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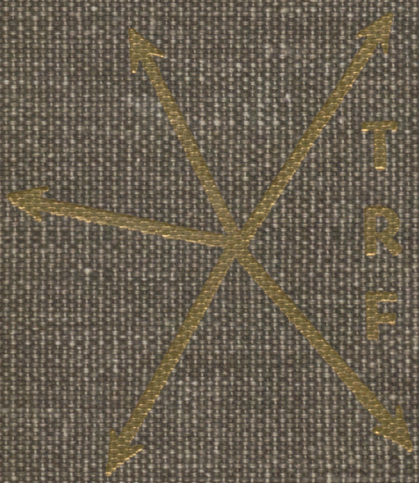

TRANSPORTATION RESEARCH FORUM

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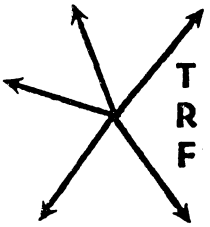

TRANSPORTATION RESEARCH FORUM

A Measure of Transportation's Impact on Regional Economic Development Conventional Wisdoms Versus Business Perceptions

by John R. G. Brander, J. David Innes* and Tim Holyoke**

ABSTRACT

IT HAS LONG BEEN HELD in the Atlantic Provinces that freight rates were the major cause of economic retardation. This and other location factors were evaluated by means of a preference model which was applied to firms in the Atlantic Region, firms outside the Region relative to their own locations, and finally the latter relative to their opinions on a location in the Region. The results call into question some of the theory and conventional wisdoms held as far as the role of transportation in regional development is concerned. If regional policy is to be effective, there must be a broader spectrum of policy instruments employed than has been the case in the past.

This paper, which is one of several which will be issued over the next few months by the Transportation Group, estimates the impact of a number of transportation factors on regional economic development. It is based upon analysis carried out by this research group over the course of the past four years.[1] In the initial stage of the research, a sample of firms in the Atlantic Provinces were asked to indicate the importance of thirteen location factors on their decision to locate at their chosen site. Of these thirteen factors, five were transportation related. In the second phase of the study, firms in various areas outside the Region were sampled and sent a questionnaire seeking two types of data. The first type of data requested were the locational importance of the same thirteen factors in the siting of their new or expanded facility. In addition, the firms were asked their opinions as to how they saw these factors being accommodated by an Atlantic Province location regardless of whether they had considered locating in that area. This paper reports on some of the findings of that research.

The first part of the paper is a brief discussion of the analytical approach employed in the research program, the **Location Factor Preference Indices Model.** It then considers both the conventional wisdoms in the region concerning development, as well as some of the regional economic theory which is in place. From each of these sources is drawn predictions as to how the importance of transportation related factors might be expected to rate as locational factors. It then considers the perceptions of businessmen, both inside and outside the region, drawing comparisons among various subsamples drawn from the overall samples. Finally, some conclusions are drawn.

**University of New Brunswick Transportation Group.*

THE LOCATION FACTOR PREFERENCE INDICES MODEL

Classical location theory is of little practical use as a tool of economic policy for at least two reasons. The first of these is the large number of unrealistic assumptions generally made. It is not unusual, for example, for such an author to assume the presence of perfect competition. In the second place, the theoretical approach has, of necessity, a tendency to exclude a wide variety of economic and noneconomic factors which are known to have some influence upon the location decision. For these reasons, it does not provide a good proxy for regional development, a term which is generally taken to mean the attraction of new secondary manufacturing into a region so as to stimulate its economy.

What is required is a method which allows for the numerical ordering of all of the factors which enter into the location decision at the level of the individual firm. The approach adopted must admit of aggregation to the macroeconomic level to determine the overall industry, sector, or regional view. Finally, the approach must permit the determination of the degree of importance of each factor relative to the others. Such an approach is possible only at the level of abstraction. In the real world, the constraints of time and money intrude, and so, the number of factors that can be considered must be reduced significantly.

When this adjustment is made, studies such as that completed by Wheat[2] satisfy the first two requirements, being able to deal with the firm, and the aggregation into more macroeconomic perspectives. Generally speaking, however, they do not come to grips with the importance of factors relative to others. The approach adopted in this study, the Location Factor Preference Indices Model overcomes this difficulty by permitting analysis within and among subgroups.

The Preference model used in this study was conceptually adapted from Burnett's multidimensional scaling measurement technique for predicting travel behavior.[3] His work involved assigning weighted measurements to attitudinal and perceptual variables to quantify the degree of preference for choice sets in travel behavior models. In the same fashion, the assignment of weighted values to subjective evaluations and the development of a model to assess the degree of preference for the independent valuations was fundamental to the design of the Location Factor Preference Indices Model.

Before dealing with the model, it is necessary to outline the data collection procedure and the evaluation assignment scheme used. In the initial stage a representative sample of firms in the Atlantic Region was selected. Then each owner or manager was interviewed by means of a questionnaire requesting them the list of plant location factors and to rate each according to its importance in the firm's decision to locate at that site. After a pilot testing, in which a ten point scale of importance was tried and rejected, it was decided to use a system distinguishing three levels of importance. These were: very important (which was assigned a value of 2); somewhat important (value = 1); and unimportant or irrelevant (value = 0). It should be noted that during the course of the analysis, this particular weighting scheme was questioned, and that the weighting for the 'very important' rating was varied from 1 through 9. By testing these different treatments of the data with an analysis of variance, it was found that there was a very low variation between the differently treated groups and that the within variation (the factor ratings) was very large. It was decided that since the between-group variation was so low that it did not matter which rating scheme was chosen, the standard rating scheme (0-1-2) would be used.

The Location Factor Preference Indiices Model produces an index for each location factor in the following form:

$$FPI_{j,s} = \sum_{n=1}^{N_s} (FR_{j,n} \div \sum_{j=1}^{J} FR_{j,n}) \div N_s$$

where:

$FPI_{j,s}$ = the location factor preference index for factor "j" in sector or disaggregate subgroup of firms "s" (j = 1, 2, 3, . . . , J)

J = the total number of location factors

N_s = the total number of firms in sector or disaggregate subgroup "s"

$FR_{j,n}$ = the location factor rating of factor "j" by firm "n"; (n = 1, 2, 3, . . . , N_s)

$(FR_{j,n} \div \sum_{j=1}^{J} FR_{j,n})$ = the location factor preference index of factor "j" for firm "n."

Each firm needs only to rate each of the "J" number of location factors on the level of importance rating scheme basis. At the microeconomic level, "J" factor preference indices are produced. These indicate the relative importance of each factor as assessed by the individual firm. For the purposes of illustration, assume that firm "n" assigns factor "j" a weighting of very important (value = 2). If there are "J = 13" factors in the analysis, and if the sum of all of the factors equals 12, then the location factor preference index of factor "j" for firm "n" would be:

$$(FR_{j,n} \div \sum_{j=1}^{J} FR_{j,n}) = 2 \quad 12 = 0.1667$$

For the aggregate location factor preference indices, ($FPI_{j,s}$) the indices from the "N_s" number of firms are summed for each factor "j" and averaged for the disaggregated sub-group "s." The limiting range of the location factor preference indices is from zero to one. In the former case, all firms in a sub-group rate a location factor as unimportant or irrelevant. In the latter case, all firms rate a location factor as

either somewhat important or very important while rating all other factors as unimportant or irrelevant. Neither case is likely to occur, so the indices are generally positive simple fractions. A scaling factor of 10^4 has been used in the following tables. The result are positive integers which theoretically can range from 0 to 10,000. The grand sample mean index is predetermined, being equal to the reciprocal of the number of location factors used in the analysis.

The indicies were first calculated and assessed using all of the firms in each sample region. Since each index is an average of the collective firms' indicies, firms which share common characteristics distinct from others should be disaggregated from the total sample. This avoids potential biases which arise from averaging dichotomous groups with opposing evaluations of the location factors. To gain deeper insights and avoid total sample biases, disaggregate subgroups were identified and the indices calculated using only those firms included in the group. Firms could be disaggregated by geographic area, by industrial sector, by time of plant location, by plant size, by market orientation, or on some other basis.

Once the firms have been grouped in some fashion, grouped-mean testing of significance was performed to determine whether one group evaluated a given factor significantly differently from another group. This is a critical step in the analysis, for the sub-groups may indicate entirely different for location factors than the entire sample reveals.

Several cautions concerning the use of the technique must be presented at this point. Some caution is required in assessing the factors between sub-groups so as not to overestimate or underestimate their values. In order to ensure that too much value is not ascribed to the nominal value of the index, reference must be made to the factor's rank among others, and to its position relative to the mean. It is also necessary to treat low rated factors with some caution. It must be remembered that the very fact that the index value exceeds zero means that it was of some importance to at least some firms in the sub-group. Finally, it must be remembered that the analysis relies entirely on the subjective evaluations made by the participating firm's management. It is therefore critical that the meanings of the location factors be properly understood. In the Atlantic Region case study, this was ensured because of the personal interview which made possible explanation where necessary. For the second stage of the research, however, it was necessary to rely upon mail questionnaires, and for this reason, the resulting data MAY be somewhat less reliable. However, it should be noted that the ratings of the factors were properly assigned, and the results do not appear to be unreasonable. As a result, the degree of error in the interpretation of the location factors is believed to be low.

The Location Factor Preference Indices Model Analysis is by no means a panacea. The analyst must have, or acquire, a reasonable knowledge of the region being studied so that the indices can be properly interpreted and assessed with respect to the actual situation. One advantage of the technique is that it is flexible with respect to the location factors chosen for analysis. In addition, it is regionally specific in its applications and results. It is possible to perform the analysis fairly quickly, and data can be readily collected due to the subjective nature of the approach. It also permits the consideration of noneconomic location factors as well as the more usual economic ones. Most important, perhaps, is that the analysis ultimately stems from the subjective judgements of the management of a number of firms, and in this sense, reflects their current thinking about a variety of locational influences. In the final analysis, it may well be this information which is of most value to the industrial development policy-makers.

CONVENTIONAL WISDOMS AND REGIONAL ECONOMIC THEORY

In addition to allowing an evaluation of the relative importance of a variety of location factors as these are perceived by business, the approach outlined above can play another role. Using it permits an evaluation of the validity of both conventional wisdoms prevailing in a region and the theory of regional development. Both tend to identify certain factors as being important or otherwise for the development process, which is to say that they predict that the indicies for these factors will rate highly on the Location Factor Preference scale. These predictions can then be weighed against the results generated by the research technique employed in this project. Where there is a difference between the two, there is at least a prima facie case to be made that the conventional wisdoms are invalid, or the theory is at best, incomplete. An examination of both the theory and the locally held opinions is therefore a useful area of exploration.

On the theoretical side, it seems useful to begin with McCrone's[4] contention that there are two different hypotheses

that might be used to explain the existence of low levels of economic performance in certain areas of an economy. He suggests that the first of these is that certain regions have, over time, evolved an economic structure which is incompatible with high rates of economic progress. As an alternative, he offers the suggestion that certain regions have inherent disadvantages, and that because of these, they

> do not provide a satisfactory environment for the modern growth industries, that is why these industries did not establish themselves in these areas in the first place and why it requires so much effort to persuade them to go there now.[5]

He goes on to suggest that if the problem is caused by the former, there is only a negligible inefficiency penalty to be paid by encouraging industrial relocation or expansion in those areas. If the cause is the later, there would be obvious penalties resulting from regional policy, and, as he suggests, these at the minimum would have to be estimated, and compared with the benefits of a regional policy.

In the real world, things will not be as neat and clean as the above suggests. The exact nature of the cause in a specific case is almost certain to be the result of the operation of both of the explanations, and the exact nature of the admixture is certain to differ among industries. It would be generally agreed that slow growth areas tend to experience out migration as a means of relieving unemployment in the short run. However, it would also be generally agreed that the tendency of the migrants to be both younger and better educated, as well as more amenable to social change. The fact of their leaving must, by definition, have a significant impact upon the future potential for economic development in the area in question.

In discussing the state of the art in regional growth theory, H. W. Richardson[6] suggests that the theory remains primitive, basing this on two factors. The first of these is that it borrows heavily from growth theory in general. The second is the need for operationality. He reviews six theories. The first of these is the economic base theory which is a weak explanation of the growth process, but which keeps recurring as a component of other models. The second is the neoclassical theory, which predicts that in the long run, regional disparities will disappear due to the workings of market forces. The third is the cumulative and causation theory involving spread and backwash effects. This theory predicts that regional disparities will widen with the passage of time. Then there are econometric models, regional input-output models, and multi-sectoral development models. The first of these is designed more for testing and forecasting, and suffers from the lack of adequate data. The second group is incomplete, in the sense that the models are open models. They suffer the same data problems as the econometric models. With regard to the final group, they provide a useful framework for analysis, but require the same sort of unrealistic assumptions as the location theory models.

With reference to location theory itself, there are several problems. The first of these deals with the nature of the assumptions usually made. There is a tendency to assume perfect competition, and, implicitly, at least, to base location on strictly economic forces. A pattern of location based upon either profit or economic rent maximization (which implies the least cost location for a particular type of activity) emerges. Location theory assigns an important role to transportation forces in the pattern of activity that develops. And, it is perhaps because of this that the role of this factor has been so stressed in the past. The importance of transportation follows directly from the nature of the usual assumptions made, particularly that of perfect competition, which allow little or no variation in other prices across the economy being considered.

Turning to the question of conventional wisdoms, there has existed in the Atlantic Provinces for several generations the notion that freight rates are the single most detrimental factor hindering economic progress. By implication, the reduction in rates would result in growth. There is also a strong feeling in the region that air transportation is important as a means of overcoming the various distance-associated problems which exist. Finally, there is, or appears to be, considerable faith in capital grants as a means of reducing regional disparities.

Both the location theory and the conventional wisdom of the region would predict high factor ratings for favorable transportation charges as a factor determining the siting of economic activity. The notion of adverse economic structure, the neoclassical theory, and the conventional wisdom would assign a high value to government financial assistance. The cumulative and causation theory would suggest that government financial assistance is relatively unimportant, and that those outside the re-

gion in question would have the perception of significant problems arising from location there. The list is obviously incomplete, but it does lay the groundwork for some assessment of the conventional wisdoms offered by business in the region, and of some aspects of the theoretical explanations of why a given region has not fully developed.

SAMPLING PROCEDURES AND DATA COLLECTION

As noted earlier, the initial stage of the research was to examine location factors as viewed by a sample of Atlantic Province firms. A sample size of 95 firms, balanced by province and industry, was chosen.[7] A questionnaire was prepared, and discussed with the owner or manager of the firm in a personal interview. This individual then rated each of the location factors on the scale discussed above. Each factor was assessed independently. The response rate was very high, with 92 of the 95 firms contacted participating in the survey.

One shortcoming of the initial stage of the research was that it did not reveal factors which deter firms from locating in the Atlantic Region. In an attempt to come to grips with this question, and to determine the importance of the same location factors as viewed by firms elsewhere, it was decided to undertake a second survey of firms located in Quebec, Ontario and Manitoba. In addition to this criterion, two others were established. Firstly, firms had to be secondary manufacturing firms. This sector was chosen because of the belief that if the Atlantic Provinces are to develop, the major thrust must be secondary manufacturing. Secondly, in an attempt to remove residentiary industries from the sample, a minimum size of fifty employees was insisted upon. Two sources were used for the survey. The first was a list of firms which had received Regional Development Incentive Act capital grants. The balance of the sample were firms appearing in Scott's Industrial Directories.[8]

RDIA Grant firms in Quebec, Northern Ontario and Manitoba were sampled at the 15 per cent level by means of a mail questionnaire. A sample was also taken for the Southern Ontario region, with questionnaires being sent to 6.4 per cent of the firms listed in the directory. The sample size in the case of the Montreal firms surveyed was 4 per cent. In total, 354 questionnaires were sent to RDIA firms, 340 to firms located in Southern Ontario, and 220 to firms in the Montreal area. The technique of collecting data via a mail questionnaire is clearly less satisfactory than the personal interview approach. However, the constraints of time and money made the use of the latter impossible.

The rate of response to the mail survey was both surprising and gratifying. It is generally held that a response rate of 18 to 20 per cent for this kind of research is very good. In this case, 41 per cent of the firms located in Southern Ontario responded, 30 per cent of the RDIA firms sampled responded, and the overall average was 31 per cent. Only in the case of Montreal firms was the response somewhat low, but it was still 16 per cent of the sample. In all cases, this rate of return of questionnaires was sufficient to permit detailed analysis of the answers.

EXPANSION BY FIRMS IN THE SAMPLE

Before considering the analysis of the location factors themselves, it appears useful to pause and examine the expansion by firms in the sample which occurred in the 1970's. This is an important question, for it gives some indication of the size of the population of firms which might be persuaded to relocate in subsequent expansions. Data on the expansion of firms in the sample, including information on the siting of expansions, are shown in Table 1.

For the sample of firms outside the Atlantic Region taken as a whole, 86 per cent expanded in the decade of the 1970's. As one would expect, the RDIA firms had a tendency to expand more often, with 90 per cent of them doing so in the relevant time frame. In the case of Southern Ontario firms, 84 per cent expanded, while 80 per cent of those located in Montreal expanded. Most firms tended to expand in situ. For RDIA firms, about 64 percent did so. In the case of Southern Ontario firms, 55 per cent expanded at their existing location, while the figure was only 36 per cent in the case of Montreal firms. Overall, 56 per cent of the firms chose to expand at the existing site. The balance of the firms either expanded only at a new site, or expanded at a new site and the existing site. For RDIA firms, about 15 per cent used new sites, while about 22 per cent expanded at both a new and the old location. In the case of Southern Ontario firms, the figures were both about 23 per cent. For Montreal based firms, 25 per cent used new sites, while 39 per cent expanded at existing sites and new sites. Overall, the figures were 20 per cent and 24 per cent respectively. Clearly, only a small proportion of firms are prepared to move when expanding, and

TABLE 1

EXPANSION OF SAMPLE FIRMS IN 1970'S BY PLANT LOCATION

	RDIA Assisted Firms	Southern Ont. Firms	Montreal Firms	Total Sampled Firms
Expanded	96	119	28	243
Did Not Expand	11	22	7	40
Expanded At				
Existing Site	61	65	10	136
New Sites Only	14	27	7	48
Existing and New Sites	21	27	11	59
Region of Expansion				
Atlantic Provinces	3	3	0	6
Quebec	18	10	8	36
Ontario	8	34	9	51
Western Canada	10	15	3	28
United States	3	4	2	9
Total New Plant Sites	42	66v	22	130

this suggests that the universe from which plants can be drawn to foster regional growth is small. In this sense, the present study is consistent with others that have been completed within Canada and elsewhere.

The table also provides information concerning the geographic location of new plant sites. Firms in the sample established 130 new plant sites in this period. Of these, 67 per cent were located in the major market area of Central Canada. About 77 per cent of the Montreal based firms so located, 66 per cent of the Southern Ontario firms, and 43 per cent of the RDIA firms. Western Canada, as would be expected, followed with 22 per cent of the new plant sites. Only slightly less than 5 per cent of the new locations chosen in the 1970's were in the Atlantic Provinces.

Firms were also asked whether they had considered locating in the Atlantic Region during the time period under review. Responses to this question are shown in Table 2. In the aggregate, 82 per cent of the firms surveyed did not even consider locating a plant in the Atlantic Provinces. The range was between 80 per cent (Montreal firms) to 83 per cent (RDIA firms). Only 11 per cent of those firms which did not have an affiliated plants in the Region considered locating there. Such a low ratio il-

TABLE 2

CONSIDERATION GIVEN TO ATLANTIC PROVINCES LOCATION (number)

	RDIA Assisted Firms	Southern Ont. Firms	Montreal Firms	Total Firms
Consideration given	11 (10)	16 (11)	3 (9)	30 (11)
Consideration not given	89 (83)	114 (81)	28 (80)	231 (82)
Firms with Atlantic Region plant	7 (7)	11 (8)	4 (11)	22 (8)

NOTE: The bracketed number is the percentage of firms in each category giving the response. Totals do not add to 100 per cent because of rounding.

lustrates the necessity of determining why this is the case, and what policy or other steps might be undertaken in order to alter the situation. This issue was investigated, and the results will be discussed later in the paper.

LOCATION FACTOR PREFERENCE: ATLANTIC REGION FORMS

This section of the paper will briefly review the findings of the factor preference analysis of the Atlantic Provinces firms. This information has been reported in an earlier paper[9] and the interested reader is directed to that source. A description of the plant location factors used in this part of the research and in the second phase as well as shown at Table 3. It should be noted that of the thirteen factors used, five are transportation related.

The Location Factor Preference indicies for a selected number of Atlantic Provinces subgroups are shown in Table 4. Manufacturing firms and food processing firms are shown separately and combined. In the course of the research itself, firms were broken down into three categories from the point of view of employment. Because of the desire here to make interregional comparisons of the results, only the combined category 'more than 50 employees 'is shown. In the initial study, three time periods were distinguished. In the table, only one of these, only those firms established after 1969 are shown. Finally, all firms in the sample are shown. Additional results can be supplied to those requesting them.

For manufacturing firms, the single most important locational factor was the availability of a skilled and/or a stable labour force. Proximity to markets ranked second, followed by government financial assistance, owners or managers residence, access to rail transport and access to road transport. All of these factors scored well above the predetermined mean. The balance of the factors scored below the mean. Most surprising of these, in view of conventional wisdoms, was the index for air transportation.

In the case of food processing, the most important factor, as one would predict, was access to raw materials. The OMR factor scored second, followed by access to road transport, markets, and processing water. Labour scored below the mean, reflecting, perhaps, the unskilled nature of the employment. The ranking of the indices in this sector is

TABLE 3

DESCRIPTION OF PLANT LOCATION FACTORS

1)	MKT	the proximity of the plant site to the prospective market for the product(s)
2)	RAW	the proximity of raw materials used in production to the plant site
3)	LAB	the availability of skilled and/or stable labour force to the plant site
4)	GFA	the availability of government financial assistance and/or incentives at the plant site if chosen
5)	ROAD	the accessibility of the plant site to highways for transporting to and from the site
6)	RAIL	the accessibility of the plant site to railways for transporting to and from the site
7)	AIR	the accessibility of the plant site to air service for transporting to and from the site
8)	SHIP	the accessibility of the plant site to ports and waterways for shipping to and from the plant site
9)	PROW	the availability of water for processing at the plant site
10)	PROE	the availability of electricity for processing at the plant site
11)	PRI	the proximity of related industry to the plant site
12)	OMR	the residence of the owner or manager located at or near the plant site
13)	RATE	the existence of reasonable transportation rates for commodity movements to and from the plant site

TABLE 4

LOCATION FACTOR PREFERENCE INDICES OF SELECTED SUB-GROUPS ATLANTIC REGION SAMPLE

LOCATION FACTORS	SECONDARY MANUF.	FOOD PROCESSING	MANUFACTURES AND FOOD PRO.	POST DREE PERIOD	MORE THAN 50 EMPL.	ALL FIRMS
MKT	1153	1082	1123	965	998	1090
RAW	515	1489	992	545	1238	1227
LAB	1244	748	1037	1513	845	901
GFA	1106	457	835	2205	988	745
ROAD	976	1296	1110	1012	915	1014
RAIL	1065	652	892	443	966	880
AIR	118	106	113	229	105	84
SHIP	699	493	613	483	944	706
PROW	392	860	583	364	675	626
PROE	660	699	676	586	617	583
OMR	1101	1300	1184	782	886	1205
RATE	458	423	443	476	405	464
MEAN	769	769	769	769	769	769

NOTE: The post DREE period refers to the period beginning in 1969.

not surprising, though attention must be drawn to the fact that reasonable transportation rates scored well below the mean as it did in the previous case.

In the period since 1969, government financial assistance has been the most important locational factor, scoring well above the other twelve. Access to a skilled or stable labour force was also important, having an index almost twice the mean. Access to road transport, markets, and the residence of the owner or manager were also of importance in that order. Other factors, including rates once again, were below mean value.

When the data are disaggregated according to the number of employees, access to raw materials stands out as the most important factor. It is followed by access to markets, government financial assistance, access to rail, ship and road transportation, residence and labour. Access to air is the lowest scoring factor, followed by reasonable transportation rates.

On the basis of these data, and other analysis which has been completed, it appears safe to say that both transportation rates and access to air transportation have been vastly overrated as factors retarding the economic progress of the Atlantic Region. The importance of both has been overemphasised in both the conventional wisdoms and in the regional development literature.

Finally, it is to be noted that a policy framework for the Atlantic Region did emerge from the analysis. Basically, the Atlantic Region has two tasks to fulfill. It is clear that the maintenance of stable and productive resource industries is important. It is equally clear that accommodations for the expansion of new secondary manufacturing industries must be made. To this end, the analysis up to this point reveals no single factor that has attracted or deterred industrial development in the Atlantic Region. It is equally clear that no single policy instrument can be expected to attract new industry to the Region. In order to determine what factors are important in attracting new industry, it is necessary to consider the perspectives of firms outside the region. This was the second stage of the research, the results of which are discussed in the following section of the paper.

LOCATION FACTOR PREFERENCE: QUEBEC, ONTARIO AND MANITOBA FIRMS

In this phase of the research, as al-

ready discussed, firms outside the Atlantic Region were surveyed by means of a mail questionnaire, and asked to rate the same location factors in two respects. They were asked, firstly, to rate the importance of each location factor relative to their chosen site. Having completed that task, they were asked how they perceived the Atlantic Region accommodated the factors as they apply to the selection of a plant site by their firm. The objective was to determine the consistency of the importance of location factors in different areas, and to determine perceived problems with an Atlantic Region location which might be amenable to change through government policy. As in the previous case, only selected sub-group tabulations of the results have been incorporated into this paper. Additional results will be made available on request as further papers are completed.

Location Factor Preference Indices for sampled firms outside the Atlantic Provinces giving their perceptions of their own locations are shown in Table 5. The table shows the perceptions of all firms by area and the perceptions of firms which expanded in the 1970's by area. Each will be discussed separately.

In three of the four cases, when all firms are considered, access to markets was considered the most important locational factor. In the case of Northern Ontario and Eastern Manitoba, it ranked second, closely following access to road transport. In fact, in this sub-group, the same six factors (though not always in the same order) appear as most significant. Labour was the second most important, ranking second three times and third in the other case. Road transport was ranked first on one occasion, second on two more and fourth in the other case. Access to favorable transportation rates ranked third in one sample, fourth in a second case, and fifth in the other two cases. Access to raw materials and the availability of electricity for processing were ranked next. Only one other index, that being government financial assistance in the case of Quebec, ranked above the predetermined mean of 769. This was the case despite the fact that firms locating in Northern Ontario and Manitoba all received such financial assistance.

The second part of Table 5 presents the factor preference indices for those firms which expanded in the period under review. These are broken down by firms which expanded only at their existing location, firms which expanded only at new locations, and firms expanding at both old and new locations. In

TABLE 5

LOCATION FACTOR PREFERENCE INDICES: NON-ATLANTIC REGION FIRMS EVALUATION OF OWN SITE

LOCATION	ALL SAMPLED FIRMS BY GEOGRAPHIC LOCATION				FIRMS EXPANDING BY SITE OF EXPANSION		
	RECEIVED RDIA GRANTS		DIDN'T RECEIVE GRANT				
	NOR.ONT/ MANITOBA	QUEBEC	SOUTH ONTARIO	MONTREAL REGION	EXISTING SITE ONLY	ENTIRELY NEW SITE	BOTH OLD AND NEW SITES
MKT	1158	1233	1483	1514	1396	1415	1352
RAW	1015	997	1051	985	1005	1173	1017
LAB	1132	1200	1287	1258	1296	1184	1204
GFA	603	810	304	391	491	436	544
ROAD	1183	1145	1064	1043	1093	1044	1154
RAIL	717	583	467	539	482	447	581
AIR	416	295	490	422	340	470	470
SHIP	141	316	176	209	208	280	207
PROW	388	551	556	386	512	390	647
PROE	1106	954	921	974	940	903	1003
PRI	511	431	612	757	637	633	445
OMR	572	448	582	436	563	640	460
RATE	1059	1039	1007	1086	1038	984	1014

NOTE: In all cases, the mean is predetermined, and has a value of 769.

all three cases, access to markets ranked as the most important locational factor, followed by the labour factor. Access to road transport ranked third in two instances, and fourth in the case of firms expanding only at new sites. Access to raw materials was next in importance, ranking from third to fifth depending on the subsample chosen. Favorable transportation rates and the availability of electricity for processing also ranked well above the mean in that order. All other factors scored well below the mean value in all cases.

To complement this analysis, the firms surveyed were also asked how they perceived the Atlantic Provinces accommodating the various location factors as they applied to the selection of a plant site for their product(s). The resulting factor preference indices, for the same subsamples shown in Table 5 appear in Table 6. It should be noted that of the 262 firms surveyed, less than half (129) completed this part of the questionnaire. Many indicated that they could not properly assess the Atlantic Region in such detail because they were not sufficiently familiar with the region. Others indicated that they found the questions too ambiguous. Still others simply left it blank. Accordingly, there are difficulties in interpreting the results.

This last point aside, care must be taken in interpreting the data in Table 6. A comparison between the indices here and those in Table 5 can be used to indicate the similarities and differences in the importance of the location factors to the outside firms, and how they perceive the Atlantic Provinces accommodating these factors. Consequently, if a factor is rated high in the case of the site chosen, and low in the Atlantic Region, it tends to indicate a perceived deficiency in the latter. If both are rated highly, then the Region can be said to accommodate that particular factor well. Most of the attention, therefore, should be focused on those factors which received high ratings in the case of non-Atlantic Region location. If a factor is rated low in the case of the firm's own location, but high in the Region, it suggests that while the factor is not an important locational determinant, the latter accommodates it well. The major difficulty in interpretation comes with the low ratings in both areas. It is not clear whether this occurs because the firm considers the factor unimportant or because the Region does not accommodate it well. For policy purposes, this may not really matter, for the adverse impact of such factors should not be great in any case.

Firms located in Northern Ontario and Manitoba, and those which had expand-

TABLE 6

LOCATION FACTOR PREFERENCE INDICES: NON-ATLANTIC REGION FIRMS PERCEPTIONS OF ATLANTIC REGION

LOCATION	ALL SAMPLED FIRMS BY GEOGRAPHIC LOCATION				FIRMS EXPANDING BY SITE OF EXPANSION		
	RECEIVED RDIA GRANTS		DIDN'T RECEIVE GRANT				
FACTOR	NOR.ONT/ MANITOBA	QUEBEC	SOUTH ONTARIO	MONTREAL REGION	EXISTING SITE ONLY	ENTIRELY NEW SITE	BOTH OLD AND NEW SITES
MKT	593	932	547	1185	654	840	794
RAW	701	794	475	636	581	857	594
LAB	1304	1076	1233	1467	1072	1511	1283
GFA	1124	1413	1576	502	1645	1337	835
ROAD	1384	1214	1041	1299	1127	1101	1398
RAIL	734	812	653	781	629	592	928
AIR	594	272	696	394	468	767	513
SHIP	395	490	481	449	485	264	413
PROW	423	464	799	599	664	365	609
PROE	1174	1138	1147	1305	1248	961	1124
PRI	535	457	358	504	473	312	459
OMR	517	286	473	371	411	512	456
RATE	524	651	521	508	543	579	594

NOTE: In all cases, the mean is predetermined, and has a value of 769.

ed at their own site ranked the market factor in the Atlantic Provinces below the mean. Those located in Quebec and in the Montreal region ranked this factor well above the mean. Those which had expanded at a new site, or at the existing and a new site, also ranked the factor above the mean. Market accessibility is one area which requires some policy measures if an effective development strategy is to be mounted. The labour factor is rated very high, and this must be regarded as a positive result. Access to road transport was the third ranking factor when outside firms were asked to rate their own location, and it receives a similar ranking in the case of the region. Again, this must be regarded as a positive result. Reasonable transportation rates were regarded as being very important by outside firms, and they perceived rates as being moderately unfavorable in the case of the Region. This must be regarded as a negative impact, though it does have implications for development strategy. It suggests that primary focus be put on those products where transportation costs are only a small fraction of the delivered costs. The availability of electricity for processing was the sixth ranked factor when outside firms evaluated their own sites. These firms saw the Region as accommodating this requirement very well.

Brief comments on two other factors must be made. While the availability of government financial assistance received a low rating by outside firms relative to their own location, it was considered to be of great importance as a factor for possible location in the Atlantic Region. This is consistent with the opinion of Atlantic Region firms which have established in the period since 1969. The results which have been obtained in both of the surveys with respect to the importance of the proximity to related industries are surprising. A considerable portion of the literature stresses this factor as an important component of a development strategy, but the results obtained in this research tend to contradict that hypothesis. These results are consistent with those of a 1971 study of 900 industrial firms in Flanders.[10]

Overall, the perceptions of the outside firms surveyed reveal the factors 'markets' and 'rates' as being the most significant negative ones from the point of view of location in the Atlantic Provinces. While the financial assistance available is a highly positive factor, it is clear that other policies are required if it is to achieve maximum impact. Of these, one improving access to markets should receive highest priority.

SUMMARY AND CONCLUSIONS

This paper has reported on research to estimate the impact of transportation on the development of the Atlantic Region. It began by reviewing the research methodology employed, and then briefly considered some of the received theory and conventional wisdoms held in the area. In both instances, it was clear that there were serious conflicts between the generally accepted concepts and the perceptions of those making the real life decisions.

The study confirms the finding of other studies that only a small fraction of firms undergoing expansion even consider an alternative location. This fact has serious implications for regional development in that it reduces considerably the universe from which new firms can be attracted into depressed areas. It also reduces the effectiveness of capital assistance programs. If regional policy is to be effective, some means must be found to encourage firms to at least consider a different location.

The Atlantic Provinces part of the study revealed that there should be two policy thrusts. The first of these involves the maintenance of a stable and productive resource based sector. Secondly, steps must be taken to accommodate the expansion of the secondary manufacturing sector. In this regard, it should be noted that outside firms view access to markets, the availability of labour, and access to highway transportation as the three most important locational factors. Access to raw materials, favorable transportation rates, and the availability of electricity were also rated highly. The perceptions of these firms was that the market accessibility factor and the reasonable transportation factor were not well accommodated by the Atlantic Region. Policies aimed at improving the former and circumventing the latter must be adopted if the available capital assistance program is to be fully effective.

FOOTNOTES

1 This research was made possible through the financial support of the Negotiated Research Contributions Programme of Transport Canada. This paper was independent prepared by the authors, and does not necessarily reflect the policy or opinions of Transport Canada.

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