people	20%

*M = Moderate

The industries listed in Appendix 2 were screened using the (selected) indicators in the order shown in Table 2. The cut-off points are consistent with those discussed in Section III B.

Table 4 presents the four-digit SIC industries that remained after the first three indicators. Note that the initial list covered fifty, four-digit industries (listed in Appendix 2). Forty-three were eliminated by at least one of the first three major screening variables.

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[5]The bulk of the primary data comes from: U.S., Department of Commerce, Economic Development Administration, Growth and Labor Statistics of Manufacturing Industries, Washington, D.C., 1972. The complete data set for this experiment is provided in Appendix 5.

Table 4

INDUSTRIES REMAINING AFTER
SCREENING FOR FIRST THREE VARIABLES

SIC Code Number	Description	Employment Growth*	Average Wage Rate*	Book Value of Assets per Employee* (In Thousands of Dollars)
3573	Electronic computing equipment	VHG	H	13.2
3574	Calculating and accounting equipment	VHG	H	11.4
3622	Industrial controls	VHG	M	8.7
3623	Welding apparatus	HG	H	14.2
3661	Telephone and telegraph	HG	H	11.4
3662	Radio and communications	VHG	H	7.1
3821	Mechanical measuring devices	HG	M	8.7
	Cut-off points	HG	M	20.0

Legend:

VHG	Very high growth
HG	High growth
H	High
M	Moderate

*See Appendix 7 for description and definitions of the variables.

Table 5 presents the set of four-digit SIC industries that qualified after screening was completed. The screening cut-off points are presented at the bottom of the table. These three industries represent the qualifying set from which may be selected a more specific subindustry (i.e., a subindustry at the six-digit SIC code level contained within these three qualifying four-digit industries).

Table 5

MANUFACTURING INDUSTRIES: THE QUALIFYING SET

SIC Code Number	Description	Employment Level (1971)	Expected Employment (1975)	Percentage of Firms with More Than 100 Employees
3573	Electronic computing equipment	134,900	8,712	29
3661	Telephone and telegraph	139,800	4,417	39
3662	Radio and communications	325,100	10,272	25
	Cut-Off points	11,000	4,000	20

(The complete data set and cut-off points used in manufacturing screening are presented in Appendix 5 to allow the reader to retrace the screening process.)

D. Screening the Service Industries

The service industries considered in the screening process are listed in Table 6. This list encompasses all of the four-digit industry groups which are included in the one, two, and three-digit service industry groups selected during Stage One (and listed in Appendix 1). The table summarizes the indicators used in screening these four-digit industry groups and the resulting eliminations. For each indicator a specific test was established as described in III B. If the industry group passed the test, an empty box appears for the relevant industry-indicator location on the matrix. If the industry group could not pass the test, the box in the table at the appropriate location is x-ed out.

When data were not available for the four-digit classifications, industry groups were screened on the basis of data obtained for the more aggregated groups. If the more aggregated groups could not pass the test, each collection of appropriate boxes is x-ed out.

In the first step of the screening process for service industry groups, ten of the 100 groups were eliminated on the basis of their lack of homogenity. In the second step, seventy-four of the 100 industry groups were eliminated on the basis of low employment increment expected in 1975. Of these, thirteen were also eliminated on the basis of both slow growth (variable 3) and low employment level (variable 4); twenty-nine were also eliminated on the basis of slow growth while employment level is adequate; seventeen were also eliminated on the basis of employment level while estimated growth rate is adequate; and fifteen had adequate growth and employment level but a low projected employment increment was caused by the interaction of employment level and growth.

The third variable, employment growth rate, eliminated forty-five of the 100 industries. Of these, forty-two were also eliminated in Step Two. The remaining three, which were eliminated on the basis

Table 6

RESULTS OF SERVICE INDUSTRY SCREENING

SIC #	Name of Industry Group	Misc. Groups	Employment: New Jobs	Employment: Growth	Employment: Level	Estab. Size	Wages	Assets per Employee
60111	Federal Reserve banks		X	X				X
6022	State banks, members Fed. Res.							
6023	State banks, FDIC, not Fed. Res.							
6024	State banks, not FDIC or Fed.							
6025	Nat'l. banks, members Fed. Res.							
6026	Nat'l. banks, FDIC, not Fed. Res.							
6027	Nat'l. banks, not FDIC							
6028	Unincorp. priv. banks, not FDIC							
6032	Mutual savings banks, mbrs. Fed.		X					
6033	Mutual savings banks, FDIC, not Fed.							
6034	Mutual savings banks, not FDIC							
6042	State nondeposit trust co.'s, of Fed.		X	X	X			
6044	State nondeposit trust co.'s, not FDIC		X	X	X			
6052	Foreign exchange establishments		X		X	X		
6054	Safe deposit companies							
6055	Clearinghouse assns.							
6056	Corporations for banking abroad							
6059	Deposit banking estab's, N. E. C.*		X		X	X		X

*N. E. C. = Not Elsewhere Classified

Continued

Table 6 (Continued)

SIC #	Name of Industry Group	Misc. Groups	Employment: New Jobs	Employment: Growth	Employment: Level	Estab. Size	Wages	Assets per Employee
6112	Non-Agr. rediscount and fin. inst.'s		X		X			X
6113	Agr. rediscount and fin. inst.'s		X		X			X
6122	Fed. savings and loan assns.		X					X
6123	State S & L assns, FSLIC		X					X
6124	State S & L assns, FHLBS, uninsured		X					X
6125	State S & L assns, not FHLBS, uninsured		X					X
6131	Agriculture credit institutions		X		X	X		X
6142	Fed. credit unions		X	X		X		X
6143	State credit unions		X	X		X		X
6144	Industrial loan companies		X	X		X		X
6145	Licensed small loan lenders		X	X		X		X
6146	Installment sales finance co.'s		X	X		X		X
6149	Misc. personal credit institutions	X	X	X		X		X
6153	Short-term bus. crdt. institutions		X	X				X
6159	Misc. bus. crdt. institutions	X	X	X				X
6162	Mortgage bnkrs. and loan correspondents		X		X			X
6163	Loan brokers		X		X			X

Continued

Table 6 (Continued)

SIC #	Name of Industry Group	Misc. Groups	Employment: New Jobs	Employment: Growth	Employment: Level	Estab. Size	Wages	Assets per Employee
6211	Security brokers							X
6221	Commodity contracts brokers		X		X	X		
6231	Security and commodity exchanges		X		X			X
6281	Services allied w. S&C exchange		X			X		X
6311	Life insurance		X	X				X
6321	Accident and health insurance							
6324	Hospital and medical service plans							
6331	Fire, marine, and casualty insurance			X				
6351	Surety insurance		X	X	X			
6361	Title insurance		X					
6371	Pension, health, and welfare funds		X		X	X		
6399	Insurance carriers, N. E. C. *	X	X		X	X		
6411	Insurance agents and brokers			X		X		
6512	Operators of nonresidential bldg.		X	X		X		X
6513	Operators of apt. buildings		X	X		X		X
6514	Operators of non-apt. dwellings		X	X		X		X
6517	Lessors of RR property		X	X		X		X
6515	Operators of mobile home sites		X	X		X		X
6519	Lessors of real property, N. E. C. *	X	X	X		X		X

*N. E. C. = Not Elsewhere Classified

Continued

Table 6 (Continued)

SIC #	Name of Industry Group	Misc. Groups	Employment: New Jobs	Employment: Growth	Employment: Level	Estab. Size	Wages	Assets per Employee
6531	Real estate agents and mgrs.					X		
6541	Title abstract offices		X	X		X		
6552	Subdividers and developers, except cemetaries					X		X
6553	Cemetary subdividers and developers					X		X
6611	Combinations of R.E., ins., and law offices	X	X	X		X		
6711	Holding offices							X
6722	Mgmnt. investment offices, open-end		X	X	X	X		X
6723	Mgmnt. investment offices, closed-end		X	X	X	X		X
6724	Unit investment trusts		X	X	X	X		X
6725	Face-amount certificate offices		X	X	X	X		X
6732	Educational, religious and charity trusts		X					X
6733	Trusts, other than educational, religious and charity		X		X	X		X
6792	Oil royalty traders		X	X	X	X		X
6793	Commodity traders		X	X	X	X		X
6794	Patent owners and lessors		X	X	X	X		X
6799	Investors, N.E.C.*	X	X	X	X	X		X

*N.E.C. = Not Elsewhere Classified

Continued

Table 6 (Continued)

SIC #	Name of Industry Group	Misc. Groups	Employment: New Jobs	Employment: Growth	Employment: Level	Estab. Size	Wages	Assets per Employee
7011	Hotels, motels and tourist courts			X			X	
7311	Advertising agencies		X	X		X		
7312	Outdoor advertising services		X	X				
7313	Radio, TV, and publishers' adv. reps.		X	X	X			
7319	Advertising, N. E. C.*	X	X	X				
7391	R & D laboratories		X	X				
7392	Mgmnt., consulting, and PR services							✓
7393	Detective agencies and protective serv.							✓
7394	Equipment rental and leasing service					X		
7395	Photo finishing labs		X					
7396	Trading stamp services		X	X	X			
7397	Commercial testing labs.		X	X				
7399	Business services, N. E. C.*	X						
7531	Top and body auto repair shops					X		
7534	Tire retreading and repair shops		X	X		X		
7535	Paint shops		X	X		X		
7538	General automotive repair shops		X			X		
7539	Auto repair shops, N. E. C.*	X	X			X		

*N. E. C. = Not Elsewhere Classified

Continued

Key: ✓ denotes an industry group which passed all screening tests.

C #	Name of Industry Group	Misc. Groups	New Jobs	Growth	Level	Estab. Size	Wages	Assets per Employee
11	Dance halls, studios and schools		☒	☒		☒		
22	Theatrical producers ex. movies		☒	☒				
29	Bands, orchestras and other entertainers		☒	☒		☒		
32	Billiard and pool establishments		☒	☒	☒	☒		
33	Bowling alleys		☒	☒				
41	Professional sports clubs & promoters		☒					
48	Racing, including track operations		☒					
92	Public golf courses		☒		☒	☒		
93	Coin-operated amusement devices				☒	☒		
96	Amusement parks							✓
97	Membership sports & rec. clubs							✓
99	Amusement & rec. services, N. E. C.*	☒				☒		

N. E. C. = Not Elsewhere Classified

ey:

✓ denotes an industry group which passed all screening tests.

☒ denotes a set of industries eliminated as a group.

of low growth, had very high employment levels. They include: SIC 6331, Fire, Marine, and Casualty Insurance; SIC 6411, Insurance Agents and Brokers; and SIC 7011, Hotels, Motels, and Tourist Courts.

The fourth variable, 1972 employment level, eliminated thirty-one of the 100 service industries. Of these, thirty were also eliminated in Step Two. The remaining one which was eliminated on the basis of low employment level had a very high employment growth rate. It is SIC 7933, Coin-Operated Amusement Devices.

As discussed in Section III B, the establishment size criterion for service industries is designed to eliminate about half of the industry groups. On the basis of this criterion, forty-nine of the 100 service industries were in fact eliminated.

The indicator for average wage eliminated only one of the 100 service industries— SIC 7011, Hotels, Motels, and Tourist Courts.

The seventh variable in Table 6, average annual asset per employee, eliminates seventy-two of the 100 service industries. This criterion effectively eliminated the Finance, Insurance, and Real Estate sector. In this sector, only two industry groups had low enough assets to pass the assets-per-employee test--SIC 6411, Insurance Agents and Brokers; and SIC 6611, Combinations of Real Estate, Insurance, and Law Offices.

Four service industry groups remained after the final screening step:

SIC 7392	Management, Consulting and Public Relations Services
SIC 7393	Detective Agencies and Protective Services
SIC 7996	Amusement Parks
SIC 7997	Membership Sports and Recreation Clubs

These four groups were then examined more carefully with

respect to their roles in the Michigan trade balance of payments. Since Detective Agencies (#7393), Amusement Parks (#7996), and Sports Clubs (#7997) are exports only in state border communities or to out-of-state residents visiting Michigan, these three industry groups were eliminated from further consideration.

Thus, the final result of the service-industry screening procedure identified one qualifying service industry target for economic expansion in Michigan: SIC 7392 Management, Consulting, and Public Relations Services. This industry group now must be examined in more detail and compared with the qualifying manufacturing industry groups, in order to identify a specific product or service group which is appropriate for MDC to study in more detail in preparation for its second promotional campaign of 1975.

The principle data source used in service-industry screening was County Business Patterns. For the source of all the employment data used, as well as the establishment-size data, County Business Patterns was relied on heavily because none of the other sources of service-industry data gave employment level for four-digit industry groups (see Appendix 3). Even County Business Patterns neglects to break down employment data to the four-digit level for most finance, insurance, and real estate industry groups.

Data on average hourly wages for industry groups were obtained from Employment and Earnings, 1971. These data generally were not available for four-digit industry groups. For finance, insurance, and real estate industries, wage data were obtained at the two-digit level, and average wages were computed for three-digit and four-digit industry groups when possible. For all of the remaining service industries, with the exception of hotels, motels, and tourist courts (SIC #7011), only one average wage was available making the average wage indicator very weak.

Data on the industries' assets were obtained from Statistics of Income 1969: Corporation Income Tax Returns and from Standard and Poor's Trade and Securities Statistics, 1971. These data were never available for the four-digit industry groups and were only occasionally available at the three-digit level. Data were obtained at the two-digit level and were computed for three-digit and four-digit industry groups when possible.

The problem of data availability for service industry groups is salient. As a result of it, the objectives of the second stage of the screening process were met in a less precise manner than had been planned.

For a description of the sources examined during the search for service-industry data see the annotated bibliography in Appendix 3.

E. Final Review of the Qualifying Set

Of the remaining four industry categories (see Table 7) the service industry group was eliminated, because it was felt that the Michigan Department of Commerce was interested in targeting a manufacturing industry for the second of its four 1975 promotional campaigns.[6] This is not to suggest that services are an unimportant industry group, it is merely an attempt to coordinate DOR efforts with the state's promotional planning.

Telephone and Telegraph was eliminated from the manufacturing sector because of the high concentration of production and sale of equipment to a few large firms. American Telephone and Telegraph is responsible for 80 percent of the phone installations in the United States and is almost completely supplied by its subsidiary,

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[6]The focus on manufacturing development also supports the notion that a well-balanced manufacturing sector may be a prerequisite to service sector development.

Table 7

THE QUALIFYING SET

SIC #	Description	Type
3573	Electronic computing equipment	Mfg.
3661	Telephone and telegraph	Mfg.
3662	Radio and communications	Mfg.
7392	Management, consul. and public relations	Service

Western Electric, which produces the bulk of the equipment used in the industry. A goal of this project is to have several prospective directions for promotion and advertising. It is our belief that the probability of attracting an industry to the state is, in part, a function of the degree of competition in that industry. This belief is based on the premise that if a state can offer substantial potential markets or inputs, intraindustry competition will increase the consideration given to location in the state by any one firm. In essence, it is believed that highly concentrated (quasi-monopolistic) industry structures may attach relatively little importance, and thus give relatively little consideration, to the comparative advantages accruing from a carefully selected industry location. If location were, in fact, to be critically important to an industry of quasi-monopolistic structure, location analysis would in all probabilities be done efficiently and effectively by the firm(s) within the industry, thereby making government efforts superfluous. For this reason there is more incentive to direct development efforts at industries with less concentration.

In view of the above elimination (i.e., the elimination of SIC 3661, Telephone and Telegraph Industry, because of high concentration ratios), the qualifying set was narrowed to SIC 3573, Electronic Computing Equipment and SIC 3663, Radio and Communications.

IV. Stage Three: Identification of a Product Group Appropriate for Detailed Analysis

Beyond this elimination, it was difficult to evolve a semi-rigorous systematic screening procedure to narrow further the range of the qualifying industries and thereby achieve a better focus on product class within them. The aggregation of industry information and other related data constraints made it almost impossible at the macro-level to determine whether any of the remaining industries might be more easily attracted or of greater benefit to the state, short of a detailed industry feasibility study for each of the six-digit industries within the categories.

There are two basic methods by which one may circumvent the "focus" problem: (1) evolve and develop detailed studies for all six-digit industries, or product mix combinations, within the three qualifying (four-digit level) industries; or (2) probe or survey superficially a set of arbitrarily selected six-digit industries, or product mix combinations, gather general information on the selected set, and narrow it down to a single industry for detailed analysis. Time and budget constraints dictated the choice of the second alternative, for although the first method appears to be ideal, it may be extremely costly and possibly wasteful.

Thus to achieve this focus, products were selected from the range of five- to six-digit SIC products manufactured under the two categories. The products were then reviewed and general profiles were made with the information available. This information included:

1. Growth in sales
2. Product characteristics
3. Leading producers
4. Markets

The products were selected by information leads indicating growing industries.

Because of its phenomenal (historical) growth rate and the presence of potential markets in the Michigan area, the mini-computer industry was chosen for detailed analysis to the extent that research resources allowed.

V. Conclusion

The purpose of this study has been twofold: (1) the selection of an industry which is both compatible with Michigan's resources and capable of diversifying Michigan's industrial mix; (2) the development of industry screening methods to aid future researchers. The mini-computer industry was finally chosen for detailed follow-up study as a potential target for the industrial promotion campaign of the MDC. This industry displays considerable employment growth potential, a major criterion of the MDC, and appears to have characteristics which correspond to Michigan's market and input capabilities.

A. Screening Considerations

1. Criteria Types

The ideal approach to industry screening would involve examination of all industries, in this instance four-digit industries, with respect to their practicality, desirability, and feasibility.

Practicality criteria are developed through analysis of the cost/benefit aspects of industrial development promotion. By examining the needs of the Michigan economy and the costs of promotion, the MDC was able to specify the operating characteristics (e.g., average employment per establishment) of that type of firm at which it would prefer to direct its "blitz" campaigns. The intent is to select those industries which will bring a maximum of benefits to the state in relation to promotional dollars expended.

Desirability criteria are developed to give consideration to the long-run impact of industries on the region. It is useful to maximize benefits-per-promotion-dollar-expended in the short run, but it is also desirable to attract those industries

which will have a favorable effect on the region in the long run. Desirability criteria thus focus on expected future employment growth potential and wage levels in industry.

Feasibility criteria are developed to allow consideration of the attractiveness of an area as a potential location for a type of industry. The feasibility of an industry in a given region is a function of the degree to which the inputs and markets needed by the industry match the resources of the region. Inclusion of feasibility criteria in the screening process is therefore essential, but the extent to which they were considered during this four-digit screening was limited compared to consideration of practicality and desirability criteria. There are two reasons for this. If feasibility criteria are used at a two-, three-, or four-digit level, they are difficult to interpret because of data aggregation. If feasibility criteria are used at a less aggregate level, the tasks of data collection and analysis are too time-consuming to be appropriate for a screening study.

The task of developing profiles for 900 industries would be impossible considering the promotion "blitz" schedule of the MDC. A feasibility profile, of even the most general nature, requires considerable time because of the data requirements for such a profile. A feasibility profile of an industry might include the following information on an industry's inputs:

Raw materials requirements
Skilled and unskilled labor requirements
Required financial services
Utilities demand of the industry
Land requirements

and the following market information:

Methods and channels of distribution
Breakdowns of markets by user type
Demand potential for the firm's product
Industry structure and competition
Descriptions of the industry's products

Although the time required to develop feasibility profiles for this screening prevented their inclusion, some general considerations for market and input compatability were made in Stage One. The first step of the industry screening performed in Stage One involved selection of industries that were currently active in Michigan. These were the industries to be considered in the later stages of the screening process. The rationale for this focus on presently active industries was that entrepreneurs of an industry presently active in the state must have perceived the region as having some comparative advantage as to either markets or inputs or both. Focus on the active Michigan industries was intended to increase the probability that the firms considered for promotional efforts after screening would have favorable perceptions of the region from a market and input standpoint.

There are alternative approaches to the inclusion of some consideration of feasibility of the industries being screened. For example, in the early stages of the screening we might have focused on industries (outside of Michigan) whose products are imported in significant quantities to Michigan. This approach assumes that the existence of demand, in excess of local supply as indicated by the imports, might justify local production of the imported product. Several other approaches might evolve as hybrids of the approach used in this study and the example mentioned above.

It is important to note that the broad consideration for market and input compatability of industries in Stage One was not intended to eliminate the need for more detailed feasibility analysis. The more detailed analysis was merely postponed until the screening process was completed and the industry to

which the MDC would direct their promotional campaign had been indicated. A follow-up study of the mini-computer industry, which will include the more detailed feasibility analysis, is the next planned phase of the MDC/DOR industrial development program.

2. Alternative Methodologies

Two screening methodologies were used in this study:

1. Index screening (Stage One)
2. Single variable screening (Stage Two).

After screening the industries by both methods, the resulting sets of industries may differ. A screening of industries by the index method allows an industry to deviate on any single variable used to make up the index. The value of the sum of all the weighted variables is of prime importance, rather than the value of any single variable used to make up the composite. The single variable screening method requires that an industry conform to some established cut-off point on each variable. This study takes two approaches to the single variable screening methodology. (These were discussed in section III A.)

B. Problems Encountered

In this screening procedure we utilized the four-digit Standard Industrial Classification (SIC) codes as our definition of "industries." The two-digit classification scheme was not useful because the data available at that level is too general — a result of aggregating and averaging across many industry sectors. The six-digit groupings were not used because the required measures of screening criteria are simply not available from secondary sources on a six-digit basis. An illustration of the problems of aggregated two-digit data and the

reasons for the lack of existing six-digit information are briefly developed below.

The two-digit group, Machinery-Except Electrical (SIC 35), is a useful illustration of the aggregation problem at the two-digit level. SIC 35 includes such diverse industries as turbine engine and typewriter production. The measures of employment, assets per employee, and other similar descriptive measures for SIC 35 are derived by summing and averaging the data for turbine engines, typewriters, and roughly forty-eight other machinery-producing groups. In screening an entire two-digit category of this type one risks eliminating many potentially feasible sub-industries within the two-digit category. The individual descriptive measures will most probably differ from the composite two-digit measure which resulted from the averaging.

Two-digit data were not used in the screening process unless a particular classification was not available at the four-digit level. When a two-digit measure was utilized, its value was taken as typical of the four-digit subgroups within it. Each of these four-digit subgroups was then screened on the same value.

There are two apparent reasons for the lack of available six-digit data. First, the six-digit level is fairly detailed and increases the possibility of disclosing an individual firm's descriptive statistics. Revealing an individual firm's operating parameters in nationally circulated sources may adversely affect the firm's competitive well-being. Consequently, to prevent such possibly damaging disclosure, the individual figures of one firm must be averaged with those of other firms. The much broader categories which this process creates include many firms whose operating parameters may be of increasing dissimilarity. A second reason for lack of six-digit data is the prohibitive expense of collecting samples large enough to develop statistics which represent the true parameters of each six-digit group.

Implications of Aged Data

For the data that are collected at the two-, three-, and four-digit levels, the task of sampling and compiling often results in a considerable time lag between planning and final publication. For example the most current statistics available for this study from the Census of Manufactures were sampled in, and prior to, 1967. The age of these data with respect to our research is approximately seven years. The industrial development goals underlying this project make old data a serious problem.

One of the goals of the MDC was to focus its industrial development efforts toward growth industries. This criterion was important since it was felt that the rapidly growing industries would be those with planned expansion of facilities and employment. The problem of using aged data with this criterion was, obviously, that the operating characteristics of these growth industries could change drastically over a short time. The data taken from aged sources may not be accurate indicators of current operating characteristics. Current descriptive measures may be either more or less favorable with respect to the cut-off points established in the screening.

C. Some Suggestions for Future Research

1. Use of Input-Output Tables

Although a detailed feasibility study for several industries was not possible because of the time and data limitations we have noted, a somewhat crude analysis was made comparing the production and marketing compatibility of two qualifying industries with the Michigan area and its resources. This analysis was done more as an exercise to develop and test methodology

than as a device for further screening. When more detailed data are available, however, this type of analysis should prove a very powerful industry-screening device.

The input requirements were tabulated for Electronic Computing Equipment (SIC 3573) and Radio and Communications (SIC 3662) for each dollar of output. To do this, the 1963 direct requirements interindustry transaction table (input-output table evolved by the Office of Business Expansion, U.S. Department of Commerce, published November 1969 by the Survey of Current Business) was utilized. Note that the static estimates of direct requirement made a critical assumption of constant technologies and thus constant input-output ratios. Because of the nature of the source (viz., the input-output table published by the OBE aggregates industry data for eighty-two basic sectors), the data here are significantly more aggregated and, therefore, heterogeneous within any one group than were data used in the preceding section. The inputs for each of these two industries were then ranked in descending order by share in total input costs for that industry (Appendix 10). These rankings were used to identify potentially critical inputs[7] for each of these industries. After critical inputs were identified, the Michigan area was studied for resources that match these needs.

Materials consumed by the qualifying industries were tabulated alongside Michigan shipments of those materials. Shortfalls and/or excesses could then be anticipated and further analyzed (Appendix 11). The 1967 Census of Manufactures was the major data source for resource levels in Michigan. By

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[7] In essence, the assumption here is that the more an input accounts for total cost of goods sold by the industry, the more "critical" it is. The reasoning is simplistic but facilitates analysis.

this matching process, a general feel for compatibility of industry inputs and Michigan resources was developed.

To assess market compatibility, the qualifying set was analyzed for market orientation. Again the interindustry transaction table was utilized. The distribution of sales between interindustry categories and the final demand sectors evolved (Appendix 11). In a matching process analogous to the above, Michigan's share of industrial shipments was calculated to reflect the size of potential Michigan markets. Since statistics on purchases of the qualifying industry's products by Michigan industries are not directly available, a roundabout method of calculation was used. The sales of the qualifying industry (i) were broken down into sales to individual industries ($j = 1, 2, \ldots n$) which used industry i's product as input. Assuming that purchases by industry j from industry i vary directly with industry j's shipments (i.e., the input-output ratios remain constant), one way of determining the size of the Michigan market would be by measuring the shipments of the (buying) j industries from Michigan. If 20 percent of all the shipments in industry $j = 1$ originate from Michigan, it is assumed here that 20 percent of all the purchases by industry $j = 1$ from industry i will originate in Michigan. In brief, the size (in terms of shipments) of the buying industry (j) in Michigan was used as a proxy to reflect Michigan's potential share of the total purchase by (buying) industry j from (selling) industry i. To develop a feel for the magnitude of the Michigan market in dollar terms, one may work backwards with the ratios and make ballpark estimates of purchase levels.

Schematically, the data was used in the following manner: sales (as a percentage of total sales) from industry i (e.g., computing equipment) to the different j ($j = 1, 2, \ldots n$) industries

were tabulated using the direct-requirement interindustry transaction table (see Column 1, Table 8). Michigan activity levels as a percentage of total United States activity, measured by value of shipments from Michigan for each of the same j industries were then tabulated to reflect the size of the potential Michigan market.

Table 8

USE OF DATA TO ESTIMATE POTENTIAL MICHIGAN MARKETS

Market for Selling Industry i	Percentage of Total Sales by Industry i to Industry j	Michigan Activity Level for Industry j (In Percentage)
Industry j = 1	10	20
Industry j = 2	5	10
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
Industry j = n	12	15
Total	100	100

A crude feel for potential market size is then provided by multiplying columns one and two of Table 8. Potential sales from (selling) industry i to (buying) industry j = 1 in Michigan will then roughly approximate 2 percent (10 percent x 20 percent) of industry i's total sales.

Two serious flaws are evident:

1. Shipment statistics of industry j may not truly represent purchase levels of industry j.

2. The 1963 input-output table aggregates all SIC sectors into roughly 82 categories. The data aggregation problem weakens the validity of any such analysis. (This problem will be of little future significance since input-output tables five to six times more detailed [484 sectors] have recently become available, and is not unreasonable to expect even more detailed tables in the future.) Because of the aggregation (averaging effect) problem, little importance was attached to this portion of the screening. Note, however, that, should sufficiently detailed information become available, analysis of this nature would be crucial since it constitutes an attempt to assess the compatibility of an industry (its inputs and outputs) with a specified region.

2. Capital Formation as a Screening Variable

Future research should incorporate and use jointly both employment growth and net capital formation. Net capital formation levels imply the rate at which the industry is building capacity. Taken with the industry's labor employment growth rate, this information could yield insights into real capacity growth. For example, one industry may expand shipments and output levels by increasing employment to man existing excess (physical) plant capacity, while another industry may expand shipments (output) by increasing its employment level and capital formation. A key factor becomes evident. In the former case, employment expands at the source, or where industry is

currently located, making industry attraction a difficult undertaking and promotional efforts futile. In the latter case, the opposite occurs. Thus, pursuant to MDC objectives, one would screen out the former by eliminating medium to high growth industries which displayed low capital formation patterns. In this case, a prerequisite for target industries should be a favorable employment growth and net capital formation.

APPENDIXES

APPENDIX 1

Industry Groups Selected after Stage One
(defined by one-digit, two-digit, or three-digit SIC codes)

Manufacturing Industry Groups

SIC # 208	Beverages
209	Miscellaneous Food Kindred Products
273	Books
275	Commercial Printing
281	Industrial Chemicals
284	Soap, Cleaners, and Toilet Goods
344	Fabricated Structural Metal Products
357	Office and Computing Machines
362	Electrical Industrial Apparatus
366	Communication Equipment
382	Mechanical Measuring and Control Devices
384	Medical Instruments and Supplies
394	Toys and Sporting Goods

Service Industry Groups

SIC # 6	Finance, Insurance and Real Estate
701	Hotels, Motels and Tourist Courts
731	Advertising
739	Miscellaneous Business Services
753	Automotive Repair Shops
79	Amusement and Recreation Services

APPENDIX 2

Four-Digit Industry Groups after Stage 1: Manufacturing

208 Beverages

2082	Malt Beverages
2083	Malt
2084	Wines, Brandy and Brandy Spirits
2085	Distilled Liquor, Except Brandy
2086	Bottled and Canned Soft Drinks
2087	Flavoring Extracts and Syrup, N.E.C.*

209 Miscellaneous Foods and Kindred Products

2091	Canned and Cured Seafoods
2092	Fresh and/or Frozen Packaged Fish
2095	Roasted Coffee
2097	Manufactured Ice
2098	Macaroni and Spaghetti
2099	Food Preparations, N.E.C.*

273 Books

2731	Book Publishing
2732	Book Printing

275 Commercial Printing

2751	Commercial Printing, Letterpress
2752	Commercial Printing, Lithographic
2753	Engraving and Plate Printing
2754	Commercial Printing, Gravure

281 Industrial Chemicals

2812	Alkalies and Chlorine
2813	Industrial Gases
2816	Inorganic Pigments
2819	Industrial Inorganic Chemicals, N.E.C.*

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*Not Elsewhere Classified

NB: The listing is based on the 1972 SIC code book primarily for purposes of completeness.

APPENDIX 2 (Continued)

284 Soap Cleaners and Toilet Goods

2841	Soap and Other Detergents
2842	Polishes and Sanitation Goods
2843	Surface Active Agents
2844	Toilet Preparations

344 Fabricated Structural Metal Products

3441	Fabricated Structural Metal
3442	Metal Doors, Sash and Trim
3443	Fabricated Plate Work
3444	Sheet Metal Work
3446	Architectural Metal Work
3448	Prefabricated Metal Work
3449	Miscellaneous Metal Work

357 Office and Computing Machines

3572	Typewriters
3573	Electronic Computing Equipment
3574	Calculating and Accounting Machines
3576	Scales and Balances, Excluding Laboratory
3579	Office Machines, N.E.C.*

362 Electrical Industrial Apparatus

3621	Motors and Generators
3622	Industrial Controls
3623	Welding Apparatus, Electric
3624	Carbon and Graphite Products
3629	Electrical Industrial Apparatus, N.E.C.*

366 Communications Equipment

3661	Telephone and Telegraph Apparatus
3662	Radio and TV Communications Equipment

382 Mechanical Measuring and Control Devices

3822	Environmental Controls
3823	Process Control Instruments
3824	Fluid Meter and Counting Devices
3825	Instruments (to measure electricity)
3829	Measuring and Controlling Devices, N.E.C.*

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*Not Elsewhere Classified

APPENDIX 3

Sources Considered during Search for Statistics on Service Industries in the U.S.A. as Defined by Four-Digit SIC Codes

General Statistical Sources

Business Statistics contains data on very few of the service-type industries. Statistics are presented for "non-manufacturing" and "non-agricultural" industries as a whole, but specific service industry data are available for only banking and life insurance. Biennial.

Census of Business has data for selected services in the SIC categories beginning with the digit 7. It has no data for Financial, Insurance, or Real Estate industries. Data include number of establishments, receipts, payroll, and number of proprietors.

Census of Transportation has data on the origin and destination of product shipments from manufacturing industries, but not on the origin or destination of service industry output.

City and County Data Book has data for counties, cities, metropolitan areas, and states, but not for the U.S.A. as a whole.

County Business Patterns has data for service industries at the three-digit level for most Finance, Insurance and Real Estate Industries, and at the four-digit level for most service industries in the SIC categories beginning with the digit 7. Data include employment, and distribution of establishments by employment size. Annual.

Employment and Earnings has wage data at the three-digit level for a few of the Finance, Insurance and Real Estate industries and for Hotels, Motels and Tourist Courts (SIC #701). For some others of the service industries this publication has wage data at the two-digit SIC code level.

Handbook of Labor Statistics contains data for service-type industry groups as defined at the general one-digit level only.

1963 Enterprise Statistics has data by type of establishment (corporations, partnerships, etc.) rather than by type of industry.

Statistics of Income 1969: Corporation Income Tax Returns has data pertaining to financial condition for selected service industry groups at the three-digit level and for most service industry groups at the two-digit level.

APPENDIX 3 (Continued)

Periodical and Specific-Industry Statistical Sources

Area Wage Surveys have wage data for specific occupations in specific cities. Industrial breakdowns are no more specific than "manufacturing" and "non-manufacturing" categories.

Current Industrial Reports are available for very few of the service industries. These reports provide data at the seven-digit level for industry groups' shipments, exports and imports.

Standard and Poor's Industry Profiles include few profiles of service industries.

Standard and Poor's Trade and Securities: Statistics provides data on financial condition for banks, savings and loans, and life insurance companies, but not for other service industries.

Survey of Current Business published an input/output table of 1963 data in November 1969. Unfortunately, this table is a matrix of manufacturing and service industries defined at approximately the three-digit level rather than at the four-digit level.

Statistical Projections

Patterns of U.S. Economic Growth has data on growth of employment and output for service industries aggregated for the most part by two-digit (and sometimes by one-digit) SIC codes.

The U.S. Economy in 1980 has data on growth of employment and output for service industries aggregated for the most part by two-digit (and sometimes by one-digit) SIC codes.

U.S. Industrial Outlook 1973 has employment data for banking, insurance and amusements at the two-digit level, and for hotels, advertising, and automotive repair shops at the three-digit level.

Guides to Statistical Data Sources

Business Reference Sources, An Annotated Guide for Harvard Business School Students: 1971

Encyclopedia of Business Information Sources (by Paul Wasserman, published by Gale Research Company).

Statistics Sources (by Paul Wasserman, published by Gale Research Company).

APPENDIX 3 (Continued)

U.S. Statistical Abstract, "Statistical Sources: Subject Guide"

APPENDIX 4

Sources Considered during Search for Statistics on Manufacturing Industries in the United States

Census of Manufacturers (1967)--Contains data on four-digit manufacturing industries. Data includes size of establishments, inventory levels, plant and equipment expenditures, materials consumed and labor statistics. Also comparative statistics by geographic area. The census is taken every five years and is issued four years hence.

Annual Survey of Manufacturers--Data from sample surveys taken in intervening years of comprehensive census mentioned above. Several key measures for four-digit manufacturing sectors are included.

"Industry Profiles"--Annual Survey of Manufacturers--Twenty basic data series for 527-four-digit manufacturing industries (covers 1958-1970). Good reference for summary ratios such as book value of assets/employee. Data for this source is taken from both the Census of Manufacturers (1958, 1965, and 1967) and the Annual Survey of Manufacturers.

Survey of Current Business--Business indicators, commodity prices, and alike. Very little information classified on the standard industrial scheme. Primary use was for input/output analysis and the April 1973 article of the composition of value added. (Monthly Publication)

Standard Industrial Classification Manual--Description of industry classification scheme used by all federal agencies, most state, and many private organizations.

Growth and Labor Statistics of Manufacturing Industries--This source includes measures of long term growth potential, relative capital formation, average wages, and labor intensity for 411 (four-digit) manufacturing industries.

County Business Patterns--Includes employment and distribution of establishments by employment size at the four-digit level for most manufacturing industries.

United States Statistical Abstract--Included good summary information and lists other sources by topic in an appendix. This source is published annually.

APPENDIX 4 (Continued)

Other Information Sources Utilized

- Million Dollar Directory, Dun and Bradstreet
- Thomas Register
- 10K Reports
- Moody's Industrial Reports
- Trade Journals
- Technical Publications

APPENDIX 5

Manufacturing Industry Data

Manufacturing Industry Data

SIC #	Description	EMPLOYMENT Avg. Annual Growth Rate (in Percent)	1971 Level (000)	Expected Increment	Average Wage Rate	Book Value of Asset per Employee	Firms with over 100 Employees No.	Percentage
08	BEVERAGES							
.082	Malt beverages	(1.7)	5(7)10)	(920)	VH	$410,000	107	56
.083	Malt	(2.2)	1.8	(39)	VH	100,000	7	16
.084	Wines, brandy and brandy spirits	(4.4)	10.3	(396)	M	24,600	16	39
.085	Distilled liquor, except brandy	(0.5)	19.2	(95)	H	26,211	45	35
.086	Bottled and canned soft drinks	1.7	121.1	2166	L	14,388	277	9
087	Flavoring extracts and syrup	0.4	9.8	40	M	28,444	20	20
09	MISC. FOOD AND KINDRED PRODUCTS							
091	Canned and cured seafood	(4.1)	4.9	(177)		42,750	10	8
092	Fresh and frozen packaged fish	(0.1)	8.0	(78)	VL	58,250	31	33
093	Vegetable oil, N.E.C.*	(2.8)	1.6	(41)	M	53,000	5	17
094	Animal and marine fats and oils	(1.2)	12.4	(146)	M	24,083	19	4
.095	Roasted coffee	(1.8)	14.9	(254)	M	32,643	33	15
.096	Shortening and cooking oils	.1	12.7	127	H	33,583	51	40
.097	Manufactured ice	(4.8)	7.7	(319)	H	23,000	5	1

N.E.C. = Not Elsewhere Classified
..a. = Not available
H=Very High, $3.75 or greater; H=High, $3.25-$3.74; M=Moderate, $2.50-$3.24; L=Low, $2.00-$2.49; VL=Very Low, less than

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APPENDIX 5 (Continued)

SIC #	Description	EMPLOYMENT			Average Wage Rate	Book Value of Asset per Employee	Firms wi over 10(Employee	
		Avg. Annual Growth Rate (in Percent)	1971 Level (000)	Expected Increment			No.	Perce age
209	MISC. FOOD & KINDRED PRODUCTS (Continued)							
2098	Macaroni and spaghetti	0.7	7.4	51	L	$15,000	23	12
2099	Food preparations, N.E.C.*	2.3	66	1625	L	14,288	151	9
273	BOOKS							
2731	Book publishing (1963-1971)	3.5	59.9	2324	M	7,729	111	11
2732	Book printing (1963-1971)	3.7	45.9	1834	M	11,156	81	13
275	COMMERCIAL PRINTING							
2751	Letterpress	.1	171.2	869	M	10,708	231	2
2752	Lithographic	4.0	165.1	4829	H	10,479	288	4
2753	Engraving and plate printing	(0.3)	8.6	26	M	8,500	20	4
2754	Commercial printing, gravure	n.a.	37.4	n.a.	n.a.	n.a.	95	18
281	INDUSTRIAL CHEMICALS							
2812	Alkalies and chlorine	(3.1)	13.7	(386)	H	89,615	35	48
2813	Industrial gases	(1.2)	9.1	(102)	H	111,556	18	3
2815	Cyclic intermediates and crudes	.4	30	121	H	74,567	67	34

N.E.C. = Not Elsewhere Classified
n.a. = Not Available
H=Very High, $3.75 or greater; H=High, $3.25-$3.74; M=Moderate, $2.50-$3.24; L=Low, $2.00-$2.49; VL=Very Low, less than $

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APPENDIX 5 (Continued)

SIC #	Description	EMPLOYMENT			Average Wage Rate	Book Value of Asset per Employee	Firms with over 100 Employees	
		Avg. Annual Growth Rate (in Percent)	1971 Level (000)	Expected Increment			Number	Percentage
281	INDUSTRIAL CHEMICALS (Continued)							
2816	Inorganic pigment	1.1	13.1	149	H	$ 49,308	27	28
2818	Industrial organic chemicals, N.E.C.*	2.0	100.2	2127	VH	94,090	158	31
2819	Industrial inorganic chemicals, N.E.C.*	(1.6)	175.8	(1024)	H	54,800	157	22
284	SOAP, CLEANERS AND TOILET GOODS							
2841	Soap and other detergents	0.1	30.1	30	H	30,100	58	11
2842	Polishes and sanitation goods	1.6	20.2	339	M	14,050	42	4
2843	Surface active agents	6.0	6.6	472	M	28,000	11	8
2844	Toilet preparations	3.5	45.9	1781	L	13,311	91	15
344	FABRICATED STRUCTURAL METAL PRODUCTS							
3441	Fabricated structural metal	.4	96.3	390	M	$ 9,438	232	12
3442	Metal doors, sash and trim	.7	63	450	L	6,063	159	11
3443	Fabricated plate work	.5	97.2	493	M	11,505	194	13
3444	Sheet metal work	.3	61.5	149	M	7,525	123	4
3446	Architectural metal work	(1.3)	17.7	(221)	M	7,118	30	2

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n.a. = Not available
VH=Very High, $3.75 or greater; H=High, $3.25-$3.74; M=Moderate, $2.50-$3.24; L=Low, $2.00-$2.49; VL=Very Low, less than

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APPENDIX 5 (Continued)

; #	Description	EMPLOYMENT			Average Wage Rate	Book Value of Asset per Employee	Firms with over 100 Employees	
		Avg. Annual Growth Rate (in Percent)	1971 Level (000)	Expected Increment			No.	Percentage
;	FABRICATED STRUCTURAL METAL PRODS. (Cont.)							
;8	Prefabricated metal work	n.a.	n.a.	n.a.	n.a.	n.a.	80	14
;9	Miscellaneous metal work	4.0	35.2	1584	M	$ 10,029	193	8
'	OFFICE AND COMPUTING MACHINES							
'2	Typewriters	(1.2)	17	(197)	M	13,225	14	50
'3	Electronic computing equipment	5.3	158	9,777	H	13,235	171	28
'4	Calculating and accounting machines							
'6	Scales and balances, except lab.	.4	5.6	23	M	8,200	18	24
'9	Office machines, N.E.C.*	1.7	19.4	347	M	11,421	5	19
;	ELECTRICAL INDUSTRIAL APPARATUS							
;1	Motors and generators	0.0	93.7	-	M	11,581	163	41
;2	Industrial controls	4.0	45.1	2029	M	8,778	73	14
;3	Welding apparatus, electrical	1.9	12.7	255	H	14,250	33	23
;4	Carbon and graphite products	1.7	11.1	198	M	29,909	27	39
;9	Electrical indus. apparatus, N.E.C.*	1.5	20.5	322	M	8,000	37	21

.E.C. = Not Elsewhere Classified
a. = Not available
=Very High, $3.75 or greater; H=High, $3.25-$3.74; M=Moderate, $2.50-$3.24; L=Low, $2.00-$2,49; VL=Very Low, less than $2

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APPENDIX 5 (Continued)

SIC #	Description	EMPLOYMENT			Average Wage Rate	Book Value of Asset per Employee	Firms with over 100 Employees	
		Avg. Annual Growth Rate (in Percent)	1971 Level (000)	Expected Increment			Employees	Percentage
366	COMMUNICATIONS EQUIPMENT							
3661	Telephone and telegraph apparatus	4.4	139.8	6,999	H	$ 11,403	56	39
3662	Radio and TV communications equip.	5.9	325.1	22,780	H	7,108	348	25
382	MECH. MEASURING & CONTROLLING DEV.**							
3821	Mechanical measuring devices	2.0	64.7	1,373	M	8,078	119	19
3822	Automatic temperature controls	1.3	30	405	M	6,900	41	31
	CUTOFF POINTS	M	11.0	4,000	M	Less than 20,000	40	20

*N.E.C. = Not Elsewhere Classified.
**The 1967 SIC classification is utilized to facilitate data gathering.
n.a. = Not available.
VH=Very High, $3.75 or greater; H=High, $3.25-$3.74; M=Moderate, $2.50-$3.24; L=Low, $2.00-$2.49; VL=Very Low, less than $2.00

APPENDIX 6

Service Industry Data

SIC #	Name of Industry Group	U.S. Employment Level (thousands) 3/67	3/72	Avg. Annual Growth Rate 1967-1972x (in Percent)	1975 Increment	1970 Percentage of Establishments with at Least 20 Employees	1971*** Average Hourly Wage	1971*** Average Total Assets per Employee
6011	Federal Reserve banks	19.0	21.6	2.6	592	81	$2.91*	$4662
6022	State banks, members Federal Reserve	111.0*	143.1*	5.2*	8236*	49*	2.91*	186*
6023	State banks, FDIC, not Federal Reserve	111.0*	143.1*	5.2*	8236*	49*	2.91*	186*
6024	State banks, not FDIC or Federal Res.	111.0*	143.1*	5.2*	8236*	49*	2.91*	186*
6025	National banks, members Federal. Res.	111.0*	143.1*	5.2*	8236*	49*	2.91*	186*
6026	National banks, FDIC, not Federal Res.	111.0*	143.1*	5.2*	8236*	49*	2.91*	186*
6027	National banks, not FDIC	111.0*	143.1*	5.2*	8236*	49*	2.91*	186*
6028	Unincorp. private banks, not FDIC	111.0*	143.1*	5.2*	8236*	49*	2.91*	186*
6032	Mutual savings banks, members Fed. Res.	26.1*	32.7*	4.6*	548*	67*	2.91*	2710*
6033	Mutual savings banks, FDIC, not Fed. Res.	26.1*	32.7*	4.6*	548*	67*	2.91*	2710*
6034	Mutual savings banks, not FDIC	26.1*	32.7*	4.6*	548*	67*	2.91*	2710*
6042	State nondeposit trust co.'s, Fed. Res.	.9*	1.0*	2.9*	31*	37*	2.91*	186*

* = Estimated by distributing more aggregated industry data evenly across four-digit categories.
**N.E.C. = Not Elsewhere Classified.
*** = When 1971 data were not available, 1969 data were used for assets, and 1970 data were used for wages.
x = Growth rates are derived from un-rounded employment levels.

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APPENDIX 6 (Continued)

SIC#	Name of Industry Group	U.S. Employment Level (thousands) 3/67	3/72	Avg. Annual Growth Rate 1967-1972x (in Percent)	1975 Increment	1970 Percentage of Establishments with at Least 20 Employees	1971*** Average Hourly Wage	1971*** Average Total Assets per Employee
6044	State nondeposit trust co.'s, not FDIC	.9*	1.0*	2.9*	31*	37*	$2.91*	$186*
6052	Foreign exchange establishments	3.6*	4.4*	4.3*	206*	9*	2.91*	186*
6054	Safe deposit companies	3.6*	4.4*	4.3*	206*	9*	2.91*	186*
6055	Clearinghouse associations	3.6*	4.4*	4.3*	206*	9*	2.91*	186*
6056	Corporations for banking abroad	3.6*	4.4*	4.3*	206*	9*	2.91*	186*
6059	Deposit banking estab.'s, N.E.C.**	3.6*	4.4*	4.3*	206*	9*	2.91*	186*
6112	Non-agric. rediscount & fin. inst.'s	.7*	.8*	4.3*	39*	24*	2.96*	633*
6113	Agric. rediscount & fin. inst.'s	.7*	.8*	4.3*	39*	24*	2.96*	633*
6122	Federal savings and loan associations	22.9*	29.4*	5.1*	1659*	28*	2.96*	1950*
6123	State S & L associations, FSLIC	22.9*	29.4*	5.1*	1659*	28*	2.96*	1950*
6124	State S & L assns, FHLBS, uninsured	22.9*	29.4*	5.1*	1659*	28*	2.96*	1950*
6125	State S&L assns, not FHLBS, uninsured	22.9*	29.4*	5.1*	1659*	28*	2.96*	1950*

* = Estimated by distributing more aggregated industry data evenly across four-digit categories.
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*** = When 1971 data were not available, 1969 data were used for assets, and 1970 data were used for wages.
x = Growth rates are derived from un-rounded employment levels.

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APPENDIX 6 (Continued)

SIC #	Name of Industry Group	U.S. Employment Level (thousands) 3/67	3/72	Avg. Annual Growth Rate 1967-1972[x] (in Percent)	1975 Increment	1970 Percentage of Establishments with at Least 20 Employees	1971*** Average Hourly Wage	1971*** Average Total Assets per Employee
6131	Agricultural credit institutions	2.4	7.1	23.9	2603	10	$2.96*	$633*
6142	Federal credit unions	31.1*	31.4*	.2*	378*	5*	2.96*	116*
6143	State credit unions	31.1*	31.4*	.2*	378*	5*	2.96*	116*
6144	Industrial loan companies	31.1*	31.4*	.2*	378*	5*	2.96*	116*
6145	Licensed small loan lenders	31.1*	31.4*	.2*	378*	5*	2.96*	116*
6146	Installment sales finance companies	31.1*	31.4*	.2*	378*	5*	2.96*	116*
6149	Misc. personal credit institutions	31.1*	31.4*	.2*	378*	5*	2.96*	116*
6153	Short-term business credit inst.'s	22.5*	25.0*	2.2*	575*	14*	2.96*	546*
6159	Misc. business credit institutions	22.5*	25.0*	2.2*	575*	14*	2.96*	546*
6162	Mortgage bnkrs. & loan correspondents	2.5*	3.9*	9.0*	418*	12*	2.96*	633*
6163	Loan brokers	2.5*	3.9*	9.0*	418*	12*	2.96*	633*
6211	Security brokers, flotation companies	129.5	174.8	6.2	12224	25	5.43*	63

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x = Growth rates are derived from un-rounded employment levels.

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APPENDIX 6 (Continued)

SIC #	Name of Industry Group	U.S. Employment Level (thousands) 3/67	3/72	Avg. Annual Growth Rate 1967-1972[x] (in Percent)	1975 Increment	1970 Percentage of Establishments with at Least 20 Employees	1971*** Average Hourly Wage	1971*** Average Total Assets per Employee
6221	Commodity contracts brokers	1.2	1.7	7.3	146	7	$5.43	$ 65*
6231	Security and commodity exchanges	3.7	4.5	4.3	213	26	5.43*	65*
6281	Services allied with S & C exchange	8.5	15.0	12.0	2253	10	5.43*	65*
6311	Life insurance	500.6	517.8	.6	3144	32	3.55	432.9
6321	Accident and health insurance	27.3*	41.9*	9.0*	4480*	26*	3.27*	140.9*
6324	Hospital and medical service plans	27.3*	41.9*	9.0*	4480*	26*	3.27	140.9*
6331	Fire, marine, and casualty insurance	343.5	373.9	1.7	6574	27	3.40	140.9*
6351	Surety insurance	3.0	3.2	.8	26	12	3.45*	140.9*
6361	Title insurance	20.2	26.6	5.7	1695	33	3.45*	140.9*
6371	Pension, health and welfare funds	6.5*	9.5*	7.9*	877*	9*	3.45*	140.9*
6399	Insurance carriers, N.E.C.**	6.5*	9.5*	7.9*	877*	9*	3.45*	140.9*
6411	Insurance agents and brokers	248.0	291.7	3.3	10,270	3	n.a.	17.1

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x = Growth rates are derived from un-rounded employment levels.
n.a. = Not available.

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APPENDIX 6 (Continued)

SIC #	Name of Industry Group	U.S. Employment Level (thousands) 3/67	3/72	Avg. Annual Growth Rate 1967-1972x (in Percent)	1975 Increment	1970 Percentage of Establishments with at Least 20 Employees	1971*** Average Hourly Wage	1971*** Average Total Assets per Employee
6512	Operators of nonresidential bldg.	63.5*	71.7*	2.5*	1,884*	3*	n.a.	$153.8*
6513	Operators of apartment buildings	63.5*	71.7*	2.5*	1,884*	3*	n.a.	153.8*
6514	Operators of non-apartment dwellings	63.5*	71.7*	2.5*	1,884*	3*	n.a.	153.8*
6517	Lessors of railroad property	63.5*	71.7*	2.5*	1,884*	3*	n.a.	153.8*
6515	Operators of mobile home sites	63.5*	71.7*	2.5*	1,884*	3*	n.a.	153.8*
6519	Lessors of real property, N.E.C.**	63.5*	71.7*	2.5*	1,884*	3*	n.a.	153.8*
6531	Real estate agents and managers	93.7	154.5	10.5	19,802	5	n.a.	100.9*
6541	Title abstract offices	14.9	17.5	3.3	617	6	n.a.	100.9*
6552	Subdividers and devel. except cemetaries	60.7*	100.2*	26.9*	43,406*	10*	n.a.	100.9*
6553	Cemetary subdividers and developers	60.7*	100.2*	26.9*	43,406*	10*	n.a.	100.9*
6611	Combinations of R.E., ins., & law ofs.	33.4	36.7	1.9	724	3	n.a.	n.a.
6711	Holding offices	12.9	25.5	14.6	4,890	18	2.81*	1,567.0*

* = Estimated by distributing more aggregated industry data evenly across four-digit categories.
**N.E.C. = Not Elsewhere Classified.
*** = When 1971 data were not available, 1969 data were used for assets, and 1970 data were used for wages.
x = Growth rates are derived from un-rounded employment levels.
n.a. = Not available.

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APPENDIX 6 (Continued)

Service Industry Group (Cont'd)

SIC #	Name of Industry Group	U.S. Employment Level (thousands) 3/67	3/72	Avge Annual Growth Rate 1967-1972x (in Percent)	1975 Increment	1970 Percentage of Establishments with at Least 20 Employees	1971*** Average Hourly Wage	1971*** Average Total Assets per Employee
6722	Mgmnt. investment offices, open-end	2.0*	2.1*	.6*	13*	9*	$2.81*	$1,567.0*
6723	Mgmnt. investment offices, closed-end	2.0*	2.1*	.6*	13*	9*	2.81*	1,567.0*
6724	Unit investment trusts	2.0*	2.1*	.6*	13*	9*	2.81*	1,567.0*
6725	Face-amount certificate offices	2.0*	2.1*	.6*	13*	9*	2.81*	1,567.0*
6732	Educational, religious & charity trusts	7.4	13.1	12.0	1,978	12	2.81*	1,567.0*
6733	Trusts, other than ed., relig., or charity	4.4	9.5	17.0	2,218	5	2.81*	1,567.0*
6792	Oil royalty traders	1.0*	1.1*	2.0*	22*	3*	2.81*	1,567.0*
6793	Commodity traders	1.0*	1.1*	2.0*	22*	3*	2.81*	1,567.0*
6794	Patent owners and lessors	4.2	9.7	18.3	2,491	17	2.81*	1,567.0*
6799	Investors, N.E.C.**	3.5	3.5	(1.1)	(38)	1	2.81*	1,567.0*
7011	Hotels, motels and tourist courts	589.4	675.4	2.8	19,983	19	2.12	12.4

* = Estimated by distributing more aggregated industry data evenly across four-digit categories.
**N.E.C. = Not Elsewhere Classified.
*** = When 1971 data were not available, 1969 data were used for assets, and 1970 data were used for wages.
x = Growth rates are derived from un-rounded employment levels.

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APPENDIX 6 (Continued)

SIC #	Name of Industry Group	U.S. Employment Level (thousands) 3/67	3/72	Avg. Annual Growth Rate 1967-1972[x] (in Percent)	1975 Increment	1970 Percentage of Establishments with at Least 20 Employees	1971*** Average Hourly Wage	1971*** Average Total Assets per Employee
7311	Advertising agencies	76.4	75.1	(.6)	(650)	10	$2.84*	$21.4*
7312	Outdoor advertising services	11.2	11.4	.4	46	15	2.84*	21.4*
7313	Radio, TV, & publisher's adv. reps.	11.1*	9.2	(1.5)*	(9)*	16	2.84*	21.4*
7319	Advertising, N.E.C.**	11.1*	11.3	(1.5)*	(9)*	17	2.84*	21.4*
7391	R & D laboratories	99.0*	74.1	(4.6)	(4,981)	22	2.84*	11.8*
7392	Mgmnt, consulting, & PR services	161.5	302.0	12.7	38,351	14	2.84*	11.8*
7393	Detective agencies & protective serv.	96.6	182.7	12.8	20,824	41	2.84*	11.8*
7394	Equipment rental & leasing serv.	44.1	73.5	10.4	9,311	10	2.84*	11.8*
7395	Photofinishing laboratories	31.0	40.9	5.7	2,603	27	2.84*	11.8*
7396	Trading stamp services	9.7	5.3	(7.8)	(414)	11	2.84*	11.8*
7397	Commercial testing laboratories	24.3*	18.2	(4.6)	(918)	18	2.84*	11.8*
7399	Business services, N.E.C.**	300.9	361.5	3.7	13,375	62	2.84*	11.8*

* = Estimated by distributing more aggregated industry data evenly across four-digit categories.
**N.E.C. = Not Elsewhere Classified.
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x = Growth rates are derived from un-rounded employment levels.

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APPENDIX 6 (Continued)

Service Industries Detail (Continued)

SIC #	Name of Industry Group	U.S. Employment Level (thousands) 3/67	3/72	Avg. Annual Growth Rate 1967-1972x (in Percent)	1975 Increment	1970 Percentage of Establishments with at Least 20 Employees	1971*** Average Hourly Wage	1971*** Average Total Assets per Employee
7531	Top and body auto repair shops	39.2	59.0	8.5	5,016	1	$2.84*	$17.3*
7534	Tire retreading and repair shops	16.4	16.6	.1	16	9	2.84*	17.3*
7535	Paint shops	12.0	11.1	(1.4)	(160)	2	2.84*	17.3*
7538	General automotive repair shops	84.2	100.4	3.6	3,879	1	2.84*	17.3*
7539	Auto repair shops, N.E.C.**	36.9	48.7	5.7	3,104	2	2.84*	17.3*
7911	Dance halls, studios and schools	12.0	12.1	.1	12	5	2.84*	11.8*
7922	Theatrical producers except movies	28.5*	20.2	.04*	4*	13	2.84*	11.8*
7929	Bands, orchestras and other entertainers	28.5*	28.2	.04*	4*	7	2.84*	11.8*
7932	Billiard & pool establishments	48.8*	6.5	(.4)*	(192)*	1	2.84*	11.8*
7933	Bowling alleys	48.8*	81.7	(.4)*	(192)*	24	2.84*	11.8*
7941	Professional sports clubs & promoters	11.7	14.0	3.7	558	34	2.84*	11.8*

* = Estimated by distributing more aggregated industry data evenly across four-digit categories.
**N.E.C. = Not Elsewhere Classified.
*** = When 1971 data were not available, 1969 data were used for assets, and 1970 data were used for wages.
x = Growth rates are derived from un-rounded employment levels.

Continued

APPENDIX 6 (Continued)

SIC #	Name of Industry Group	U.S. Employment Level (thousands) 3/67	3/72	Avg. Annual Growth Rate 1967-1972x (in Percent)	1975 Increment	1970 Percentage of Establishments with at Least 20 Employees	1971*** Average Hourly Wage	1971*** Average Total Assets per Employee
7948	Racing, including track operations	25.8	37.0	7.5	3,208	14	$2.84*	$11.8*
7992	Public golf courses	7.7	9.7	4.7	501	9	2.84*	11.8*
7993	Coin-operated amusement devices	32.8*	8.8	9.5*	5,621*	4	2.84*	11.8*
7996	Amusement parks	32.8*	13.9	9.5*	5,621*	18	2.84*	11.8*
7997	Membership sports and rec. clubs	73.9	93.6	4.8	4,934	33	2.84*	11.8*
7999	Amusement & rec. services, N.E.C.**	32.8*	125.3	9.5*	5,621*	10	2.84*	11.8*
Cut-off point used in service industry screening		Not Applicable	10.0	3.6	4,000	10	2.50	20
Role played by cut-off point (minimum or maximum)		Not Applicable	min.	min.	min.	min.	min.	max.

* = Estimated by distributing more aggregated industry data evenly across four-digit categories.
**N.E.C. = Not Elsewhere Classified.
*** = When 1971 data were not available, 1969 data were used for assets, and 1970 data were used for wages.
x = Growth rates are derived from un-rounded employment levels.

APPENDIX 7

Definitions of Manufacturing-Industry Screening Variables

SCREENING VARIABLE SUMMARY

Variable	Source	Type	Definition
1. Employment Growth	Growth and Labor Characteristics of Manufacturing Industries. U. S. Dept. of Commerce, E.D.A. 1972	Desirability	Comparison of average annual employment in years 1958-60 and 1966-67. Very High Growth 50% gain or more High Growth 30%-50% gain Moderate Growth 10%-30% gain Static Growth less than 10% gain Declining--no gain or actual decline
2. Average Wage Rate	Same as #1	Desirability and Feasibility	Annual wage for production workers divided by total hours worked. Very High $3.75 or greater High $3.25-$3.74 Moderate $2.50-$3.24 Low $2.00-$2.49 Very Low less than $2.00
3. Book Value of Assets/Employee	Annual Survey of Manufacturers: "Industry Profiles" 1971 U.D.C. Social and Economic Statistical Administration	Desirability and Feasibility	Total employment divided into book value of fixed assets for 1971

APPENDIX 7 (Continued)

Variable	Source	Type	Definition
4. Expected Employment Increase for 1974	Same as #3 and Patterns of U. S. Economic Growth. 1970 U. S. Dept. of Labor, Bureau of Labor Statistics	Desirability and Feasibility	g_i = Projected average annual employment rate (1965-1980) Y_i = Employment level 1971 Expected 1975 employment increment = $Y_i(1+g)^3 g$
5. Percentage of Establishments Employing between 100-250 employees	County Business Patterns, 1972	Feasibility	[From the distribution of employment sizes.]

APPENDIX 8

Manufacturing Industry Employment Cut-Off Determination

To develop a feel for average employment per industry, a random sample of 25 industries was constructed. The sampling was handled as follows: numbers between 0 and 1 represented the SIC range 1911 to 3999--the range being studied--using essentially the equation

$$\tilde{X} = 1911 + \tilde{RN} \ (3999 - 1911)$$

where $\tilde{RN}$ = random numbers between 0 to 1

$\tilde{X}$ = randomly sampled SIC code

The problem of a lack of continuity in the SIC range (viz. 1911 to 3999) was handled by rounding $\tilde{X}$ to the closest actual SIC code available. A summary of the results show:

Average Employment Per SIC Industry

	All Workers	All Production Workers
All 25 industries sampled	57,532	44,806
Excluding 5 largest in sampled set	14,110	10,640

APPENDIX 9

Frequency Distribution of Service Industries
by 1972 Employment Level

Employment Class (in thousands)	Number of Four-Digit Service Industry Groups
Under 10	31
10 - 19.9	11
20 - 29.9	11
30 - 39.9	11
40 - 49.9	4
50 - 59.9	1
60 - 69.9	0
70 - 79.9	9
80 - 89.9	1
90 - 99.9	1
100 - 199.9	14
Over 200	6

APPENDIX 10

Input Rankings of Two 4-Digit Industries

Office, Computing Equipment:

Category	Inputs	Percentage of Total Cost
51	Office, Computing Equipment	34.82
57	Electronic Components and Accessories	32.55
69	Wholesale and Retail Trade	4.53
80	Gross Imports of Goods and Services	4.33
73	Business Services	3.71

Components of Value Added:

	Percentage of Value Added	Percentage of Total Output
Employee Compensation	66.0	34.0
Indirect Business Tax	4.2	2.2
Property Type Income	29.8	15.3
Value Added (Total)	n.a.	51.5

Radio, T.V. and Communications

Category	Inputs	Percentage of Total Cost
56	Radio, T.V. and Communication Equipment	11.94
69	Wholesale and Retail Trade	5.90
73	Business Services	4.93
80	Gross Imports of Goods and Services	3.64
41	Screw Machinery Production (Bolts, Nuts, Etc.)	3.51
38	Primary Non-Ferrous Metal Manufacturers	3.45

Components of Value Added:

	Percentage of Value Added	Percentage of Total Output
Employee Compensation	83.4	39.4
Indirect Business Taxes	2.3	1.1
Property Type Income	14.3	6.7
Value Added (Total)	n.a.	47.2

APPENDIX 11

Preliminary Market Orientation of Two 4-Digit Industries*

Through the inter-industry transaction table, a descriptive data set on market orientation was evolved. Coupled with Michigan market shares in specific industries, a feel for the potential market (viz., both inter-industry--final demand sectors) of the industries studies may be gleaned.

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*On the basis of the 1962 Input-Output Table.

APPENDIX 11 (Continued)

Inter-industry[1] Category No.	Office, Computing and Accounting Machines	Dollar Volume (M)	Percentage of Sector Total	Percentage of Total Sales	Shipments: Michigan Market Share ACM(67)	Shipments: Michigan Market Share ASM(71)
	SALES SECTORS					
	(1) Total Inter-industry Sales	1,305	100	33.25		
51	Office, Computing and Accounting Machines	662	50.73	16.37	.11	*
54	Household Appliances	39	2.99	0.99	6011	6076
56	Radio, TV and Communications Equipment	38	2.91	0.96	.065	.022
69	Wholesale and Retail Trade	47	3.6	1.19	n.a.	n.a.
71	Real Estate and Rental	47	3.6	1.19	n.a.	n.a.
73	Business Services	302	23.14	7.67	n.a.	n.a.
	(2) Total Final Demand Sales	2,619	100	66.75		
	Personal Consumption Expenditions	88	3.36	2.24	n.a.	n.a.
	Gross Private Capital Formation	1,615	61.66	41.16	n.a.	n.a.
	Net Inventory Change	41	1.57	1.01	n.a.	n.a.
	Net Exports	317	12.1	8.08	n.a.	n.a.
	Federal Government Purchases	448	17.11	11.42	n.a.	n.a.
	State and Local Government Purchases	111	4.24	2.83	n.a.	n.a.
	(3) Total Sales (Sector 1 and Sector 2)	3,924	n.a.	100%	n.a.	n.a.

[1] See attachment for corresponding SIC industry category.
*Insignificant.
n.a.--not available.

APPENDIX 11 (Continued)

Inter-industry Category No.	Radio, TV and Communications Equipment	Dollar Volume (M)	Percentage of Sector Total	Percentage of Total Sales	Shipments: Michigan Market Share ACM(67)	Shipments: Michigan Market Share ASM(71)
	SALES SECTORS					
56	(1) Total Inter-industry Sales	3,108	100	24.98	%	%
13	Ordnance and Accessories	281	9.04	2.25	n.a.	n.a.
56	Radio, TV and Communications Equipment	776	25	6.24	.6	.8
57	Electronic Components and Accessories	237	7.63	1.9	.22	*
59	Motor Vehicles and Equipment	111	3.57	0.9	39.93	36.713
60	Aircraft and Parts	633	21.33	5.33	1.137	.71
62	Scientific and Control Instruments	221	7.11	1.77	2.67	3.02
66	Communications, except Radio and TV	172	5.53	1.38	n.a.	n.a.
	(2) Total Final Demand Sales	9,332	100	75.02		
	Personal Consumption Expenditures	2,089	22.39	16.8	n.a.	n.a.
	Gross Private Capital Formation	1,924	20.62	15.5	n.a.	n.a.
	Net Inventory Change	151	1.62	1.21	n.a.	n.a.
	Net Exports	366	3.92	2.94	n.a.	n.a.
	Federal Government Purchases	4,686	50.21	37.65	n.a.	n.a.
	State and Local Government Purchases	116	1.24	0.9	n.a.	n.a.
	(3) Total Sales (Sector 1 and 2)	$12,440	n.a.	100%		

*Insignificant.
n.a.--not available.