Staff Paper No. 112

TRANSPORTATION AND INFRASTRUCTURE:

IMPORTANCE TO RURAL ECONOMIC DEVELOPMENT

by

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July 1993

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ABSTRACT

The overall objective of this study was to complete a comparative analysis of firms and economic development specialists' attitudes about the importance location factors in North Dakota, South Dakota, and Nebraska. Results indicated that overall, state and local taxes ranked first, infrastructure ranked second, and transportation ranked seventh. A comparative analysis was completed based on community sizes above and below 5,000 people. Economic development specialists and firms from rural communities ranked ten main location factors similarly. Small urban economic development specialists and firms had more disparity between their ranks of the ten main location factors.

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INTRODUCTION

In general, the need for economic development is broadly accepted; however, policymakers and local leaders may not have a clear understanding of the important factors affecting firm location decisions (Leistritz, 1991). The information available to policymakers may be confusing because of disagreements about the factors critical to economic development. One uncertainty is the extent that transportation and infrastructure should be included as important location factors.

The relationship between transportation and economic development is not well understood. The Canadians have been researching this issue for over twenty years and still have not reached a conclusion.[1] Debates have centered around the relationship between transportation and regionalization of industry (Kraft, Meyer, and Valette).

Some economists argue that transportation does little for shaping regions (Chinitz). In fact, they see transportation as a result rather than a cause of economic change because transportation may be adapted to the geography and growth patterns. A main argument is that transportation is a derived demand (Kraft, Meyer, and Valette).

Other economists disagree believing that transportation has location effects and can generate its own demand (Wein). Wherever it may start, a chain of reactions between transportation and development follow (Wein). The extension of transportation networks may explain some of the improved location trends in industrialized countries. Good national network connections are helpful to draw industries to a specific region but are not the only factors considered (Kraft, Meyer, and Valette).

Rural communities have attempted to combat a declining local economy by trying to attract new industry. Location theory is useful to help identify the factors firms deliberate before making a site selection. Empirical studies have been conducted to determine the factors firms consider most important when making location decisions.

Lopez and Henderson (1989) analyzed the determinants of location choice for new food processing plants. Top managers of 56 food processing plants in the Mid-Atlantic states (New Jersey, Pennsylvania, New York, Delaware, and Maryland) responded to a telephone survey. Respondents ranked the importance of six general business climate categories and 41 specific location factors. The six general categories were market, infrastructure, labor, personal, environmental regulation, and fiscal policies. Market and infrastructure were the two most important business climate categories, while environmental regulation and fiscal policy were the least important (Lopez and Henderson, 1989).

Leistritz (1991) analyzed location factors important to a sample of 314 firms in North Dakota, South Dakota, and Nebraska. He categorized 62 specific location factors into nine main categories. The nine categories were state and local taxes, incentives and infrastructure, labor, transportation, utilities, quality of life, labor availability, markets, and higher education. Many of the variables were similar to those investigated by Lopez and Henderson (1989). However, the rankings of factors were much different. For example, markets ranked first in the Lopez and Henderson (1989) study, but last in the Leistritz (1991) study. State and local taxes ranked first with Leistritz's (1991) respondents, but ranked last with Lopez and Henderson's (1989). These differences could result from the different geographic study regions or be a function of the survey design or research method.

Goode and Hastings (1989) incorporated transportation related variables in a dichotomous regression model to test their involvement in location decision making. Sixty-nine industries from nonmetropolitan and small metropolitan communities in Northeastern United States (New England, Mid-Atlantic, Southern Atlantic states, and Virginia) were evaluated. The dependent variable received a value of one if the community attracted a new plant during the period 1970-1978 and a value of zero if there was no new plant. Six infrastructure and transportation related factors were the independent variables. These variables include distance to road, distance to limited-access four-lane highways, number of rail lines, number of airlines, potential net input availability, and market access.

Goode and Hastings did not rank the factors in order of importance. However, results differed for some variables depending upon community size. For example, rail service had positive influence on location decisions for nonmetropolitan and small metropolitan communities while the availability of air service was more important in nonmetropolitan communities than in small metropolitan communities. These results are consistent with other studies that found interstate highway construction did not stimulate economic development in the counties in which the interstate highway was located but did in adjacent counties (Goode and Hastings). Results for small metropolitan communities differed from results for nonmetro communities. Air Service was less important in small metropolitan communities. Reasons for this difference may be that small metropolitan communities have airport facilities, even though they may not have scheduled air service. With airport facilities, corporate flights could still be made (Goode and Hastings).

study are to (1) complete a comparative analysis of firms and economic development specialists' attitudes about location factors, (2) evaluate the importance of infrastructure and transportation in location decisions, and (3) examine the implications of the findings for future policy decisions. The focus of the study is rural and small urban communities in North Dakota, South Dakota, and Nebraska.

The remainder of this analysis is organized as follows. In the next section, the data and research methods are addressed. The empirical results are discussed in section three. Finally, a summary of the analysis and conclusions are provided in the last section.

DATA AND RESEARCH METHODS

Two survey data bases were used for this analysis. One data base consisted of a survey of firms from North Dakota, South Dakota, and Nebraska. This survey was conducted by Leistritz (1991) as he studied the location of firms in the Upper Great Plains. Leistritz used two criteria in his studies, firms were required (1) to have sold more than 10 percent of their product or service to out-of-state markets and (2) to have begun operations or expanded their work force by more than 10 percent since 1977. The first criterion was relaxed increasing the number of manufacturing firms from 314 to 358.

The second data base was of a survey of economic development specialists from North Dakota, South Dakota, and Nebraska. A census approach was taken as surveys were mailed to 413 economic development specialists from these three states. Directories from state economic development specialists were obtained from South Dakota and Nebraska, and mailing lists from the North Dakota Economic Development Commission and the Industrial Development Association (IDA) were used to obtain the census of community leaders involved in economic development. A total of 199 economic

development specialists answered the questionnaire for a response rate of 48.2 percent (Table 1). The majority of the respondents (84.4 percent) represent local economic development organizations (Table 1).

TABLE 1. Selected Characteristics of Respondents in Upper Great Plains States

Characteristic	Economic Development Specialist		Firms	
	Frequency	Percent	Frequency	Percent
State				
Nebraska	62	31.2	107	29.9
North Dakota	85	42.7	146	40.8
South Dakota	52	26.1	105	29.3
TOTAL	199	100.0	358	100.0
City Size				
Rural	159	79.9	131	36.6
Small Urban	40	20.1	227	63.4
TOTAL	199	100.0	358	100.0

The respondents were categorized into two groups based on community population. Communities under 5,000 people were classified as rural and communities over 5,000 people were classified as small urban. The population size of 5,000 was selected because of the large number of small communities throughout the three states in the study. For example, in North Dakota, 96.7 percent of the communities have populations below 5,000 (North Dakota Census Data Center). However, there is a tendency for firms to locate in larger communities. Leistritz (1991) found that among the firms he surveyed the median community population for location was 10,000 people as a minimum. Due to the large number of small communities in the Midwest, but the preference for firms to locate in larger communities, the population size of 5,000 was chosen for comparative purposes.

Almost 80 percent (159) of the economic development specialists were from rural communities, while 20.1 percent (40) were from small urban communities (Table 1). In contrast, more of the firms were from the small urban communities. Over 63 percent (227) of the firms were located in small urban communities, while 36.6 percent were in rural communities (Table 1).

Both f i rms and economic development specialists rated the importance of 62 individual factors for attracting firms to communities. The factors were ranked between the range of one and five, with 1=CRITICAL, 3=IMPORTANT, and 5=UNIMPORTANT. The 62 specific factors were classified into ten main factors. The ten main factors are labor, labor availability, transportation, markets, utilities, quality of life, higher education, state and local taxes, incentives, and infrastructure. The scaling used is identical to Leistritz's (1991) for comparative purposes.

Certain assumptions are necessary to measure perceptions of economic development specialists and firms about particular location factors. Economic development specialists and firms are assumed to have understood the questions and were able to report accurately their perceptions. The five point attitudinal scale is assumed to capture adequately and measure perceptions of the community developers and firms. Under these assumptions, variables can be measured and a comparative analysis performed.

A mean was calculated from the values the respondents assigned each of the 62 location factors. From the means for the specific factors, an index was created for the ten main location factors. For example, the main factor, transportation, was constructed from four specific factors. These factors are motor freight services, interstate highway access,

rail, and scheduled air services. The mean value for each of the specific factors was combined to create a mean value for the main factor transportation.

A paired t-test was used to identify differences in attitudes between economic development specialists and the firms. The paired t-test determines if the means of two groups of observations are equal. This test would indicate if economic development specialists and firms view the importance of location factors similarly.

Creating a rank of importance of the indexes for each group is a second method to compare the perceptions of economic development specialists and firms. The two sets of rankings could then be observed for correlation by Spearman's rho (Siegel, 1956).[2] A correlation of 1.0 would indicate a perfect match, meaning that perceptions of economic development specialists and firms are identical. On the other hand, a correlation of 0 or a negative value would indicate no correlation, or opposed views, respectively.

EMPIRICAL FINDINGS

The data sets were combined to determine the overall rank for the ten main factors. First, results from the total population will be mentioned and then results will be discussed by breakdown based on community size. The location factors of interest infrastructure and transportation will be discussed in more detail.

The empirical results for the combined data sets reflect that state and local taxes and infrastructure ranked as the most important location factors (Table 2). Higher education and markets ranked as the least important location factors. The ranked order is quite similar for both economic development specialists and firms.

Paired t-tests were run to test the difference between the means for the ten main factors for economic development specialists and firms. The paired t-tests revealed the ten main factors are significantly different at the .05 confidence level (Table 2).

TABLE 2. Comparison of Ranks of Main Location Factors Among EDSs and Finns, by Community Size, 1991

Main Factors	Ranks and Means of					Ranks and Means of			
	Overall	EDS	Mean	Firms	Mean	EDS	Mean	Firms	Mean
State and Local Taxes	1	3	2.34	2	2.78	4	2.41	1	2.63
Infrastructure	2	2	2.26	1	2.69	5	2.43	2	2.79
Incentives	3	1	2.19	3	2.82	2	2.36	4	3.05
Labor*	4	7	2.74	4	3.15	6	2.46	3	2.80
Utilities	5	5	2.47	5	3.18	3	2.39	6	3.14
Quality of Life*	6	4	2.47	6	3.20	8	2.66	5	3.13
Transportation	7	6	2.59	8	3.50	1	2.30	7	3.30
Labor Availability*	8	8	2.82	7	3.49	9	2.70	9	3.39
Higher Education	9	9	2.94	10	3.76	7	2.58	8	3.35
Markets	10	10	2.97	9	3.59	10	2.80	10	3.56

NOTE: EDS = Economic development specialist

*Significant difference at .05 level between economic development specialists and firms means for the economic development specialists' views are consistently lower than the mean values representing the firms' views (Table 2). This indicates that the economic development specialists view all ten main factors as more critical than firms do for making a location decision.

Rural Economic Development Specialists and Rural Firms

A Spearman's rho correlation coefficient for the ten main factors was calculated to measure correlation between rural economic development specialists and rural firms. A correlation coefficient of .842 indicates a high correlation, significant at the .05 confidence level (Table 3). Thus, the population of economic development specialists and firms from rural communities has similar attitudes about the importance of location factors.

Labor is the only main factor differing in rank by more than two positions. Firms ranked labor third, while economic development specialists ranked it sixth (Table 2). Therefore it is suggested that economic development specialists supply information to fi r ms about the community labor force such as work attitudes, labor productivity, status of unions, and wage levels.

TABLE 3. Spearman's Rho Correlation Matrix of the Ten Main Factor Rankings, by Community Size, 1991

	Rural EDS	Small Urban Firms
Rural Firms	.842*	.903*
Small Urban EDS	.624*	.479

NOTE: EDS = Economic development specialist
*Significant difference at the .05 level

The other main location factors do not differ greatly in rank. Rural economic development specialists ranked incentives and infrastructure as the two top location factors and higher education and markets ranked as the least important of the ten main location factors (Table 2). In comparison, rural firms ranked infrastructure and state and local taxes as the top factors and markets and higher education as to lowest of the location factors (Table 2).

These ranks are inconsistent with Lopez and Henderson's (1989) conclusions for agricultural processing firms in the Mid-Atlantic states. Their findings ranked fiscal policy last and markets first. The conventional wisdom in the economic literature is that taxes are an unimportant location factor (see Carlton [1983] and Schmenner [1982]). However, Bartik (1985) concluded that state taxes have a significant effect on location decisions. The Upper Great Plains states typically rank low in terms of tax burden. Therefore, the higher rank for taxes likely reflects a belief and attitude about the regional tax structure. The low rank for markets may reflect the great distances to market from this region.

Infrastructure is very important to both rural firms and economic development specialists, ranking first and second, respectively (Table 2). The main factor infrastructure was developed from six specific location factors. They are developable land available, buildings available, cost of property, cost of construction, environmental regulations, and improved state regulatory climate.

There was little difference in rank for cost of property, buildings available, or environmental regulations, or improved state regulatory climate. Overall cost of property was eighth of 62 factors (Table 4). The other two infrastructure specific factors differed in rank by 14 or more between rural firms and economic development specialists. Rural economic development specialists ranked developable land available fourth overall, while rural firms ranked it eighteenth (Table 4). Given firm's perspectives, rural economic development specialists can probably de-emphasize somewhat the importance of available buildings. Rural firms are interested in obtaining more specific information about the cost of construction. They ranked it eighth while rural economic development specialists ranked it twenty-third (Table 4).

Rural economic development specialists and firms did not rank the transportation variables high among the ten major location factors. The main factor transportation was ranked sixth by rural economic development specialists and eighth by rural firms. Except for rail service, there is close agreement on the ranks for the specific transportation factors between the two groups. Both rural firms and economic development specialists ranked motor freight service as the most important transportation factor, ranking 19th and 21st, respectively (Table 4). However, motor carrier access, especially for specialized equipment such as refrigerated vans, was often cited as a problem in rural areas. Rural economic development specialists ranked rail service 41st, eighteen positions higher than rural firms (Table 4). Moving bulky agricultural products or natural resources are important to many rural communities in the Upper Great Plains. In contrast, small manufacturing firms generally have little need for rail service. Firms may also feel that the trucking industry is able to provide better service than rail.

TABLE 4. Ranks of Infrastructure and Transportation Location Factors, by Community Size, 1991

Factor	Class	Overall	Rural		Small Urban	
			EDS	Firms	EDS	Firms
Cost of property	I	8	16	4	24	10
Motor freight services	T	15	21	19	11	11
Developable land available	I	16	4	18	6	22
Cost of Construction	I	18	23	8	35	18
Buildings available	I	23	17	21	21	31
Environmental regulations	I	24	27	20	39	21
Improved state regulatory climate	I	27	34	24	46	24
Interstate highway access	T	34	32	44	5	34
Rail	T	60	41	59	48	62
Scheduled air service	T	53	50	55	22	47

Small Urban Economic Development Specialists and Small Urban Firms

A Spearman's rho correlation coefficient of .479 for the ten main location factors indicated a statistically insignificant correlation between ranks of small urban economic development specialists and small urban firms (Table 3). It is surprising that the correlation coefficient is smaller between small urban communities than it was between rural firms and economic development specialists. This seems inconsistent because the small urban areas have full-time, paid developers. In contrast, most rural areas rely on part-time volunteers. One reason for this low correlation could be the rural firms are more homogeneous in nature then firms in small urban communities which may be more diversified.

The ranks for the main factors are very different between small urban firms and small urban economic development specialists. Six of the ten main factors differ in rank by more than three positions (Table 2). Economic development specialists ranked transportation and incentives as the two top main factors and labor availability and markets as the bottom two main factors (Table 2). Small urban firms ranked state and local taxes and infrastructure as the two top factors and labor availability and markets as the bottom two factors.

Economic development specialists from small urban communities ranked infrastructure fifth while firms from small urban communities ranked it second (Table 2). The higher overall rank for infrastructure by small urban firms reflects their much higher rankings for four of the six specific variables. Costs and regulations were much more important to urban firms. Thus, economic development specialists should inform potential locating firms of property costs and construction costs. Small urban firms also cited improved state regulatory climate as much more important. "One-stop shopping" is an important trend in many applications. Businesses increasingly wish to minimize their efforts in complying with government regulations, licensing, and financing programs. Small urban communities might consider developing a program whereby they assist the firm meet the state regulatory requirements. As with rural economic development specialists, their urban counterparts can probably de-emphasize the importance of developable buildings available.

There was a large discrepancy between the main location rankings for transportation. Small urban economic development specialists ranked transportation first while small urban firms ranked it seventh (Table 2). The specific factor, motor freight services was ranked 11th by both groups (Table 4). However, interstate highway access, rail, and scheduled air service were all ranked much higher by small urban economic development specialists. The importance of interstate highway access and scheduled air service may be lower for urban firms because these are factors they can determine easily by themselves. However, small urban community developers may expand upon this information by emphasizing that their community is a regional trade center.

CONCLUSIONS

Economic development is vital to the Upper Great Plains. In order to promote economic development, it is important that local leaders and policymakers are aware of the present needs of firms and other industries that are making location decisions. In this study, differences in perceptions about location factors were found to exist between economic development specialists and firms. The differences indicate that economic development specialists may not be aware of the specific factors that firms view as important. If economic development specialists are not aware of the important factors, they may not be meeting the firm's needs and thus economic development may bypass in the community.

Certain conclusions and suggestions are made based upon the results of this study. The major difference in the ranks of the ten main factors among economic development specialists and firms occurred for the factor labor. Firms ranked labor considerably higher than economic development specialists. Some anti-union sentiment is evident among community development practitioners and firms in the region. Infrastructure ranked dose among the groups. Cost factors were viewed as more important by firms from both community sizes. Thus, more information on cost of property and construction may better meet the needs of locating firms. Transportation was viewed more importantly by economic development specialists than by firms for both community sizes. Motor freight services was the only specific factor that firms ranked in the top quartile. Therefore economic development specialists should continue to inform locating firms about motor freight services, however, they might de-emphasize interstate highway access, rail, and scheduled air service.

It was surprising that rural economic development specialists' ranked factors were more highly correlated with firms than small urban economic development specialists and firms. One would expect the training and resources available to small urban economic development specialists would enable them to better meet the needs of locating firms. However, their clientele base is much more diverse than that for rural communities.

Further conclusions of the study reveal that the high rank of state and local taxes is inconsistent with previous studies. However, it is consistent with the findings by Bartik and Leistritz. An explanation for the inconsistent findings may be that the importance of location factors is a function of the region studied.

ENDNOTES

1. See *Transportation and Regional Development: Proceedings of a Conference.* ed. E.W. Tyrchniewicz and Om P. Tangri, Center for Transportation Studies, University of Manitoba, 1970; and *The Role of Transport in Manitoba's Economic Future: Proceedings of a Conference,* ed. E. W. Tyrchniewicz, University of Manitoba Transport Institute, 1988.

2. This procedure is similar to work done by Wood, McDonald, and Youngs (1989).

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