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An Analysis of Transport Services and Facilities in Northern Ontario Centres: A Qualitative Approach

Violet Konkle
Wilfrid Laurier University

AN ANALYSIS OF TRANSPORT SERVICES AND FACILITIES IN NORTHERN ONTARIO CENTRES: A QUALITATIVE APPROACH

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ABSTRACT

Transportation has been considered in the discipline of geography largely within the context of distance and cost constraints, particularily with reference to industrial location decision-making processes. These costs are easily-quantifiable and measureable, and transportation geographers have tended to depend upon distance and tariff costs as the major transportation inputs in locational decision-making processes.

This dependency upon cost considerations is no longer evident in the real world. The priorities of the consignors (shippers) and consignees (customers) have shifted lately, and these distance and cost considerations are now examined in conjunction with such qualitative priorities as frequency of the consistency and reliability of service, with the result that it is no longer sufficient to deal only with distance and tariff costs when assessing transportation variations over space.

Very little work has been done on transportation services, particularily with reference to their impact upon industrial location problems. This research is an attempt at providing some evaluation of the qualitative aspects of transportation. It utilizes the indexing method in order to relate the various qualities of transportation services at various centres. The findings from the evaluation can be applied to regional development planning, and the evaluation technique can be used by the individual entrepreneur in an effort to determine the most advantaged centres in terms of the quality of transportation services available.

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INTRODUCTION

Chapter One

1.1 PROBLEM STATEMENT

In the past, transportation as an input into the industrial location decision-making process has been considered largely within the framework of easily-quantifiable cost constraints - namely distance and rate tariff costs. However, a shift in the priorities of shippers (consignors) from distance and time cost considerations to the quality of transportation services is evident, and there is consequently a need for a re-evaluation of transportation in Canada. H.J. Newman, in Distribution Worldwide, stresses the importance of high-quality transportation services, for he places dependable service and reasonable cost as the twin goals of any transportation system (Distribution Worldwide, Vol. 74, No. 9, p. 32). This would point to a need for more consideration of the qualitative aspects of transportation in geography.

"Quality of Transportation Service" is not an easily-defined concept. "Transport service" is commonly accepted to refer to any conveyance of people or goods over space, and may apply to any number of modes, such as air, marine, rail and highway. Although passenger and freight services are both offered by these modes, and passenger conveyance services are important influences upon industrial activity, the "Quality of Transportation Service" of concern in this study relates only to freight transportation services. The quality of these services may vary with the speed, consistency, reliability and frequency of the services. According to B. Millican, Marketing Manager of Kingsway Transport, transportation service quality may be expanded to include the consistency and reliability of transit time, the availability of ancilliary services - such as rate coding, customer assistance, the proper handling of claims - and the distance over which services are available.

This shift in priorities from quantitative to qualitative considerations creates several problems for both the geographer and the entrepreneur. The tools for quantifying time and distance costs are well developed. Tariff rates and mileage figures are easily-measured and compared. On the other hand, tools for quantifying qualitative data are inadequate and frequently unfamiliar to the entrepreneur.

Within geography, the emphasis upon quantitative tools and their value has developed from the early classical works on industrial location. Such locational studies were largely theoretical in nature, concerned with one plant and limited to a unifunctional problem.

The significance of costs and distance measures as transportation inputs is evident in the geometric techniques used by the classical approach.

1.2 A REVIEW OF THE RELEVANT LITERATURE

1.2.a The Classical Industrial Location School.

Classical Transportation studies frequently refer back to von Thunen's study. He stated that , on a uniform plain of considerable extent, undifferentiated in its physical features and isolated from the rest of the world, and with a single population cluster at some distance from its periphery, concentric circles of varying intensities of land use would develop (Wartenberg,1966,pp.7-37). Demand for the agricultural products in the urban centre combined with the cost to transport the goods to the centre would determine the location of each product in the various zones. Thus, transport cost was considered as the significant influence in the agricultural product pattern of centres as early as 1826.

Another classical writer to address the issue of location was Wilhelm Launhardt (Friedrich,1929,pp. 224-238). Launhardt's work was primarily concerned with finding the optimum location for a production site given raw material and market locations. The optimum site, according to Launhardt, is the minimum transport cost location, and is the point at which the forces from the market and the raw material sources are balanced. According to Launhardt, for each set of different forces, a different optimum location exists. "Each set of forces has its own particular angular relationship, determined only by the locational forces and not (within limits) by the location of the forces (Hecht, Unpublished paper, p.3).

Alfred Weber followed Launhardt in studies in locational analysis (Friedrich, 1929) and retained the transport cost only approach. According to Weber's simplified model, three factors influenced industrial location, transportation being a "general regional factor" along with labour cost, and the local factor of agglomeration or deglomeration forces being the third. He viewed transport costs as the primary determinant of plant location, although weight to be carried and distance to be covered were more important to his model than direct costs. He utilized Launhardt's Pole Line Method to arrive at the minimum transport cost point - cost being in terms of weight and distances. Weber also introduced the concept of "ideal weights" whereby actual weight and transport rates could be incorporated into the analysis. Through ideal weights, Weber utilized estimates of cost per unit of distance rather than ton-miles as an input into transport costs. Weber also introduced "isodapanes" or lines joining points of equal additional transport costs, and "critical isodapanes" to represent the point at which savings in other input costs equal savings in transport costs. He suggests that movement to points of greater savings in other inputs within the confines of the critical isodapane will result if these savings more than offset increased transport costs.

While the above writers were largely concerned with a high level of abstraction in dealing with industrial location and the significance of transportation costs as influences upon industrial location, Hoover's work was largely oriented to empirical studies. His Location Theory and the Shoe and Leather Industries dealt with transportation and production or extraction costs as the determinants of location. He combined the two costs as representative of the delivered price to the buyer, and illustrated their variation over space by a series of "isotims", which radiate outward around the point of production and which joint points of equal delivery price. As buyers will purchase from the cheapest source, the boundary between market areas is the point of equal transport cost from each source. Hoover also developed the "transport gradient", a cross-section through an isotim map illustrating the influence of diminishing returns upon the market area. In the case of manufacturers, Hoover suggested that the best location is at the point of minimum transport costs - which is found, first, by constructing isotims around material and market points. From the isotims, isodapanes - or lines of equal transport costs - may be constructed. Hoover contended that if transportation costs are less than proportional to distance, the optimum production location will no doubt be at the market, source of material or breakpoints in the transport network. Hoover's 1948 work, The Location of Economic Activity, cited "transfer costs" as being significant in two of the three stages of manufacturing, these two being a) the acquisition of materials, and b) the distribution of products, while the third activity involves the production process itself. According to Hoover, the shape of markets and supply areas are all largely a function of transfer costs, as the producer will attempt to minimize his total cost - which in turn is largely a function of transportation costs.

August Losch's writings presented a slightly different approach to location theory (Losch, 1954). He suggested that the proper approach involved the determination of the points of maximum profits. Maximum profits, in turn, were realized where total revenue exceeded total cost by the greatest amount. The market area is determined by the demand curve, which is a function of price and quantity, price in turn being a function of distance and rising with transport costs. He expanded his discussion to illustrate the evolution of a hexagonal series of market areas which characterize an economic landscape which is in equilibrium, and also attempted to explain the development of towns - which are partially a function of the minimization of transport costs.

Melvin Greenhut's 1956 work on Plant Location in Theory and In Practice took the approach that transportation is one of a variety of causal factors or important locational determinants. Although Greenhut specified that the relative significance of these determinants varies from industry to industry, he felt that transportation was a very important plant location determinant and should be considered separately. If freight costs varied significantly from place to place and transport costs comprised a major portion of the total production costs, transportation inputs would be the most important variable. Generally, he concluded, transportation costs will favour locations near the market, although in special cases of high raw material transport costs and material perishability, the optimum location may be at the material source. Greenhut also suggested that high transport costs to consignees will affect the height of freight rates and in turn, the dispersion of production points - particularily if the demand for the product is elastic.

In Location and Space Economy , W. Isard (1956) attempted to develop principles of location theory for the manufacturer. Isard gave considerable attention to transportation cost as one of the major factors of production (along with land, labour, capital and enterprise) as he believed that transportation plays a significant role in production and consumption processes. He referred to transportation as "transport inputs", and used the "substitution approach" via "transformation" and "equal outlay" lines (similar to the concepts of isocost curves and isoquants in micro economics) to illustrate the substitution of transport inputs between material sources and the derivation of the optimum (least-cost) point (Isard, 1956, pp.143-217). Isard's analysis of transport input substitutions would appear to support Hoover's location of terminal points as optimum sites.

In 1962, von Boventer attempted to "discuss the most important economic principles which determine the spatial structure of an economy and to show the way in which the various economic factors are interrelated" (von Boventer, 1962, p. 163), where "spatial structure (means) the spatial distribution of various goods and services of consumers in cities and towns of various sizes as well as the spatial layout of these cities" (von Boventer, 1962, p. 163). Von Boventer saw three economic factors as determinants of spatial differentiation of the economy: (a) external and internal economies or indivisibilities; (b) demand for land input; and (c) transport costs. He summarized the most important characteristics of both urban and agricultural location theory and the spatial structure models of Christaller and Losch stating that distance is one of the most important influences which would comprise a comprehensive theory of location (von Boventer, 1963. pp. 171-173).

Von Boventer stated that distances would affect the utility of the manufacturer through influences it would exert upon income, leisure and non- monetary advantages of particular sites - these influences taking the form of distances to social activities, work, shopping activity, input suppliers, purchasers, competitors and other producers and sellers. Von Boventer's work provides a fairly incisive review of the aforementioned works and he also came to the conclusion that transportation - through distance inputs - is significant as a determinant of the viability of alternative industrial locations.

1.2.b The New Transportation Evaluation Approach.

Several more recent writers have begun to question the significance of transportation cost considerations as the only transportation input into industrial location decisions. While some authors feel that transportation is not significant as an input, others would contend that the old approach to accessibility, and the concern with overcoming distance, is now giving way to considerations which emphasize other aspects of transportation.

Alonso (1967) would appear to support the school which emphasizes transportation inputs other than cost. He stated that minimization of transport costs is a doubtful criterion of location. According to Alonso, classical location theorists have considered only the factors which are continuous, differentiable functions over space, and have neglected the discontinuities - such as steps in transportation cost functions, actual transportation networks, terminal costs, cheap labour, power, or any other factors which may exist at particular locations. He also argued that industries are oriented to production costs rather than transportation costs. If Weber's assumption of "ceteris paribus", save transportation costs, is varied, the optimum location will very likely not correspond to the minimum transport cost location. Rather, it would vary with factor mix, economies of scale, the structure of demand, pricing policy, and the objectives of the firm.

Barloon (1962) tended to support the approach that transportation as a whole is no longer significant as an input into industrial location decisions. He rather emphatically stated his viewpoint: "Subject to these limitations, I believe it may be said that transportation requirements are of little, or of limited, influence in the selection of industrial locations with respect to a growing portion of the periodic increment, to the nation's industrial establishment"(Barloon, 1962, p. 97). He went on to state that "changes in the structure of transportation appear to be principally responses to changes in the structure of the national product and in the consequent changes in transport requirements of the shipping and receiving industries. For the most part, changes in industrial output and in location appear to alter the structure of transportation, rather than the converse"(Barloon, 1962, p. 97). The declining role of transportation as a factor in plant location is argued from the point that:

> "As time passes, a growing segment of industry requires higher standards of transport service, accepting the associated higher costs, and becomes less preoccupied with, or even indifferent to, the availability of those modes which, at the sacrifice of premium service, provide for the movement of goods at minimum cost. In the selection of locations, premium transportation service is a less confining influence than minimum cost. A shipping or receiving industry whose executives are preoccupied primarily with transportation service will ordinarily find a wider range of sites where their transport requirements can be fulfilled. Therefore, within this wider range of sites, locational influences other than transportation will more usually be determinants of final site selection"(Barloon, 1962, p. 98).

What Barloon in fact was assuming is that high quality transportation services are not significant variables to be utilized as a basis of comparison for various potential industrial sites.

Other recent writers are still supporting the classical approach. D.M. Smith (1971) disputed Barloon's viewpoint in Industrial Location. He tended to substantiate the viewpoint that, in fact, transportation inputs - particularily distance and rate considerations - are indeed important, and he incorporated such assumptions into his model (Smith 1971, p. 69).

Norcliffe (in Collins and Walker, 1975) developed location factors which are more relevant to modern industry than those suggested by the classical school. It was his contention that there are a number of logical shortcomings in classical location theory - particularily with respect to the emphasis placed on transportation cost considerations. He stated that "the utility of classical location theory can also be questioned on empirical grounds",(1975, p.20), and that "...changes in the real world have lessened the explanatory power of location theory..."(1975, p. 21). Norcliffe argued that "Transportation costs are no longer of great importance to a large number of industries" (1975, p. 21) as suggested by Weber. Although Weber's theory had considerable relevance at the turn of the century, Norcliffe contended that the importance of transportation has been downgraded because of several reasons, the main one being that lighter industries have expanded. This has resulted in the decline of transportation cost influence upon location. Other reasons for the reduction in the influence of transportation costs include the decline in the influence of raw materials upon plant location and the increased substitution of inputs (1975, p23). Norcliffe concluded his discussion of transport costs by stating:

> "In summary, transport costs are demoted from the sovereign position accorded to them by Weber. For manufacturing activity with voluminous material inputs and high weight loss, they remain important, but for the majority of medium-to-high value-added industries, they tend to confine plant location to the heartland, within which transportation costs to accessible points or the network vary relatively little"(1975, p. 24).

While Norcliffe critized the significance given to transportation costs, he did allude to the importance of transportation as a "locational influence" rather than a "cost factor" (1975, p. 29) in its role as a linkage. Although he did not discuss transportation as a separate issue in his linkage discussion, he mentioned transportation modes as services available to entrepreneurs in major centres (1975, pp. 31,35).

Ian Hamilton's Spatial Perspectives on Industrial Organization and Decision Making is a recent attempt at channelling research effort into directions which diverge from the traditional and hitherto dominant mould of Weberian analysis, and to explore underdeveloped avenues which might yield new insights into the problem, and thereby give broader, more contemporary meaning to the field of industrial location analysis (Hamilton, 1974, pp. vii-viii). In his preface, Hamilton stressed the need to study the locational behaviour by the organization, which has been a neglected area of industrial location analysis, even to the point of exclusion in Smith's (1971) Industrial Location. In his first chapter, Hamilton did not see the locational aspect of growth and organization of the firm as being important (Hamilton, 1974, p. 13), but rather that responses by the firm to particular stresses will call forth specific location decisions (Hamilton, 1974, p. 15), these being frequently accomodated in plans for acquisition or internal plant expansion.

Other recent authors to discuss transportation inputs other than cost considerations include Walker and Bater (1974). Their writings have emphasized transportation as a "service linkage", and an important factor in infrastructure development. According to Parker (1974, p. 128), "service linkages" may be defined as "recurrent interactions with other firms (which) provide for the production process and administration of the firm". Walker and Bater do not attempt to demote cost considerations; rather, the emphasis is placed upon transportation as a service, with quality variations which are divorced from cost considerations. They suggest (1971) that transportation as a service linkage constitutes one of the more important linkages available to entrepreneurs, and as such, may be a valuable tool for regional economic development.

The changing status of industrial location analysis and the traditional determinants of such analysis has pointed to a dissatisfaction with the old aspect of accessibility, where time and distance costs constituted the primary transportation input into location decisions. It is evident that such an approach must be supplemented by transport quality considerations. Writings in Canadian Transportation literature are also discovering the inadequacy of cost considerations.

1.2.c Within a Canadian Context.

The importance of factors other than tariff rates and distance has been recognized by several Canadian Government Departments. The Department of Regional and Economic Expansion (D.R.E.E.) (1975) and the Canadian Transport Commission (Mulder, 1976) are evidently attempting to inventory and analyze the availability of transportation infrastructure in Canada, and literature on transportation in various parts of Ontario has been recently released by the Ministry of Transportation and Communications (1976). This recent preoccupation with variations in transportation services and facilities in Canada would tend to dispute Barloon's argument for ubiquitous services within the Canadian context. The disparities which pervade throughout Canada are representative of the variations in infrastructures between centres and the associated quality of these service linkages - particularily transportation.

Outside the field of Geography, Currie's encyclopediac work Canadian Transportation Economics provides a thorough description of the character of various transport sectors, their organization and historical development in Canada. His work also provides some insight into the causes for variations in transportation qualities in Canadian regions - namely, regulations and government policies - and deals with the problem of providing better services for the Canadian public by all modes. Currie's work also deals with the various priorities of the Canadian consignee, whether rates and prices or quality of service. It is Currie's contention that integration, co-ordination and harmonization are necessary for efficient, high-quality transport service, and that the integration of various modes into large co-operatives would eliminate duplication and inefficiencies in services. The increased efficiency resulting from integration is due largely to the monopolistic position of each mode in its respective spheres of usefulness. Thus, a co-ordinated transport sector would not only optimize efficiency of capital but increase the quality of service to the consignee.

Improvement in the quality of transport service, and the elimination of inefficiencies due to burdensome regulations were topics dealt with at length in the "MacPherson" Royal Commission on Transportation in 1961. This monumental report again supported Currie's argument that the integration of modes would increase quality of transportation service - which, in turn, was again viewed as a primary objective of the transport sector and the related government policies.

Analyses of the Canadian transportation sector have undergone an interesting transition within the past decade. Whereas the Currie work and the Royal Commission dealt at great lengths with the priorities of distance and tariff costs, their writings also allude to the need for high-quality services. Concern over the quality of transport services available in Canada has surfaced in Studnicki-Gizbert's Issues in Canadian Transport Policy (1974) and in Purdy's Transport Competition and Public Policy in Canada (1972). It would appear that the death of the Railway Age Ideology (see Studnicki-Gizbert, 1974, p. 8) and the dominance of the Competitive Age Ideology (Studnicki-Gizbert, 1974, p. 35) has overshadowed a concomitant shift in the relative priorities of shippers. The Railway Age Ideology identified the main economic problems as the result of transportation problems, while the Competitive Age Ideology sees competition in the transportation sector as an adequate means of protecting public interest. While the Royal Commission and authors of the 1950's and 1960's were writing primarily in reference to the pros and cons of regulation vs. competition, one can detect a growing concern in these writings for the establishment of a wider variety of reliable, speedy high-quality services, services which could meet the growing demands for transportation by the growing proportion of high-quality freight (Royal Commission on Transportation, 1961. 3. pp. 147-148). The Royal Commission alludes to this wider variation in servicing:

> Since the end of World War Two, particularily in the last decade, the application of rapid and continuous improvement in all modes of transport, and the construction of new ones offered a range of services at a range of costs which inevitably gave rise to more intense competition in the provision of transportation. Vastly improved air services, construction of pipelines, the expansion of the St. Lawrence River System, the tremendous technological improvement in railway equipment and methods plus the growth of the trucking industry as equipment improved and the highway network spread, has given the nation a range of services which has widened the horizon of choice within which individual business and industry may operate in planning production and supplying markets within Canada and abroad" (Royal Commission on Transportation, 1961. 3. p.7).

Purdy's main objective in his book was to present the major policy issues facing Canadian inter-city transport with considerable attention given to the character of intermodal competition (Purdy, 1972, p. xv). Whereas he concentrated on a description of intermodality in Canada, one can surmise from his discussion that - along with evaluation of rates which vary from mode to mode - there is a need to evaluate intermodality as a new service of higher quality to the Canadian shipper.

Given the above discussion, it is obvious that - although no outright effort has been made to evaluate spatial variations in the quality of transport servicing in Canada - recent changes in intermodal relationships and regulations have profoundly altered the original variety of services available. While some industrial location analysts argue that transportation factors are no longer significant determinants of industrial location decisions, it would appear that some evaluation of qualitative variations in transport servicing over space would prove to be a timely exercise, particularilv within the Canadian context where variations in "quality of transportation service" would appear to be quite pronounced.

1.3 OBJECTIVES

Given the dichotomy of qualitative priorities and quantitative measures, it is the primary objective of this paper to develop a viable measure of the quality of transportation services available in different centres - which, in turn, can be utilized in a comparative evaluation of potential industrial locations. The steps to realizing this objective would include the following: a)delimitation of a study area ; b) choice of indicators (or surrogates) of the quality of transport service; c) establishment of proper measurement techniques; and d) application of the technque to the study area and surrogates.

It could be argued that such an evaluation is time-consuming and that simple measures may be used to evaluate variations in qualities of transportation services. One proxy used historically as an indicator of central place variations is population. One could hypothesize that quality variations in transportation are not significantly different from population variations. In other words, an entrepreneur could assume that a large population is indicative of a high quality of transportation service (as did Norcliffe), and a small population, with a low quality of transportation service. The secondary objective of the paper, then, is to test the null hypothesis that there is no significant difference between population and the quality of transportation service. By evaluating the correlation between the quality of transport service and population size, one can determine whether population alone is a sufficient indicator of quality of transport service available to the entrepreneur at a centre, or whether transport service is better measured by other surrogates. The first objective will involve an evaluation of transportation services available to an entrepreneur at various centres: the second objective will hopefully reveal the relationship between population and transportation service quality.

AN INVENTORY OF THE RELEVANT FACILITIES AND SERVICES FOR THE STUDY AREA.

Chapter Two

The first prerequisite to the evaluation of the quality of transportation service will involve the delimitation of a good study area. As the objective is to evaluate the quality of transportation services, then the study area should provide a variation in such service qualities. Within the Canadian context, such transportation service quality variations would appear to be most pronounced in the North, where centres are removed from the shadow of large metropolitan areas (such as Toronto and Montreal) and smaller centres cannot readily draw upon the services available at adjacent centres. Northern Ontario was finally chosen as the study area, as it was felt that this region was sufficiently close for research purposes, but also promised great variations in transportation services amongst centres. The area also provided a wide range of city sizes so that the second objective could be accomodated.

Transportation has been named as one of the most important influences upon economic activity in Northern Ontario, and the role of this factor has been recently emphasized in Executive Summary: An Investigation of Freight Rates and Related Problems - Northern Ontario (Ministry of Transportation and Communications. 1976). Figures 1 and 2 illustrate the Northern Ontario highway and rail infrastructures. While one might suggest that the infrastructures as illustrated by these maps would

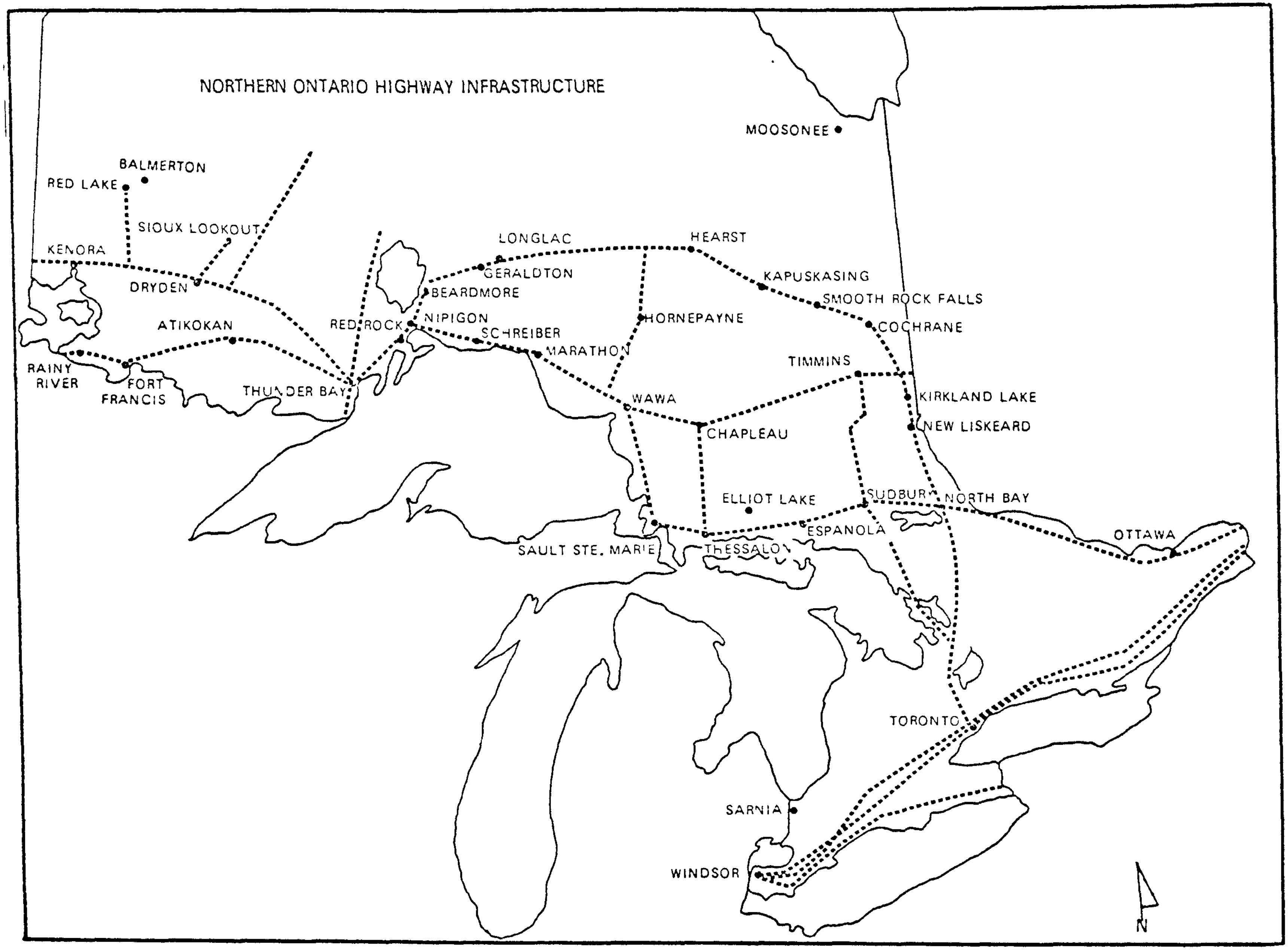
NORTHERN ONTARIO HIGHWAY INFRASTRUCTURE
MOOSONEE
BALMERTON
RED LAKE
SIOUX LOOKOUT
KENORA
DRYDEN
LONGLAC
HEARST
GERALDTON
BEARDMORE
KAPUSKASING
SMOOTH ROCK FALLS
ATIKOKAN
RED ROCK
NIPIGON
SCHREIBER
HORNEPAYNE
COCHRANE
MARATHON
TIMMINS
RAINY RIVER
FORT FRANCIS
THUNDER BAY
WAWA
KIRKLAND LAKE
CHAPLEAU
NEW LISKEARD
ELLIOT LAKE
SUDBURY
NORTH BAY
ESPANOLA
OTTAWA
SAULT STE. MARIE
THESSALON
TORONTO
SARNIA
WINDSOR
N

Figure 1

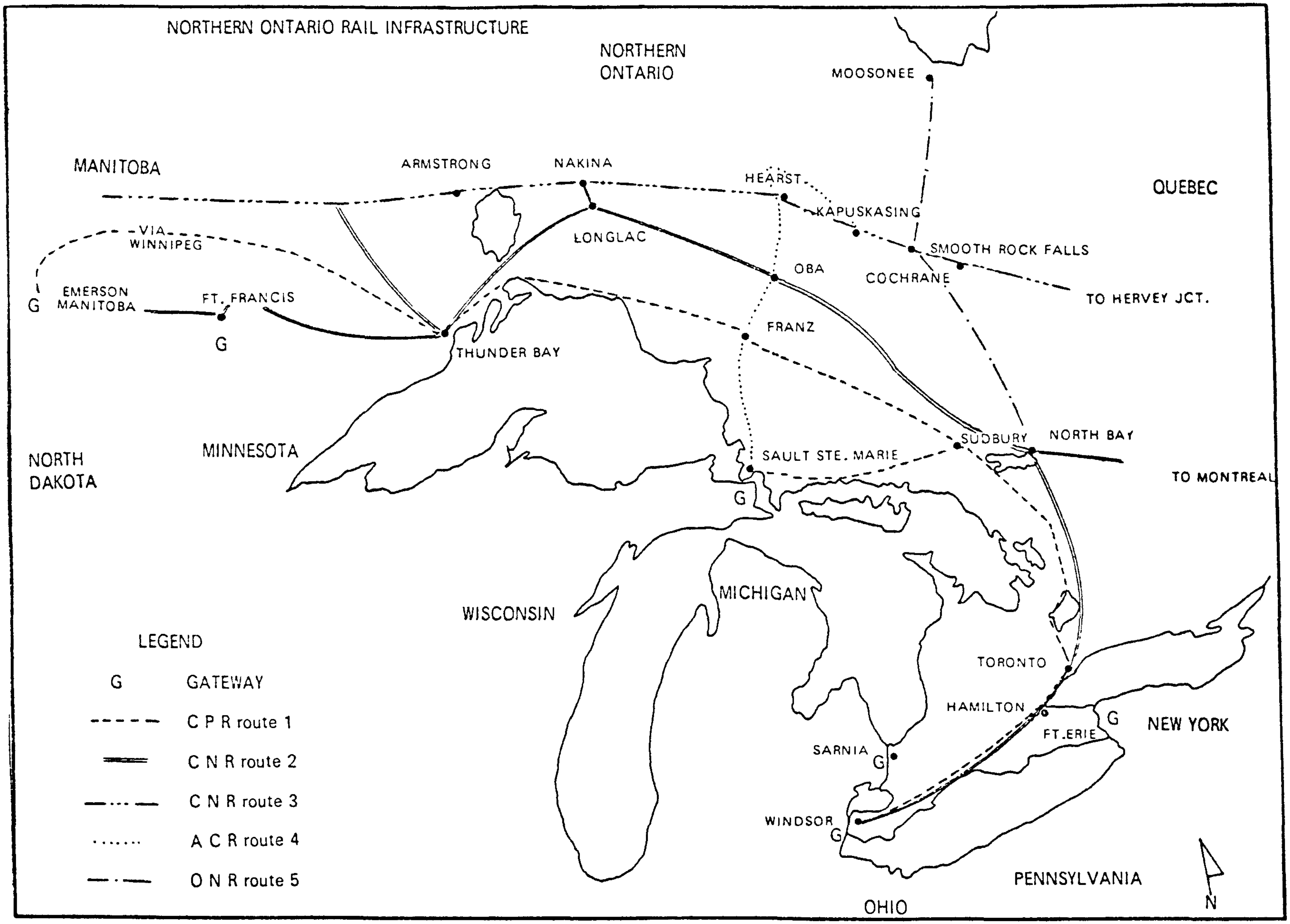
NORTHERN ONTARIO RAIL INFRASTRUCTURE
NORTHERN ONTARIO
MOOSONEE
MANITOBA
ARMSTRONG
NAKINA
HEARST
QUEBEC
KAPUSKASING
VIA WINNIPEG
LONGLAC
SMOOTH ROCK FALLS
OBA
COCHRANE
EMERSON MANITOBA
G
FT. FRANCIS
TO HERVEY JCT.
G
FRANZ
THUNDER BAY
SUDBURY
NORTH BAY
NORTH DAKOTA
MINNESOTA
SAULT STE. MARIE
TO MONTREAL
G
MICHIGAN
WISCONSIN
LEGEND
G GATEWAY
C P R route 1
C N R route 2
C N R route 3
A C R route 4
O N R route 5
TORONTO
HAMILTON
G
NEW YORK
FT. ERIE
SARNIA
G
WINDSOR
G
PENNSYLVANIA
OHIO
N

Figure 2

appear to be adequate to meet the needs of the population in the area, one must note that some points are either highway or rail captive, as opposed to Southern Ontario where both modes service the vast majority of urban centres. Assuming Toronto and North-Eastern United States as the major market areas for Northern Ontario industries, such points are often removed from Northern producers by 900 miles.

One can surmise that Northern Ontario appears to suffer from a relatively disadvantaged position in terms of distance (and therefore cost) to markets. These issues have been covered quite adequately in other works, however, and do not constitute the major issues in this present study. Suffice it to say that Northern Ontario represents a fairly large, isolated example with a great variation in city size, and should therefore constitute a valid study area. The centres chosen for analysis are all centres in excess of 3,000 in population, as listed in Table 2.1.

2.1 SPECIFIC FACILITIES AND SERVICES AVAILABLE

2.1.a Highway Carrier Services

When discussing road transportation, freight movements by highway carrier are controlled by the Public Commercial Vehicles (P.C.V.) Licenses, and fall under the following categories and regulations:

Table 2.1

POPULATION

City/Town	Population
Sault Ste. Marie	80,332
Blind River	3,450
Cochrane	4,965
Hearst	3,501
Iroquois Falls	7,271
Timmins	28,542
North Bay	49,187
Sturgeon Falls	6,662
Fort Francis	9,947
Sudbury	90,535
Capreol	3,470
Copper Cliff	4,089
Espanola	6,045
Lively	3,000
Thunder Bay	108,411
Geraldton	3,178
Haileybury	5,280
New Liskeard	5,488
Kapuskasing	12,820
Dryden	6,939
Kenora	10,952
Wawa	4,874
Kirkland Lake	14,918
Elliot Lake	9,093

Source: Statistics Canada. Census. 1971.

Class "A" Licenses: Class "A" licenses authorize the licensee, as a common carrier, to conduct a public commercial vehicle service between places on the King's Highway and other places named in the lincense.

Class "C" Licenses: These licenses authorize the licensee as a common carrier, to transport goods on a continuous trip, (i) from the place or places named in the license if the goods are consigned by one consignor to one or more consignees, or (ii) to the place or places named in the license if the goods are consigned to one consignee. "Consignor" means (i) a person other than a person who: a. arranges, sells or offers for sale, or b. negotiates for, or c. furnishes or provides, transportation services where the transportation service offered is to be or has been in part furnished by a carrier other than the person, or, c. is a forwarding agent, a transportation broker, a cartage agent, or any person engaged in similar operation or anyone who enters into a pooling of freight arrangement, or (iii) a common carrier by rail, a common carrier by air or water, where the transportation of goods is incidental to any immediate prior or subsequent transportation of goods by a common carrier by rail, air or water. "Continuous trip" means a trip without cessation or stopover from the place of commencement to the destination of the shipment other than a cessation made to refuel the vehicle, effect any repairs, provide a rest period for the driver, or, in the case of emergency, to effect pickup or delivery of goods, or to transport goods and/or interchange trailer by another class "C" carrier.

Class "D" Licenses: These licenses authorize the carrier to conduct a public commercial vehicle service exclusively for the transportation of a particular type of goods or class of freight designated by the license.

Class "F" Licenses: These licenses authorize the licensee to conduct a public commercial vehicle service exclusively for the transportation of: livestock, coal, rough lumber, garbage, sand, gravel, rubble, slag, earth, turf and crushed or uncut rock and stone, and other materials named in the license and used for construction.

Class "FF" Licenses: This class represents freight forwarder carrier classifications, freight forwarder meaning any person not the holder of an operating license who transports or offers to transport or provides the transportation or consolidation of goods for transportation for compensation, and who, (i) assembles and consolidates or provides for assembling and consolidation of shipments, and performs or provides for distribution operations with respect to such consolidated shipments, (ii) assumes responsibility for the transportation of such property from point of receipt to point of destination, and (iii) utilizes a commercial motor vehicle or trailer as defined in the Highway Traffic Act.

Class "K" Licenses: This class authorizes the licensee to conduct a public commercial vehicle service exclusively for the transportaiton of heavy-duty machinery, boilers, transformers, and similar equipment that requires special loading devices and cannot be carried on a standard truck, trailer or semi-trailer.

Class "T" Licenses: This classification authorizes the licensee, as a common carrier, to conduct a public commercial vehicle service for the transportation of bulk commodities in tank vehicles.

Class "X" Licenses: These licenses authorize the licensee to engage in extra-provincial transportation under the Federal Motor Vehicle

Transport Act. (Public Commercial Vehicles Act and Regulations, 1974).

Each of the above classifications represent a different level of service with the "A" classification as the most desirable for the shipper, carrier and consignee.

P.C.V. Licensing varies not only between centres, but also along specific routes, and for specific commodities. Such licenses are strictly regulated, and carriers must defend applications for new licenses before the provincial Transport Boards. At present, highway carriers are reglated by the Provincial Government, although the British North America Act gives the jurisdiction to the Federal Government. At present, the Federal Government has chosen to delegate such authority to the Provinces, with the result that intra-provincial regulations vary significantly across the country. In Ontario, licensing is regulated and classified as described above. As mentioned , the most desirable license for a consignor to use (via a licensed carrier) is the class "A" license. Each license is explicitly defined in terms of the routing and areal extension of the license. A Class "A" license allows the carrier to service the named centres and the route named with limited restrictions, while the classes "C" and "D" limit the carrier to one consignor or destination, or commodity. Such commodity limitations are explicitly stated in class "D" licenses, with the name and commodities of the consignor specified.

In the study area, the variation in highway carrier licensing is large. The number of "A" licenses varies from 15 in Sault Ste. Marie to only 1 for Kirkland Lake. Data for these licenses was accumulated from correspondence with knowledgeable personnel from the various centres, as well as thorough search of licenses for various carriers. The existence of the large number of "A" licenses in Sault Ste. Marie means that industries in this centre are serviced by 15 fairly large carriers. As "A" carriers are not limited in terms of commodities, interlining, or consignors, an entrepreneur within Sault Ste. Marie should have a wide range of unrestricted carriers to consult for highway carriage purposes.

Class "C" licenses are available at all centres, as are "A" licenses, but Sturgeon Falls is the most advantaged with respect to this license. "D" licenses vary from 1 to 8 in number for the centres in the study area, and the "F" licenses, from 1 to 4. Local freight forwarding services are almost non-existent in the smaller towns, and services advertised in such centres are usually available from larger adjacent centres. Both "K" and "T" licenses represent specialized services, and are consequently limited throughout the study area. "X" licenses are highly desirable. One could conjecture that such a license would be important in the study area, particularily for primary extraction activities where the raw materials are forwarded to the United States or other Canadian markets for secondary manufacturing. "X" licensing varies from 2 for the smaller centres to 15 for Sault Ste. Marie. Such

Table 2.2

An Inventory of Transportation Services and Facilities in the Study Area

Centres	Trucking Services[1] Class 'A' Licensees	'C'	'D'	'F'	'FF'	'K'	'T'	'X'	'CM&W'	Power Units	Trailer Units	Head Offices Local	Head Offices Terminal	Call Stations	Number of 'A' Routes
Sault Ste. Marie	15	2	8	1	3	1	1	15	2	4342	7036	4	6	0	23
Blind River	7	3	3	2	0	1	1	3	1	2458	4933	1	1	0	5
Cochrane	3	1	2	2	1	1	1	4	1	772	1295	0	0	0	8
Hearst	5	3	3	2	1	1	1	4	1	791	1321	2	0	0	6
Iroquois Falls	3	1	1	1	1	1	0	2	1	792	1296	0	0	0	6
Kapuskasing	3	1	4	2	2	1	1	2	1	780	1296	2	0	1	4
Timmins	3	0	4	1	1	1	1	3	1	1222	1299	2	2	0	10
Dryden	6	3	2	3	0	3	1	5	2	1296	3566	0	3	0	6
Kenora	7	4	1	1	0	3	1	7	2	2104	2598	2	4	0	7
North Bay	11	1	3	1	1	1	1	8	2	3393	5898	0	7	0	14
Sturgeon Falls	6	6	2	2	1	1	1	2	1	2196	4532	0	0	1	6
Fort Francis	5	3	1	1	2	3	1	6	1	918	1631	0	1	1	6
Sudbury	13	4	12	3	4	1	2	9	2	2105	5543	1	8	4	25
Capreol	8	3	1	3	4	1	2	2	1	2409	3872	0	0	0	8
Copper Cliff	11	2	2	3	1	1	[illegible]	2	2	2429	4742	0	0	0	9
Espanola	8	3	2	3	0	1	2	5	1	3965	4316	0	0	1	1
Lively	9	1	2	3	1	1	1	3	1	1786	2045	0	0	0	8
Thunder Bay	11	6	4	4	7	3	2	8	2	1776	3199	3	8	0	14
Geraldton	7	3	1	1	0	2	1	6	1	1359	2462	0	5	0	6
Haileybury	3	2	2	2	0	1	1	3	1	672	1296	0	0	0	4
New Liskeard	4	2	2	2	0	1	1	4	1	772	1296	0	2	0	5
Wawa	5	1	1	4	1	1	1	2	1	666	1216	0	1	0	8
Elliot Lake	9	1	2	3	0	1	1	3	1	2057	3544	0	1	0	8
Kirkland Lake	1	3	3	2	0	1	1	2	1	774	1296	0	1	0	3

Table 2.2 continued

Centre	Distance to nearest dock on seaway[2]	Distance to nearest commercial airport[2]	Distance to nearest bonded warehouse[2]	Distance to inter-switching facilities[3]	Number of railroad companies available[3]	Distance to nearest Divisional Point[3]	Distance to nearest Sub-Divisional Point[3]	Distance to Piggyback Facilities[3]	Distance to Customs Port of Entry[2]	Number of local high quality warehouses[2]	Number of truck/ trailer rental facilities[2]
Sault Ste. Marie	0	0	0	0	2	-186	-186	0	0	6	4
Blind River	-95	-91	-91	-91	1	-91	-91	-95	-95	0	0
Cochrane	-363	-56	0	0	2	-214	-73	-56	0	0	1
Hearst	-330	0	-179	0	2	-79	-50	0	-115	0	1
Iroquois Falls	-333	-26	-26	0	2	-216	-108	-26	-26	0	2
Kapuskasing	-320	-134	-134	0	1	-139	0	-134	-73	0	1
Timmins	-317	0	0	-235	1	-175	-126	0	0	2	6
Dryden	-212	0	-87	-87	1	-504	-475	0	-181	0	3
Kenora	-304	0	0	0	2	-441	-567	0	0	1	0
North Bay	-90	0	0	0	3	-78	0	0	0	1	7
Sturgeon Falls	-122	-24	-25	-25	1	-53	-25	-25	-25	0	7
Fort Francis	-212	-212	-271	0	1	-395	-516	0	0	0	0
Sudbury	-73	0	0	0	2	0	0	0	0	5	5
Capreol	-102	-24	-24	-24	1	0	0	-24	-24	0	0
Copper Cliff	-63	-6	-6	0	2	-6	-6	-6	-6	0	0
Espanola	-32	-46	-46	-46	1	-46	-58	-46	-46	0	0
Lively	-62	-12	-12	-12	1	-12	-12	-12	-12	0	0
Thunder Bay	0	0	0	0	2	-124	-245	0	0	4	7
Geraldton	-167	-167	-167	-20	1	-175	-213	-167	-167	0	0
Haileybury	-249	-20	-97	-56	1	-175	-97	-4	-11	0	0
New Liskeard	-253	-16	-150	-40	1	-150	-210	-79	-15	0	0
Wawa	0	-130	-139	-139	1	-56	-113	-139	-139	0	0
Elliot Lake	-101	-101	-101	-121	0	-101	-101	-101	-121	0	0
Kirkland Lake	-289	0	-38	0	1	-211	-158	-39	-66	0	1

Sources:

[1]Ontario Trucking Association. Ship-by-Truck. 1975.; Personal Correspondence, Town/City Administrators; Ministry of Industry and Tourism. Industrial Surveys of Ontario Municipalities.

[2]Personal Correspondence. Town/City Admin s: Ministry of Industry and Tourism. Industrial Survey of Ontario Municipalities. 1971 to 1975 issues.

[3]Personal Correspondence. Town/City Administrators; Canadian National Railways, Canadian Pacific Railways, Ontario Northland Transportation Commission, and Algoma Central Railway Personnel; Ministry of Industry and Tourism. Industrial Survey of Ontario Municipalities. 1971 to 1975 issues.

services (ie. Quebec-Maritime, or Western licensing) are predominantly offered by the larger carriers, as these carriers can suffer the "loss" of power units and trailers for long trips without equipment shortages.

2.2.b Railroad Carrier Services and Facilities.

The existence of railroad facilities for the centres is outlined in Table 2.2 by the distances to which an entrepreneur must transport his goods via branch lines to inter- switching points, marshalling yards, and division/subdivisional points. "Interswitching" refers to the ability to change equipment from one railroad network to another. This precludes any additional commodity-handling at change-over points, and allows equipment (ie. railcars) from one railroad company to be used on tracks of another company. Cars and equipment are stored in "marshalling yards", providing a local reserve of equipment. Proximity to marshalling yard facilities is advantageous as cars can be routed to the marshalling yard and formed into unit trains without passing through intermediate divisional marshalling points. Cars are assembled and relayed from branch to main lines at "divisional" and "Subdivisional" points. Each point through which the loaded car must pass represents a delay due to marshalling and assembling procedures.

The number of railroad companies servicing the centre is also indicated in Table 2.2, as is the distance to the nearest piggyback facilities. Intermodality has become an increasingly popular means of utilizing the advantages of each mode, with the ability to cut both terminal handling charges and long-haul charges. By utilizing faster trucking services for short-haul pick-up and delivery trips, and railroad services for cheaper long-hauls, the advantages of both modes are combined. Time is also evidently saved, as origin and destination dock-handling and marshalling costs are cut. This, in turn, is viewed as an inducement to lower inventory and warehousing investments and costs because of the reduced transit times involved. Table 2.2 illustrates the presence of piggyback facilities at the larger centres and their absence at 15 of the smaller centres.

2.2.c Other Transportation Services

The two remaining modes of air and marine transport are also included in the inventory on Table 2.2. The distance to the nearest docking facilities for access to the Great Lakes Seaway system, and the availability of commercial airport facilities are also outlined. Sault Ste. Marie and Thunder Bay are the only centres advantaged by these alternative modes: all other centres - with the exception of Wawa - are at least 60 miles from these facilities. Kapuskasing, Elliot Lake and Wawa are the only centres more than 100 miles from commercial airport facilities.

This chapter has provided an inventory of the various highway, railway, air and marine services which are available in the study area. These will be discussed further in the next chapter - particularily with reference to their value as indicators (surrogates) of the quality of transportation service which is available at various centres. The next chapter will also establish a technique whereby these indicators can be measured, and the quality of transportation service in the study area evaluated.

AN ANALYSIS OF THE
"QUALITY OF FREIGHT TRANSPORT SERVICES"

Chapter Three

3.1 THE SURROGATES.

When one attempts to evaluate a qualitative service which is not readily-measurable in distance or cost variables, it is necessary to first establish some acceptable quantitative substitutes which reflect the qualitative variable, but which can also be compared and measured. Surrogates, or proxy, measures, provide "indications" only and as such do not represent the actual measure of the quality itself. Such surrogate measurements are frequently necessary in order to provide quantifiable representatives for qualitative data in the field of geography. It is the purpose of this chapter to first establish a series of surrogate measures for quality of freight transport service, and secondly to establish a measurement technique. Having realized these two objectives, one can then operationalize tests based on related data and arrive at an objective measure of the "quality of transport service". To accomplish this task, the geographer has the tools at hand for testing correlations between quality of transportation service and city size. The entrepreneur can use the objective standard to assess various potential industrial sites for their relative "quality of freight transport service" ratings.

According to representatives of the transportation industry , consignees' shifts in priorities from cost to quality considerations have also been accompanied by a shift in the utilization of transportation modes. While railroad provides bulk service, it is not as well-equipped to handle goods which require flexible, rapid delivery. Because of this, consignors are becoming more dependent upon the trucking industry - which in turn is becoming more sensitive to the demands of manufacturers (Millican, 1976). These adjustments point to a transportation service sector which is led by the trucking industry and which is sensitive to the regulations and restrictions governing the trucking industry. Because of the significance of the trucking industry in providing such freight transportation, any evaluation of quality of transport service should be sufficiently sensitive to variations in trucking services. For this reason, the following list of surrogates includes a number of highway carrier-related indicators. Other factors which influence the quality of transport service relate to the availability of railroad, air, marine, and ancilliary services. While these have been briefly alluded to in the preceeding chapters, their value as indicators is further elaborated as follows:

A. Number of Class 'A' highway carriers servicing an urban centre: As this study is concerned primarily with freight services to the entrepreneur - particularily manufacturing industries - the number of companies licensed to move freight without major restrictions is an important variable and indicator of quality of transport service variations. As 'A' carriers are neither restricted in terms of customers or commodities for origin or destination points, companies operating under such licenses can freely service any manufacturer within the centre without a great deal of preparatory licensing and regulating proceedings. The measure of the number of 'A' licenses reflects both the frequency with which the consignor can be serviced and the flexibility of the service, as a large number of 'A'-licensed companies would provide more frequent servicing and flexible scheduling. The 'A' license is the least restrictive of all PCV licenses, and is seen as a prerequisite to high-quality service.

B. Number of Class 'C' highway carriers servicing the centre: In simple terms, the Class 'C' operator offers a direct service, usually of full loads, whereby goods are moved directly from the consignor to the consignee. As this service is generally established in response to a demand for service by industry, its availability is an indicator of the quality of service available for freight movement.

C. Number of Class 'D' highway carriers servicing a centre: This license is also established as a response to specialized freight transport demands by the entrepreneur, and is therefore also an indicator of the frequency and flexibility of services available.

D. Number of 'F' carriers: As defined in Chapter Two, 'F' carriers are licensed to transport raw materials or construction materials, and as such, indicate the availability of services for the transportation of inputs into various manufacturing activities.

E. Number of Class 'FF' highway carriers servicing the centre: Freight Forwarders are defined in Chapter Two to be carriers or individuals providing goods-transferral co-ordination services for a manufacturer to his customers. Such services remove the responsibility of damages and risks from the manufacturer, as well as the need for traffic management staff and transportation equipment. Such services are increasing in importance as express service to the manufacturer, and would tend to provide a good indication of the quality of express service available within the community.

F. Number of Class 'K' highway carriers servicing a centre: While this service appears to be relatively ubiquitous within the study area, it does provide an indication of the quality and availability of services for the carriage of capital stock to/from manufacturing plants.

G. The Number of Class 'X' highway carriers servicing the centre: As the final licensing category of concern to the manufacturer, the class 'X' license authorizes the licensee to engage in extra-provincial transportation. Because of the scale and dependency of a number of Northern Ontario manufacturing interests upon exportation of primary 'staples', high-quality 'X' services are essential to such manufacturing interests.

H. Number of Inter-Provincial Carriers: As classified in the Ontario Trucking Association "Ship-by-Truck" manual, Quebec-Maritime carriers provide interline, transfer arrangements from most Ontario general commodity carriers to points in Eastern Canada, while Western carriers have terminals and/or call station facilities in Ontario centres, with interline, transfer arrangements from such Ontario points and Ontario carriers to points in Western Canada.

Because of the variations in servicing which correspond with different classes of licenses, some indication of this variation between centres would hopefully provide some sign of the corresponding servicing quality fluctuations. For this reason, the existence of these license categories for centres is viewed as a significant factor in influencing the quality.

In addition to licensing categories, other highway-carrier related variables of importance which should be incorporated into the index aggregate value include the following quality indicators:

J. Number of Class 'A' Routes which service the centre: The number of routes which pass through an urban centre and provide services to the centre en route provide a good indication of the quality of services available for a centre. "Route" may be defined as the "course of highways and places along and through which the license permits movement". Such a measure provides a surrogate for the availability and variety of services which are required by the manufacturer. If a centre has a relatively large number of class 'A' routes passing through its limits, then there is a greater probability that the manufacturer's customer can be served directly from his plant without time-consuming transshipments. For this reason, the number of class 'A' Routes is viewed as an influence upon the quality of transport service.

K. Number of Potential Power Units available in a city: "Power Units" may be defined as the trucks or tractors used by highway carrier companies, and may provide an indication of the potential number of servicing units at the shipper's disposal.

L. Number of Available Trailer Units in a city: An average ratio of trailers per power unit has been ideally established at 3 to 1 (Millican, 1976), and shortages of trailers would appear to be a major consideration at times of heavy traffic. Consequently, the availability of such units is indicative of the quality of service available.

M. Availability of Local Highway Carrier Head Offices in a centre: It has been suggested that high quality service is provided by smaller local companies, rather than larger non-local carriers (Millican, 1976). If the head offices of local trucking firms are located within the same centre as the manufacturer, then the risk of error through communications is reduced, the quality of business transactions through personalized service is improved, and face-to-face contact ensures improved quality of transport service for the manufacturer. Customer assistance and other ancilliary services are also readily-available to the local manufacturer through such head offices.

N. Number of Local Terminals: Terminals are stations which are manned by the highway carrier for 24 hours a day. Such stations provide information and assistance to the local customer and are an advantage to the entrepreneur in that they provide local docking, storage and handling of goods by large, inter-provincial carriers.

O. Number of Local Call Stations: Call Stations are terminals which provide services only upon demand. Such stations represent infrequent service to the entrepreneur, and reduced access to ancilliary services such as customer assistance and claims; however, they are valuable in providing service upon demand by larger trans-provincial carriers.

P. Number of Railroad Companies Servicing the Centre: This indicator is fairly self-explanatory: the greater the number of railroad facilities available to the manufacturer, the greater the number of alternatives open to him and the greater the flexibility of services available.

Q. Distance to Nearest Railroad Interswitching Facility: This measure will provide an indication of the quality of railroad facilities available through the provision of a surrogate for the range, or distance to which the customer's goods may travel directly. Interswitching facilities allow inter-line movements and provide access from one railroad company's system to that of another railroad system. Through provision of this service, the entrepreneur may have access to a larger variety and inventory of equipment, and may ship to "CP only" points via CP and "CN only" points by CN. This eliminates further delays at distant interswitching points.

R. Distance to Divisional/Subdivisional Points: Divisional points - or points where cars are collected and marshalled into unit trains of common destination and/or commodity - are major terminal points where cars are often delayed in an effort to economize on trains by collecting a large number of cars for common destinations. Before cars from branch lines reach divisional points and are marshalled, arranged and shipped to their final destination points, they must frequently pass through subdivisional points, where the same procedure takes place on a smaller scale. Consequently, the farther an entrepreneur is removed from the main divisional points, the slower the available railroad services and the lower the quality of transport services available for his location.

S. Distance to Nearest Piggyback Facilities: "Intermodality" - or the use of several different modes throughout the trip from origin to destination for a carload of goods - has increased in popularity as a means of increasing the efficiency of transportation modes and decreasing costs in tariff and time to the consignor. The increase in freight forwarding has encouraged the development of intermodality, and this service is viewed as a means to greater flexibility of services and reduced rates. These services offer the manufacturer freight forwarding speeds with reduced rates and decreased risk of pilferage (Dinsmore, CP Express, March 1976).

T. Distance to Nearest Dock on the Great Lakes - St. Lawrence Seaway System: Marine transport is another mode which should be taken into consideration during the derivation of an index of 'total' transportation service quality for a centre. Bulk shippers may find it more efficient and convenient to ship via marine transport rather than rail if such marine facilities are readily-available.

U. Distance to Nearest Commercial Airport: While the manufacturer will undoubtedly rely heavily upon the aforementioned modes for input/output movements, the availability of air services for express freight and business transactions is a significant influence upon the overall quality of service available within an urban centre.

Other services which constitute important surrogates for measures of the quality of freight transport service relate to the efficiency of the goods distribution system within an area. Ease of distribution is facilitated by the following services, each of which consequently would tend to influence the quality of transport service for a centre:

V. Number of Local High-Quality Warehouses: It may be argued that proximity to high-quality warehousing facilities is an important determinant of the quality of transportation service in an area. The availability of this facility removes the shipper from any capital investment requirements for warehousing, and offers greater flexibility in inventory control. If proper warehousing facilities are available, the shipper can decrease transportation costs by ordering full carloads and paying the related reduced rates. "High quality" warehousing for this study will refer to bonded warehouse facilities.

W. Distance to Nearest Bonded Warehouse: Although closely related to the above variable, the inclusion of distance variables is significant in the provision of a more accurate picture of the 'access' to such facilities which alternative sites are afforded.

X. Number of Local Truck/Tractor Trailer Rental Facilities: In addition to servicing the householder, truck rental operations allow the manufacturer to transport his own goods. Such services are vital to the operations of manufacturers in the event of strikes or other disruptions in the transportation sector. This service is of importance to manufacturers who are subject to fluctuations in demand, and cannot invest in transportation capital which will not be used efficiently for the entire year.

Y. Distance to Nearest Point of Entry: This variable provides an indication of the availability of customs brokerage houses, whereby trucking companies can import goods in bond directly to the local customs house without interruption for inspection at the border. This factor should provide a surrogate for flexibility and speed of transportation services available to the entrepreneur.

The above list of 26 variables may be summarized as follows:

TRUCKING SERVICES
1. Number of Class "A" highway carriers.
2. Number of Class "C" highway carriers.
3. Number of Class "D" highway carriers.
4. Number of Class "F"highway carriers.
5. Number of Class "FF" highway carriers.
6. Number of Class "K" highway carriers.
7. Number of Class "T" highway carriers.
8. Number of Class "X" highway carriers.
9. Number of inter-provincial carriers.
10. Number of Potential Power Units Available.
11. Number of Potential Trailer Units Available.
12. Number of Local Highway Carrier Head Offices.
13. Number of Local Terminals.
14. Number of Local Call Stations.
15. Number of Class "A" Routes.

RAILROAD SERVICES
16. Number of Railroad Companies.
17. Distance to Nearest Interswitching Facilities.
18. Distance to Nearest Divisional Points.
19. Distance to Nearest Subdivisional Points.
20. Distance to Nearest Piggyback Facilities.

OTHER SERVICES
21. Distance to Nearest Dock on the Seaway.
22. Distance to Nearest Commercial Airport.
23. Distance to Nearest Bonded Warehouse.
24. Number of Local High-Quality Bonded Warehouses.
25. Distance to Nearest Customs Point of Entry.
26. Number of Local Truck/Tractor Trailer Rental Facilities.

See Table 2.2 for the data matrix for the 24 cases (urban centres) and 26 variables.

3.2 THE MEASUREMENT TECHNIQUE.

The Measure: There are a number of alternative measures which one could use in an attempt to arrive at some standardization of 'quality of transport services'. However, it is the author's contention that the most suitable measure is the 'indexing ' technique. "Index numbers" represent "group comparisons between different periods of time, or between different locations" (Parl, 1967, p. 313). The "group comparisons" in this case would refer to the 24 urban centres, with the "index" providing one final statistic which could be compared among the centres (ie., "between different locations"). An interesting extension of the indexing technique would be a time series analysis through which the qualities of transportation services have changed in places through time. However, for purposes of this study, variations in the quality of transport services among the 24 urban centres will be analyzed through the indexing technique.

Indexing should prove to be a valuable tool for this study as it provides the following advantages: (a) it allows one to derive a quantitative measure for qualitative data; (b) it facilitates the aggregation of large amounts of data; (c) it provides one final statistic and precludes extensive subjective analysis of large quantities of information; (d) it provides a standard by which other centres can be compared; (e) indices can be weighted in a variety of ways to incorporate varying strengths of variables; and (f) time series analyses are possible as an extension of the study (Parl, 1967, pp. 312-320).

3.2.a The Derivation of the Index:

The first problem encountered in an attempt to combine these quality variables into an overall variable relates to the need to standardize the input data in order to ensure consistent units of measurement for each of the 26 variables. Without such procedures, the values for such variables as "Distance to X" would outweigh the values assigned to "Number of X" variables, as mileage figures are considerably larger than the values assigned to each centre for the various inventoried services. While it may be argued that some weighting should be considered and applied in accordance with the relative importance of specific transportation services, there is no evidence available which would point to such weightings in the area of transportation. In order to to accomodate this variation of measures, Z-scores must be derived for the 24x26 matrix.

Z-scores have historically been a valuable means of standardization. "The Z-score" variable transformation is the most common and universally utilized method for standardizing the scale of a variable of interval level measurement. The Z-score transformation generates a new variable with a mean of 0 and a standard deviation of 1. Each case in the file then contains a value equivalent to the number of standard deviation units that it is above or below the mean. Z-scores are computed by subtracting from the values of each case the original mean of the variable and then dividing the remainder by the standard deviation. The formula for the Z-score transformation is

$$\frac{Xi - X}{sd}$$

were Xi is the original value of the 'i'th case in the file for the variable being transformed, X is the mean of the variables, and sd the standard deviation" (Nie, 1975, p. 187).

Given the Z-scores, magnitudes of differences in means and standard deviations can be easily compared. See Table 3:1 for the matrix of Z-scores as derived through computer programming.

3.2.b The Index.

The final step to arriving at the index value included averaging the Z-scores for the 26 variables for each centre. These, in turn, could he compared to the mean (0), and standard deviation (1) of each variable to illustrate the relative status of each centre in the study area in terms of the "quality of freight transport service" available to the entrepreneur. The final index value for each centre is shown in Table 3:2.

One can conclude that, according to a general index of "quality of freight transport service", the 24 centres listed in the study area would be of the rankings as listed in Table 3:2.

Table 3.1
Data Matrix Z-Scores

	A licenses	'C'	'D'	'F'	'FF'	'K'	'T'	'X'	'QM & W'	Power Units	Trailer Units	Head Offices Local	Head Offices Terminal
Sault Ste. Marie	2.28625	-.29924	2.08426	-1.13428	1.02918	-.48722	-.34611	3.35413	1.52557	.65508	2.32412	2.83721	1.46540
Blind River	.05808	.35364	.06723	-1.13428	-.73513	-.48722	-.34611	-.50983	-.62818	.73940	1.13002	.25140	-.34747
Cochrane	-1.05701	-.95212	-.33617	-.12603	-.14703	-.48722	-.34611	-.18783	-.62818	-.97496	-.93512	-.61054	-.71004
Hearst	-.49947	.35364	.06723	-.12603	-.14703	-.48722	-.34611	-.18783	-.62818	-.95564	-.92092	1.11333	-.71004
Iroquois Falls	-1.05701	-.95212	-.73958	-1.13428	-.14703	-.48722	-2.42277	-.83182	-.62818	-.97496	-.93512	-.61054	-.71004
Kapus-kasing	-1.05701	-.95212	.47064	-.12603	-.14703	-.48722	-.34611	-.83182	-.62818	-.96682	-.93512	1.11333	-.71004
Timmins	-1.05701	-1.60500	.47064	-1.13428	-.14703	-.48722	-.34611	-.50983	-.62818	-.51739	-.93341	1.11333	.01511
Dryden	-.22069	.35364	-.33617	.88222	-.73513	2.11129	-.34611	.13417	1.52557	.19845	.35392	-.61054	-.71004
Kenora	.05808	1.00653	-.73958	-1.13428	-.73513	2.11129	-.34611	.77816	1.52557	.37944	-.19582	1.11333	.74026
North Bay	1.17316	-.95212	.06723	-1.13428	-.14703	-.48722	-.34611	1.10015	1.52557	1.69012	1.67795	-.61054	1.82798
Sturgeon Falls	-.22069	2.31229	-.33617	-.12603	-.14703	-.48722	-.34611	-.83182	-.62818	.47299	.90232	-.61054	-.71004
Fort Francis	-.49947	.35364	-.73958	-1.13428	.44108	2.11129	-.34611	.45616	-.62818	-.82650	-.74490	-.61054	-.34747
Sudbury	1.73071	1.00653	3.69788	.88222	1.61728	-.48722	1.73055	1.42215	1.52557	.38046	1.47638	.25140	2.19055
Capreol	.33685	.35364	-.73958	.88222	1.61728	-.48722	1.73055	-.83182	-.62818	.68957	.52757	-.61054	-.71004
Copper Cliff	1.17316	-.29924	-.33617	.88222	-.14703	-.48722	1.73055	-.83182	1.52557	.70991	1.02156	-.61054	-.71004
Espanola	.33685	.35364	-.33617	.88222	-.73513	-.48722	1.73055	.13417	-.62818	1.35254	.26865	-.61054	-.71004
Lively	.61562	-.95212	-.33617	.88222	-.14703	-.48722	-.34611	-.50983	-.62818	.05609	-.50982	-.61054	-.71004
Thunder Bay	1.17316	2.31229	.47064	1.89047	3.38159	2.11129	1.73055	1.10015	1.52557	.04593	.14543	1.97527	2.19055
Geraldton	.05808	.35364	-.73958	-1.13428	-.73513	.81204	-.34611	.45616	-.62818	-.37809	-.27305	-.61054	1.10283
Haileybury	-1.05701	-.29924	-.33617	-.12603	-.73513	-.48722	-.34611	-.50983	-.62818	-1.07664	-.93512	-.61054	-.71004
New Liskeard	-.77324	-.29924	-.33617	-.12603	-.73513	-.48722	-.34611	-.18783	-.62818	-.97496	-.93512	-.61054	.01511
Wawa	-.49947	-.95212	-.73958	1.89047	-.14703	-.48722	-.34611	-.83182	-.62818	-1.08274	-.98054	-.61054	-.34747
Elliot Lake	.61562	-.95212	-.33617	.88222	-.73513	-.48722	-.34611	-.50983	-.62818	.33165	.34133	-.61054	-.34747
Kirkland Lake	-1.61455	.35364	.06723	-.12603	-.73513	-.48722	-.34611	-.83182	-.62818	-.97292	-.93512	-.61054	-.34747

	Call Station	Number of 'A' routes	Distance to nearest dock	Distance to nearest airport	Distance to nearest warehouse	Distance to inter-switching	Number of railway companies	Distance to div-isional point	Distance to subdivisional point	Distance to piggy-back	Distance to port of entry	Number of quality warehouses	Number of rental facilities
Sault Ste. Marie	-.25896	2.52951	.85924	.57591	-.20306	-.26536	-.26315	.76705	.79965	1.40529	.72332	3.02999	.81431
Blind River	-.25896	-.52286	-.33909	-.97883	-.20376	.44144	.31823	-1.06808	-.82531	.62514	-.81941	-.46056	-.71851
Cochrane	-.25896	-.01413	.85924	.57591	-.20306	-.47367	.42839	-.31471	.79965	-1.57569	-.18607	-.46056	-.33531
Hearst	-.25896	-.35328	-1.49791	.57591	-.20306	.53071	.56914	.76705	-1.16740	-1.30469	.72332	-.46056	-.33531
Iroquois Falls	-.25896	-.35328	.51686	.57591	-.20306	-.48855	.21419	.26481	.35492	-1.32933	.30110	-.46056	.04790
Kapus-kasing	-.09541	-.69243	-.90533	.57591	-.20376	.08432	.87513	-1.82145	-.44900	-1.22257	-1.45274	-.46056	-.33531
Timmins	-.25896	.32502	.85924	-3.43906	-.20376	-.18352	.10404	.76705	.79965	-1.19793	.72332	.70296	1.58073
Dryden	4.64761	-1.37074	.85924	.57591	4.69483	-2.63125	-2.03178	.76705	-2.29632	-.33567	.72332	-.46056	.43111
Kenora	-.25896	-.18371	.85924	.57591	-.20306	-2.16254	-2.60704	.76705	.79965	-1.09118	.72332	.12120	-.71851
North Bay	-.25896	1.00332	.85924	.57591	-.20236	.53615	.87513	.76705	.79965	.60051	.72332	.12120	1.96393
Sturgeon Falls	-.09541	-.35328	.53003	.14878	-.20376	.72415	.72214	.28412	.37203	.40342	.33358	-.46056	1.96393
Fort Francis	-.09541	-.35328	-2.70941	.57591	-.20376	-1.82030	-2.28269	.76705	.79965	-.33567	-2.71940	-.46056	-.71851
Sudbury	.39525	2.86866	.85924	.57591	-.20306	1.11847	.87513	.76705	.79965	.76475	.72332	2.44823	1.19752
Capreol	-.25896	-.01413	.54320	.16587	-.20376	1.11847	.87513	.30344	.38913	.56766	.33358	-.46056	-.71851
Copper Cliff	-.25896	.15544	.78023	.57591	-.20306	1.07383	.83841	.65115	.69702	.84687	.62589	-.46056	-.71851
Espanola	-.09541	-1.20116	.25349	-.21000	-.20376	.77623	.52018	-.12154	.01283	1.14250	-.02368	-.46056	-.71851
Lively	-.25896	-.01413	.70122	.37089	-.20376	1.02919	.80170	.53525	.59439	.89614	.52845	-.46056	-.71851
Thunder Bay	-.25896	1.00332	.85924	.57591	-.20306	.19592	-.62422	.76705	.79965	1.40529	.72332	1.86647	1.96393
Geraldton	-.25896	-.35328	-1.33989	.23421	-.21845	-.04216	-.42839	-2.45891	-2.05685	.03387	-1.98863	-.46056	-.71851
Haileybury	-.25896	-.69243	-.41810	-.38085	-.20376	-.18352	.28151	.68978	.61150	-.63951	.39854	-.46056	-.71851
New Liskeard	-.25896	-.52286	-1.11603	-.10749	-.20376	.00248	-.41003	-.75900	.54308	-.67236	-.46350	-.46056	-.71851
Wawa	-.25896	-.01413	-.97118	-1.79891	-.20376	.70183	.18359	-1.91803	-1.57792	1.40529	-1.38778	-.46056	-.71851
Elliot Lake	-.25896	-.01413	-.47077	-1.49138	-.20446	.36704	.25703	-1.18398	-1.27003	.57537	-.91684	-.46056	-.71851
Kirkland Lake	-.25896	-.86201	-.43127	.57591	-.20376	-.45136	-.09180	.01368	-.32927	-.96800	.72332	-.46056	-.33531

Table 3.2

RANKINGS OF CENTRES ACCORDING TO THEIR COMPOSITE INDEX VALUES

Rankings	Centre	Index Value
1	Sudbury	1.288
2	Thunder Bay	1.154
3	Sault Ste. Marie	.960
4	North Bay	.502
5	Copper Cliff	.321
6	Sturgeon Falls	.176
7	Capreol	.169
8	Espanola	.098
9	Kenora	.080
10	Lively	.014
11	Dryden	-.140
12	Hearst	-.173
13	Timmins	-.188
14	Blind River	-.268
15	Cochrane	-.295
16	Haileybury	-.323
17	Kirkland Lake	-.338
18	Kapuskasing	-.363
19	Elliot Lake	-.362
20	New Liskeard	-.366
21	Fort Francis	-.398
22	Iroquois Falls	-.434
23	Wawa	-.468
24	Geraldton	-.645

Figure 3 shows the index values for the centres. The first 10-ranking centres (with the exception of Kenora) are advantaged in terms of distance to Southern Ontario and the North-Eastern United States markets. They are also strategically located in terms of major highway and railway routes. Sault Ste. Marie and Thunder Bay also boast dock facilities, while Sudbury and North Bay are at the junctions of various highways and railways. Copper Cliff, Sturgeon Falls, Lively and Capreol are also sufficiently close to the above centres to take advantage of such facilities. Espanola is only 32 miles from docking facilities and 46 miles from all other major facilities.

Centres falling below the mean are farther removed from the major transportation junctions and port facilities. It is interesting to note the gradation with distance from North Bay to Haileybury (with an index value of -.323), to New Liskeard (-.366), Kirkland Lake (-.388), and Iroquois Falls (-.434). The value rises again for Timmins, Cochrane and Hearst, reflecting the better rail services. Geraldton's isolated location is reinforced by the centre's status as number 24 on the list.

These findings would tend to indicate the lack of facilities in isolated centres. Also, as one moves farther away from the major junctions, the quality of service tends to fall.

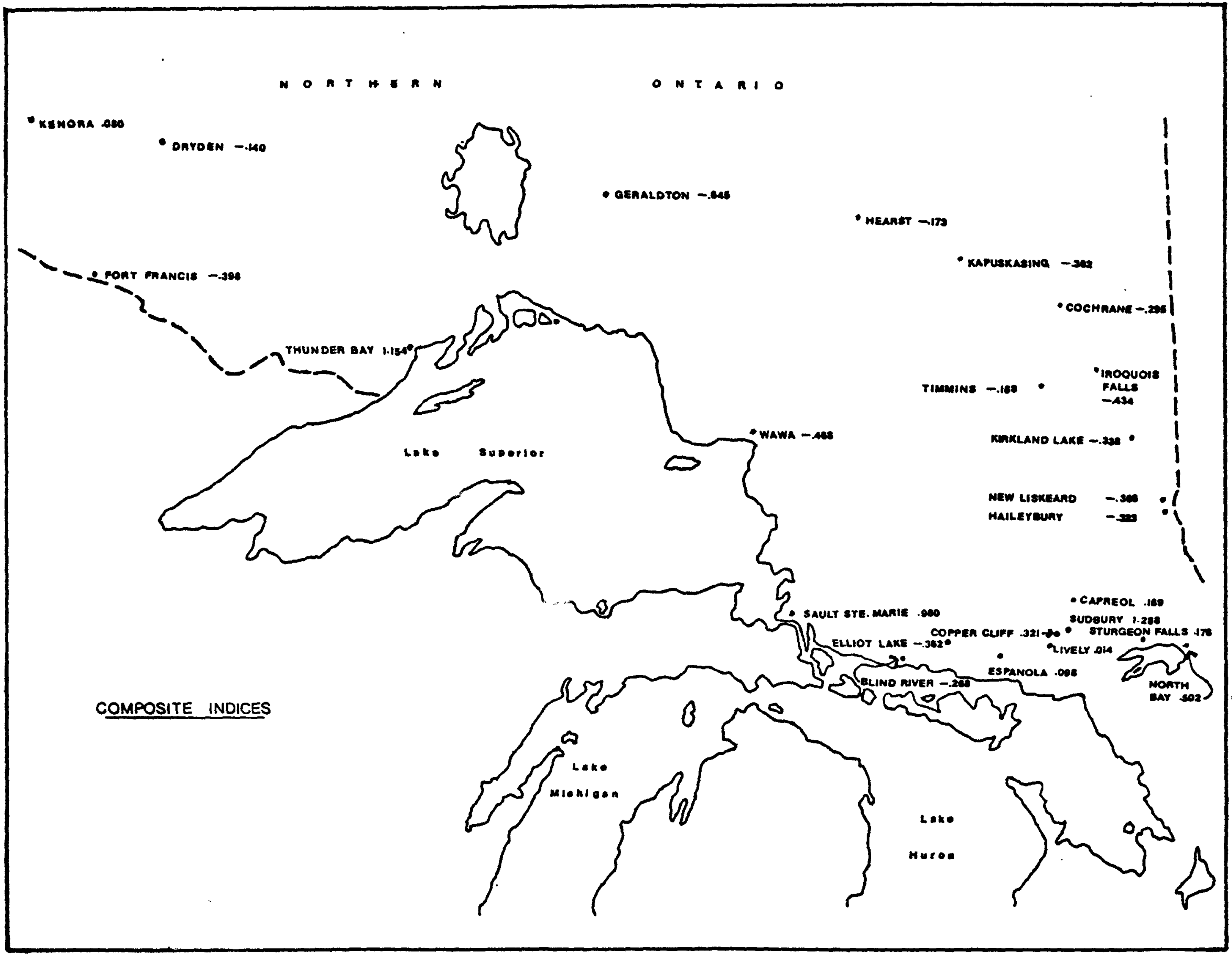
NORTHERN ONTARIO
KENORA .080
DRYDEN −.140
GERALDTON −.845
HEARST −.173
KAPUSKASING −.382
COCHRANE −.295
FORT FRANCIS −.398
THUNDER BAY 1.154
TIMMINS −.168
IROQUOIS FALLS −.434
WAWA −.468
KIRKLAND LAKE −.336
Lake Superior
NEW LISKEARD −.368
HAILEYBURY −.323
CAPREOL .169
SAULT STE. MARIE .980
SUDBURY 1.288
COPPER CLIFF .321
STURGEON FALLS .176
ELLIOT LAKE −.362
LIVELY .014
ESPANOLA .098
BLIND RIVER −.288
NORTH BAY .502
COMPOSITE INDICES
Lake Michigan
Lake Huron

Figure 3

These rankings could be grouped according to the breaking points in the rankings in order to show categories or classes of places. The three highest-ranking centres - namely, Sudbury, Thunder Bay and Sault Ste. Marie - fall near +1 standard deviation above the mean, and are obviously the first choices as centres with high quality transportation service rankings. Centres falling below +1 standard deviations but above the mean (0) include North Bay, Copper Cliff, Sturgeon Falls, Capreol, Espanola, Kenora, and Lively. It is possible that the rankings of Copper Cliff, Lively and Capreol are due to the spill-off of services from Sudbury, although Capreol is a significant point on the railway network. North Bay is well known as a transportation centre in Canada, as it represents the junction of railroads and highways for trans-Canada movements. It is interesting to note that - despite this transportation function - North Bay is well below the three high- ranking centres. Espanola and Sturgeon Falls lie on routes which connect the high-ranking centres, and are close enough to larger centres to utilize inter-switching and piggyback facilities without extended transit time requirements. One could conjecture that Kenora's isolation has forced the development of transportation- related services as support systems to the centre's industry. The centre boasts a fairly large number of highway carrier terminals and local head offices, as well as bonded warehouses, airport and customs services. Perhaps proximity to the International and Manitoba boundaries have encouraged the development of high-quality transport services. Because of the distance factors involved in Kenora and Dryden inventories, one would hypothesize that both centres would suffer from low quality rankings.

The remainder of the centres fall below the mean (0). It would appear that distance to such services as seaway, airport, warehousing, interswitching and other rail services have hindered the quality of transport services for the majority of these centres. In the case of Geraldton, entrepreneurs would be faced with distances of 167 miles to docking, airport, warehousing, piggyback and customs services. Rail facilities for interswitching are 20 miles from Geraldton, and the nearest subdivisional and divisional points are removed by 75 and 213 miles respectively. While some of the higher-ranking centres must also overcome long distances for some services (e.g.: Thunder Bay is 124 miles from the nearest divisional point, and 245 miles from the nearest subdivisional pint), the other services available at the larger centres appear to outweigh the distance disadvantages. For the isolated centres with few local services, the distances to services accentuate low index values.

One further use of the index would involve its application to several individual industrial activities. While the aggregate index provides an equal weighting for each surrogate, in reality various industries rely upon specific transportation inputs. By delimiting these various inputs, one can establish an index which will enable the individual entrepreneur to assess the quality of service which his firm requires from various centres. This objective is dealt with in the following chapter.

TESTS and APPLICATIONS

Of The METHODOLOGY

Chapter Four

Once the indexing technique has been established and the final Quality of Transport Service Index values known, one can examine the indexing output in order to ascertain the following: a) its viability as a tool for the entrepreneur; b) the correlation between the index and the population of the urban centres; c) its applicability relative to other rating systems for service measurement; and d) its applicability to regional development planning and policies.

4.1 INDUSTRIAL TRANSPORTATION REQUIREMENTS.

The procedure for the derivation of the generalized, aggregate "quality of transport service" index is too time-consuming and complicated for the average individual entrepreneur who wishes to objectively analyze variations in such qualities among different centres through the use of an index. The entrepreneur for any particular manufacturing industry is also concerned with only a limited number of the 26 variables which comprised the aggregate index value.

The index values also may not be as closely correlated with population for limited transportation services as with the aggregate value for these services. For these reasons, the index should be modified to allow individual entrepreneurs to include only those transportation services which are relevant to their business activities.

All industries in Canada are classified under the Standard Industrial Classification (SIC) according to the function (manufacturer, wholesaler, retailer, or service) under which the industry operates. All listings with the same SIC code number are in the same line of business: eg., manufactuers of wood household furniture fall under classification 2511. The SIC code is a government index used to identify business activity, with manufacturing listed from 2000 to 3999. The first two digits of the four-digit number identify the major industry group, the third digit identifies sub-groups within the industry, and the fourth digit identifies the specific product (Canada DBS., SIC Manual, 1960).

While the SIC code classifies activities according to principle function, it does not further categorize industries according to product characteristics. For this reason, the author has further subdivided industries according to the following product criteria:

	Durable	Non-Durable
Bulk		
Non-Bulk		

"Bulk" has been defined as "anything which cannot be handled by a forklift, but must be scooped or shovelled" (Deeley. June 24, 1976). "Durable" is defined by Barrett as a consumer good which provides a flow of service over a period of time - generally in excess of a single year"(Barrett, 1972, p. 125).

In order to ascertain the transportation services required by manufacturers within these categories, manufacturers listed in the Dun and Bradstreet Reference Book for the 24 centres from the study area were categorized according to the bulk/nonbulk, durable/nondurable criteria. The purpose was to arrive at several examples of specific industry transportation requirements. By arriving at a list of these requirements of individual firms, the index can then be applied to those particular firms. In undertaking this specific index calculation, only those transportation facilities and services required by that particular firm would be considered. Unfortunately, the dependency of Northern Ontario upon primary and extractive activities, and the tendency toward single-industry communities in the study area precluded the establishment of a sample representative of each of these four categories (i.e. bulk-durable, non-bulk - durable, bulk - non-durable, non-bulk - non-durable).In the case of a single-industry town, the transportation services often have developed as a result of the particular requirements of that one industry, rather than vice versa. For these reasons, the classifications could not be properly represented. In order to provide an indication of individual industry requirements, then, 15 individual industries operating in Northern Ontario were sampled, with the objective of chosing two examples for case studies which would apply the index on a one-firm level.

Case 1: Pulp and Paper

The first specific index derived represents the transportation needs of the pulp and paper industry. This category would fall under the bulk-durable category. From the correspondence received from two companies, it was evident that the transportation facilities utilized by this activity included the following list of variables from the original matrix: NOA(Number of Class "A" carriers), NOX (Number of Class "X" carriers), NOQX (Number of Quebec-Maritime carriers), NOW (Number of Western carriers), NAR (Number of A Routes), DRRI (Distance to the Nearest Interswitching Facilities), NORRC (Number of Railroad companies servicing the centre), DTDP (Distance to Nearest Divisional Point), DTSDP (Distance to Nearest Subdivisional Point), DTDS(Distance to Nearest Dock-on-Seaway Facilities). The same procedure was followed for this example as the general aggregate index, with the exception that the other 16 variables were eliminated. The Z-scores for the 24 x 10 matrix were averaged to arrive at the final "quality of transport service" for the pulp and paper company. The index values are listed in Table 4:1.

Table 4.1

PULP AND PAPER INDUSTRY INDEX VALUES

Centre	Index Values
Sault Ste. Marie	1.279
Sudbury	1.250
North Bay	1.050
Thunder Bay	.760
Copper Cliff	.656
Lively	.176
Capreol	.076
Geraldton	.005
Espanola	.003
Hearst	-.058
Sturgeon Falls	-.085
Kenora	-.190
Blind River	-.200
Cochrane	-.220
Wawa	-.226
Elliot Lake	-.314
Iroquois Falls	-.318
Kapuskasing	-.373
New Liskeard	-.424
Haileybury	-.463
Dryden	-.515
Fort Francis	-.570
Kirkland Lake	-.571
Timmins	-.734

The centres which presently boast pulp and paper operations of the two companies are Thunder Bay, Iroquois Falls, Sturgeon Falls, Sault Ste Marie and Kapuskasing, which are ranked as follows by the index: Sault Ste. Marie (1st), Thunder Bay (4th), Sturgeon Falls (11th), Iroquois Falls (17th), Kapuskasing (18th).

One can see that the rankings of the centres which boast pulp and paper are varied. This would tend to support the contention that transportation is, in many cases, not the primary determinant of plant location - at least not in the location decisions made by the two companies sampled in this study.

Given the variation between the index values and actual plant locations for the pulp and paper firms, one must not dismiss quality of transport service as an input into industrial location decisions, for the importance of inputs varies not only among industries, but also among firms.

Case 2: A Rubber and Plastics Firm

The second case study is conducted on the basis of information provided by a rubber and plastics firm. The requirements specified by the firm included the following: Class "A" highway carriers, Class "C" carriers, local highway carrier head offices, local bonded warehousing facilities, Quebec-Maritime carriers, Western carriers. These six variables were then analyzed according to the methodology derived above, with the addition of "Distance to the Nearest Bonded Warehouse" as the seventh variable. This variable was introduced to the original six in order to provide a better indication of the relative status of warehousing at each centre. The Z-scores derived for the matrix were then indexed and the final rankings of the 24 centres derived (see Table 4: 2). Again, the three largest centres ranked highest in terms of the quality of freight transportation services required for this particular firm.

Table 4:2 lists the variations in rankings which occur between the general index for the centres and the Rubber and Plastics Index. One could conclude, from cursory inspection of the indices, that there are no major disparities between the rankings of the general index and the "Rubbers and Plastics" index. Given only the quality of transport services as an input into the locational decision-making process of such a plant, one

Table 4.2

A COMPARISON OF THE RUBBER AND PLASTICS INDUSTRY INDEX RANKINGS AND THE GENERAL "QUALITY OF TRANSPORT SERVICE" INDEX RANKINGS.

City	General Index	Rubber and Plastics
Sudbury	1.288	1.216
Thunder Bay	1.154	1.438
Sault Ste. Marie	.960	1.561
North Bay	.502	.401
Copper Cliff	.321	.352
Sturgeon Falls	.176	.114
Capreol	.169	.084
Espanola	.098	.126
Kenora	.030	.720
Lively	.014	.208
Dryden	-.140	.091
Hearst	-.173	-.253
Timmins	-.188	-.105
Blind River	-.268	-.129
Cochrane	-.295	-.424
Haileybury	-.323	-.516
Kirkland Lake	-.338	-.504
Kapuskasing	-.362	-.434
Elliot Lake	-.362	-.378
New Liskeard	-.366	-.577
Fort Francis	-.393	-.676
Iroquois Falls	-.434	-.474
Wawa	-.468	-.610
Geraldton	-.645	-.397

would conclude that Sault Ste. Marie is the optimum location for that firm.

4.2 POPULATION/INDEX CORRELATION TESTS.

One commonly-utilized criterion for classifying and/or rating urban centres is population. Population figures are readily available for use by the entrepreneur. A correlation testing which would accept the null hypothesis that "there is no significant difference between rankings of population and quality of transport service" would also allow the entrepreneur to make conclusions about transportation quality only on the basis of population figures. This would preclude a great deal of unnecessary research into such alternative rating criteria.

The technique chosen for measuring the correlation between population and the quality of transportation service index was the Spearman's Rank-Order. This procedure is non-parametric test and requires the use of rankings, rather than absolute values of variables (see Table 4:3 for population and Index values). The two hypotheses are as follows: Ho: there is no significant association($r = 0$) between the rankings of population and the quality of transport service for the 24 centres. Hi: There is no significant difference between the rankings of population and the quality of transport

Table 4.3

POPULATION and INDEX VALUES COMPARED

City/Town	Population	Index Value
Thunder Bay	108,411	1.154
Sudbury	90,535	1.288
Sault Ste. Marie	80,332	.960
North Bay	49,187	.582
Timmins	28,542	-.188
Kirkland Lake	14,918	-.338
Kapuskasing	12,820	-.362
Kenora	10,952	.080
Fort Francis	9,947	-.393
Elliot Lake	9,093	-.362
Iroquois Falls	7,271	-.434
Dryden	6,939	-.140
Sturgeon Falls	6,662	.176
Espanola	6,045	.098
New Liskeard	5,488	-.366
Haileybury	5,280	-.323
Cochrane	4,965	-.295
Wawa	4,874	-.458
Copper Cliff	4,089	.321
Hearst	3,501	-.173
Capreol	3,470	.169
Blind River	3,450	-.268
Geraldton	3,178	-.645
Lively	3,000	.014

service for the 24 urban centres. With a level of acceptance at α=.05, and df= 24-1=23, the probability value of such an occurance under the null hypothesis stated was .388 (Snedecor, p. 174). The actual value derived from the test was .3400. Because the accepted significance level is .95, the conclusion one must draw is acceptance of the null hypothesis (i.e. r=0). In other words, the association is strictly due to chance. There is therefore a difference between the rankings of population and the quality of transportation index. One can also see from the .3400 coefficient value that the direction of the relationship is positive; however, the relationship is not strong enough between the two rankings to be significant.

This finding would tend to indicate the inadequacy of population as an indicator of quality of transport service.

4.3 GUTTMAN-SCALE ANALYSIS.

A second means of testing the usefulness of the indexing technique involves a comparison of the index to alternative measurement techniques. According to Mulder (1976) the most desirable technique for use in empirical studies in transportation service evaluation is "Scallogram Analysis" or the Guttman-Scale Analysis (N. Mulder, Canadian Transport Commission, May 1976).

"'Guttman-Scale Analysis' is a means of analyzing the underlying operating characteristics of three or more items in order to determine if their interrelationships met two special properties that define an acceptable Guttman scale - unidimensionality and cumulativeness," where "...Unidimensional(means) the component items must all measure movement towards or away from the same single underlying object... cumulative scale implies that the component items can be ordered by degree of difficulty and that respondents who reply positively to a difficult item will also reply positively to less difficult items and vice versa"(Nie et al. 1975. p. 529).

Each item in the Guttman Scale must also be ordinal, or divisible into two portions - yes or no. The Guttman scale for the 24 x 27 matrix of the cases and variables is listed in Table 4:4.

Unfortunately, the second prerequisite for Guttman scaling requires the capacity of the data for ordering from the most difficult to the least difficult. The purpose of this ordering is to assume that a positive response for a more difficult problem has been accompanied by a positive response to all less difficult problems. This is difficult to apply to the data set for the quality of transport service index, as one cannot accurately rank services with the understanding that one service will exist, and therefore, some other

	TRUCKING SERVICES A	C	D	E	EF	K	T	X	DM	W	Local Head Office	Terminal	Call Station	RAIL SERVICE Interswitching	CN	CP	Other	Div-isional Point	Sub-divisional Point
Sault Ste. Marie	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1	1	1	0
Blind River	1	1	1	1	0	1	1	1	1	0	1	1	0	0	0	0	1	0	0
Cochrane	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	0	1	0	0
Hearst	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	0	1	0	0
Iroquois Falls	1	1	1	1	1	1	0	1	1	0	0	0	0	1	1	0	1	0	0
Kapuskasing	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	0	0	1
Timmins	1	0	1	1	1	1	1	1	1	0	1	1	0	0	0	0	1	0	0
Dryden	1	1	1	1	0	1	1	1	1	1	0	1	0	0	0	1	0	0	0
Kenora	1	1	1	1	0	1	1	1	1	1	1	1	0	0	1	1	1	0	0
North Bay	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	0	1	0	1
Sturgeon Falls	1	1	1	1	1	1	1	1	1	0	0	0	1	0	1	0	0	0	0
Fort Francis	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	0	0
Sudbury	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	1	1
Capreol	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	0	0	0
Copper Cliff	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	1	0	0	0
Espanola	1	1	1	1	0	1	1	1	1	0	0	0	1	0	0	1	0	0	0
Lively	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	0	0	0
Thunder Bay	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0
Geraldton	1	1	1	1	0	1	1	1	1	0	0	1	0	0	1	0	0	0	0
Haileybury	1	1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	1	0	0
New Liskeard	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	1	0	0
Wawa	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	1	0	0
Elliot Lake	1	1	1	1	0	1	1	1	1	0	0	1	0	0	0	0	0	0	0
Kirkland Lake	1	1	1	1	0	1	1	1	1	0	0	1	0	1	0	0	1	0	0

	AIRPORT SERVICE local	commercial	Piggyback	Seaway	Ware-housing	Truck/Trailer Rental	Customs Port of Entry
Sault Ste. Marie	1	1	1	1	1	1	1
Blind River	0	0	0	0	0	0	0
Cochrane	0	0	0	0	0	1	1
Hearst	1	1	1	0	1	1	0
Iroquois Falls	0	0	0	0	1	1	0
Kapuskasing	0	0	0	0	1	1	0
Timmins	1	1	1	0	1	1	1
Dryden	1	1	1	0	0	1	0
Kenora	1	1	1	0	1	0	1
North Bay	1	1	1	1	0	1	1
Sturgeon Falls	0	0	0	0	0	1	0
Fort Francis	0	0	1	0	0	0	1
Sudbury	1	1	1	0	1	1	1
Oapreol	0	0	0	0	0	1	0
Copper Cliff	0	0	0	0	0	1	0
Espanola	0	0	0	0	0	1	0
Lively	0	0	0	0	0	1	0
Thunder Bay	1	1	1	1	1	1	1
Geraldton	0	0	0	0	0	0	0
Haileybury	0	0	0	0	0	0	0
New Liskeard	0	0	0	0	0	0	0
Wawa	0	0	0	1	0	0	0
Elliot Lake	0	0	0	0	0	1	0
Kirkland Lake	0	0	0	0	0		

Source: As in Table 2.2

service must exist. Guttman scaling would also require a large number of additional categories in order to capture the information available with the index. Such categories would include the following: "1 to 5 Class 'A' carriers", "6 to 10 Class 'A' carriers", "11 to 20 Class 'A' carriers", "1 to 5 Class 'C' carriers", "6 to 10 Class 'C' carriers", etc. While Guttman scaling is valuable for dichotomous data, such dummy variables are used if there are no alternatives. As such, it represents the minimum in measurable qualitative data. While some rankings could be assumed and hypothesized, such assumptions would require extensive testing for verification.

It is imperative that the inadequacies of such an an analysis be realized with respect to any evaluation of quality of transport service. There is a movement within government to utilize Guttman Scaling as a technique for the evaluation of quality of transportation services in Canada, with the purpose of applying results to regional infrastructure development planning and policy-formulation. The inadequacies of the procedures are quite evident - particularily if the degree of differences between centres is of importance.

Because of the incompatibility of scaling tools with assessment of relative qualities of transportation services, and the applicability of indices to infrastructure evaluation, some discussion of the research findings in relation to the quality of transportation services in Northern Ontario is of value at this point.

44 APPLICATIONS TO REGIONAL DEVELOPMENT

Table 3:2 provides a listing of the general index values for the 24 centres in the study area. Of these 24 centres, the most advantaged in terms of "quality of transport service" is Sudbury, with a rating of +1.288 standard deviations above the mean for the total study area. The values range from 1.288 for Sudbury to -.645 for Geraldton. Such findings have some additional value in respect to their regional development implications (see figure 3).

The Northern Ontario region has received a great deal of attention lately with respect to its "comparative disadvantage" (Department of Treasury, Economics and Inter- Governmental Affairs (TEIGA) 1975, Ministry of Transportation and Communications 1976), and development strategies to alleviate the problems which result from this comparative disadvantage have been proposed. The Ministry of Transportation and Communications has attempted to outline the problem of freight transportation facing northern entrepreneurs, and has suggested some possible solutions to the problems in Executive Summary: An Investigation of Freight Rates and Related Problems - Northern Ontario (Ministry of Transportation and Communications, 1976). The report is an attempt to identify the components of transportation which provide unnecessary obstacles to the most efficient and economical movement of goods to and from Northern Ontario. The report is also exclusively concerned with rates and distance variables, although the provision of piggyback as a service is suggested at one point. The final recommendation also states that "The Federal Government should also provide the needed funds for Northern Ontario's port/rail infrastructure, thereby enabling Northern Ontario industry greater access to the low-cost Great Lakes system"(Ministry of Transportation and Communications, March 1976, p. 21). This alludes to the need for improved services and facilities generally within Northern Ontario, but does not further specify areas requiring special funding.

The Ministry of Treasury, Economics and Inter-governmental Affairs has also recently released some work on Northern Ontario through the Design for Development, Northeastern Ontario Regional Strategy Study (1975). The study specifies that "the strategy should not be viewed primarily as a package of new programs, but rather as a guide to more effective management of future provincial expenditures in the

Northeast, in order to achieve definite objectives beneficial to the people of the regional and the province" (TEIGA, 1975. p.x). The three strategies are "economic", "social", and"spatial" with the discussion of spatial touching upon several issues in transportation. While the social strategy recognizes the need for minimization of costs and the effects of distance, the spatial strategy lists three goals under the "urban system" subcategory: a) more efficient use of existing infrastructure and services; b) an equitable distribution of economic and social opportunities, and c) a rational location of additional development (TEIGA, 1975. p. xix). Recommendations concerning manufacturing include the suggestion that the Northern Ontario Development Corporation should "consider providing funds to the service sectors which are not currently eligible under its program (Ministry of Treasury, Economics and Inter-Governmental Affairs, 1976, p. xiv), and that "the Province, in co-operation with the federal government, should review trucking and rail freight rates and arrangements affecting the regional and Northern Ontario generally" (TEIGA. 1975. p. xv).

The report goes further, and suggests that development and manufacturing should be encouraged in selected centres. "The priorities in terms of providing additional economic development assistance should go to the four subregional centres: North Bay, Sault Ste. Marie, Sudbury, and Timmins. The provision of additional economic development assistance to the region's area service centres should be of a somewhat lower priority...the area service centres are Kapuskasing, Kirkland Lake, Tri-Town (Cobalt, Haileybury, New Liskeard). Third priority for economic development assistance should be given to local service centres: Elliot Lake, Blind River, Wawa, Hearst, Cochrane, Espanola, Sturgeon Falls, Iroquois Falls. The same order of priorities should be used to structure the provision of provincial government services in the region" (TEIGA. 1975. p. xix). The report discusses projected population changes, and suggests that "Since little alteration of present growth trends is apparent, no change in growth emphasis would be expected between the various urban centres" (TEIGA, 1975, p. 24). "The service sector would probably grow proportionately more stronger than other sectors of the economy" (TEIGA, 1975, p. 29). The statements concerning transportation services per se, are rather unclear: "For the most part, the transportation requirements of businesses or industries in the Northeast are adequately met by the existing infrastructure and levels of service. There are, however, some high-cost elements in the system, particularily in the movement of freight. Transportation users in the region do not have access to a full range of rates and services" ,"...the moderately increased rate of growth is expected to place some additional pressure on the region 's infrastructure, environment and services. However, this pressure will be of manageable proportion". (TEIGA. 1975. p. 34).

One can surmise from the above quotations that the Ministry feels that development should occur in the four largest centres, as such development would "reinforce their role in providing specialized services for the region" (TEIGA. 1975. p. 34). However, the report also states that "the increased growth among smaller centres would better enable them to support certain additional services" (TEIGA. 1975. p. 34). While all of this discussion touches upon the availability of services and infrastructure, and a specific listing of centres and priorities is given, there is no specific discussion of the present status of services at these various centres, excepting the statement that "..increased...growth...pressures (on the transportation infrastructure) will be of manageable proportions" (p. 34).

Upon comparing the priorities and the rankings of these centres according to the index (as listed in table 4:5), one can arrive at some interesting conclusions: While the first three centres are equally ranked for both lists, the remainder of the centres differ in their rankings between the lists. This suggests that the

Table 4:5

CENTRE RANKINGS ACCORDING TO THE NORTHEASTERN DEVELOPMENT REPORT AND THE "QUALITY OF TRANSPORT SERVICE" INDEX

	Northeastern Report Rankings	Index Rankings
	Subregional Centres	
1	North Bay	Sudbury
2	Sault Ste. Marie	Sault Ste. Marie
3	Sudbury	North Bay
4	Timmins	Sturgeon Falls
	Area Service Centres	
5	Kapuskasing	Espanola
6	Kirkland Lake	Hearst
7	Haileybury	Timmins
8	New Liskeard	Blind River
	Local Service Centres	
9	Elliot Lake	Cochrane
10	Blind River	Haileybury
11	Wawa	Kirkland Lake
12	Hearst	Kapuskasing
13	Cochrane	Elliot Lake
14	Espanola	New Liskeard
15	Sturgeon Falls	Iroquois Falls
16	Iroquois Falls	Wawa

Source: TEIGA 1975. p. 33.

quality of freight transport service for all of the area service centres is not better in all of the local service centres. Given the objective of efficient use of existing infrastructure and services, the following three prerequisites to this efficient use must be realized: "1) the required infrastructure and service must already be in existence; (2) there must exist a sufficient excess of capacity to absorb the growth; and 3) the required infrastructure and services can be expanded at the least additional cost"(TEIGA.1975. p. 60). If area service centres are preferred as development sites over local service centres, then either a) the quality of transport services and facilities should be improved at these cites; or b) priorities should be changed to account for these variations. As the report also specifies that "unproductive competition among the major urban centres and needless duplication of services sustained at public expense should be minimized"(TEIGA. 1975. p. 60), then perhaps there is a need for a more thorough analysis of the services and facilities - including transportation - which exist, particularily since table 4:5 illustrates the incompatibility of the priorities of the Ministry and the current infrastructures. Only by inventorying and analyzing the facilities and services can one objectively rank centres on the basis of their capabilities for supporting increased economic activity.

By using such an index, one can both inventory and evaluate the relative quality of transportation service, and then draw conclusions concerning planning requirements and policies. inventory and evaluate the relative quality of transportation service, and then draw conclusions concerning planning requirements and policies. cumulativeness"(Nie et al. 1970. p. 18).

CONCLUSIONS AND FUTURE RESEARCH GUIDELINES

Chapter Five

5.1 CONCLUSIONS.

This research constitutes an attempt to quantify a qualitative input into the industrial decision-making process. There are undoubtedly problems with such an approach: this is particularily true in the case of the choice of surrogate measures for those characteristics of freight transport service which influence the "quality" of this service. It is extremely difficult to measure the consistency and reliability of any individual carrier, much less a mode. It is much more difficult to provide any indication of an aggregate quality of transport service. It must be remembered that surrogates provide "indications" only, and as such do not represent the actual measures of quality itself.

If some statement could be made concerning the transportation corporation's ranking in the provision of high-quality transport service, the problem would still remain concerning variations in the quality of services provided by these companies between various centres. As some companies provide ancilliary services to customers (such as claims departments and rate classification services), it is impossible to measure the variations between companies. "Quality of transport service" also involves such things as rate negotiations, damage problems, claim matters, tracing of shipments, and checking of freight accounts which vary not only by mode but also from company to company. To incorporate these indicators would involve an assessment of internal qualitative variations among servicing companies.

"Consistency" of service is also another very difficult variable to measure. To do so would require interviews with customers for each carrier, and these values would again vary with commodity, size of consignee and/or consignor and carrier, and would provide only a static picture of the "quality of transport service" available.

As in any research which attempts to quantify qualitative data, the omission of valuable inputs can severly alter the final values. Other variables which could possibly be incorporated into the data matrix include variations in road qualities between local/county/regional road systems. However, the Sudbury region is the only area within the study area which boasts a co-ordinated road network and any inventory of road qualities. All other non-regional roads vary in quality and jurisdiction from township to township.

One point worthy of further discussion concerning the choice of surrogates relates to the alternative criteria for such choices. One such criterion is the SIC code, which distinguishes between various transportation services within a centre. However, this classification of transportation services is far too generalized for the purposes of this paper,as it does not list such facilities as interswitching, divisional points, "A" as opposed to "C" licenses, etc. In addition to this shortcoming, a number of the classifications (particularily those relating to passenger service) in the SIC code are not applicable to the study. While the classification was used with the Dun and Bradstreet Reference Book for the stratified sample of industries for parts of the study, this data source is not adequate as a source of variables for the original data matrix. This inadequancy is due to the listing of servicing companies only in their head office locations.

The correlation between employment in manufacturing, and the index is also another point worth closer examination. Although population figures can be collected for any centre, employment figures are not published for centres of less than 10,000 population. However, such a test may provide some valuable insights into the variations in transport service qualities and the function of the centres. For example a transportation centre such as North Bay may offer better transportation service quality than a centre of comparable size with a different function.

Another potential variable which may be of value to the study would involve some indication of the availability of one-day service to Toronto or the major market areas. However, this again would involve individual interviews with large numbers of consignees/consignors and a formidable data collection process and market area study. The use of "distance to markets" and "distance to input sources" as variables has also been avoided as these go beyond the scope of the "quality of transport service" study, relating more closely to tariff and time cost constraints than qualitative considerations.

Another assumption which is a potential shortcoming of the paper may be caused by the study area. Northern Ontario may be an anomoly in terms of the quality of transportation service relative to the size of the centre. In other words, the correlation test which illustrates the absence of correlation between population and the index may not be true for other centres. The shortcomings of Northern Ontario transport services relative to the other areas of Canada are common knowledge (TEIGA 1975, Ministry of Transportation and Communications 1976): this being the case, the choice of the study area may have biased the results.

In comparing the index derived in this paper to the Guttman technique, several points are worth noting. According to Nie et al (1975), Guttman scaling techniques fall under a category of qualitative variables with nominal or ordinal levels of measurement. While one may work back to nominal levels of measurement from ordinal as is the case with this study, such an inventorying technique loses a great deal of information about the degree of variation between centres. The only means by which this could be overcome is the establishment of a number of additional categories in the Guttman inventory, such as the following: 1 Class"A" Route; 5 Class"A" Routes, 10 Class"A" Routes, etc. However, if one is interested in only the existence/nonexistence of the facility or service at an urban centre, then the Guttman-Scaling technique is adequate.

One can surmise from the above discussion that, while the index provides a quantitative measure for the"quality of transport service", the measure must not be accepted blindly without consideration of the constraints and limitations of the study. Given these constraints, one can then draw the following conclusions from the study:

A. The generalized index values tend to indicate a ranking of service qualities which are significantly different from population rankings. This would tend to indicate that the transportation service quality index is much more sensitive to variations in the transport sector variations than one would anticipate. The simple indicator of centre size is evidently not sufficient as an indication of the quality of the service available.

B. The methodology may be used to compare the quality of transportation services which are available to individual activities within alternative potential locations. While only a few examples have been included in the paper, a matrix based upon the criteria of bulk/non-bulk and durable/non-durable goods could be established as mentioned before. Industrial categories could be classified accordingly, and the methodology applied to each category through a sample equation.

In the study area chosen for this paper, centres with representative industries were largely single-industry communities and therefore subject to unique transport systems. For this reason, sample cases were not available for all classes; however, such a comparative study may provide some information concerning types of transport infrastructures which should be developed in relation to the dominant economic activities. As alluded to earlier, individual entrepreneurs could also use the methodology to assess various potential sites.

C. Work done in the field of transportation in reference to regional economic development has been recently released from government sources; however, the topic of transportation and specifically transportation as a service linkage has not been considered. While this research has not dealt with the service linkage aspects of transportation, but rather only on the qualitative aspects of the service, much more research into the linkage is necessary, particularily if responsible regional planning is to be forthcoming.

5.2 FUTURE RESEARCH GUIDELINES.

This study has hopefully provided a stepping stone for future work on the qualitative aspects of transportation. By assessing the generalized quality of transportation services available between alternative centres, the entrepreneur has an indication of the maturity of the transportation infrastructure available in an urban centre, as well as an objective measure of the relative qualities of service available between potential sites. Transportation constitutes only one of a long list of service linkages, many of which could also be quantified via similar methodologies. However, the obvious point of departure from this paper would include further applications of the technique. The index could be used to examine a different set of urban centres, or applied to various other industries which require a wider variety of transportation services and are not as dependent upon raw material inputs as are the Northern Ontario examples which were cited. Other variables could also be tested as surrogates for a different study area. An index derived from the surrogates listed in this study could be compared to an index derived from a different list of surrogates, and these tested via correlation to employment data. Types of airports, travel time via air, accessibility to services, weightings according to head office locations, terminals or call stations, ranges of trucking services, flow charts of highway carriers and measures of service duplication or requirements for a network could all provide a clearer picture of the quality of freight transport services available. Distances to markets could be incorporated into individual industry equations, as well as cost indicators; however, such measures should be considered separately from the generalized index. This research has cited the cost and distance variables as representative of a quantity which is entirely separate and apart from the "quality" of transport service measurement, although the individual entrepreneur could include such measures into his equation if they were properly weighted.

Number of school days lost due to adverse weather and road conditions may also indicate the probability of shutdown. This would be of some merit as an indication of surety of service. Road maintenance and quality were considered during the initial stages of the study; however, as mentioned earlier, the jurisdictions and standards for road qualities within the study area vary by township - with the exception of the Sudbury area. This makes such data collection formidable, and would require either subjective judgements on the part of the analyst or some dollar per mile expenditure on road maintenance. Inclusion of such a variable in study areas with accurate records would be of interest.

Another final area for future consideration is the assessment of quality of passenger service. Such studies could apply to both inter-city and intra-city transportation, and would provide some valuable insight into such issues as "GO" services, and bus service optimization.

All of these possibilities constitute potential areas of examination above and beyond the limited analysis provided by this paper. This study has been an attempt to evaluate a qualitative aspect of a major area of concern to the economic geographer, and thereby provide an accurate picture of the directions needed in the development of transportation and research in the field. Indexing is a useful, flexible tool, and as such, offers a great deal of potential as a tool for bringing more insight into the body of knowledge collectively acknowledged as transportation geography.

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Fox. W. Clerk-Administrator. Town of Walden. Lively. June 14, 1976.

Goodman. J. Vice-President. Ontario Trucking Association. March 1976.

Harmen, L. Department of Regional and Economic Expansion. Ottawa. May 1976.

Hicks, B. Canadian National Railways. May 27, 1976.

Hortness, R. Traffic Analyst. City of Sudbury. June 6, 1976.

Kauk, W. Transportation Analyst. Department of Regional and Economic Expansion. Ottawa. May 1976.

Lafleche, J.V. Clerk-Treasurer. Corporation of the Town of Espanola. June 21, 1976.

Lucas, J. Supervisor of Property Management, Corporation of the City of Sault Ste. Marie. June 25, 1976.

McFadden, G.W. Director, Development Bureau of the City of Thunder Bay. June 13, 1976.

McGuire, T.A. Director of Economic Development. City of North Bay. February 24, 1976.

Millican, B. Marketing Manager, Kingsway Transport. Rexdale. June 7, 1976.

Mulder, N. Assistant Deputy Minister. Canadian Transport Commission. Ottawa. May 1976.

Paul, H. Algoma Central Railway. June 1976.

Reid, J. Industrial Commissioner. City of Timmins. June 18, 1976.

Smith, P. Kirkland Lake Development Commissioner. June 18, 1876.

Thompson, G. C. Superintendant of Product Planning and Handling, Spruce Falls Power and Paper Co. Ltd., July 8, 1976.

Wake, W. The Corporation of the City of Dryden. June 1976.

Wilbee, J.D. Assistant General Manager. Transportation and Distribution. Abitibi Paper Company. July 12, 1976.