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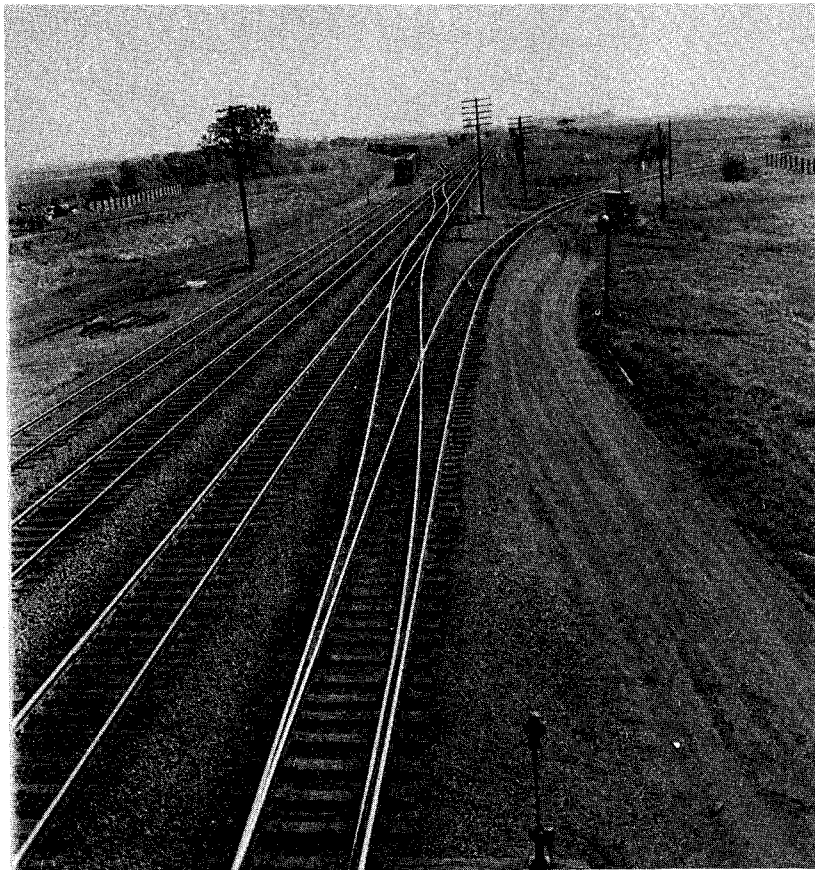
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# THE IMPACT OF FREIGHT RATES ON THE LOCATION DECISIONS OF MANUFACTURERS AND WHOLESALERS LOCATED IN THE MAJOR REGIONAL DISTRIBUTION CENTERS IN NORTH DAKOTA



Gary D. Lipp  
and  
Delmer L. Helgeson

Agricultural Economics Department  
North Dakota Agricultural Experiment Station  
and  
Upper Great Plains Transportation Institute  
North Dakota State University  
Fargo, North Dakota 58105

## FOREWORD

A study was undertaken to determine the influence that freight rates have had on the location decisions of industrial and wholesale shippers located in the major regional distribution centers in North Dakota. A location factor survey was sent to shippers in order to determine what influences, if any, affected their initial decision to locate and their decision to remain. It is hoped that this information will provide community and business leaders with the insight needed when directing efforts to protect present commercial development and to attract new industry.

We extend our appreciation to the shippers which participated in this survey. Thanks are also due officials of the state agencies, carriers, and private shipper groups, which were interviewed.

The authors gratefully acknowledge the manuscript review and valuable suggestions contributed by Gene Griffin, Director, Upper Great Plains Transportation Institute, John Finsness, Director of Traffic, North Dakota Public Service Commission, and staff members in the Department of Agricultural Economics and Community and Regional Planning, North Dakota State University.

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## Highlights

The objectives of this study were to assess the overall impact freight rates have had on the location decisions of wholesale and industrial shippers in North Dakota, and to identify major legislative and action agencies currently involved in the setting and changing of interstate freight rates. A location factor survey was forwarded to 528 manufacturers and wholesalers located in the regional distribution centers of Bismarck, Fargo, Grand Forks, and Minot, North Dakota. Personal interviews were also conducted with the Transportation Division of the Fargo Chamber of Commerce, the Burlington Northern Railroad, Incorporated (BN), and the Traffic Department of the North Dakota Public Service Commission.

Analyses of the survey data indicate that freight rates have had a limited impact on the location decisions of North Dakota shippers. Location factors considered by shippers in their initial location decision, suggests that transportation related location factors listed in the questionnaire, were generally perceived to have had a slight positive influence. Wholesale and industrial branch plants, had given higher ratings to transportation facilities, and to the quality and frequency of transportation facilities, than to inbound shipping costs.

Unlike branch plants, which have access to greater resources, and consequently greater location flexibility, some homegrown firms could be placed in a captive position. For smaller firms, the initial location decision reflects a position of limited financial capability. Therefore, the owner is forced to rely on an established system of for-hire transportation. The shipper here is at a disadvantage--unknowingly or not, and serves as one possible explanation for the low ratings given to inbound shipping costs, by this sample group.

Inbound shipping and distribution costs were also perceived by industrial and wholesale shippers to have had a slight positive influence in their decision to remain.

The statistical findings support the contention that the general level of transportation costs have not yet risen to the point where it has a significant impact on shipper attitudes in relationship to shipper location.

Another explanation relative to the statistical findings relates to the concept of a captive user or shipper. A captive shipper is one who finds it necessary in the absence of carrier competition or protection to absorb freight rates over the long run that may be higher than the long term costs to carriers furnishing the service. Long term cost includes a reasonable rate of return on carrier investments.

North Dakota manufacturers and wholesalers utilizing the transportation carriers serving the state reflects this captive position. Reaction to this stance at one point led shipper groups in Fargo, Grand Forks, and Minot, North Dakota to organize and support freight rate monitoring activities. Currently, Fargo is the only center in the state where such activities continue to be actively supported.

Forces in the transportation market, resulting from intermodel competition, generally favor reduced freight rates, in order to serve large shippers. These lower rates, as a rule, are not extended into areas where there is a lack of competition. These captive areas, having no other transportation alternatives, are forced to pay the higher freight rates. Indirectly, the captive areas subsidize the lower rates given to these larger shippers.

Federal regulatory policies prohibit carriers from charging one shipper more than another, for services under similar conditions. Similarly, carriers are prohibited from the setting and changing of rates such that one locality, region, or territory may have an undue or unreasonable advantage over another.

The lack of rate monitoring activities suggests that private shipper groups in North Dakota face a disadvantage. Under current federal regulatory practices concerning the setting and changing of interstate freight rates, the law virtually demands that a person be injured before that party can petition for relief.

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by

Gary D. Lipp and Delmer L. Helgeson\*

Need for the Study

North Dakota is in many respects at a locational disadvantage because of its remoteness from the major national centers of industry, marketing, and finance. This remoteness translated in terms of the cost for transporting raw materials and manufactured goods in and out of the state raises the question of the impact that freight rates have on location decisions of wholesale and industrial shippers in the state.

Economic development within the state has rested heavily upon the middleman--the transportation carrier. The theme of high freight rates, and their effect upon the economic development of the state, has been thoroughly documented by historians such as Robinson (1966).<sup>1</sup> As such it represents an extremely controversial subject.<sup>2</sup> Freight rates, in the past, have had considerable influence on shipper groups within most of North Dakota's major trade centers, and the state in general. The freight rate structure, which existed during the 1920's and before, consisted of combinations of local or separate rates into and out of the Twin Cities (Minneapolis-St. Paul). Freight charges, in many instances, for shipments originating in the east going to the Twin Cities, were less costly when compared to freight charges for a similar shipment (involving approximately the same distance) from the Twin Cities to Fargo.<sup>3</sup>

This practice formed the basis of the complaint of the Fargo Chamber of Commerce to the Interstate Commerce Commission (ICC), in the "Fargo Rate Case"

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\*Former Graduate Research Assistant, and Professor, Department of Agricultural Economics, North Dakota State University, Fargo.

<sup>1</sup>Robinson, Elwyn B., History of North Dakota, (Lincoln: University of Nebraska Press, 1966), p. 4.

<sup>2</sup>Historical research in this subject has been thoroughly documented. However, the conclusions given in such publications, which are oriented for popular consumption, may or may not be substantiated by other empirical research.

<sup>3</sup>An example of this once common practice can be found in Hiram Drache, The Challenge of the Prairie, (Fargo: North Dakota Institute for Regional Studies, 1970), p. 102.



of 1925.<sup>4</sup> The resultant ruling of the ICC reduced rates from origins east of the Twin Cities into North Dakota, greatly improving North Dakota's rate relationships with communities in other states. Later cases involving high freight rates on specific commodities (1930-1940) were initiated by either the Traffic Department of the North Dakota Public Service Commission (PSC), or the Chamber of Commerce of Grand Forks, Fargo, or Minot.<sup>5</sup>

Shipper groups, as discussed above, had supported efforts to monitor freight rates, and to negotiate for more favorable rates where possible. Fargo was reported to be the only city in North Dakota in 1979 where such activities continued to be supported.<sup>6</sup>

The lack of general support in North Dakota to sponsor freight rate monitoring and negotiation efforts had recently led to speculation that commercial and industrial shippers in the state could be placed in a captive position.<sup>7</sup> Shippers in some cases could be paying an unjust or discriminatory rate when lacking qualified traffic personnel to represent them in gaining more favorable rates. The final result could conceivably influence business leaders to refrain from making further capital investments; curtailing economic development.

#### Purpose of the Study

The influence of freight rates, in general, on commercial and industrial location, is a subject of intense research in the private sector. Rarely does management fail to consider the impact of freight rates upon the procuring, processing, and marketing activities of the firm, when evaluating alternative sites. Yet when the emphasis shifts to government sponsored community industrial development strategies, the freight rate aspect is usually regarded as a given. However, contrary to commonly accepted views by the public, freight rates are subject to various influences other than the market place, and consequently are not completely fixed or unchangeable.

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<sup>4</sup>ICC Docket No. 13839, Fargo Rate Case (1925).

<sup>5</sup>North Dakotan, October, 1940, p. 3.

<sup>6</sup>Opinion expressed by John Finsness, Fargo Chamber of Commerce Traffic Division, in a personal interview, Fargo, North Dakota, July 20, 1978. Finsness has since been appointed Director of Traffic, North Dakota Public Service Commission.

<sup>7</sup>Fargo Forum, July 24, 1979, sec. A, P. 8, cols. 1-3.

Contrary to the popular view, regulation does not normally prescribe exact rates unless appealed to by interested shippers under the law. Normally, regulation provides a "zone of reasonableness" above which or below which rates may not go (in theory).

To determine the influence that freight rates have had on the location decisions of wholesale and industrial shippers in selected cities in North Dakota, particular attention was given to the following objectives:

- 1) to assess the overall impact that freight rates have on the location decisions of industrial and wholesale shippers;
- 2) to identify the major participants (private shipper groups, public agencies, and common carriers) currently involved in the setting and changing of interstate freight rates.

### Scope of the Study

Primary data used in addressing the first objective was collected by the use of a mail survey sent to 528 manufacturers and wholesalers in the four main state (ND) trade centers. These distribution centers are Bismarck, Fargo, Grand Forks, and Minot, North Dakota.<sup>8</sup>

Shippers in each of the distribution centers, listed as manufacturers in the Directory of North Dakota Manufacturing: 1978-1979, were included in the study.<sup>9</sup> Wholesale shippers identified by the local Chambers of Commerce, or by the North Dakota Wholesalers Association, were also included. A total of 238 or 45 percent of the firms receiving the questionnaire responded.

Prior to the mailing of the questionnaires each firm was contacted to secure the name of the individual best qualified to complete it. The survey instrument was designed to secure information on factors that initially influenced shipper location, and on factors influencing the decision to remain.

The second objective was addressed primarily through a series of interviews with private shipper groups, common carriers, and state agencies. Interviews were conducted with the Transportation Division of the Fargo Chamber of Commerce, the Burlington-Northern Railroad, Incorporated (BN), and the Traffic Department

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<sup>8</sup>The trade centers selected for this study were identified as major trade centers in a study by John R. Borchert, Russel B. Adams, Trade Centers and Trade Areas of the Upper Midwest, Urban Report No. 3, (Minneapolis: Upper Midwest Council, 1963), p. 27.

<sup>9</sup>The Directory of North Dakota Manufacturing is an annual publication sponsored by the North Dakota Bureau of Industrial Development.

of the North Dakota PSC, concerning their efforts to retain and attract new industrial and commercial firms by attempting to influence the setting and changing of interstate freight rates.

#### Description of the Regional Distribution Centers

Currently, the four regional distribution centers represent the largest concentrations of industrial and wholesale activity in the state (Appendix A: Table A-1, A-2). Collectively since 1977-1978, these urban centers have contained not only a large percentage of the total number of establishments in wholesaling (28 percent) and manufacturing (38 percent) in the state, but also a large share of the state's total wholesale (38 percent) and industrial (48 percent) labor market.

Fargo is the state's leading wholesaling and manufacturing center. Employment survey results (1977-1978), furnished by the North Dakota Employment Security Bureau, have shown that Fargo possesses almost a 2:1 ratio in the number of wholesale and industrial establishments, and almost a 3:1 ratio in the number of people employed in each of the above areas, as compared to Bismarck, Grand Forks, and Minot.

Reported sales and payroll statistics for the wholesaling and manufacturing sectors in each of the cities was limited. Sales and payroll statistics for the comparison periods 1963, 1967, and 1972, reported in the U.S. Census of Manufacturing, for Fargo, Bismarck, Minot, and Grand Forks, were either not reported or withheld to avoid disclosure. Aggregate wholesale sales figures for the same comparison periods in each of the cities, were reported in the U.S. Census of Business and Wholesale Trade. However, the wholesale receipts for Fargo, Bismarck, Minot, and Grand Forks, when classified by type of operation were again withheld to avoid disclosure in some cases.

#### Wholesale Operations

Wholesale operations in the 1963-1967 wholesale censuses, were classified into one of five major categories:

- 1) merchant wholesalers
- 2) merchandise agents and brokers
- 3) assemblers of farm products
- 4) petroleum bulk stations and terminals
- 5) manufacturing sales branches and offices.

The wholesale-trade classification was changed from five categories to three, in 1972:<sup>10</sup>

- 1) merchant wholesalers
- 2) manufacturers sales branches and offices
- 3) merchandise agents and brokers.

Merchant wholesalers on the basis of type of operation, accounted for the greatest volume of 1972 sales in North Dakota (Appendix A: Table A-3). Sales by merchant wholesalers in Fargo and Grand Forks accounted for over one-half of the total sales in each of these cities (52 percent and 83 percent respectively).

### Manufacturing Operations

The Directory of North Dakota Manufacturing: 1978-1979, classifies manufacturers into one of 24 general industrial categories on the basis of type of product produced. The 24 industrial categories listed in the Directory, were included in a bar graph to relate their relative concentrations in Bismarck, Fargo, Grand Forks, and Minot (Figure 1). Food processing (Category 20), lumber (Category 24), and building-related activities (Category 32), were evenly distributed. Fabrication (Category 34), and machinery production activities (Category 35), were concentrated in Bismarck and Fargo. Oil and gas extraction activities (Category 13), were concentrated in Bismarck.

### Major Transportation Routes

Fargo, the leading wholesaler and manufacturer, was the first community within the state to benefit from transportation development (the railroads and later the interstate highway system). Fargo has traditionally served as the major trans-shipment point for most of the state's imports and exports. Fargo has access to major railroad main lines (Figure 2), and serves as the junction for two federal interstate highways, I-94, and I-29, (Figure 3). The other three regional distribution centers, Grand Forks, Bismarck, and Minot, all have access to major railroad lines. Bismarck and Grand Forks are served by the federal interstate and U.S. highways. Minot is not on an interstate highway.

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<sup>10</sup>Merchant wholesalers: establishments engaged primarily in buying and selling merchandise on their own account. Manufacturers' Sales Branches and Sales Offices: establishments maintained by companies apart from their plants or mines for marketing their products at wholesale. Merchandise Agents and Brokers: establishments whose operators are in business for themselves and are primarily engaged in selling or buying goods for others.

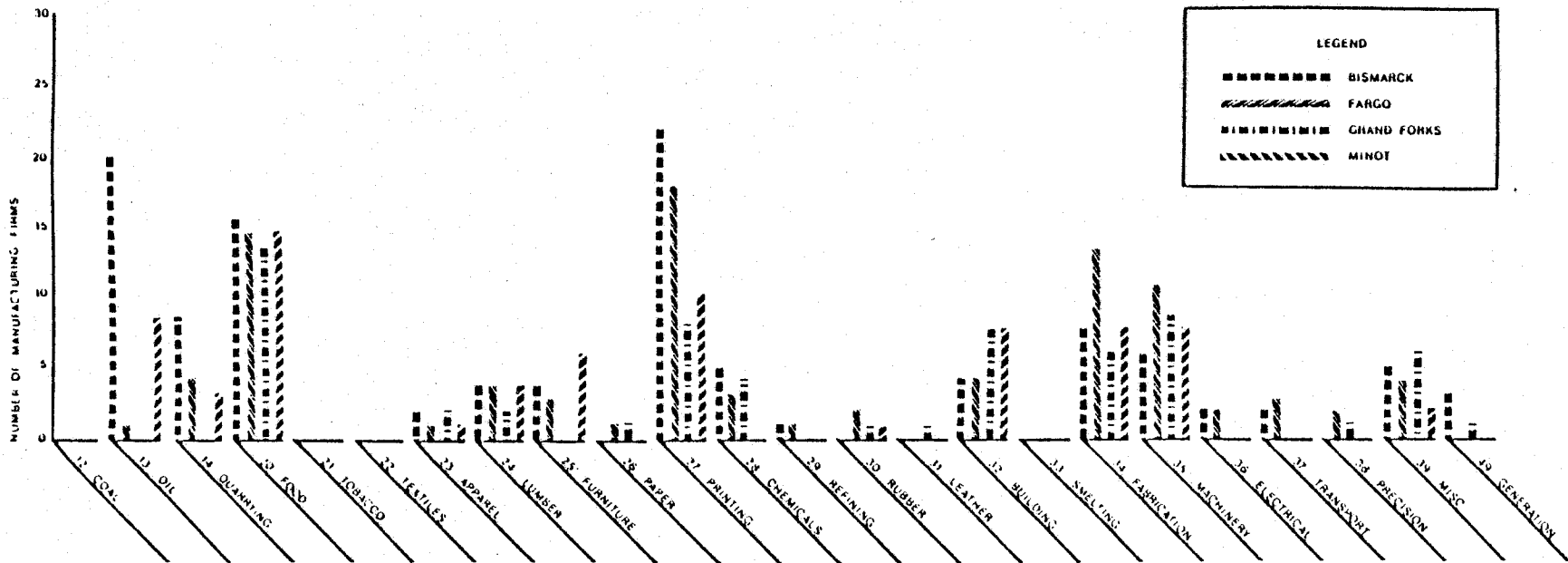
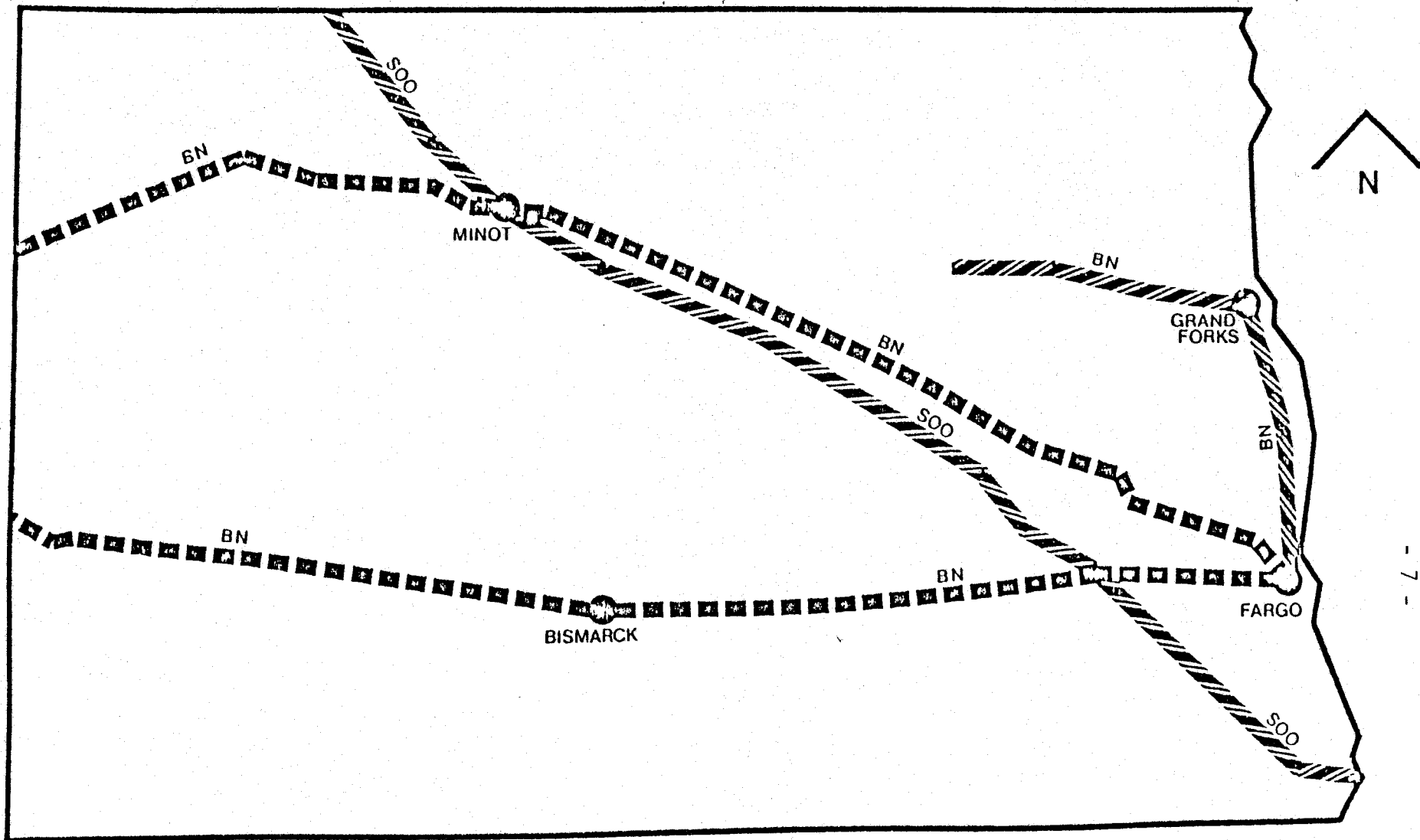



Figure 1: Manufacturing Activities in the Regional Distribution Centers.

SOURCE: Directory of North Dakota Manufacturing: 1978-1979.



CATEGORY A - MAIN LINE  - TRAFFIC DENSITY IS EQUAL OR MORE THAN TWENTY MILLION GROSS TONS ANNUALLY.

CATEGORY B - MAINLINE  - CARRIES LESS THAN TWENTY MILLION GROSS TONS BUT AT LEAST FIVE MILLION GROSS TONS ANNUALLY.

BN - BURLINGTON NORTHERN  
SOO - SOO LINE

SOURCE: U.S. DEPARTMENT OF TRANSPORTATION

Figure 2: North Dakota Rail Classification.

SOURCE: U.S. Department of Transportation.

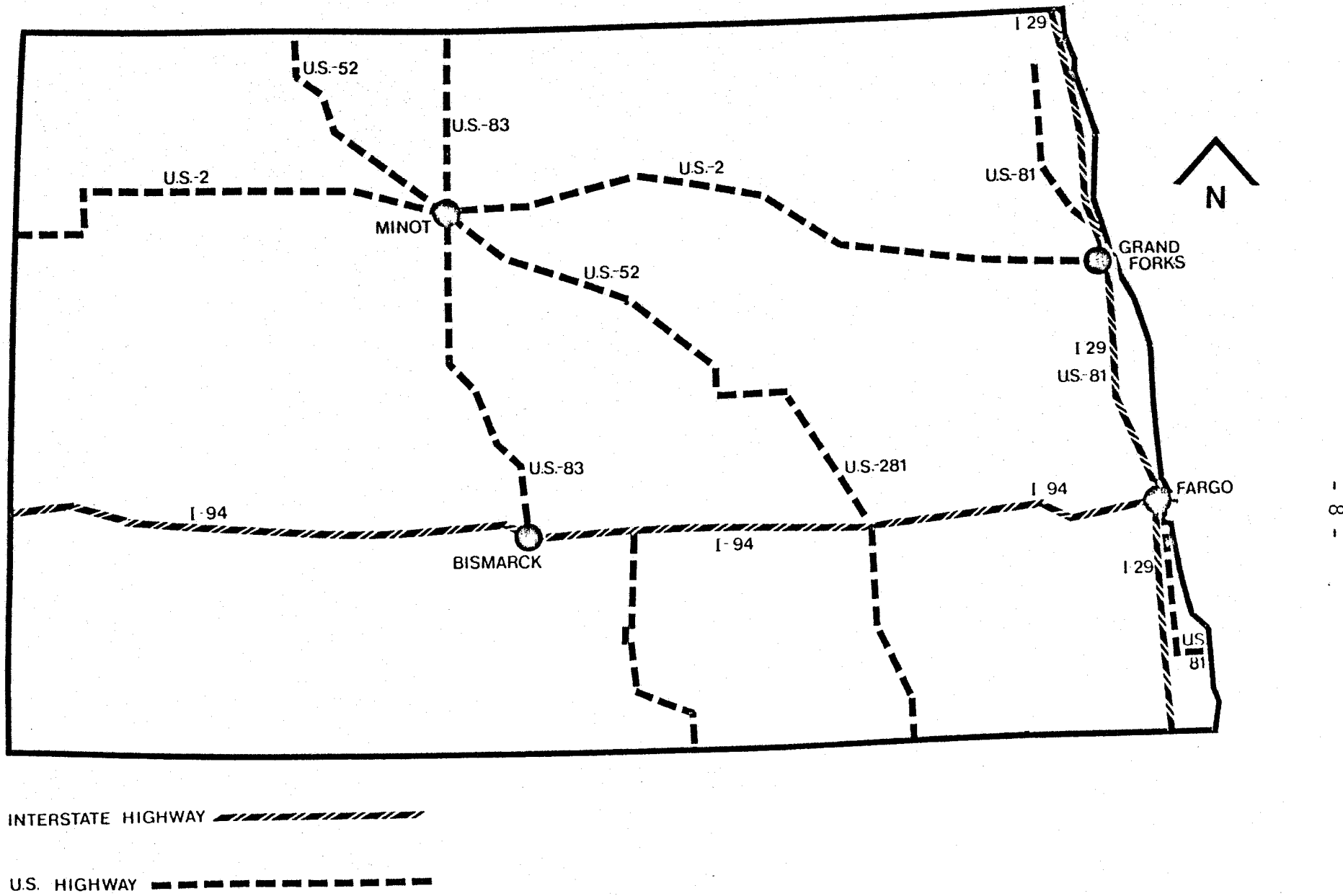


Figure 3: U.S. and Interstate Highways Serving the Major Regional Distribution Centers in North Dakota.

SOURCE: Upper Great Plains Transportation Institute.

### Historical Factors Affecting the Selected Cities

Historians have generally acknowledged that the state's economic development of North Dakota has mostly hinged upon the railroads. Robinson holds that the impact of railroad development (1871-1915) had relegated the state to a colonial status. Robinson cites historical data which shows initial railroad expansions into North Dakota were due mostly because of changes in outside markets. Improved techniques in both the milling and marketing of hard wheat led to increased demand for what Robinson termed "its (the state's) most natural product."<sup>11</sup> Robinson holds that because of these improvements, the desire of the Minneapolis-St. Paul merchants for a commercial and agricultural hinterland, not only led the railroads here, it also affected later economic development and settlement patterns.<sup>12</sup>

Railroad expansion into the state, was characterized by the development of feeder or branch lines, to bring agricultural products to junction points. Through-trains were assembled at the junction points to carry the products to Eastern markets. Some settlements located at these junction points have developed into major trade centers.<sup>13</sup>

A review of the literature at this point shows that except for central place or trade center studies, industrial and wholesale location research in North Dakota was limited in scope.<sup>14</sup>

The first state-wide trade center study was conducted by the North Dakota State Planning Board in 1939. One of the aims of the study involved looking at the effect of changes in transportation (1900-1935) upon individual trade center growth.

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<sup>11</sup>Robinson, Op. cit., p. 4.

<sup>12</sup>Ibid, p. 240.

<sup>13</sup>Kazeck, Melvin E., North Dakota: A Human and Economic Geography, (Fargo: North Dakota Institute for Regional Studies, 1956), pp. 184-189.

<sup>14</sup>Only three studies were identified which recently dealt with North Dakota. The reader is referred to John R. Borchert, Russel B. Adams, Trade Centers and Trade Areas of the Upper Midwest, Urban Report No. 3, (Minneapolis: Upper Midwest Council, 1963). Maurice J. Zink, "Impact of Rural Industrialization," (Unpublished master's thesis North Dakota State University, 1973). Stanley W. Voelker, D. L. Helgeson, H. G. Vreugdenhil, A Functional Classification of Agricultural Trade Centers in North Dakota, Agricultural Economics Report No. 3, (Fargo: North Dakota State University Extension Service, 1978).



The Planning Board, in its assessment, had singled out transportation as the major factor responsible for overall trade center growth. However, the Board also concluded that the impact of specific modes; namely, trucks, and the supporting highway system, were responsible for the growth of regional trading centers. The report stated that while railroads influenced the initial site selection of most trading centers within the state, it was only with highway development that major shifts in the concentration of trading activity to the larger urban centers of Fargo, Grand Forks, Bismarck, and Minot, became noticeable. It was also noted in the report that:<sup>15</sup>

Good roads, motor cars, and trucks have revolutionized many features of country life. Farmers have been brought closer to towns, cities, churches, picnic grounds, parks, and long haul transportation facilities. The average farmer's travel range has been greatly increased and life has, thereby, been greatly enriched, but it has also seriously injured many villages and reduced the number of trading units.

North Dakota, against the background of the automobile revolution, the Great Depression of the 1930's, and the impacts of the Second World War, experienced long term trends of population out-migration and rural loss and urban gain.<sup>16</sup> Robinson, in an analysis of this historical period (1920-1960), notes that the general attitude of the state was one of change, to stimulate broad industrial development.<sup>17</sup>

Selected studies sponsored by state agencies (1944-1952) dealt with the issues of promoting and developing the industrial potential of the state.<sup>18</sup>

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<sup>15</sup>North Dakota State Planning Board, Trade Centers in North Dakota, (Bismarck: North Dakota State Planning Board, 1939), p. 3.

<sup>16</sup>Robinson, op. cit., p. 443. According to Robinson, between 1940-1960, the state's population declined from 642,000 in 1940, to 632,000 in 1960. Population movements within the state signaled an exodus from the rural areas to the larger urban places. In each decade after 1930, the rural population (villages and farms) declined by about 10 percent. The urban population (2500 or larger) increased by 16 percent. By 1960, 35 percent of the state's population was urban.

<sup>17</sup>Ibid., p. 427.

<sup>18</sup>The state agencies which played a pivotal role during this time (1940-1960) included the North Dakota Post-War Planning Board, and the North Dakota Research Foundation (now the Bureau of Industrial Development). The function of the Board was to develop a plan to return all returning veterans to full employment. The function of the Foundation was to conduct research on the economic uses of the state's resources.

The Report of the North Dakota Post-War Planning Board, called the attention of the Legislature to:<sup>19</sup>

- 1) examine the taxation policies of the state with respect to industrial development;
- 2) examine the freight rate structure with the view of developing suitable national legislation favorable to North Dakota industry, and to support related activities;
- 3) examine and enact legislation to encourage the development of industry;
- 4) carefully examine the research conducted by the North Dakota Research Foundation, and to continue to support its activities.

Robinson noted that this time period was characterized by the promotion of research. The North Dakota Research Foundation, the lead agency, was involved in a wide range of empirical research relating to industrial development.<sup>20</sup>

The analysis of the effects of freight rates on industrial development appeared to be left largely to the legal profession.<sup>21</sup>

Historians such as Robinson have stated that high freight rates charged by transportation carriers have had an adverse impact on the development of manufacturing, and have reduced the standard of living in North Dakota.<sup>22</sup> The thesis developed in this field of literature is not strongly supported because of a lack of empirical research dealing with this subject.

## THE SURVEY OF LOCATION FACTORS

### Sample Selection

One of the limitations of this study lies in the method used to select the sample. Originally, the identity of industrial and wholesale shippers located

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<sup>19</sup>North Dakota Post-War Planning Board, Report of the North Dakota Post-War Planning Board, (Bismarck: North Dakota Post-War Planning Board, 1944), pp. 28-39.

<sup>20</sup>The reader is referred to the following reports issued by the North Dakota Research Foundation. I. Hanning, How North Dakota Taxes Industry: A Comparison of Taxes in North Dakota and Ten Other States As They Affect Selected Industries, Bulletin No. 3, (Bismarck: North Dakota Research Foundation, 1947). A. S. Dale, Industrial Development in North Dakota, Bulletin No. 5, (Bismarck: North Dakota Research Foundation, 1948). R. M. Henrickson, Feasibility of Wool Processing in North Dakota, Bulletin No. 7, (Bismarck: North Dakota Research Foundation, 1952).

<sup>21</sup>The only source of information dealing with the effects of transportation costs on North Dakota industrial and wholesale shippers comes from petitions filed before the Interstate Commerce Commission, to complain against freight rate increases by common carriers.

<sup>22</sup>Robinson, Op. cit., p. 241.

in Bismarck, Fargo, Grand Forks, and Minot were to be obtained from employment survey files maintained by the North Dakota Employment Security Bureau. The information obtained would have then been updated with more recent secondary sources. The inability of the Employment Security Bureau to release the desired information forced a reliance on information obtained solely from the secondary sources.<sup>23</sup> /Approximately one-fifth of the total number of industrial and wholesale shippers located in the selected cities were surveyed (Table 1).

TABLE 1. TYPE OF ESTABLISHMENTS PARTICIPATING IN THE SURVEY OF LOCATION FACTORS FOR BISMARCK, FARGO, GRAND FORKS, AND MINOT, NORTH DAKOTA, 1979.

Establishment	Industrial & Wholesale Establishments		Percent of All Shippers Sampled	Questionnaires Returned	
	N	%	%	N	%
Wholesale Shippers	645	75	13	82	45
Industrial Shippers	216	25	46	100	55
TOTAL	861	100	21	182	100

SOURCE: Appendix A: Manufacturing and Wholesale Statistics for the Selected Distribution Centers, The Survey of Location Factors, 1979.

#### Data Collection

Recent estimates (1977-1978) of business establishments, supplied by the North Dakota Employment Security Bureau, revealed that there were approximately 861 manufacturers and wholesalers located in the four regional distribution centers of Bismarck, Fargo, Grand Forks, and Minot (Table 2).

The 861 firms were regarded as the total population universe. Given that a complete enumeration was not possible, the sampling procedure was changed when it was learned the Employment Security Bureau could not release the identity of the manufacturers and wholesalers. The firms included within this study (528) were

<sup>23</sup>The secondary sources included the local chambers of commerce located in each of the regional cities; the North Dakota Wholesalers Association, and the Directory of North Dakota Manufacturing, 1979.

TABLE 2. MANUFACTURING AND WHOLESALING ESTABLISHMENTS INCLUDED IN THE SURVEY OF LOCATION FACTORS IN FOUR REGIONAL DISTRIBUTION CENTERS IN NORTH DAKOTA, 1979<sup>1</sup>

City	Industrial and Wholesale Shippers				
	Total Population <sup>2</sup> Universe		Shippers Participating <sup>3</sup>		Percent of Population Universe Sampled
	N	%	N	%	%
Bismarck	172	20	124	23	72
Fargo	390	45	174	33	45
Grand Forks	150	18	100	19	67
Minot	149	17	130	25	87
TOTAL	861	100	528	100	61

<sup>1</sup>Four regional cities include Fargo, Grand Forks, Bismarck, and Minot, North Dakota.

<sup>2</sup>Statistics furnished by the North Dakota Employment Security Bureau, 1978.

<sup>3</sup>Information was supplied by the local chambers of commerce in each of the selected cities, Directory of North Dakota Manufacturing,<sup>3</sup> and the North Dakota Wholesalers Association.

SOURCE: The Survey of Location Factors, 1979.

either identified as manufacturers in the Directory of North Dakota Manufacturing; or else as wholesalers identified by the local chambers of commerce in each of the four cities, or by the North Dakota Wholesalers Association. Given the information obtained from these sources, it was estimated that 61 percent of the total population could be sampled.

Overall, there were 528 questionnaires mailed to industrial and wholesale shippers located in the selected cities (Table 3).

TABLE 3. MANUFACTURING AND WHOLESALING ESTABLISHMENTS PARTICIPATING IN THE SURVEY OF LOCATION FACTORS IN FOUR REGIONAL DISTRIBUTION CENTERS IN NORTH DAKOTA, 1979.

City	Mailed	Returned	Response Rate	Returned (Adjusted)	Response Rate
	N	N	%	N	%
Bismarck	124	52	41	39	31
Fargo	174	86	30	72	41
Grand Forks	100	45	45	38	38
Minot	130	55	42	33	25
TOTAL	528	238	45	182	34

SOURCE: The Survey of Location Factors, 1979.

A total of 238 questionnaires were returned, yielding a response rate of 45 percent. The majority of the questionnaires (182) were judged to be acceptable and were included in the study. A number of questionnaires (56) were omitted for a lack of complete information. The readjusted response rate was 34 percent.

### Questionnaire Design

The survey sent to wholesalers and manufacturers in each of the four regional distribution centers was patterned after ones used in similar studies. The survey instrument was comprised of three parts: (1) characteristics of the firm; (2) location factors considered in the initial decision of the firm to locate; and (3) location factors which may be currently influencing the decision of the firm to remain in the state.<sup>24</sup>

### Sampling Procedures

Initial telephone interviews were conducted (January, 1979) with each of the firms to explain the nature of the study and to secure the cooperation of management officials.

During the initial telephone interviews, it became apparent that certain problems--inherent in any study involving the use of a questionnaire, would be encountered. First, management officials of the firms participating in the survey were very reluctant to disclose information concerning such areas as employment, sales volume, modes of transportation utilized in procurement and distribution activities, transportation costs, and marketing areas. Second, after assurances that individual returns were to be kept confidential and used in aggregated statistical analyses, most preferred to inspect the questionnaire before agreeing to participate. Third, many of the firms which responded had deleted information in areas where they perceived disclosure would not be in their best interests.

Problems encountered with the second element of the study--the initial decision to locate, were associated with a lack of accurate information. This

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<sup>24</sup>The reader is referred to the following study for an example of a similar type of questionnaire. Maurice J. Zink, "Impact of Rural Industrialization," (Unpublished Master's thesis, North Dakota State University, 1973).

was due to ownership changes in older firms, applicability of the survey, or speculation on the part of respondents.<sup>25</sup>

Shippers participating in the remaining elements of the study indicated that they would be able to give a more complete account of the factors affecting their decision. Management officials of branch plants generally indicated that their responses were speculative to some degree.

### Sample Characteristics

The length of stay within a given community for many firms generally depends upon profitability. Factors which directly or indirectly impact on the ability of the firm to generate a profit over time would be evaluated accordingly. One of the objectives of this element of the study was to gather information regarding the impact that transportation costs have had on shipper location. Other variables were included which were thought to influence a shipper's response to the location factors listed in the survey.

### Factors Affecting Shipper Evaluation

Data collection on variables thought to affect shipper evaluation was limited to (1) scope of operations; (2) type of firm; (3) size of firm; (4) length of stay; and (5) transportation costs.

Scope of Operations. Shippers which elected to participate in the study, in many cases, had indicated that their firm's business operations involved more than just wholesaling or manufacturing (Table 4).

Many industrial shippers (61 percent) had indicated that their scope of operations involved more than just manufacturing. This was also true for wholesalers (40 percent). This finding conforms to Vance's observation that the modern firm tries to combine efforts in one or more marketing channels.<sup>26</sup>

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<sup>25</sup>Ownership changes in many older firms resulted because the original owner retired or sold the business. Other shippers indicated that the nature of their operations did not apply to this situation. Still other shippers--branch plants, indicated that they could only speculate on the nature of the location factors which the parent firm considered.

<sup>26</sup>Vance, James, The Merchant's World, (Englewood Cliffs: Prentice Hall, 1970), p. 7.

TABLE 4. SCOPE OF OPERATIONS OF SHIPPERS PARTICIPATING IN THE SURVEY OF LOCATION FACTORS, 1979.

Type of Shipper	Completing Questionnaire	Response
	Firms	Rate
	<u>N</u>	<u>%</u>
Industrial Shippers		
Manufacturer	39	39
Manufacturer-wholesaler	14	14
Manufacturer-retailer	17	17
Manufacturer-wholesaler-retailer	<u>30</u>	<u>30</u>
TOTAL INDUSTRIAL SHIPPERS	100	100
Wholesale Shippers		
Wholesaler	49	60
Wholesaler-retailer	<u>33</u>	<u>40</u>
TOTAL WHOLESALE SHIPPERS	82	100

SOURCE: The Survey of Location Factors, 1979.

Type of Firm. Management officials of the participating firms had also classified their firms into one of five categories (1) homegrown single firm; (2) branch operation; (3) relocated single firm; (4) homegrown corporate firm; (5) relocated corporate firm.<sup>27</sup> The majority of industrial shippers (63 percent) which participated, are homegrown single firms (Table 5).

Size and Length of Stay of the Firm. Other factors thought to affect shipper evaluation included the size of the firm and the length of stay. For evaluation purposes, two indexes of size were included in the survey; sales volume, and the number of people employed. Tabulation of the returns indicated that plant management disclosed information on the size of the employed labor force more readily than sales volume later (Table 6). A majority of the shippers employ a labor force of up to 20 people (54 percent), a sales volume ranging up to \$2 million dollars (51 percent), and have been located at their present site 20 years or less (63 percent).

<sup>27</sup> Homegrown refers to a firm which originated from within the community.

TABLE 5. INDUSTRIAL AND WHOLESALE SHIPPERS PARTICIPATING IN THE SURVEY OF LOCATION FACTORS CLASSIFIED BY TYPE OF FIRM, 1979.

Type of Shipper	Firms	Response
	Completing Questionnaire	Rate
	<u>N</u>	<u>%</u>
<b>Industrial Shippers</b>		
Homegrown single firm	63	63
Branch operation	19	19
Relocated single firm	4	4
Homegrown corporate firm	--	--
Relocated corporate firm	<u>14</u>	<u>14</u>
TOTAL INDUSTRIAL SHIPPERS	100	100
<b>Wholesale Shippers</b>		
Homegrown single firm	25	30
Branch operation	36	44
Relocated single firm	--	--
Homegrown corporate firm	--	--
Relocated corporate firm	<u>11</u>	<u>26</u>
TOTAL WHOLESALE SHIPPERS	82	100

SOURCE: The Survey of Location Factors, 1979.

Wholesale shippers which participated were either classified as homegrown single firms (30 percent), branch operations (44 percent), or relocated corporate firms (26 percent).

#### The Impact of Transportation Costs

An examination of the procurement and distribution activities of shippers in this study shows that a majority of the firms have placed a heavy reliance on the use of trucking (Table 7). A majority of shippers indicated that common carrier trucking (58 percent) was used in receiving inbound shipments. Shippers also indicated that private trucking (52 percent) was used in the distribution of their products.

Cross-tabulations by type of product received and by type of inbound transport mode shows that durable and nondurable goods were hauled mostly by truck for all shippers on an annual basis (Table 8).



TABLE 6. SIZE AND LENGTH OF STAY OF SHIPPERS PARTICIPATING IN THE SURVEY OF LOCATION FACTORS, 1979

Variables	Completing Questionnaire	Response
	Firms	Rate
	<u>N</u>	<u>%</u>
Size of Labor Force		
1 -- 20 employees	98	54
21 -- 40 employees	33	18
41 -- 60 employees	15	8
61 -- 80 employees	9	5
81 -- 100 employees	8	4
more than 100	<u>18</u>	<u>10</u>
TOTAL SHIPPERS	182	100
Annual Sales Volume		
up to \$500,000	33	20
\$500,001 to \$1,000,000	28	17
\$1,000,001 to \$2,000,000	23	14
\$2,000,001 to \$3,000,000	13	8
\$3,000,001 to \$4,000,000	16	10
\$4,000,001 to \$5,000,000	4	2
\$5,000,001 to \$6,000,000	9	5
\$6,000,001 to \$7,000,000	5	3
\$7,000,001 to \$8,000,000	2	1
more than \$8,000,000	<u>34</u>	<u>20</u>
TOTAL SHIPPERS	167	100
Length of Stay		
1 -- 5 years	44	24
6 -- 10 years	29	16
11 -- 15 years	24	13
16 -- 20 years	17	9
more than 20	<u>68</u>	<u>38</u>
TOTAL SHIPPERS	182	100

SOURCE: The Survey of Location Factors, 1979.

TABLE 7. MODES OF TRANSPORTATION UTILIZED IN THE PROCUREMENT AND DISTRIBUTION ACTIVITIES OF FIRMS PARTICIPATING IN THE SURVEY OF LOCATION FACTORS, 1979.

Transport Mode Used	Firms	Response <sup>1</sup>
	Completing Questionnaire	Rate
	<u>N</u>	<u>%</u>
Inbound Shipments		
Rail	25	14
Air freight	2	1
Supplier trucking	15	9
Own private trucking	26	15
Common carrier trucking	100	58
Contract carrier trucking	<u>6</u>	<u>3</u>
TOTAL SHIPPERS	174	100
Product Distribution		
Rail	5	3
Air freight	--	--
Supplier trucking	8	5
Own private trucking	90	52
Common carrier trucking	62	36
Contract carrier trucking	<u>7</u>	<u>4</u>
TOTAL SHIPPERS	172	100

<sup>1</sup>The above figures reflect a firm's reported usage of a particular mode of transportation for more than 75 percent of all shipments.

SOURCE: The Survey of Location Factors, 1979.

A firm's annual transportation bill generally reflects a composite measure of the costs incurred by the firm in each of the above areas. Shippers in this study were asked to indicate what percentage of their annual gross sales volume was consumed by transportation costs (Table 9).

A general guide used by traffic managers to assess the impact of transportation costs on the firm states that if the total annual transportation bill exceeds more than 5 percent of the total annual sales volume, that firm may soon be forced to examine alternatives to stay competitive. Many of the firms (39 percent) are affected if this is applied to shippers in the study.<sup>28</sup>

<sup>28</sup>Since the completion of the study many shippers have been affected by rapidly rising fuel costs and freight rate increases. What influence this will have on shifts in the utilization of various transportation modes in procurement and distribution activities is unknown.

TABLE 8. MODES OF TRANSPORTATION UTILIZED BY SHIPPERS PARTICIPATING IN THE SURVEY OF LOCATION FACTORS, 1979, WHEN RECEIVING OR DISTRIBUTING PRODUCTS ON AN ANNUAL BASIS

Shipments <sup>1</sup>	Firms Responding <sup>2</sup>		
	Air	Rail	Truck
Inbound			
Durable goods	20	14	149
Nondurable goods	4	19	90
Product Distribution			
Durable goods	--	1	172
Nondurable goods	--	5	114

<sup>1</sup>Specific product groupings for both durable and nondurable goods can be found in Appendix B.

<sup>2</sup>Shippers included in this study typically handle one or more types of durable or nondurable goods. Shippers were categorized by transport mode if it was used in more than 75 percent of all shipments on an annual basis for that particular product.

SOURCE: The Survey of Location Factors, 1979.

This is also typically true for outbound shipments of durable and nondurable goods. Specific product breakdowns by type of transport mode are given in Appendix B.

TABLE 9. RATIO OF ANNUAL SALES VOLUME REPRESENTED BY TRANSPORTATION COSTS FOR INDUSTRIAL AND WHOLESALE SHIPPERS, NORTH DAKOTA, 1979

Transportation Cost Ratio	Number of Firms Responding		Industrial Shippers		Wholesale Shippers	
	N	%	N	%	N	%
0 -- 2 percent	46	28	28	31	18	24
3 -- 5 percent	55	33	31	34	24	32
6 -- 8 percent	26	16	10	11	16	21
9 -- 11 percent	18	11	12	13	6	9
12 percent or more	<u>20</u>	<u>12</u>	<u>10</u>	<u>11</u>	<u>10</u>	<u>14</u>
SHIPPER TOTAL	165	100	91	100	74	100

SOURCE: The Survey of Location Factors, 1979.

## EVALUATION OF FACTORS AFFECTING SHIPPER LOCATION

Limitations imposed upon this study by a restricted data base affected the choice of analyses used to study the nature of the impact that transportation costs and other related location factors have had on shipper location. The statistical analyses used in this study include (1) Chi-Square; (2) Standard t-Test; and (3) Multiple Regression Analysis.<sup>29</sup>

### Chi-Square

The first level of analysis involved the use of the Chi-Square statistic. Chi-Square is frequently used to analyze survey returns where it is more convenient to classify individuals into groups or categories. For example, pretesting of the Survey of Location Factors revealed that many shippers were reluctant to give exact data concerning employment and sales volume. However, they did not hesitate when asked in which one of a number of categories of employment and sales volume they belonged.

Chi-Square can be used to test the "independence" or relatedness between shipper responses to classification variables, and to the selected location factors. Use of the Chi-Square statistic was limited to a determination as to whether shipper characteristics were related to the attitudinal responses of shippers to the selected location factors.

The response categories of the selected location factors were aggregated into two groups, "Considered" or "Not Considered." Other characteristics of the firm were grouped into class variables appropriate for analysis. The above variables were established partially through subjective reasoning and partially by the rules of the Chi-Square statistic. A valid Chi-Square analysis requires that the expected cell frequencies have at least five observations. Class categories of the above variables were aggregated to increase the frequency of observations in cells when Chi-Square tables were found to be invalid because of this requirement. The final variable classification categories are given (Tables 10, and 11).

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<sup>29</sup> Consultation took place with the Statistical Consulting Center, Mathematics Department, North Dakota State University. The statistical procedures were accomplished via the IBM 360 Model 50 computer using the Statistical Analysis System (SAS) Package.

TABLE 10. CLASS CATEGORIES OF LOCATION FACTORS IN CHI-SQUARE TABLES, THE SURVEY OF LOCATION FACTORS, 1979

Location Factors	Classification Category
Private Capital	
Considered	1
Not Considered	0
Public Assistance	
Considered	1
Not Considered	0
Industrial Park Space	
Considered	1
Not Considered	0
Building Space	
Considered	1
Not Considered	0
Taxes	
Considered	1
Not Considered	0
Zoning and Other Legal Factors	
Considered	1
Not Considered	0
Community Attitude	
Considered	1
Not Considered	0
Labor Factors	
Considered	1
Not Considered	0
Transportation Facilities	
Considered	1
Not Considered	0
Inbound Shipping Costs	
Considered	1
Not Considered	0
Transportation Service	
Considered	1
Not Considered	0
Markets and Supply Sources	
Considered	1
Not Considered	0
Community Facilities	
Considered	1
Not Considered	0
Management's Preference	
Considered	1
Not Considered	0
Corporate Directives	
Considered	1
Not Considered	0
Location of Competition	
Considered	1
Not Considered	0
Promotional Efforts	
Considered	1
Not Considered	0

SOURCE: The Survey of Location Factors, 1979.

TABLE 11. CLASS CATEGORIES OF FIRM CHARACTERISTICS USED IN CHI-SQUARE TABLES, THE SURVEY OF LOCATION FACTORS, 1979

Firm Characteristics	Classification <sup>1</sup> Category
Length of Stay	
Up to 20 years	Young
Over 20 years	Old
Size of Firm	
Up to 20 workers	Small
Over 20 workers	Large
Type of Firm	
	Homegrown
	Branch Operation
Scope of Operations	
	Manufacturer
	Wholesaler

SOURCE: The Survey of Location Factors, 1979.

Chi-square tables, computed for location factors considered in both the initial location decision and in the decision to remain, were tabulated with shipper characteristics (Tables 12 and 13).

### Results of the Chi-Square Analysis

The application of the Chi-Square statistic here does not specifically identify the strength of shipper response to location factors, nor does it permit a determination as to why significant differences exist between the nature of the response of shippers classified according to selected characteristics of the firm.<sup>30</sup> However, an examination of the bivariate frequency tables presented suggests possible significant relationships.<sup>31</sup>

<sup>30</sup>Roscoe, John R. Fundamental Research Statistics for the Behavioral Sciences, (New York: Holt, Rinehart, and Winston, Inc., 1969), pp. 196-204.

<sup>31</sup>Statistical analysis centers on hypothesis testing. A hypothesis, in statistical usage, is a mathematical statement which states that there is no relationship between the dependent and independent variables--the null hypothesis. A hypothesis is rejected when the probability that it is a true statement is lower than some predetermined probability. The predetermined probability (usually .01, .05, .10), indicating the degree of risk, is called the level of significance. Rejecting a null hypothesis that is actually true is called a Type I Error. The acceptance of a null hypothesis as true when it is actually false is called a Type II Error. For example, the level of significance of .05 states that the probability of having made a Type I Error is five chances in 100.

TABLE 12. RESULTS OF CHI-SQUARE ANALYSIS OF TABULATION OF LOCATION FACTORS INFLUENCING THE INITIAL LOCATION OF SHIPPERS WITH CHARACTERISTICS OF THE FIRM, THE SURVEY OF LOCATION FACTORS, 1979<sup>1</sup>

Location Factors	Characteristics of the Firm					
	Type of Firm			Scope of Operations		
	Homegrown	Branch Plant	Total	Manufacturer	Wholesaler	Total
<b>Private Capital</b>						
1	60	12	72	41	31	72
0	65	45	110	59	51	110
Total (Chi-Square)	125	57	(.001)	100	82	(.66)
<b>Public Assistance</b>						
1	22	11	33	22	11	33
0	103	46	149	78	71	149
Total (Chi-Square)	125	57	(.78)	100	82	(.13)
<b>Industrial Park Space</b>						
1	87	44	131	72	59	131
0	38	13	51	28	23	51
Total (Chi-Square)	125	57	(.29)	100	82	(.99)
<b>Building Space</b>						
1	33	13	46	29	17	46
0	92	44	136	71	65	136
Total (Chi-Square)	125	77	(.61)	100	82	(.20)
<b>Zoning and Other Legal Factors</b>						
1	42	20	62	37	25	62
0	83	37	120	63	57	120
Total (Chi-Square)	125	57	(.84)	100	82	(.67)
<b>Community Attitude</b>						
1	72	31	103	58	45	103
0	53	26	79	42	37	79
Total (Chi-Square)	125	57	(.68)	100	82	(.67)
<b>Labor Factors</b>						
1	71	41	112	64	48	112
0	54	16	70	36	34	70
Total (Chi-Square)	125	57	(.05)	100	82	(.45)
<b>Transportation Facilities</b>						
1	82	48	130	71	59	130
0	43	9	52	29	23	52
Total (Chi-Square)	125	57	(.05)	100	82	(.89)
<b>Inbound Shipping Costs</b>						
1	56	33	89	58	31	89
0	69	24	93	42	51	93
Total (Chi-Square)	125	57	(.10)	100	82	(.007)
<b>Transportation Service</b>						
1	77	35	112	58	54	112
0	48	22	70	42	28	70
Total (Chi-Square)	125	57	(.05)	100	82	(.28)
<b>Markets and Supply Sources</b>						
1	82	43	131	69	62	131
0	43	8	51	31	20	51
Total (Chi-Square)	131	51	(.005)	100	82	(.32)
<b>Community Facilities</b>						
1	55	23	78	49	29	78
0	70	34	104	51	53	104
Total (Chi-Square)	125	57	(.10)	100	82	(.06)
<b>Management's Preference</b>						
1	81	27	108	58	50	108
0	44	30	74	42	32	74
Total (Chi-Square)	125	57	(.03)	100	82	(.68)
<b>Corporate Directives</b>						
1	19	29	48	26	22	48
0	106	28	134	74	60	134
Total (Chi-Square)	125	57	(.0001)	100	82	(.90)
<b>Location of Competition</b>						
1	63	31	94	46	48	94
0	62	26	88	54	34	88
Total (Chi-Square)	125	57	(.62)	100	82	(.09)
<b>Promotional Efforts</b>						
1	29	17	46	32	14	46
0	96	40	136	68	68	136
Total (Chi-Square)	125	57	(.34)	100	82	(.02)

<sup>1</sup>Tables are observed frequencies. The level of significance of the Chi-Square statistic is given in ( ) in the Total Column.

TABLE 13. RESULTS OF CHI-SQUARE ANALYSIS OF TABULATION OF LOCATION FACTORS INFLUENCING THE DECISION OF SHIPPERS TO REMAIN WITH CHARACTERISTICS OF THE FIRM, THE SURVEY OF LOCATION FACTORS, 1979\*

Location Factors	Characteristics of the Firm												
	Length of Stay			Type of Firm			Size of Firm			Scope of Operations			
	Young	Old	Total	Homegrown	Branch	Plant	Total	Small	Large	Total	Manufacturer	Wholesaler	Total
Private Capital													
1	20	55	75	65	10	75	37	38	75	42	33	75	
0	24	83	107	60	47	107	61	46	107	58	49	107	
Total (Chi-Square)	44	138	(.51)	125	57	(.0001)	98	84	(.31)	100	82	(.81)	
Public Assistance													
1	9	24	33	28	3	33	20	13	33	22	11	33	
0	34	114	149	97	52	149	78	71	149	78	71	149	
Total (Chi-Square)	44	138	(.65)	125	57	(.03)	98	84	(.39)	100	82	(.14)	
Industrial Park Space													
1	13	30	43	32	11	43	18	25	43	25	18	43	
0	31	108	139	93	46	139	80	59	139	75	64	139	
Total (Chi-Square)	44	138	(.29)	125	57	(.35)	98	84	(.07)	100	82	(.63)	
Building Space													
1	31	96	127	93	34	127	66	61	127	68	59	127	
0	13	42	55	32	23	55	32	23	55	32	23	55	
Total (Chi-Square)	44	138	(.91)	125	57	(.04)	98	84	(.44)	100	82	(.56)	
Taxes													
1	24	78	102	75	27	102	48	54	102	57	45	102	
0	20	60	80	50	30	80	50	30	80	43	37	80	
Total (Chi-Square)	44	138	(.82)	125	57	(.11)	98	84	(.04)	100	82	(.77)	
Zoning and Other Legal Factors													
1	14	53	67	49	18	67	33	34	67	41	26	67	
0	30	85	115	76	39	115	65	50	115	59	56	115	
Total (Chi-Square)	44	138	(.43)	125	57	(.32)	98	84	(.34)	100	82	(.20)	
Community Attitude													
1	26	77	103	79	24	103	52	51	103	61	42	103	
0	18	61	79	46	33	79	46	33	79	39	40	79	
Total (Chi-Square)	44	138	(.30)	125	57	(.01)	98	84	(.30)	100	82	(.19)	
Labor Factors													
1	29	88	117	80	37	117	55	62	117	65	52	117	
0	15	50	65	45	20	65	43	22	65	35	30	65	
Total (Chi-Square)	44	138	(.80)	125	57	(.91)	98	84	(.01)	100	82	(.82)	
Transportation Facilities													
1	30	101	131	90	41	131	65	66	131	69	62	131	
0	14	37	51	35	16	51	33	18	51	31	20	51	
Total (Chi-Square)	44	138	(.52)	125	57	(.99)	98	84	(.07)	100	82	(.32)	
Distribution Costs													
1	24	75	99	64	35	99	46	53	99	54	45	99	
0	20	63	83	61	22	83	52	31	83	46	37	83	
Total (Chi-Square)	44	138	(.98)	125	57	(.20)	98	84	(.03)	100	82	(.91)	

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TABLE 13. RESULTS OF CHI-SQUARE ANALYSIS OF TABULATION OF LOCATION FACTORS INFLUENCING THE DECISION OF SHIPPERS TO REMAIN WITH CHARACTERISTICS OF THE FIRM, THE SURVEY OF LOCATION FACTORS, 1979<sup>1</sup> (CONTINUED)

Location Factors	Characteristics of the Firm											
	Length of Stay			Type of Firm			Size of Firm			Scope of Operations		
	Young	Old	Total	Homegrown	Branch Plant	Total	Small	Large	Total	Manufacturer	Wholesaler	Total
Inbound Shipping Costs												
1	23	71	94	62	32	94	43	51	94	55	39	94
0	21	67	88	63	25	88	55	33	88	45	43	88
Total (Chi-Square)	44	138	(.92)	125	57	(.41)	98	84	(.02)	100	82	(.32)
Transportation Service												
1	25	95	120	83	37	120	63	57	120	63	57	120
0	19	43	62	42	20	62	35	27	62	37	25	62
Total (Chi-Square)	44	138	(.14)	125	57	(.84)	98	84	(.61)	100	82	(.36)
Markets and Supply Sources												
1	29	101	130	90	40	130	68	62	130	72	58	130
0	15	37	52	35	17	52	30	22	52	28	24	52
Total (Chi-Square)	44	138	(.35)	125	57	(.80)	98	84	(.51)	100	82	(.85)
Community Facilities												
1	19	64	83	67	16	83	44	39	83	47	36	83
0	25	74	99	58	41	99	54	45	99	53	46	99
Total (Chi-Square)	44	138	(.71)	125	57	(.01)	98	84	(.84)	100	82	(.68)
Management's Preference												
1	29	82	111	86	25	111	62	49	111	65	46	111
0	15	56	71	39	32	71	36	35	71	35	36	71
Total (Chi-Square)	44	138	(.44)	125	57	(.001)	98	84	(.50)	100	82	(.22)
Corporate Directives												
1	10	35	45	19	26	45	22	23	45	24	21	45
0	34	102	137	106	31	137	76	61	137	76	61	137
Total (Chi-Square)	44	138	(.72)	125	52	(.01)	98	84	(.44)	100	82	(.80)
Location of Competition												
1	21	77	98	70	28	98	49	49	98	45	53	98
0	23	61	84	55	29	84	49	35	84	55	29	84
Total (Chi-Square)	44	138	(.35)	125	57	(.01)	98	84	(.26)	100	82	(.01)
Promotional Efforts												
1	9	31	40	30	10	40	23	17	40	21	19	40
0	35	107	142	95	47	142	75	67	142	79	63	142
Total (Chi-Square)	44	138	(.78)	125	57	(.33)	98	84	(.60)	100	82	(.72)

<sup>1</sup>Tables are observed frequencies. The level of significance of the Chi-Square statistic is given in ( ) in the Total column.

SOURCE: The Survey of Location Factors, 1979.

Results from the Chi-Square analysis of location factors influencing the initial location of shippers shows that significant relationships exist between (1) transportation facilities and the type of firm ( $p = .009$ ); (2) inbound transportation costs and the scope of operations of the firm ( $p = .007$ ); and (3) markets and supply sources with the type of firm ( $p = .005$ ).

Results from the Chi-Square analysis of location factors influencing the decision of shippers to remain shows that significant relationships were found to exist between (1) distribution costs and the size of the firm ( $p = .03$ ); (2) inbound shipping costs with the size of the firm ( $p = .02$ ); and (3) location of the competition with the type of firm ( $p = .008$ ).

#### Standard t-Test

The second level of analysis utilized in the Survey of Location Factors, examined attitudinal responses of shippers. One form of the Standard t-Test--the one sample case was used to determine whether the actual shipper response to each of the selected location factors was significantly different from that of a hypothetical indifferent response (3.00). Another form--the two sample case, was used to test for significant differences between groups of shippers.<sup>32</sup> Differences found under the one and two sample cases which exceeded a predetermined probability (.10) were considered significant.

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<sup>32</sup>Significant findings under the one sample case indicate that the mean response of shippers to selected location factors are different from the neutral response. The location factors were then ranked according to the intensity of the overall mean response for that group of shippers. A mean value above 3.00 indicates a higher intensity of positive responses as to the influence of a particular location factor, while values below 3.00 indicate the intensity of negative responses. As the mean values approach 5.00, the positive influence of a location factor increases. Conversely, as the values approach 1.00, the negative influence a location factor has upon the location decisions of shippers increases. Significant findings under the two sample case indicate that the difference between the groups of shippers under consideration is significant with respect to that location factor. The probability level chosen here to test for significance was low. This was due because of the exploratory nature of the study.

### Results Of The t-Test Analysis on Initial Shipper Location

The findings with respect to this study indicate that transportation related location factors were generally perceived to have had a slight positive influence on initial shipper location (Table 14).

When management officials from branch plants--located in the four cities selected for this study were asked to indicate what location factors (if any) may have influenced the decision of the parent firm in the initial location decision of the branch plant, the following location factors were considered most often:

- transportation facilities
- markets and supply sources
- building space
- location of competition
- transportation service.

The higher rankings generally given by branch plants to transportation facilities and to the quality and frequency of transportation service appears to conform to a trend which has gradually developed among commercial firms. A study of plant location factors by Thompson shows:<sup>33</sup>

...that of all location factors, transportation has increased most in importance in recent years. At the same time, firms are tending to place increased emphasis on the service aspect of transportation.

In a more recent commentary on the role of transportation and initial site selection, Fernstrom notes:<sup>34</sup>

The high quality and dependability of transportation service are sometimes of greater importance in the location of a plant than the achievement of the lowest possible transportation costs. In many cases, the location of plants is conditioned upon the availability of regular shipments within certain time limits.

The factors influencing the initial location decision of homegrown firms generally revolves around a combination of personal considerations and community controlled cost factors.

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<sup>33</sup>Thompson, J. H. Methods of Plant Site Selection Available to Small Manufacturing Firms, Small Business Management Research Reports, (Morgantown: West Virginia University, 1961), p. 28.

<sup>34</sup>Fernstrom, John R. Bringing in the Sheaves, (Oregon: Oregon State University Extension Service, 1974) p. 41.

TABLE 14. RANKING OF LOCATION FACTORS INFLUENCING THE DECISION OF SHIPPERS TO LOCATE ACCORDING TO MEAN RESPONSE BY MAJOR SAMPLE CATEGORIES, THE SURVEY OF LOCATION FACTORS, 1979<sup>1</sup>

Location Factors	Scope of Operations by Type of Shipper <sup>2</sup>							
	Manufacturers				Wholesalers			
	Branch Plant		Homegrown		Branch Plant		Homegrown	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Private Capital	3.45*	11	3.65*	6	3.20*	13	3.80*	7
Public Assistance	3.40*	12	3.17*	13	3.05	15	3.17*	14
Building Space	4.35*	1	4.01*	1	4.11*	2	4.11*	2
Industrial Park Space	3.15	13	3.34*	10	3.24*	11	3.33*	11
Taxes	4.20*	3	3.30*	11	3.27*	10	3.60*	9
Zoning & Other Legal Factors	3.50*	10	3.37*	9	3.22*	12	3.40*	10
Community Attitude	4.25*	2	3.83*	3	3.50*	8	4.00*	4
Labor Factors	4.05*	4	3.76*	4	3.68*	6	3.66*	8
Transportation Facilities	4.35*	1	3.91*	2	4.32*	1	4.04*	3
Inbound Shipping Costs	3.75*	8	3.23*	12	3.57*	7	3.30*	12
Transportation Service	3.70*	9	3.63*	7	3.89*	3	3.88*	6
Markets & Supply Sources	4.00*	5	3.67*	5	4.32*	1	4.00*	4
Community Facilities	3.70*	9	3.63*	7	3.37*	9	3.60*	9
Management's Preference	3.50*	10	3.91*	2	3.70*	5	4.40*	1
Corporate Directives	3.95*	6	3.14	15	3.76*	4	3.18*	13
Location of Competition	3.80*	7	3.56*	8	3.89*	3	3.96*	5
Promotional Efforts	3.70*	9	3.15	14	3.16	14	3.16	15

<sup>1</sup>A mean value above 3.0 indicates a higher intensity of positive responses as to the influence of a particular location factor, while values below 3.0 indicate the intensity of negative responses. Asterisks (\*) indicate mean values significantly different than 3.0. As the mean values approach 5.0, the positive influence of a location factor increases. Conversely, as the values approach 1.0, the negative influence of a location factor upon the initial choice of shipper location increases.

<sup>2</sup>The intensity of the average mean response served as the basis for the ranking of location factors.

SOURCE: The Survey of Location Factors, 1979.

Building space and management's personal preference--the highest ranked location factors, appeared to be especially important. Many older established firms in the survey indicated that either change of ownership or the option to buy into an already established business were important. Other firms which started out on a small scale with limited resources have limited choice in the matter of location. Location factors such as:

- transportation facilities
- building space
- community attitude
- private capital

were considered. Development of this type according to Mueller and Morgan is strongly related to chance.<sup>35</sup> Yet communities which are in a position to help support such an activity, can and often do attract new firms.

One transportation element which homegrown firms could be especially sensitive to lies in the area of transportation costs. The small firm is placed in a captive position, unlike branch plants, which usually have access to greater resources, and consequently greater location flexibility. This location decision, because it partially reflects a position of limited financial capability, forces the owner to rely on an established transportation network and system of for-hire transportation. The shipper is placed at a disadvantage--unknowingly or not. This also serves as one possible explanation for the low rating given to inbound shipping costs and to the quality and frequency of transportation service, by this sample group.

Another element of this study focused on differences between the mean response of branch plants and homegrown firms for the two major sample categories (Table 15). Significant factors which were perceived by industrial managers to have had a greater influence on their initial location decision included:

- taxes
- community attitude
- transportation facilities
- inbound shipping costs
- corporate directives
- promotional efforts.

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<sup>35</sup>Mueller, E. and J. N. Morgan. "Location Decisions of Manufacturers," Locational Analysis for Manufacturers, eds. Gerald J. Karaska, David F. Bramhall, (Cambridge: M.I.T. Press, 1969), p. 429.

TABLE 15. RESULTS OF t-TEST ANALYSIS OF MEAN RESPONSES OF SHIPPERS TO LOCATION FACTORS INFLUENCING THE DECISION OF SHIPPERS TO LOCATE, THE SURVEY OF LOCATION FACTORS, 1979.

Location Factors	Scope of Operations by Type of Shipper <sup>1</sup>					
	Manufacturers			Wholesalers		
	Branch Plant	Homegrown	P	Branch Plant	Homegrown	P
Private Capital	3.45	3.65	.38	3.20	3.80	.0001*
Public Assistance	3.40	3.17	.22	3.05	3.17	.24*
Building Space	4.35	4.01	.09	4.11	4.11	.98
Industrial Park Space	3.15	3.34	.33	3.24	3.33	.51
Taxes	4.20	3.30	.0001	3.27	3.60	.059*
Zoning & Other Legal Factors	3.50	3.37	.52	3.22	3.40	.14
Community Attitude	4.25	3.83	.06	3.50	4.00	.008
Labor Factors	4.05	3.76	.17	3.68	3.66	.96
Transportation Facilities	4.35	3.91	.045	4.32	4.04	.14
Inbound Shipping Costs	3.75	3.23	.039	3.57	3.30	.20
Transportation Service	3.70	3.63	.75	3.89	3.88	.99
Markets & Supply Sources	4.00	3.67	.27	4.32	4.00	.13
Community Facilities	3.70	3.63	.73	3.37	3.60	.18
Management's Preference	3.50	3.91	.73	3.37	3.60	.18
Corporate Directives	3.95	3.14	.0008*	3.76	3.18	.001*
Location of Competition	3.80	3.56	.27	3.89	3.96	.76
Promotional Efforts	3.70	3.15	.007	3.16	3.16	.95*

<sup>1</sup>P refers to the probability that the calculated value of the mean difference is greater than the tabled value. Asterisks (\*) denotes t-test for unequal variances was used.

SOURCE: The Survey of Location Factors, 1979.

### Results of the t-Test Analysis on the Decision of Shippers to Remain

Management officials in this element of the study were asked to evaluate a list of 18 location factors and to indicate the degree of influence (if any) each factor had on their firm's decision to stay. The decision of many firms to remain at their present sites were based on a number of considerations (Table 16).

The ranking of location factors influencing the decision of homegrown firms in both sample groups to remain shows that the following factors were considered:

- industrial park space
- management's preference
- community attitude
- transportation facilities
- transportation service
- markets and supply sources.

One possible explanation for the high rankings given to the availability of industrial park space and transportation facilities revolves around plans for future expansion. Success and growth to many smaller firms is often eventually translated into greater capacity. Capital decisions are made regarding the expansion of facilities for the production and/or storage for the procurement and distribution of goods. However, accessibility could become an issue. The smaller plant could simply add to existing facilities on site. Site access to adequate transportation facilities to enable the firm to carry out expanded procurement and distribution functions would, however, be essential. Inadequate accessibility may cause the firm to relocate.

Management's preference also appeared to play a role in the decision of homegrown firms to stay. Many established firms had felt that their presence within the community represented a social investment--a feeling of responsibility to the community. The community had to be able to compete with other commercial areas if it was to grow.

The high value placed on community attitude was also very important. Many homegrown firms in the survey appeared to judge a community's attitude on the basis on its willingness to provide adequate industrial park space.

Transportation also played a part in the decision of homegrown firms to stay. Management officials indicated the importance of transportation costs and service to the growth of the firm. Many firms with an interstate market area felt that the impact of rising freight rates will soon make the feasibility of distributing products from one location questionable.

TABLE 16. RANKING OF LOCATION FACTORS INFLUENCING THE DECISION OF SHIPPERS TO REMAIN ACCORDING TO MEAN RESPONSE BY MAJOR SAMPLE CATEGORIES, THE SURVEY OF LOCATION FACTORS, 1979<sup>1</sup>

Location Factors	Scope of Operations by Type of Shipper <sup>2</sup>							
	Manufacturers				Wholesalers			
	Branch Plant		Homegrown		Branch Plant		Homegrown	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Private Capital	3.05	13	3.50*	8	3.24*	13	3.87*	6
Public Assistance	3.05	13	3.17	16	3.05	17	3.24*	13
Building Space	3.05	13	3.27*	14	3.27*	12	3.31*	12
Industrial Park Space	3.75*	2	4.14*	1	3.97*	3	4.36*	1
Taxes	3.15	11	3.43*	12	3.38*	10	3.60*	9
Zoning & Other Legal Factors	3.10	12	3.50*	11	3.20*	15	3.40*	10
Community Attitude	3.85*	1	3.98*	4	3.41*	9	4.07*	3
Labor Factors	3.70*	4	3.76*	7	3.78*	6	3.87*	6
Transportation Facilities	3.75*	2	4.01*	3	4.08*	2	4.07*	3
Distribution Costs	3.25*	10	3.55*	10	3.67*	7	3.33*	11
Inbound Shipping Costs	3.55*	6	3.38*	13	3.37*	11	3.17	14
Transportation Service	3.45*	8	3.81*	6	3.89*	4	3.84*	7
Markets & Supply Sources	3.85*	1	3.90*	5	4.13*	1	3.80*	8
Community Facilities	3.73*	3	3.50*	11	3.23*	14	3.90*	5
Management's Preference	3.50*	7	4.10*	2	3.60*	8	4.20*	2
Corporate Directives	3.65*	5	3.20*	15	3.78*	6	3.07	15
Location of Competition	3.50*	7	3.58*	9	3.84*	5	3.96*	4
Promotional Efforts	3.35*	9	3.14*	17	3.08	16	3.31*	12

<sup>1</sup>A mean value above 3.0 indicates a higher intensity of positive responses as to the influence of a particular location factor, while values below 3.0 indicate the intensity of negative responses. Asterisks(\*) indicate mean values significantly different than 3.0. As the mean values approach 5.0, the positive influence of a location factor increases. Conversely, as the values approach 1.0, the negative influence of a location factor upon the decision of shippers to remain increases.

<sup>2</sup>The intensity of the average mean response served as the basis for the ranking of location factors.

SOURCE: The Survey of Location Factors, 1979.



The decision of many branch plants (industrial and wholesale) to stay in a particular location appears to reflect a sensitivity to those location factors which affect profit. Factors under community control such as industrial park space does play a role in keeping industry. However, changes in site advantages and location factors outside community control can also affect industrial location.

The present location for some branch plants reflects the influence of proximity to markets and supply sources. This location also reflects the influence of another factor (considered outside community control) the frequency and cost of transportation service as provided by common carriers.

A location which loses its particular advantages--affecting the profits or costs of the firm, causes the firm to find some acceptable solution. Changes in both transportation service and costs--advantages associated with a particular location, are forcing some branch plants located in the regional distribution centers to switch to different forms of trucking in order to stay competitive.

The examination of differences between the mean response of branch plants and homegrown firms were also conducted for the two main sample groups (Table 17). Significant factors which were perceived by homegrown manufacturers to have had a greater influence in their decision to stay included:

- industrial park space
- zoning and other legal factors
- management's preference.

Significant factors which were perceived by homegrown wholesale firms to have had a greater influence on their decision to stay included:

- industrial park space
- community attitude
- community facilities
- management's preference.

### Multiple Regression Analysis

The near neutral response generally given to the perceived impact of various transportation-related location factors on the decision of shippers to remain, suggests the possibility that the general level of transportation costs has not yet reached a point to where it has an adverse impact on product demand and ultimately shipper profits, employment, and attitudes.

TABLE 17. RESULTS OF t-TEST ANALYSIS OF MEAN RESPONSES OF SHIPPERS TO LOCATION FACTORS INFLUENCING THE DECISION OF SHIPPERS TO REMAIN, THE SURVEY OF LOCATION FACTORS, 1979

Location Factors	Scope of Operations by Type of Shipper <sup>1</sup>					
	Manufacturers			Wholesalers		
	Branch Plant	Homegrown	P	Branch Plant	Homegrown	P
Private Capital	3.05	3.66	.002*	3.24	3.87	.0003*
Public Assistance	3.05	3.17	.33*	3.05	3.24	.07*
Building Space	3.05	3.27	.23	3.27	3.31	.78
Industrial Park Space	3.75	4.14	.0997	3.97	4.36	.075
Taxes	3.15	3.43	.32	3.38	3.60	.25
Zoning & Other Legal Factors	3.10	3.50	.06	3.20	3.40	.38*
Community Attitude	3.85	3.98	.56	3.41	4.07	.001
Labor Factors	3.70	3.76	.78	3.78	3.87	.67
Transportation Facilities	3.75	4.01	.23	4.08	4.07	.95
Distribution Costs	3.25	3.55	.20	3.67	3.33	.13
Inbound Shipping Costs	3.55	3.38	.48	3.37	3.17	.34
Transportation Service	3.45	3.81	.14	3.89	3.84	.83
Markets & Supply Sources	3.85	3.90	.85	4.13	3.80	.16
Community Facilities	3.73	3.50	.26	3.23	3.90	.001
Management's Preference	3.50	4.10	.01	3.60	4.20	.004
Corporate Directives	3.65	3.20	.021*	3.78	3.07	.0001*
Location of Competition	3.50	3.58	.74	3.84	3.96	.55
Promotional Efforts	3.35	3.14	.21	3.08	3.31	.11*

<sup>1</sup>P refers to the probability that the calculated value of the mean difference is greater than the tabled value. Asterisks (\*) denotes t-test for unequal variances was used.

SOURCE: The Survey of Location Factors, 1979.

The objective of the multiple regression analysis was to determine the relationship between the employment of shippers and the transportation cost ratio accounting for the effects of age and sales volume of the firm. It is believed that the level of a shippers annual transportation bill affects the supply of capital needed for modernization and expansion. Employment is regarded here as a "barometer" of shipper attitudes. Location factors which adversely impact on needed capital, will be evaluated accordingly.

Use of the multiple regression technique permits the researcher to separate the total explainable variation of the dependent variable, employment, into components attributable to the independent variables of sales, age, and transportation costs. The procedure yielded an equation that included the effect of those independent variables found to be significant.

#### SAS Regression Procedure

A stepwise regression technique of the SAS program was used for the regression analysis.<sup>36</sup> This algorithm finds the "best" one-variable equation producing the highest R-Square statistic.<sup>37</sup> Then a second variable is entered into the equation, one from among all of the remaining candidate variables which yields the greatest increase in R-Square. The algorithm eventually determines a "best" equation by adding variables sequentially until a step is reached where the addition of any further variables will not significantly improve the R-Square of the equation. In this manner, the "best" equation is found.

The ordinary least squares model was:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + E$$

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<sup>36</sup>Regression analysis yields a predicting or estimating equation such that it best fits the data in such a way as to closely approximate the true (but unknown) relationship between the dependent and independent variable. The stepwise procedure was taken from A. J. Barr and others, A User's Guide to SAS, (Raleigh: SAS Institute Inc., 1976), p. 251.

<sup>37</sup>R-Square is an estimate of the percent of variation in a dependent variable "explained" by the regression. It can be used as a criterion for deciding which of a series of regression is best. SAS has a procedure stepwise maximum R-Square improvement option which looks for the "best" multiple variable equation producing the highest R-Square statistic.

where:  $Y$  = employment of the firm  
 $X_1$  = the number of years a shipper has been located at his present site  
 $X_2$  = the annual sales volume of the shipper  
 $X_3$  = the transportation cost ratio  
 $E$  = an error term which includes the variation in the dependent variable not attributable to the variables included in the model

The hypothesis that there was no relationship (that is  $b_1 = b_2 = b_3 = \dots b_n = 0$ ) was tested by the "F" test.

### Results of the Regression Analysis

Four separate "best" equations were determined by regression, one for each group of industrial and wholesale shippers cross-tabulated with the type of firm. Variables in the models significantly contributed to the R-Square statistic (Table 18). The R-Square is computed by dividing the sum of squares due to, or explained by regression, by the total variation of  $Y$ , the sum of squares about the mean, before accounting for the effect of the variable  $X$ .<sup>38</sup> Dividing the mean square due to regression by the mean square due to error yields the  $F$  value.<sup>39</sup> The "probability greater than  $F$ " indicates the significance level of the  $F$  value for the regression equation.<sup>40</sup> As other variables are added to the equation, a partial  $F$  test is used to assess whether the addition, given other variables in the model, significantly contributes to the overall model.<sup>41</sup>

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<sup>38</sup>Kleinbaum, D. G. and Lawrence L. Kupper. Applied Regression Analysis and Other Multi-variable Methods, (North Scituate: Duxbury Press, 1978), pp. 188-189, 420-422.

<sup>39</sup>The sum of squares is the sum of the squared deviations of the observed values from the mean. Mean square is found by dividing the sum of squares by the associated degrees of freedom. The overall sum of squares is the portion of the sum of squares for the regression that is attributable when all factors or variables are considered together is the regression. The partial sum of squares (used in the partial  $F$  test) is the portion of the sum of squares for the regression that is attributable to that variable controlling for other variables already in the model.

<sup>40</sup>The overall  $F$  test is used to determine whether or not all of  $n$  independent variables taken together significantly contribute to the estimation of the dependent variable.

<sup>41</sup>The partial  $F$  test is defined to be the difference between the sum of squares of all variables in the model and the sum of squares of all variables except the test variable. The partial sum of squares is then divided by the mean square residual of all variables in the model.

TABLE 18. RESULTS OF REGRESSION OF AGE, SALES, AND TRANSPORTATION COSTS ON THE EMPLOYMENT OF SHIPPERS, THE SURVEY OF LOCATION FACTORS, 1979

Items	Scope of Operations by Type of Shipper <sup>1</sup>			
	Manufacturers		Wholesalers	
	Branch Plant	Homegrown	Branch Plant	Homegrown
R-Square	.48 <sup>2</sup>	.79 <sup>2</sup>	.46 <sup>2</sup>	.55 <sup>2</sup>
N	19	76	37	43
Intercept	100	81	-37	-49
Age	--	--	--	11 <sup>3</sup>
Sales Volume	\$2,600,000 <sup>2</sup>	\$3,800,000 <sup>2</sup>	\$2,900,000 <sup>2</sup>	\$1,800,000 <sup>2</sup>
Transportation Costs	--	--	--	--

<sup>1</sup>Only significant variables were included in the stepwise regression equations for wholesale and industrial shippers.

<sup>2</sup>Significant at 1 percent level.

<sup>3</sup>Significant at 5 percent level.

SOURCE: The Survey of Location Factors, 1979.

The regression equations generated by the stepwise algorithm shows that transportation costs did not have a significant impact on the employment of shippers. The regression equation with the highest R-Square was obtained for homegrown industrial shippers,  $R^2 = .78$ . Independent variables entered into the equation were limited to sales.

A word of caution must be injected at this point. Although the equations determined by regression were significant, the R-Square in most of the equations was low. Other possibilities such as the existence of better explanatory variables which were not measured, or other characteristics difficult to measure, may underlie the cause of the unexplained variation.

### Implications of Statistical Findings

Findings from the Survey of Location Factors revealed that the general level of transportation costs used here was not a significant factor influencing the employment of the surveyed firms. Further, the results from an analysis of the perceived effect that transportation-related location factors have had on the decision of shippers to remain, was also similar.

These statistical findings appear to indicate that the general level of transportation costs have not yet risen to the point where it has a significant impact on demand, which in turn influences shipper employment and attitudes. The tendency of firms today is to add on the increased transportation costs to the final selling price. The willingness of the consumer to absorb the added cost does not affect the net profit margin needed by the firm in order to remain solvent. However, this assumes that the increased transport costs are of the same level elsewhere.

Differences in the final selling price for a given product or service; whether due to lower transport costs or to a minimization of other cost factors, has been shown to affect resultant demand. Given the above situation with respect to developing economic regions, one promotional aid utilized to insure dominance of one region over another, has historically revolved around transportation.<sup>42</sup>

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<sup>42</sup>Sampson, Roy J. and Martin T. Farris. Domestic Transportation (Boston: Houghton Mifflin Co., 1966), pp. 239-260.

Another explanation for the low ratings given by shippers to transportation costs is related to the methodology applied in this study. The regression findings did not consider transportation costs to be a statistically significant factor influencing shipper employment and attitudes. This suggests the possibility that the low ratings may be an artifact of the survey design.

Many smaller homegrown shippers may simply not be aware of transportation rate problems which impact on their competitive ability. The Survey of Location Factors was designed to study perceived shipper attitudes and sought to analyze shipper characteristics thought to influence shipper attitudes. Other methodologies with greater statistical power may be needed to evaluate transportation rate factors which this study did not fully consider.

PUBLIC AND PRIVATE EFFORTS IN THE SETTING AND CHANGING  
OF INTERSTATE FREIGHT RATES IN NORTH DAKOTA

The Rationale and Dilemma of Freight Rate Regulation

Involved in the setting and changing of interstate freight rates, the common carrier, among other things, is legally bound to charge reasonable rates and to avoid discrimination. The common carrier when determining a given rate has traditionally based the rate level on the "value-of-service."<sup>43</sup> That is, freight rates were based on the demand for transportation services rather than the cost to provide such service. As a result this practice has been generally criticized as operating to the disadvantage of society.<sup>44</sup>

The value-of-service rate setting method was a common practice predating the imposition of federal transportation regulations, according to Martin.<sup>45</sup> With the passage of the Act to Regulate Commerce in 1887, the resultant rate structure was essentially frozen into place.

Under the value-of-service pricing system initially adopted, a differential existed between the rates charged to ship agricultural commodities and manufactured goods. Low rates on raw materials shipped east from the Western United States

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<sup>43</sup>Martin, M. V. "Misallocative Effects of Value-of-Service Rail Grain Rates," Transportation Journal, 18; March, 1979, pp. 74-83.

<sup>44</sup>Ibid., p. 75.

<sup>45</sup>Ibid., p. 74.

assisted the development of this region. The high rates on imported manufactured goods encouraged industrial development in the Western region by protecting the infant industries from the larger--more efficient eastern producers.

The dominant issue today facing freight transportation is the extent to which the value-of-service pricing system should be maintained.<sup>46</sup> Circumstances governing the creation of such a system appear to have changed in the wake of competing modes of transportation (Table 19). The U.S. Department of Transportation (DOT) states that the railroads' share of domestic intercity freight movement has declined from 54 percent in 1947, to 34.7 percent in 1970, despite an absolute increase in total ton miles.<sup>47</sup> Comparisons of the percentage annual growth rate (1947-1970) between competing modes of transportation show that the railroad industry had experienced the least amount of growth, .7 percent.

A review of economic studies by Martin, examining the rate regulation of manufactured or finished products, suggests that the value-of-service pricing system has resulted in a misallocation of traffic from rail to truck.<sup>48</sup> Railroads and trucks cannot compete for traffic by cutting rates.<sup>49</sup> Here the railroads are at an advantage. Rather the competition has focused on the service aspect, where trucks have an advantage.

An analysis of national railroad issues in 1975 by the U.S. Congress Office of Technology Assessment, suggests that the railroads have been prevented from engaging in competitive rate making.<sup>50</sup> The result, generally acknowledged, is that trucking--which has higher costs, moves much more freight that could be

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<sup>46</sup>Friedlaender, Ann F. The Dilemma of Freight Transport Regulation, (Washington: The Brookings Institute, 1969), pp. 1-28.

<sup>47</sup>U.S. Department of Transportation, Railroad Abandonment and Alternatives: A Report on Effects Outside the Northeastern Region, (Washington: U.S. Department of Transportation, 1976), p. 10. The result was not necessarily competition but a division of the freight according to each modes capabilities and service factors which was then monopolized within each mode and artificially retained by regulation in the case of motor carriers.

<sup>48</sup>Martin., Op. cit., p. 75.

<sup>49</sup>The reader is referred to a publication by John Hazard, Transportation Management, Economics, Policy, (Cambridge: Cornell Maritime Press, Inc., 1979), p. 135. Here Hazard discusses government findings with regards to marginal cost comparisons between railroad and truck.

<sup>50</sup>U.S. Congress Office of Technology Assessment, A Review of National Railroad Issues, (Washington: U.S. Congress Office of Technology Assessment, 1975).



TABLE 19. DOMESTIC INTERCITY FREIGHT MOVEMENT BY MODE: 1947-1980

Intercity Freight Mode	1947		1970		Percentage Annual Growth Rate 1947-1970	Projected Percentage Annual Growth Rate 1970-1980
	Ton Miles (Billions)	Percent of Total	Ton Miles (Billions)	Percent of Total		
Railroad	664.5	54.0%	773.5	34.7%	0.7%	2.3%
Water	385.0	31.3%	622.2	27.9%	2.1%	2.6%
Pipeline	116.6	9.5%	477.7	21.5%	6.3%	2.5%
For-Hire Trucks	45.1	3.7%	220.1	9.9%	7.1%	4.0%
Private Trucks	19.6	1.6%	130.2	5.9%	8.6%	5.0%
Air Carrier	0.1	--	3.4	0.2%	15.8%	15.2%
TOTAL	1231.1	100.0%	227.1	100.0%	2.6%	2.8%

SOURCE: U.S. Department of Transportation, Railroad Abandonment and Alternatives: A Report on Effects Outside the Northeastern Region, (Washington: U.S. Department of Transportation, 1976,) p. 5.

shipped by rail--which has lower costs.<sup>51</sup> Friedlaender, in 1963, reported that the direct social losses resulting from this misallocation ranged upward up to \$500 million.<sup>52</sup> Harbeson was reported to have estimated the dollar loss resulting from the misallocation to be between \$1.1 and \$2.9 billion, for 1963.<sup>53</sup>

Proponents of the rail industry, by advocating intermodal rate deregulation, appears to have polarized other modes into opposing it--most notably trucking. The position of the trucking industry, according to Harbeson, was that in traffic where intermodal competition exists, rail rates should not be permitted to fall below a level which would enable motor carriers to share in the traffic in question.<sup>54</sup>

Inroads made by other modes of transportation coupled with a changing rural loss and urban gain in population, has been acknowledged to have left an outmoded rail transportation network. This network was essentially designed to serve the transportation needs of earlier years. Subsequently, the railroads which are governed by an outmoded and outdated transportation regulatory framework, argue that excess capacity and an inability to set a competitive freight rate, are the causal factors responsible for the negative financial plight of the industry.

The issue of railroad abandonment and freight rate regulatory reform has been the subject of extensive research and the recipient of legislative reform.

#### Railroad Abandonment Legislation

Railroad abandonment of nonprofitable lines has been facilitated by passages of two legislative acts of Congress. Congress, in 1973, passed the Regional Rail Reorganization Act (3R Act), to deal with unprofitable, light density lines, in the Northeastern U.S. The 3R Act recognized that the public sector had to assume some financial responsibility for uneconomic branchline operation if service was to continue. Thus a temporary subsidization program was initiated.

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<sup>51</sup>Sampson, R. J. and Martin T. Farris. Domestic Transportation, (Boston: Houghton Mifflin Company, 1966), pp. 137-153.

<sup>52</sup>Friedlaender, Op. cit., p. 98.

<sup>53</sup>Martin, Op. cit., p. 75.

<sup>54</sup>Harbeson, R. W. "Recent Trends in the Regulation of Intermodal Rate Competition in Transportation," Land Economics, 3; XLII, p. 315.

Passage of the Railroad Revitalization Regulatory Reform Act (4R Act), in 1976, by Congress, not only extended the idea of government subsidies to the rest of the nation, but also: (1) directed the ICC to develop new regulations concerning railroad abandonment; and (2) required states to develop statewide rail plans in order to establish eligibility for government subsidies.

Section 803 of the 4R Act established a five year national program for federal subsidies for branchline continuance and state rail transportation planning. Eligibility for assistance was contingent upon the state having a designated lead agency. The lead agency would be responsible for planning and implementing the state's rail program. The rail program was to contain the following:

- 1) a general description of rail service in the state
- 2) a description of the planning process
- 3) data collection methodologies
- 4) analytical methodologies
- 5) participatory process
- 6) overall planning for all modes
- 7) information and analysis of already abandoned lines; or potential ones
- 8) selected projects
- 9) special studies where appropriate
- 10) process for continuing planning and plan update.

#### The North Dakota State Rail Plan

The state of North Dakota, in compliance with section 803 of the 4R Act, submitted the North Dakota State Rail Plan on February 20, 1979. The plan was developed under the direction of a State Intermodal Transportation Team (SITT). The designated lead agency was the North Dakota State Planning Department. The plan, subject to the approval of the Federal Railroad Administration, lists a number of priority projects (Appendix C). Rail assistance funds to implement these projects have been allocated.

#### Interstate Freight Rate Regulatory Structure and Reform

Rate regulatory reform has received scant attention until recently. The Interstate Commerce Commission (ICC), is empowered to prescribe a system of rates, one which would enable common carriers to earn a fair profit on their investment.<sup>55</sup> The system of rates should also allow common carriers to maintain their facilities.

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<sup>55</sup>Ovens, E. A. Transportation and Traffic Management, IV, (Chicago: College of Advanced Traffic, 1976), p. 29.

The administrative procedures formulated by the ICC to handle the setting and changing of interstate freight rates have remained relatively unchanged. The standards or tests used by the ICC in their general rate making procedures, to determine the legality of a proposed or established rate have changed.

### The Rate Making Procedure

Contrary to the popular notion that freight rates are fixed or unchangeable; freight rates are arrived at either through the process of negotiation or litigation. It should also be noted that actually, the majority of freight rates are simply set by the carriers themselves, with little negotiation or litigation.

Generally speaking, the common carrier is free to raise or lower his rates. However, interested parties generally have the right to oppose the increase or decrease. They do this by petitioning the ICC to investigate the proposed rate change. If the ICC decides to investigate the new or changed rate, the burden is on the carrier to prove that the proposed rate is lawful.

If a shipper or other interested party believes an existing rate is too high or low he can bring a complaint before the ICC alleging the rate is unlawful. In this situation the burden is on the complaining party to prove that the existing rate is unlawful.

When a shipper is contemplating a rate change, the firm's first step is to make its proposal to the carrier. From there, the carrier will refer it on to the appropriate bureau. The rate bureau is an association of carriers through which a rate proposal is often discussed. The bureau will study the request and docket it for public hearings. The hearings are usually held within 30 to 60 days of the initial filing date. After due consideration of all relevant evidence, the rate bureau can either deny or grant the request.<sup>56</sup>

If the proposal for a rate change is granted, the rate bureau will publish the new tariff which contains the new rate. If there are no protests, the rate automatically becomes effective usually within 30 days. Overall, the entire process (barring any protests before the new rate goes into effect), is completed within 60 to 90 days after the initial application to the carrier.

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<sup>56</sup>Finsness, John. Fargo Chamber of Commerce Traffic Division, personal interview, Fargo, North Dakota, September, 1978.

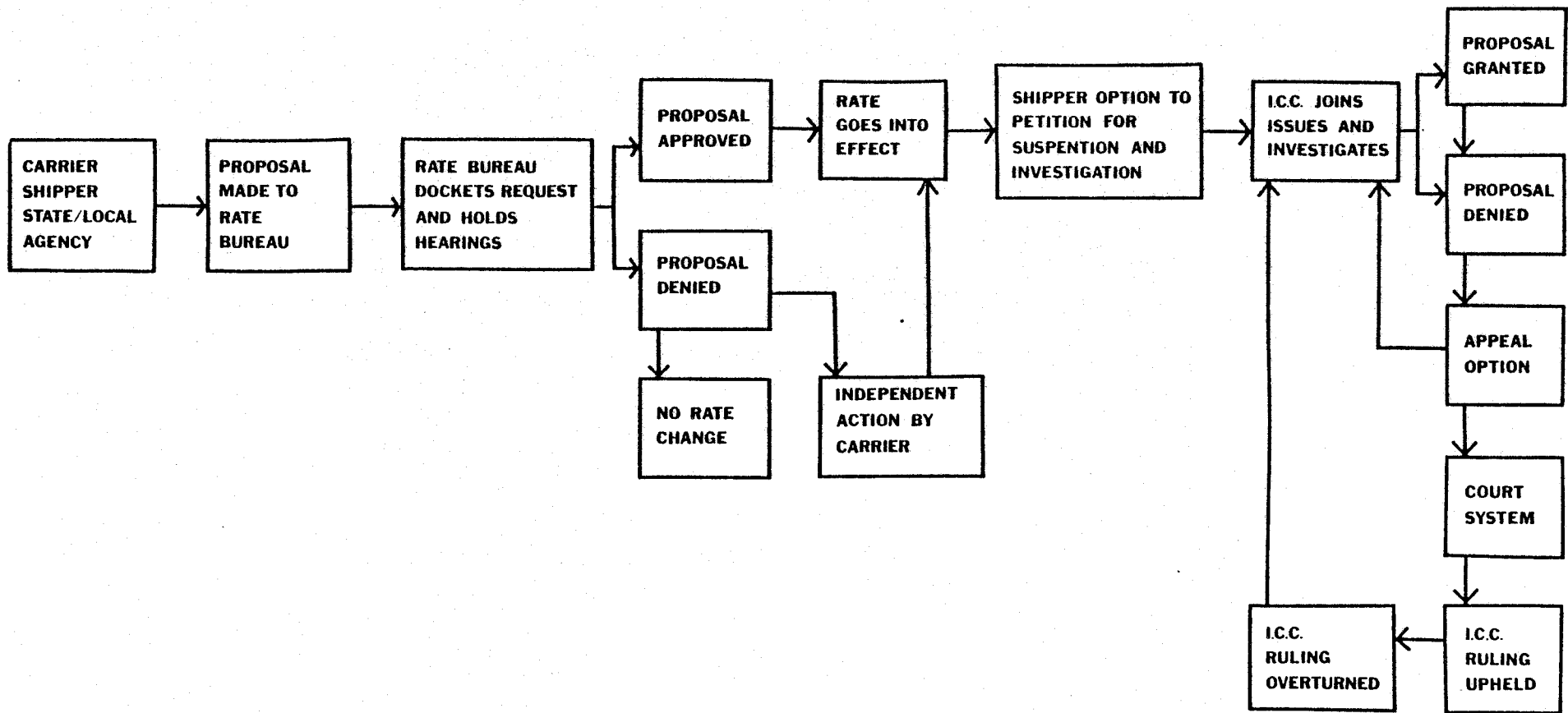


Figure 4: Generalized Flow Chart Illustrating the Interstate Rate-Making Procedure

If the request to modify an existing or newly proposed rate, is denied by the carrier or rate bureau, then the shipper can bring a complaint before the ICC alleging that the existing rates are unlawful and that the rates he proposes are lawful. As noted earlier, the complaining party must prove that the existing rates are unlawful.

If the carrier decides to change a rate, interested parties may protest the change. Again as noted earlier, the carrier then has the burden of providing that the proposed rate will be lawful.

Of the complaint or protest; which is usually filed by an experienced traffic attorney or practitioner, its content questioning the legality of the freight rate, asks the ICC to make a determination as to whether the existing or proposed change is lawful. The most common points raised in a complaint are that the existing rates are unreasonable or discriminatory.<sup>57</sup>

The Act to Regulate Commerce prohibits carriers from charging unreasonable rates. That is, carriers must charge rates, which are neither too high nor too low.

In reaching a determination as to whether a rate is unreasonable, there are a number of factors which the ICC considers. Briefly, they include:<sup>58</sup>

- comparisons between the proposed rate and rates on similar commodities between points in a given geographic area
- cost of service
- carrier earnings
- traffic density
- value of service
- type of commodity
- influence of competition.

The Act to Regulate Commerce also prohibits carriers from charging discriminatory rates. That is, carriers cannot charge one shipper more than another for services under similar conditions. Similarly, carriers are prohibited from the setting and changing of rates such that one locality, region, or territory may have an undue or unreasonable advantage over another.<sup>59</sup>

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<sup>57</sup>Miller, Mike. North Dakota State Wheat Commission, personal interview, October, 1978.

<sup>58</sup>Miller, Mike. "Collected Readings Summer Law Internship U.G.P.T.I. Law Program," 1978) pp. 12-2:12-4. (Mimeographed).

<sup>59</sup>Ovens, op. cit., p. 141.

As was mentioned earlier, the ICC had to adhere to specified conditions when arriving at a determination concerning a filed complaint. According to Ovens, a proceeding before the ICC must:<sup>60</sup>

- have a complaint in writing
- have an answer
- be properly submitted
- be duly heard
- be fully investigated
- be fully reported on by the ICC as to its findings and decision.

If the above procedures are not followed, the findings of the ICC can be successfully challenged in the courts on the grounds of an unlawful procedure.<sup>61</sup>

In a normal procedure, any interested party may file a complaint or protest against existing rates, stating the facts complained of against the carrier. The carrier must then answer the complaint. When the issues have been joined, the ICC is empowered to investigate, and hearings are sometimes scheduled. After the evidence has been presented, the ICC will consider the facts and make known its findings and subsequent actions.

If the affected party (shipper or carrier) faces an adverse decision, the affected party may appeal to the ICC for reconsideration. If the appeal is denied, the case may end up in the courts. The courts may uphold the ICC's decision, or it may be remanded back for further action in line with the court's view of its legality.<sup>62</sup>

The ICC of its own accord may also elect to suspend and/or investigate the legality of a newly proposed rate. If the newly proposed rate is not suspended but rather is allowed to go into effect, it remains in effect if found lawful, but must be cancelled if the ICC rules otherwise.

#### Proposed Rate Regulatory Reform

The Carter Administration, in 1979, outlined its proposed Railroad Deregulation Act.<sup>63</sup> Key provisions which applied to the setting and changing

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<sup>60</sup> Ibid., p. 152

<sup>61</sup> Ibid., p. 153

<sup>62</sup> Sampson and Farris, Op. cit., pp. 168-169.

<sup>63</sup> "Rails Say DOT Bill Is Not Quite The Ticket," Railway Age, April, 1979, pp. 21-22.

of interstate freight rates called for a gradual phasing out of maximum rate regulation by the ICC during a transition period from 1980-1984. Rules governing the minimum rate regulation and the prohibition of rate discrimination would continue. During the transition period, individual rates may be raised with no regulatory investigation or interference, by 7 percent each year. The Act would also take away the authority of the ICC to suspend a rate increase or decrease. Further, the ICC would be empowered to investigate rates only upon request by an injured party. Notice and publication of rate changes would be changed so as to allow rates to be effective immediately upon publication. However, a railroad may not set a rate below a level which covers the cost to provide service.

Public and Private Involvement in North Dakota to  
Influence Interstate Freight Rates

Interviews were conducted with state officials, common carriers, and private shipper groups in North Dakota. The parties interviewed are the principal actors who are frequently involved with the setting and changing of interstate freight rates which affect the state.

Traffic Department of the North Dakota Public Service Commission

The primary work of the Traffic Department of the Public Service Commission (PSC) is with freight rates (rail and highway) and their application on product movement either to, or from within the state. The Traffic Department, acting in an advisory capacity to the PSC, has historically been concerned with monitoring agricultural shipments.<sup>64</sup> Limited time has been devoted to the study of rates applicable to the movement of manufactured or semi-finished goods, and only upon request.

Rate studies conducted by the Traffic Department must address the issue of private want vs public need. Ideally, to balance private wants (a maximum rate of return on investment capital necessary for carriers to attract new investors) against public need (shipper welfare which includes predictable and dependable service at reasonable rates), rate studies must determine that level of rates which is sufficient to attract needed capital, and yet not be unduly excessive to shippers in the state, as a whole.

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<sup>64</sup>Wilner, Frank, Director, Traffic Department, North Dakota Public Service Commission, personal interview, Bismarck, North Dakota, June, 1979. Frank Wilner has since resigned.



### Transportation Division of the Fargo Chamber of Commerce

The Transportation Division of the Fargo Chamber of Commerce, has been actively engaged in seeking equitable interstate and intrastate freight rates for over fifty years. Currently, the Fargo Chamber is the only organized shipper group in the state sponsoring such efforts.<sup>65</sup>

The Transportation Division continually monitors transportation rate matters. During inflationary times, the Transportation Division had adopted a "holding" rule with respect to proposed rate increases. That is, trying to become aware and block a proposed rate increase before it becomes effective, by filing a complaint to the ICC to institute an investigation. In times of recession, the tendency is to monitor rate reductions to other shippers elsewhere, and to determine the applicability of that lowered rate to this area. Applicability of that lowered rate here would then result in the filing of a complaint before the ICC, usually alleging discrimination.<sup>66</sup>

### The Burlington Northern Railroad, Inc.

Railroads serving North Dakota operate over approximately 5122 miles. The Burlington Northern Railroad, Inc., (BN), the largest rail carrier serving the state, operates over 67 percent of this trackage.<sup>67</sup>

The railroads are closely linked with industrial development efforts in North Dakota. Recognizing the state's disadvantage with respect to major markets and centers of population, the railroads in several instances (1959-1966), gave lowered rates to help establish industry.<sup>68</sup> However, the predisposition of the rail carriers towards granting lowered rate reductions to encourage industrial development, appears to be changing.

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<sup>65</sup>During the 1940's, the cities of Grand Forks and Minot also had traffic representatives.

<sup>66</sup>Finsness, John, Fargo Chamber of Commerce Transportation Division, personal interview, Fargo, North Dakota, June, 1979.

<sup>67</sup>Upper Great Plains Transportation Institute, North Dakota State Rail Plan, I, (Fargo: Upper Great Plains Transportation Institute, 1979), p. 26.

<sup>68</sup>Robinson, Elwyn B. History of North Dakota, (Lincoln: University of Nebraska Press, 1966), p. 4.

Railroad officials from the BN now suggest that rates are not the deciding factor for the establishment of industry. Rather, the emphasis is upon quality and frequency of transportation service. The position adopted by the BN with respect to rate negotiations is that a substantial amount of business would have to be secured before rates would be negotiated.<sup>69</sup>

## SUMMARY AND CONCLUSIONS

### Summary

#### The Location Decisions of Shippers

Results from the t-Test analysis of location factors considered by shippers in their initial location decision, suggests that transportation related location factors listed in the questionnaire, were generally perceived to have had a slight positive influence. Wholesale and industrial branch plants, had given higher ratings to transportation facilities, and to the quality and frequency of transportation facilities, than to inbound shipping costs.

Unlike branch plants, which have access to greater resources, and consequently greater location flexibility, some homegrown firms could be placed in a captive position. For smaller firms, the initial location decision reflects a position of limited financial capability. Therefore, the owner is forced to rely on an established system of for-hire transportation. The shipper here is at a disadvantage--unknowingly or not, and serves as one possible explanation for the low ratings given to inbound shipping costs, by this sample group.

Inbound shipping and distribution costs were also perceived by industrial and wholesale shippers to have had a slight positive influence in their decision to remain. The near neutral response, generally given suggested the possibility that the general level of transportation costs, had not yet reached a point to where it has an adverse impact on product demand, and ultimately shipper employment and attitudes. Accounting for the effects of age and sales volume of the firm, multiple regression analysis yielded four equations. Regression equations for branch plants and homegrown firms in each of the two major sample categories, showed a positive

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<sup>69</sup>Hatton, Wayne, Spokesman, Burlington Northern Railroad, Inc., personal interview, Fargo, North Dakota, June, 1979.

relationship between the dependent variable, shipper employment, and the independent variable, sales volume. Age was found to be a significant factor, in addition to sales, for homegrown wholesale shippers. Transportation costs were not found to be significant in any of the equations.

Regarding the first objective of this study, the examination of the survey results suggest that freight rates have had little or no impact on the location decision of shippers. The statistical findings appear to indicate that the general level of transportation costs have not yet risen to the point where it has a significant impact on shipper attitudes, with regards to shipper location.

Another possible explanation with regards to the statistical findings relates to the concept of the captive user or shipper. Federal rural transportation task force hearings define a captive shipper as one who finds it necessary in the absence of carrier competition or protection to pay freight rates over the long term that may be higher than the long term costs to carriers furnishing the service.<sup>70</sup> Long term cost includes a reasonable rate of return on carrier investments.

Forces in the transportation market, resulting from intermodal competition, favor reduced freight rates, in order to serve large shippers. These lower rates, as a rule, are not extended into areas where there is a lack of competition. These captive areas, having no other transportation alternatives, are forced to pay the higher freight rates. Indirectly, the captive areas subsidize the lower rates given to these larger shippers.

North Dakota reflects this captive position with regards to the transportation carriers serving the state. Reaction to these practices at one point led shipper groups in Fargo, Grand Forks, and Minot, North Dakota, to organize and support freight rate monitoring activities. Currently, Fargo is the only center in the state where such activities continue to be supported.

Discussions concerning possible rate reductions to promote economic activity carry little weight with transportation carriers. And under current federal regulatory policies concerning the setting and changing of interstate freight rates, the law virtually demands that a person be injured before that party can petition the ICC for relief. This acts as a deterrent to the attraction of future economic activity, with respect to North Dakota.

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<sup>70</sup>Hearings regarding the formulation of this definition were held by the Federal Rural Transportation Task Force in Fargo, 1979.

### Conclusion

Future studies regarding freight rates and shipper location, need to secure greater cooperation with state and local officials, and with local commercial organizations. State records in North Dakota are kept current with regards to shipper employment and location. Cooperation with local commercial organizations, can be of vital importance in helping to secure the cooperation and trust of the respondents.

The Survey of Location Factors made no distinction as to the different forms of business ownership. Future location decision studies with an attitudinal component utilizing an improved classification scheme, could be further refined through the application of discriminant analysis.

Follow-up location factor studies should also be considered. The information gained would enable community and business leaders to evaluate their competitive position with respect to location factors outside their control. The findings could serve as a guide as to how to best direct subsequent efforts to protect present development and attract new industry.

Pending legislation now before Congress (reintroduction of the Railroad Deregulation Act), if passed; will change the current interstate rate regulatory structure. The Carter Administration's goal appears to be oriented towards the easing of restraints surrounding the transportation market. The impacts of such a move, with respect to captive markets, needs to be further examined.

APPENDIX A

Manufacturing and Wholesale Statistics

For

The Selected Regional Distribution Centers

TABLE A-1: WHOLESALE EMPLOYMENT, PAYROLL, AND SALES STATISTICS FOR FARGO, BISMARCK, MINOT, AND GRAND FORKS, NORTH DAKOTA: 1963-1978

Cities (In Order of 1972 Sales)	Number of Establishments <sup>1</sup>				% Change 1978/1963	Number of Employees <sup>2</sup>				% Change 1977/1963	Annual Payroll (Millions)			Total Receipts (Millions)		
	1963	1967	1972	1978		1963	1967	1972	1977		1963	1967	1972	1963	1967	1972
Fargo	184	182	218	308	67%	2628	3048	2995	4050	54%	\$15.905	\$20.693	\$28.064	\$309.485	\$382.349	\$524.220
Bismarck	72	72	89	127	76%	749	787	979	1310	75%	4.212	4.882	8.836	71.839	87.216	107.951
Minot	70	74	83	103	47%	625	638	910	1130	81%	3.315	3.910	6.245	53.425	51.111	83.862
Grand Forks	57	70	97	107	88%	514	593	843	800	56%	2.363	3.648	6.596	35.347	60.034	74.993
Total Cities	383	398	487	645	68%	4516	5066	5727	7290	61%	25.795	33.133	49.291	469.646	580.710	791.026
Remainder of the State	1652	1597	1948	1664	.7%	5270	5615	8823	11662	73%	23.201	27.970	55.571	750.462	913.945	1431.485
State Total	2035	1995	2382	2309	13%	9786	10681	14550	18962	67%	47.096	63.103	104.862	1220.108	1491.655	2222.511

<sup>1</sup>1978 estimates for the Minot area were based upon 1976 employment survey results, furnished by the North Dakota Employment Security Bureau.

<sup>2</sup>1977 Fargo employment statistics have been adjusted. Original figures supplied by the North Dakota Employment Security Bureau, included the West Fargo Industrial Park and West Fargo.

SOURCE: U.S. Census of Business-Wholesale Trade, North Dakota 1963, 1967, 1972. North Dakota Employment Security Bureau.

TABLE A-2: MANUFACTURING EMPLOYMENT, PAYROLL, AND SALES STATISTICS FOR FARGO, GRAND FORKS, BISMARCK, AND MINOT, NORTH DAKOTA: 1963-1977.

Cities (In Order of 1972 Sales)	Number of Establishments <sup>1</sup>				% Change 1977/1963	Number of Employees <sup>2</sup>				% Change 1977/1963	Value of Shipments (Millions)			Annual Payroll (Millions)		
	1963	1967	1972	1977		1963	1967	1972	1977		1963	1967	1972	1963	1967	1972
Fargo	46	54	58	82	78%	1180	1300	1700	3760	219%	(D)	35.8	73.3	6.05	8.20	14.4
Grand Forks	27	31	30	43	59%	654	800	1400	1450	122%	(D)	38.8	52	3.44	4.70	10.0
Bismarck	22	26	29	45	105%	(D)	(D)	1000	1310	*	(D)	(D)	22.1	(D)	(D)	5.9
Minot	27	27	26	46	70%	479	500	500	790	65%	(D)	10.1	18.5	2.63	2.60	(D)
Total Cities	122	138	143	216	77%	2313	2600	4600	7310	216%	(D)	84.7	165.9	12.12	15.5	30.3
Remainder of the State	337	316	339	346	.3%	4187	4900	5600	7390	89%	(D)	280.7	428	19.31	26.1	17.4
State Total	459	454	482	562	22%	6500	7500	10200	15240	134%	(D)	365.4	593.3	31.43	41.6	47.7

\*The overall percent change figures were for the number of employees, does not reflect the Bismarck labor market.  
(D)--withheld by the U.S. Census to avoid disclosure.

<sup>1</sup>Figures for the Minot area were based upon 1976 employment survey results, furnished by the North Dakota Employment Security Bureau.

<sup>2</sup>1977 Fargo employment figures have been adjusted. Original figures, supplied by the North Dakota Employment Security Bureau, included West Fargo and the West Fargo Industrial Park.

SOURCE: U.S. Census of Manufacturing, North Dakota, 1963, 1967, 1972. North Dakota Employment Security Bureau.

TABLE A-3: WHOLESALE SALES IN FARGO, BISMARCK, MINOT, AND GRAND FORKS, NORTH DAKOTA, CLASSIFIED BY TYPE OF OPERATION: 1963, 1967, 1972.

	Merchant Wholesalers <sup>1</sup>						Other Operating Types <sup>2</sup>					
	Number of Establishments			Total Sales (Millions)			Number of Establishments			Total Sales (Millions)		
	1963	1967	1972	1963	1967	1972	1963	1967	1972	1963	1967	1972
Fargo	133	125	163	\$164.259	\$196.973	\$273.973	51	67	55	\$145.226	\$185.376	\$251.118
Bismarck	52	53	75	(D)	67.225	(D)	20	19	14	(D)	19.961	(D)
Minot	51	55	71	37.949	41.137	(D)	19	19	12	15.476	9.974	(D)
Grand Forks	39	52	87	19.201	(D)	62.386	18	18	10	16.386	(D)	12.607
Total Cities	275	285	396	221.409	305.365	335.488	108	123	91	176.848	215.311	263.725
Remainder of the State	245	276	1475	144.255	170.656	1164.945	1406	1311	420	677.626	800.323	458.353
State Total	521	561	1871	365.634	476.021	1500.433	1514	1434	511	854.474	1015.634	722.078

(D)--withheld by the U.S. Census to avoid disclosure.

<sup>1</sup>1972 wholesale data is not strictly comparable with 1963 and 1967 because of changes in the classification of wholesalers into the above categories.

SOURCE: U.S. Census of Business-Wholesale Trade, North Dakota, 1963, 1967, 1972.



APPENDIX B

Transportation Modes  
Utilized  
In The Procurement and Distribution  
Of Goods

TABLE B-1. MODES OF TRANSPORTATION UTILIZED WHEN RECEIVING INBOUND SHIPMENTS OF RAW MATERIALS OR PRODUCTS BY TYPE OF FIRM AS DETERMINED FROM SURVEYS

Product Classification	All Firms			Established Firms Originating From Within The Present Community			Branch Plant or Branch Operation			Established Firms Relocating to the Present Community		
	Air	Rail	Truck	Air	Rail	Truck	Air	Rail	Truck	Air	Rail	Truck
Motor Vehicles, Automotice Parts and Supplies	--	1	12	--	1	8	--	--	2	--	--	2
Lumber and Other Construction Materials	1	8	24	1	6	19	--	2	5	--	--	--
Sporting, Recreational, Photographic, and Hobby Goods, Toys, and Supplies	--	--	13	--	--	10	--	--	2	--	--	1
Furniture and Home Furnishings	--	1	16	--	1	12	--	--	3	--	--	1
Metals and Minerals	--	1	14	--	1	10	--	--	3	--	--	1
Electrical Goods	--	--	19	--	1	10	--	--	7	--	--	1
Hardware, Plumbing, and Heating Equipment and Supplies	--	--	21	--	--	13	--	--	8	--	--	--
Machinery, Equipment, and Supplies	--	2	26	--	1	15	--	--	9	--	1	--
Miscellaneous Durable Goods	--	1	6	1	--	3	--	--	3	--	--	--
Paper and Paper Products	2	4	23	2	3	16	--	1	6	--	--	1
Drugs, Drug Proprietaries, and Druggists' Sundries	--	--	4	--	--	3	--	--	1	--	--	1

- CONTINUED -

TABLE B-1. MODES OF TRANSPORTATION UTILIZED WHEN RECEIVING INBOUND SHIPMENTS OF RAW MATERIALS OR PRODUCTS BY TYPE OF FIRM AS DETERMINED FROM SURVEYS (CONTINUED)

Product Classification	All Firms			Established Firms Originating From Within The Present Community			Branch Plant or Branch Operation			Established Firms Relocating to the Present Community		
	Air	Rail	Truck	Air	Rail	Truck	Air	Rail	Truck	Air	Rail	Truck
Apparel, Piece Goods, and Notions	1	--	6	1	--	3	--	--	3	--	--	--
Groceries and Related Products	--	4	20	--	2	8	--	2	12	--	--	--
Chemicals and Allied Products	1	4	12	1	1	7	--	1	2	--	2	2
Farm-Product Raw Materials	--	3	4	--	2	4	--	--	--	--	1	--
Petroleum and Petroleum Products	--	1	3	--	--	1	--	1	1	--	1	--
Beer, Wine, and Distilled Alcoholic Beverages	--	2	4	--	2	3	--	--	--	--	--	1
Miscellaneous Nondurable Goods	--	1	15	--	--	10	--	1	3	--	--	2

SOURCE: Results determined from The Survey of Location Factors.

TABLE B-2. MODES OF TRANSPORTATION UTILIZED WHEN DISTRIBUTING PRODUCTS PRODUCED OR HANDLED BY TYPE OF FIRM AS DETERMINED FROM SURVEYS

Product Classification	All Firms			Established Firms Originating From Within The Present Community			Branch Plant or Branch Operation			Established Firms Relocating to the Present Community		
	Air	Rail	Truck	Air	Rail	Truck	Air	Rail	Truck	Air	Rail	Truck
Motor Vehicles, Automotive Parts and Supplies	--	--	13	--	--	9	--	--	2	--	--	2
Lumber and Other Construction Materials	--	--	33	--	--	26	--	--	7	--	--	--
Furniture and Home Furnishings	--	--	14	--	--	10	--	--	3	--	--	5
Sporting, Recreational, Photographic, and Hobby Goods, Toys and Supplies	--	--	11	--	--	8	--	--	2	--	--	1
Metals and Minerals	--	1	19	--	--	16	--	1	2	--	--	1
Electrical Goods	--	--	19	--	--	11	--	--	7	--	--	1
Hardware, Plumbing, and Heating Equipment and Supplies	--	--	18	--	--	10	--	--	8	--	--	8
Machinery, Equipment, and Supplies	--	--	26	--	--	16	--	--	8	--	--	2
Miscellaneous Durable Goods	--	--	7	--	--	6	--	--	1	--	--	--
Paper and Paper Products	--	--	30	--	--	22	--	--	6	--	--	2
Apparel, Piece Goods, and Notions	--	--	6	--	--	3	--	--	3	--	--	--

- CONTINUED -

TABLE B-2. MODES OF TRANSPORTATION UTILIZED WHEN DISTRIBUTING PRODUCTS PRODUCED OR HANDLED BY TYPE OF FIRM AS DETERMINED FROM SURVEYS  
(CONTINUED)

Product Classification	All Firms			Established Firms Originating From Within The Present Community			Branch Plant or Branch Operation			Established Firms Relocating to the Present Community		
	Air	Rail	Truck	Air	Rail	Truck	Air	Rail	Truck	Air	Rail	Truck
Drugs, Drug Proprietaries, and Druggist's Sundries	--	--	5	--	--	3	--	--	1	--	--	1
Groceries and Related Products	--	2	25	--	1	12	--	1	13	--	--	--
Chemicals and Allied Products	--	--	14	--	--	7	--	--	3	--	--	4
Farm-Product Raw Materials	--	2	7	--	1	6	--	--	1	--	1	--
Petroleum and Petroleum Products	--	--	4	--	--	1	--	--	2	--	--	1
Beer, Wine, and Distilled Alcoholic Beverages	--	1	7	--	1	5	--	--	--	--	--	2
Miscellaneous Nondurable Goods	--	--	16	--	--	10	--	--	4	--	--	2

SOURCE: Results determined The Survey of Location Factors.

APPENDIX C

Priority List of Projects Taken From the  
North Dakota State Rail Plan

PRIORITY LIST OF PROJECTS

1. Jamestown to Kloze line  
Rehabilitate rail line up to Jamestown State Hospital and abandon remaining portion of line.
2. Edgely to Aberdeen line  
Construct a spur line from a Burlington Northern line running just to the north to Edgley to maintain service to businesses in that town.
3. Oakes to Forbes line  
Maintain service to the town of Ellendale.
4. Fargo to Ortonville line  
Maintain service to Fairmont, Wahpeton, and Fargo via adjacent railroads.
5. Linton to Roscoe, South Dakota line  
The town of Linton will continue to receive rail service. Abandonment on this line will not be opposed.
6. Wishek to Pollock line  
At this time, Soo Line Railroad intends to maintain service to Ashley. Abandonment of the remainder of this line is likely.
7. York to Dunseith line  
Maintain service to the town of Wolford
8. Brampton to Andover, South Dakota line  
The major portion of this line is within South Dakota. In view of this, the fate of this line primarily rests with the State of South Dakota.
9. Joliette to Pembina line  
Abandonment of this line is not expected to substantially impact the area.
10. Crete to Oakes line  
Abandonment of this line is not expected to substantially impact the area.
11. Brinsmade to Leeds line  
Abandonment of this line is not expected to substantially impact the area.

SOURCE: Upper Great Plains Transportation Institute, North Dakota State Rail Plan, Vol. 2. (Fargo: Upper Great Plains Transportation Institute, 1979), p. 132.

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