

Manufacturers' Views of Transportation's Role in Site Satisfaction

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Over the last several decades, many large manufacturers have moved to North Carolina, or expanded operations there, generating a sort of economic resurgence, particularly in metropolitan areas. Many North Carolina counties still recruit companies from outside—the classic “buffalo hunt” style of economic growth. Concerns about taxes, labor, transportation, and quality of life are often mentioned as factors in the siting decision. However, less is known about these companies once arrived, or companies that sited in North Carolina in earlier years, or their subsequent satisfaction with their decisions. This study reports on a 1989 survey of North Carolina manufacturers that focuses on manufacturing siting decisions and the role of transportation in site satisfaction. A representative sample of 504 manufacturers in North Carolina answered a 5-page questionnaire about present manufacturing inputs and outputs, modes of shipment, company size and unionization, concerns about the present site, and suggestions for policy actions that would improve site satisfaction. Over 93 percent of respondents were satisfied with their present locations; many cited good labor supply, transportation access, lack of unions, and lower taxes as reasons for the choice. Transportation factors also rated high in site satisfaction. Of major concerns, manufacturers were most worried about the quality, trainability, and availability of labor, particularly public school education, work attitudes of workers, crime rates, utility service, and environment. Concern about more transportation access ranked lower on the list of 34 items. The findings varied somewhat by region or industry group, but nowhere did strong concerns for transportation surface. The study concludes that transportation access in North Carolina is presently good in the manufacturers' eyes—a real plus—allowing them to be more concerned about fundamental labor and worker attitude issues, which are seen as a real threat to the competitive economic future of the state.

Over the last 30 years, numerous manufacturers have moved their facilities to the Sunbelt, in search of lower taxes and wages and other amenities. Typical “come-on” recruitment efforts tout the region's quality-of-life, transportation access, low tax rates, and labor costs and availability. Companies from northern rust-belt states are actively recruited in this fashion. Much less is known, however, about postsiting satisfaction of these companies, or earlier movers. A survey of 500 North Carolina manufacturers' opinions about their location is described, and the present transportation and other concerns they now express are discussed.

THE NORTH CAROLINA INDUSTRIAL PATTERN

The structure and geography of manufacturing in North Carolina are based on patterns that were established over many

decades. Thus, an understanding of present and likely future trends requires an appreciation of the state's rather unique history of industrialization. Manufacturing has been a major part of the North Carolina economy ever since the late 19th century. After about 1880, numerous textile mills were built throughout the Piedmont area (1). The rapid expansion of this industry in cities, towns, and rural areas provided a welcome employment alternative to farming in the post-Civil War era. Cigarette manufacturing and the furniture industry soon followed and, with textiles, formed the “Big Three” as pillars of the state's economy. Textiles and furniture plants were noted for their tendency to locate not in cities but rather in towns and rural areas. This practice was in contrast to the experience of other newly industrializing regions where the clustering of factories provided the basis for the growth of large cities. In North Carolina, both industry and people came to be broadly dispersed and large cities did not emerge (2), a pattern called “rurban” (rural-urban blend). By the late 20th century the state was still one of the few to have less than half of its population classified as urban by the census (48 percent in 1980). Yet by 1986, North Carolina ranked eighth nationally in terms of employment, value added, or value of shipments in manufacturing. Furthermore, fully 12.7 percent of the total population had a factory job, the highest such proportion for any state. By that measure, North Carolina is the most industrialized in the nation even though it is still one of the least urbanized.

Recent growth has involved a good deal of diversification. Even though the textile industry lost 26,000 jobs, a host of other industries grew to more than offset the loss in mill jobs (Table 1). During this period of growth and diversification, two major new trends were affecting the state. One was the emergence of the international economy, wherein multinational companies placed production facilities all over the world wherever they could achieve more competitive production costs. A second trend was the appearance of the information processing economy, in which the office replaced the factory as a primary place of work. The modern office tends to locate in clusters that are close labor supplies, business services, and various amenities. Proximity to a major commercial airport is often important; the new office economy is synonymous not just with cities but with large ones. Charlotte has experienced a 10-fold increase in office space between 1970 and 1990. Raleigh, Greensboro, Winston-Salem, and several other cities have had major increases as well. Otherwise, the office space explosion that has been driven by the information processing economy has not extended much to the smaller cities and certainly not to the rural areas. These recent trends have tended to favor growth in metropolitan areas, whereas North

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TABLE 1 MANUFACTURING EMPLOYMENT IN NORTH CAROLINA

Industry (SIC)	Employment (thousands)		% Change 1980-89
	1980	1989	
Food (20)	44.0	50.5	14.8%
Tobacco (21)	24.2	21.7	-10.3
Textiles (22)	245.8	219.3	-10.8
Apparel (23)	88.0	82.8	-5.9
Wood (24)	35.5	36.5	2.8
Furniture (25)	81.5	87.6	7.5
Paper (26)	21.3	22.9	7.5
Printing-Publishing (27)	20.5	30.3	47.8
Chemicals (28)	39.4	44.0	11.7
Rubber-Plastics (30)	27.1	34.7	28.0
Fabricated Metals (34)	26.0	30.7	18.1
Non-Elec. Mach. (35)	49.5	63.8	28.9
Elec. Equip. (36)	55.3	57.1	3.3
Other Mfg. (29,31,32,33,37,38,39)	61.9	85.9	38.8
TOTAL	820.0	867.8	5.8%

Source: N.C. Employment Security Commission, Labor Force Estimates

Carolina rural counties have experienced slower growth or even economic stagnation. Rural areas are not only losing some of their manufacturing base, but they are not able to attract office complexes or the more high-technology industries that are substantial elements of the information processing economy.

A detailed view of intrastate trends was obtained by using a 14-group classification of counties (3). This classification was created by merging five functional classifications that were based on manufacturing specialization, overall economic structure, socioeconomic character of the population, internal accessibility, and external accessibility. Employment patterns of the resulting group of 14 county types are presented in Table 2. Descriptive terms are applied to each group. Suburban are those counties that are close, usually adjacent, to metropolitan counties. Fringe counties are generally a second ring away from the metropolitan areas. Rural groups tend to lack cities of at least 20,000 and are not adjacent to metropolitan areas. Many counties lack towns of over 5,000 people. The unique small-city group contains cities such as New Bern, Greenville, and Fayetteville. They form a distinctive group in the overall classification because they have unusually high proportions in military or civilian governmental employment. The patterns exhibited by the two most rural groupings, fringe and rural, are revealing. In every case the fringe groups have higher proportions in manufacturing, ranging from 28.4 to 41.1 percent, than does the total state. In all cases, manufacturing growth was negative or modest, ranging from a loss of 7.7 percent to a gain of 5.4 percent. In every case, non-manufacturing employment growth was less than the statewide increase of 33.3 percent, ranging between 15.5 and 27.9 percent. The real disparity in North Carolina thus lies in the fact that the large metropolitan counties are not only growing faster but that the quality of this growth, in terms of income levels, for example, is higher. Perhaps the worst implication of this, as noted by Day (4), is that the economic inequalities

among North Carolina counties have begun to widen again after years of moving toward parity. The possibility of attracting substantial new industry may be over, but rural areas would do well to hang onto the industry that they have already. In general, it seems to look more closely at current manufacturers to determine how they perceive themselves to be faring in the contemporary economic environment.

RESEARCH METHOD

Manufacturers' opinions of their satisfaction with current locations were sought by sending a questionnaire to a random sample of about 2,600 plants. The sample group was drawn from the 6,800 factories listed in the 1988-89 North Carolina Industry Directory, compiled by the Business-Industry Division of the North Carolina Department of Community and Economic Development

A stratified sampling procedure was used in drawing the sample. The 14-group classification of county types presented in Table 2 was used for this purpose, yielding groups of varying size. In most cases, the names and addresses of 200 units were drawn from each group but in one large group the sample size was increased to 300. Several groups had total populations of fewer than 200, in which cases the entire population was sampled. The probability of selection from each group was proportional to the plant's employment size. This procedure favored the larger plants and ensured that the responses would represent a large proportion of all North Carolina manufacturing workers.

Each questionnaire was mailed with a cover letter that was addressed by name to the top official at each plant as indicated in the industrial directory. The mailing also included a self-addressed, postage-paid envelope. Mail out began in mid-November, 1989, and took about 3 weeks to complete. Returns were accepted until late January, 1990. A total of 504 usable responses were received, about 20 percent of the total. Several companies formally declined to respond, and another 15 questionnaires were returned as undeliverable. A dozen or so came back after the cut-off date and were not used, except for several narrative comments. Most analyses were conducted through the use of the SAS statistical package.

CHARACTERISTICS OF RESPONDENT MANUFACTURERS

Because not all 504 questionnaires included answers to every question, the response rate on any given item was slightly less than 500. Table 3, for example, indicates that 496 respondents provided data on their employment; this totaled 148,860 workers, or 17.2 percent of the North Carolina total in 1989. Mean employment was 300 per plant. About 28 percent of sampled firms employed fewer than 50 persons, smaller than the statewide average of 54 percent (Figure 1). Very large plants, by contrast, made up 1 percent of the sample, but only 0.22 percent of the North Carolina total. In other words, the sample is skewed somewhat in favor of larger plants.

Table 4 presents the distribution of responses according to major industry groups. The four major industry groups described as "traditional labor intensive" were well accounted for with 35 percent of employees, but these industries make

TABLE 2 EMPLOYMENT CHANGE IN TYPES OF NORTH CAROLINA COUNTIES

County Group	No. of Counties	Rural-Urban Index	Non-Agricultural Employment			Farm Employment	
			% in Mfg. 1987	% Change 1980-87	% Change Non. Mfg. 1980-87	% Total Employment 1987	% Change 1980-87
I. Service-Travel Govt.-Education Economy (Metro Areas) Electronics-Elec. Equip. (Computers Mfg.)							
(1) High Socio Econ. Status/High Access	(8)	2.3 (Metro)	16.9	3.9	37.4	0.7	-22.5
II. Traditional Manufacturing Economies (Textiles, Apparel, Furniture and Food)							
(2) High Socio Econ. Status/Good Access	(7)	2.9 (Suburban)	38.9%	3.3%	26.5%	1.9%	-25.1%
(3) High Socio Econ. Status/Fair Access	(4)	5.3 (Fringe)	28.8	-7.7	15.5	4.3	-32.1
(4) Low Socio Econ. Status/Good Access	(8)	3.8 (Suburban)	41.5	7.7	30.8	4.0	-22.5
(5) Low Socio Econ. Status/Fair Access	(10)	5.4 (Fringe)	41.1	3.7	27.9	4.7	-23.5
(6) Low Socio Econ. Status/Low Access	(9)	8.1 (Rural)	36.5	14.3	22.6	8.6	-21.1
(7) Very Low Socio Econ. Status/	(4)	6.3 (Fringe)	32.9	5.4	18.6	6.0	-33.5
(8) Very Low Socio Econ. Status/Fair Access	(7)	5.7 (Fringe)	28.4	3.6	15.5	10.8	-32.8
(9) Very Low Socio Econ. Status/	(8)	7.6	37.2	11.6	35.9	6.2	-33.1
(10) Socio Econ. Status/Low Access	(3)	8.3 (Rural)	20.8	6.2	33.3	4.5	-23.5
III. Varied Economies, Diverse Mfg.							
(11) Varied Mfg. Socio Econ. Status/Low, Fair Access	(9)	5.7 (Fringe)	31.4	-0.8	24.6	6.2	-29.7
(12) Non-Mfg. Socio Econ. Status/Medium, Fair Access	(3)	4.3 (Small City)	10.0	4.5	21.4	1.7	-37.1
(13) Non-Mfg. Socio Econ. Status/Low, Fair Access	(12)	7.2 (Rural)	7.6	-7.6	34.9	3.9	-26.2
(14) Non-Mfg. Socio Econ. Status/Very Low, Fair Low Access	(8)	8.4 (Rural)	16.4	-5.7	16.8	17.5	-27.4
North Carolina - All Counties		5.8	24.9%	3.7%	30.5%	3.0%	-27.9%

Note: The Rural-Urban Index is an average for all counties in each group. The integer values are taken from the "Beale Code," by which counties are assigned a code value of 0 to 9 depending on their status. Values of 0 and 1 are counties in MSAs of our 1,000,000 population. There are none of these in North Carolina. Values of 2 and 3 are for counties of smaller MSAs. Categories 4 and 5 are non-MSA counties with at least 20,000 more residents. Groups 6 and 7 have urban populations between 5,000 and 20,000. The first two are not considered to be "rural." The code values used for North Carolina are those contained in Chmura, Christine and Ihrig, Jane, "Changes in Manufacturing Employment in North Carolina Counties, 1980-85," *Economic Review*, Federal Reserve Bank of Richmond, September-October 1989, pp. 37-46.

up 49 percent of state manufacturing employment. On the other hand, the other durable groups, which account for 27 percent of the actual North Carolina employment total, contributed 40 percent of the employment by responding firms.

About 32 percent of the respondents considered themselves to be occupying rural sites (Table 5); 19.5 percent noted urban and 43 percent, suburban. These statistics reflect the respondents' own perceptions rather than any precise measure or location. Only about 9 percent of all plants reported a union present, but those plants accounted for 15 percent of the total employment. Factories that have a union are relatively large, averaging 562 employees each, whereas the nonunion factories averaged 276 employees.

Table 6 presents the variety of industry groups from which respondent factories acquire their input materials. Each

respondent was asked to list the three top materials and the source of each. The chemicals groups, of course, provides an array of products for other industries. Evidently, many of these materials are acquired within the state: fully one-quarter of all input materials come from within North Carolina (Figure 2). This fact suggests that there are many functional linkages among the various plants that operate within the state. This sign of diversity and interdependency within North Carolina's industrial economy is healthy. Figure 2 also projects an image of strong centrality within the eastern seaboard for the state in terms of access to materials sources.

Outgoing shipments also cover a wide area (Table 7). About 15 percent of all shipments were intracompany transfers. This traffic is relatively high in the textiles, apparel, chemicals, metals, transportation equipment, and instruments industries.

TABLE 3 EMPLOYMENT AND SIZE OF SITE REPORTED BY COUNTY GROUP

County Group	Employment			Acreage		
	Total No.	Mean Per Plant	No. Responses	Total	Avg. Per Plant	No. Responses
1	42,054	609	69	3750	52.8	71
2	13,851	396	35	1178	33.7	35
3	13,688	249	55	1698	30.9	55
4	19,783	471	42	1152	28.1	41
5	15,425	396	39	1703	42.6	40
6	2,339	111	21	865	41.2	21
7	5,092	154	33	1262	37.1	34
8	6,518	197	33	521	17.4	30
9	6,740	170	40	1097	28.1	39
10	793	88	9	172	19.1	9
11	7,158	211	34	1806	51.6	35
12	11,724	317	37	2878	73.8	39
13	2,506	72	35	439	12.5	35
14	1,189	49	14	73	5.6	13
TOTAL	148,860	300	496	18,594	37.4	497

N. C. Total 867,800 in Mfg.

Proportion of N.C. 17.2%

TABLE 4 SURVEY RESPONSE BY INDUSTRY GROUPS

SIC Industry	Percent of Employment by Survey Respondents	Percent of Total N.C. Manufacturing Employment
I. Traditional Labor Intensive Industry		
22 Textiles	18.1%	25.3%
23 Apparel	6.7	9.5
24 Wood	2.4	4.2
25 Furniture	7.7	10.1
Sub-Total	34.9	49.1
II. Other Non-Durable Industries		
20 Food	3.0	5.8
21 Tobacco	2.5	2.5
26 Paper	2.1	2.6
27 Print-Pub.	1.4	3.5
28 Chemical	8.0	5.1
30 Rubber-Plastics	7.1	4.0
29-31 Petroleum/Leather	0.8	0.5
Sub-Total	24.9	24.0
III. Other Durable Industries		
32 Stone Clay Glass	4.7	2.4
33 Primary Metals	1.9	1.4
34 Fab-Metals	2.0	3.5
35 Machinery	12.8	7.4
36 Electric Equipment	11.1	6.6
37 Transp. Equip.	5.4	3.2
38-39 Instruments-Misc.	2.3	2.4
Sub-Total	40.2	26.9
Total	100.0%	100.0%
Total Employment	146,850	867,800

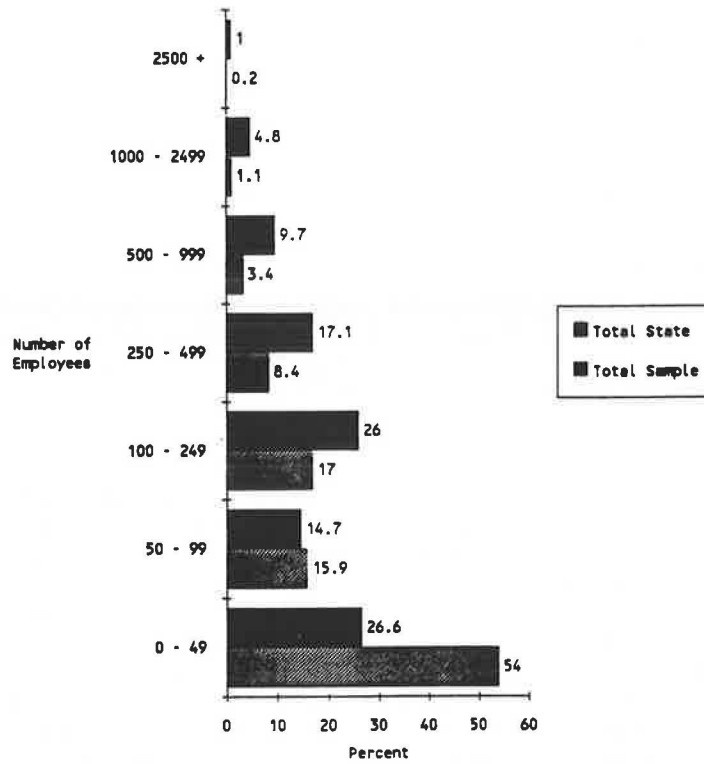


FIGURE 1 Distribution of respondents, by employment size of factors (top bar, total state; bottom bar, total sample).

TABLE 5 CHARACTERISTICS OF MANUFACTURERS BY COUNTY GROUP

County Group	Location Type*			Union Present	Headquarters at this location	Time to Interstate Hwy (minutes)	Time to Hub Airport (minutes)	Number of Responses
	Urban	Suburban	Rural					
1	25.5%	67.4%	2.3%	18.6%	39.5%	8.4	24.5	71
2	12.0%	68.0%	16.0%	16.0%	36.0%	7.4	44.2	35
3	23.0%	42.3%	26.9%	3.9%	42.3%	39.6	51.2	55
4	23.1%	53.9%	19.2%	4.0%	52.0%	11.6	35.2	41
5	18.5%	29.6%	40.7%	3.7%	29.6%	28.4	58.7	40
6	11.1%	11.1%	77.8%	11.1%	33.3%	51.1	90.6	21
7	21.4%	42.9%	35.7%	7.7%	35.7%	11.4	48.2	34
8	11.1%	33.3%	55.6%	11.8%	41.1%	26.7	48.4	30
9	7.7%	0.0%	84.6%	7.7%	7.7%	49.2	81.9	39
10	0.0%	75.0%	25.0%	25.0%	25.0%	45.5	63.8	8
11	21.1%	47.4%	21.1%	15.8%	31.6%	24.8	40.8	35
12	18.8%	62.4%	18.8%	12.5%	25.0%	36.9	74.7	39
13	33.3%	16.7%	38.9%	0.0%	61.1%	40.9	74.7	35
14	16.7%	50.0%	33.3%	0.0%	33.3%	21.0	47.5	13
Major Groups								
Metro (1)	25.5%	67.4%	2.3%	18.6%	39.5%	8.4	24.5	71
Mfg. Types (2-10)	16.5%	37.7%	41.1%	8.3%	35.0%	28.4	56.4	303
Non-Mfg. (11-14)	23.4%	43.7%	26.8%	8.5%	38.1%	32.9	62.1	122
TOTAL	19.5%	43.4%	32.0%	9.8%	36.4%	26.6	53.2	496

* Do not add up to 100 percent. Not shown are both no responses and "others".

TABLE 6 INDUSTRY SOURCES OF INPUT MATERIALS

Industry Source	Number	Percent
Chemicals	231	15.9
Textiles	134	9.2
Primary metals	132	9.1
Lumber	104	7.2
Farm	59	4.1
Fabricated metals	55	3.8
Paper	50	3.4
Rubber and plastics	50	3.4
Electrical equipment	40	2.8
Stone-clay-glass	33	2.3
Others	213	14.7
Unspecified	351	24.1
Total	1,452	100.0

The fact that 19 of 20 industry groups reported 10 percent or more of shipments going to intraplant transfers demonstrates that North Carolina has a highly interdependent industrial economy.

This fact is reinforced by the data on the geographic destination of shipments. Over one-fifth of all shipments are made within a 50-mi radius of the plant. These local proportions are especially high in the printing-publishing and stone-clay-glass industries. The high percentage in petroleum is explained by the fact that in North Carolina this industry is predominantly involved in making paving and roofing materials. Otherwise, North Carolina factories are region-serving, with over 45 percent of all shipments being sent through either the southeast or northeast. These and the local shipments together account for over two-thirds of the market destinations for North Carolina manufacturers. Tobacco, leather, primary metals, instruments, and miscellaneous products industries have large general national markets, whereas the chemicals and instruments sectors have relatively strong proportions going to international destinations.

Overall, trucks dominate to the extent of nearly 90 percent or more of both types of shipments (Table 8). Among the larger county groups and manufacturing groups, only the other nondurable industries had less than 80 percent of shipments by trucks. This is because of relatively heavy railroad use for materials shipments by the food, paper, chemicals, and rubber-plastics industries. The metropolitan counties also use rail shipments more heavily for inputs and have a substantially higher proportion of air freight for shipments to market.

Nearly 59 percent of all responding factories are within 30 min access of an Interstate highway, and over 86 percent are within 30 min of all types of four-lane highways, including Interstates (Figure 3). In fact, nearly two-thirds are within 10



FIGURE 2 State sources of input materials for North Carolina factories.

TABLE 7 DISTRIBUTION OF OUTGOING SHIPMENTS BY INDUSTRY

SIC Industry	Geographic Destinations					National	Inter-National	Other Plants of the Same Company	No.
	Within 50-Mile Radius	South-East U.S.	North-East U.S.	Western U.S.	Mid-West U.S.				
20 Food	34.0%	30.9%	24.8%	0.2%	2.7%	4.3%	3.1%	5.7%	29
21 Tobacco	26.2	17.5	14.3	6.8	7.5	24.9	2.8	7.5	4
22 Textiles	12.3	36.9	23.0	7.1	6.0	12.5	2.2	24.1	53
23 Apparel	15.6	28.7	17.9	6.3	7.1	19.5	4.9	18.5	35
24 Wood	28.9	40.7	14.3	0.8	6.4	3.3	5.6	14.1	31
25 Furniture	5.9	34.3	24.8	6.6	10.3	11.3	6.8	5.6	24
26 Paper	18.9	31.6	23.2	1.1	9.7	7.8	7.7	11.3	17
27 Print/Pub.	66.1	3.5	14.7	1.2	2.2	11.9	0.4	10.7	17
28 Chemicals	15.1	36.6	13.6	2.7	2.7	11.4	17.9	13.8	29
29 Petroleum	55.8	44.2	0.0	0.0	0.0	0.0	0.0	8.3	6
30 Rub-Plastics	19.1	32.2	13.5	3.7	18.8	5.7	7.0	7.1	23
31 Leather	4.0	23.3	16.7	10.0	8.3	34.4	3.3	0.0	3
32 Stone-Clay-Gla.	43.0	21.8	18.7	3.4	8.2	0.6	4.3	10.5	24
33 Prim. Metals	12.7	14.6	11.4	3.2	9.1	47.2	1.8	20.6	11
34 Fab. Metals	29.4	25.8	8.9	4.0	10.8	17.7	3.4	24.5	21
35 Machinery	22.6	15.6	13.9	5.5	11.1	18.7	12.6	16.9	30
36 Elec. Eq.	4.5	10.1	28.5	9.9	19.2	20.3	7.5	15.7	24
37 Transp. Eq.	16.0	23.9	20.5	4.5	17.3	11.7	6.1	18.2	22
38 Instruments	2.2	19.2	11.7	14.5	5.8	25.9	20.9	21.5	6
39 Misc.	12.9	16.4	19.3	0.7	2.9	39.7	8.1	11.4	7
ALL	21.6%	27.5%	18.1%	4.4%	8.6%	13.1%	6.6%	14.9%	416

Note: Geographic destinations account for 100 percent of shipments. The proportions for other plants of the same company are not geographic - specific and are part of the shipments to geographic destinations.

TABLE 8 TRANSPORTATION MODES BY INDUSTRY AND COUNTY GROUPS

(a) Mfg. Industry Group	Assembly of Input Materials				Products Shipped to Market				No. of Responses
	Truck	Rail	Air	Water	Truck	Rail	Air	Water	
Traditional	95.7%	1.6%	0.9%	1.8%	96.1%	1.5%	1.4%	1.0%	171
Other - Non-Durable	79.7	14.8	1.4	4.1	91.7	4.8	2.0	1.5	130
Other - Durable	90.1	3.5	3.5	2.9	89.1	1.8	4.9	4.2	155
All mfg.	89.3%	6.0%	1.9%	2.8%	92.5%	2.5%	2.7%	2.3%	456
(b) County Group									
Metro	82.4%	8.7%	4.9%	4.0%	87.6%	2.8%	7.3%	2.3%	65
Other Mfg.	90.2	5.6	1.7	2.5	93.9	2.3	2.3	1.5	284
Non-Mfg.	90.4	5.3	1.3	3.0	91.0	2.9	2.0	4.1	110
All counties	89.3%	6.0%	1.9%	2.8%	92.5%	2.5%	2.7%	2.3%	459

min of a four-lane highway. In access to one of North Carolina's hub airports (those offering scheduled commercial service), just under half of the responding plants are within 45 min driving time and three-quarters are within 1 hr and 15 min (Figure 4).

SATISFACTION WITH LOCATION

Overall Satisfaction

Figure 5 shows manufacturers' responses regarding their overall satisfaction with their current locations. It is remarkable

that only 6.6 percent expressed some degree of dissatisfaction, as opposed to the 28.3 percent that were very satisfied. This high degree of satisfaction did not vary substantially among the major groups of counties or industries. The consistency of this finding is somewhat surprising and unexpected. Of course, there were a few unhappy companies, such as the respondent who commented that "I could bring another of my factories into North Carolina, but refuse to do so because of my experiences here." This suggests that, despite an overall positive evaluation, there are a few disgruntled companies, because of unique local circumstances or problems within the company itself.

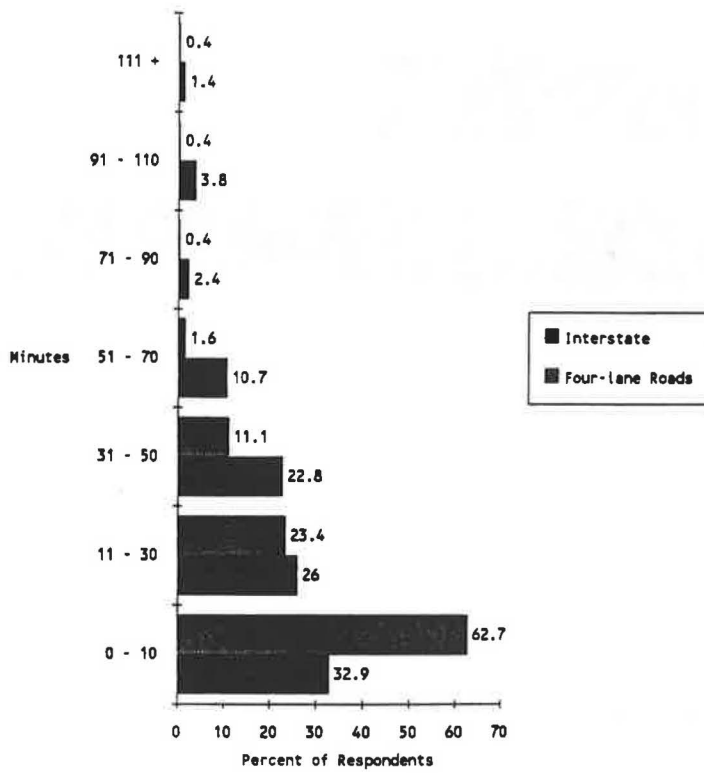


FIGURE 3 Average driving time to Interstate and all four-lane highways by all respondents (*top bar*, Interstates; *bottom bar*, four-lane highways).

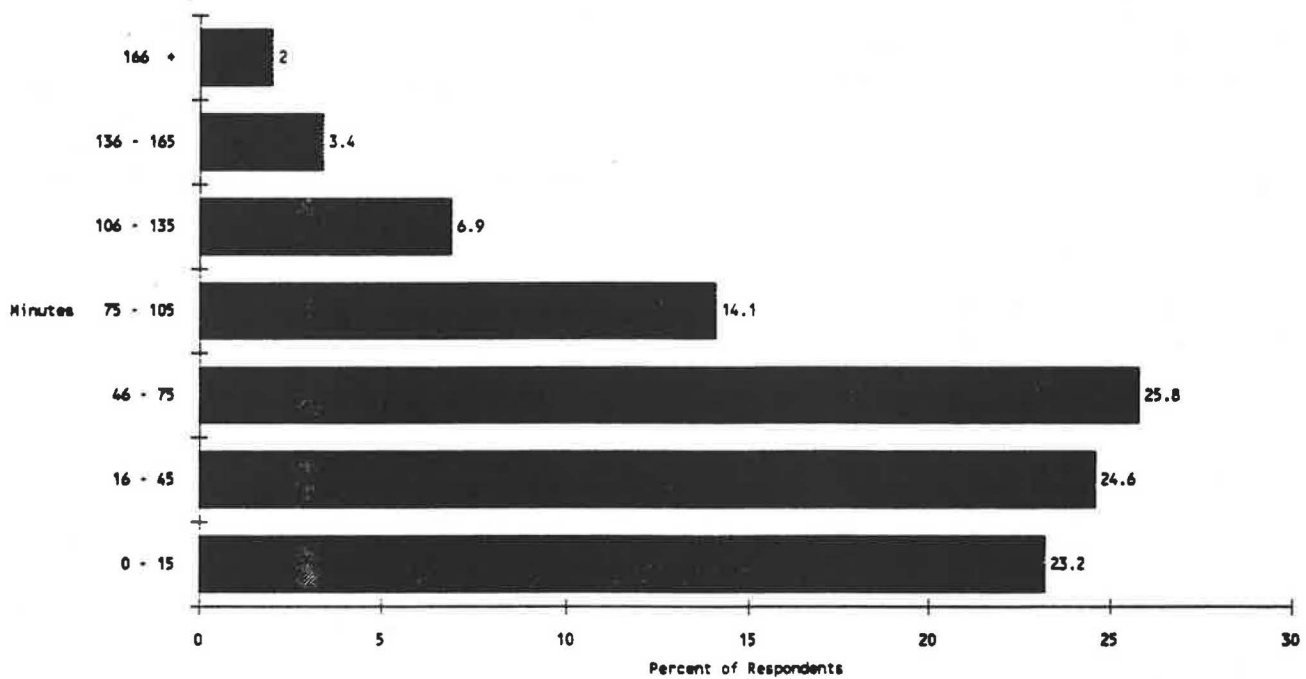


FIGURE 4 Average driving time to nearest hub airport by all respondents.

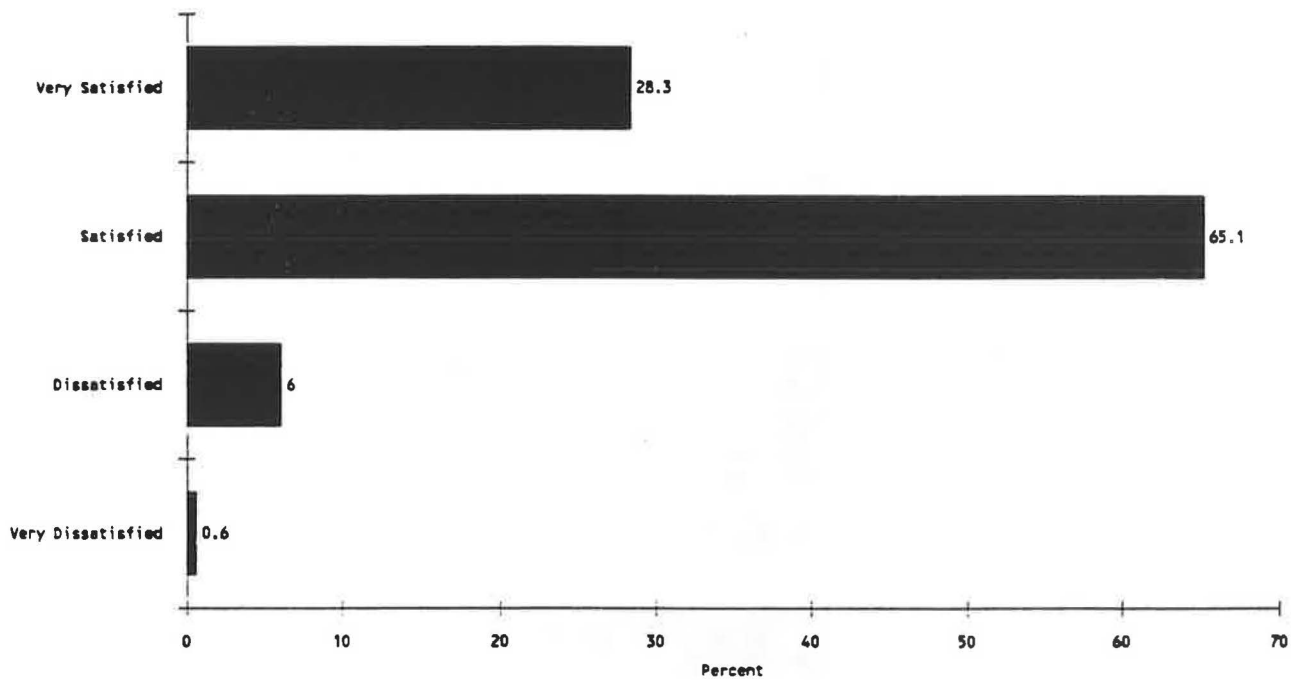


FIGURE 5 Overall satisfaction with location.

In Table 9, responses are divided into specific groups; the table indicates that there is some slight variability in overall satisfaction ratings. The overall average of 3.21 is thus strongly positive: 15 of the 20 industry groups had average ratings of 3.0 or better. The most satisfied industries included tobacco, printing-publishing, chemicals, fabricated metals, instruments, and the miscellaneous group. Least satisfied were transportation equipment, machinery, and leather industries. Among the three major groupings of industries the other durables group expressed somewhat more satisfaction than did the other two but the average values were higher than 3.0 for all three. Ratings are also uniformly positive for each county group.

Positive Location Factors

Another perspective on overall satisfaction was provided by questions in which respondents were asked to list factors that make the current location a good one, and factors that might lead to discounting operations at the present site.

Table 10 presents a summation of the good factors as generalized from the variety of responses. A total of 1,512 factors (3 per respondent) were possible, but 90 companies did not elect to comment, creating a response total of 1,242. A total of 21 factors received 1 percent or more of the responses, topped by labor availability. That and other factors having to do with labor (worker attitudes, skill levels, wage levels, etc.) collectively accounted for over 25 percent of all responses. Transportation and accessibility factors (market access, input materials access, state-to-state access, etc.) followed closely behind at over 23 percent. Assets of the community (good living conditions, good community, etc.) totaled nearly 12 percent.

Discontinuation Factors

Table 11 presents the factors cited that might lead to a decision to discontinue operations. In general, the overall factor cited the most was some sort of labor item (availability, union activity, skill level, etc.), which collectively accounted for over one-third (34.4 percent) of the responses. Far behind (14.4 percent) in second place were economic conditions (decline of business, competition, etc.). Interestingly, the third most frequent response was "none." One respondent, one of those 13.7 percent listing "none," commented simply "I hope none." Another commented "continued dissatisfaction with local government." Still another responded by saying "labor shortage—high taxes—too stringent requirements, such as regulations and environmental laws." Apparently, 58 companies could think of no factor that would lead them to discontinue operations. Only 4.2 percent of respondents mentioned accessibility, and that related to input materials.

Satisfaction with Specific Factors

In addition to the overall rating of satisfaction and open-ended comments, the respondents were asked to rate 34 specific factors, all on a scale of 1 to 4, again with 4 indicating high satisfaction (or high importance) and 1 great dissatisfaction (or low importance). The factors were simultaneously rated in terms of their importance on similar scale. Tables 12 and 13 list the factors as listed in the questionnaire along with the headings under which they were placed.

More insight into these factor evaluations can be obtained by comparing the ratings of importance with those of satisfaction. That is, high satisfaction on a factor might not mean much if the factor is considered to be unimportant. Similarly, a slightly negative satisfaction rating is more disturbing if the

TABLE 9 OVERALL SATISFACTION RATING BY MANUFACTURING INDUSTRIES AND COUNTY TYPES

Manufacturing Industry	Satisfaction Rating	County Type	Satisfaction Rating
20 Food	3.09	1	3.25
21 Tobacco	3.20	2	3.26
22 Textiles	3.03	3	3.17
23 Apparel	3.12	4	3.15
24 Wood	2.95	5	3.33
25 Furniture	3.03	6	3.25
26 Paper	2.95	7	3.07
27 Printing-Pub.	3.20	8	3.33
28 Chemicals	3.35	9	3.31
29 Petroleum	3.00	10	3.25
30 Rub.-Plastics	3.00	11	3.11
31 Leather	2.67	12	3.00
32 Stone-Clay-Glass	3.11	13	3.56
33 Primary Metals	3.00	14	3.00
34 Fab. Metals	3.26		
35 Machinery	2.92	TOTAL	3.21
36 Elec. Equip.	3.07		
37 Transp. Eq.	2.79		
38 Instruments	3.22		
39 Misc.	3.25		
TOTAL	3.21		
<u>Industry Group</u>		<u>County Group</u>	
Traditional Labor Int. (SIC 22-25)	3.17	Metro (1)	3.25
Other Non-Durable (20-21, 26-31)	3.18	Mfg. (2-10)	3.20
Other Durables (SIC 32-39)	3.28	Non-Mfg. (11-14)	3.22

Scale:

- 1 = Very Dissatisfied
- 2 = Dissatisfied
- 3 = Satisfied
- 4 = Very Satisfied

TABLE 10 FACTORS THAT MAKE THE CURRENT LOCATION A GOOD ONE FOR THIS FACILITY

Factor	Percent of Responses	Number of Responses
Labor Availability	12.8%	159
Market Access	8.7	108
Input Materials Access	7.0	87
Existing Location	5.9	73
Good Living Conditions	5.6	70
Local Business Climate	4.8	60
Site Costs	4.2	52
Worker Attitudes	3.9	49
State-to-State Access	3.7	46
Natural Environmental Quality	3.4	42
Skill Levels of Labor	2.4	30
Union Activity in Area	2.3	28
Available Space and Site Size	2.3	28
Local Wage Levels	2.1	26
Good Overall Transportation	2.1	26
Local Tax Rates	2.1	26
Local Access by Road	1.9	24
Labor Costs	1.9	24
Site Image	1.9	24
Good Community	1.7	21
Water and Sewer	1.4	19
Others	17.7	220
TOTAL	100.0%	1,242

TABLE 11 FACTORS THAT MIGHT LEAD TO DISCONTINUING OPERATION AT THE CURRENT LOCATION

Factor	Number of Responses	Percent of Total
Labor Availability	80	18.9%
None	58	13.7
Union Activity	38	9.0
Decline of Business	30	7.1
Access to Input Materials	18	4.2
Skill Level of Labor	17	4.0
Close Business/Consolidation	16	3.8
Competition	15	3.5
Site Costs	13	3.1
Local Tax Rates	12	2.8
Local Business Climate	11	2.6
Natural Environment Quality	10	2.4
Labor Costs	10	2.4
Others	96	22.5
TOTAL SAMPLE	424	100.0 %

TABLE 12 EVALUATION FACTORS

Factor Type	Factor Description
<u>Labor</u>	
1.	Labor Availability
9.	Skill Level
19.	Local Wage Rates
3.	Work Attitudes of Workers
4.	Trainability of Labor
23.	Union Activity in the Area
<u>Site and Utilities</u>	
20.	Site Costs
6.	Electricity Costs and Supply
22.	Natural Gas Costs and Supply
<u>Quality of Life</u>	
25.	Quality and Availability of Housing
26.	Natural Environmental Quality
18.	Cost of Living
29.	Local Cultural Facilities (libraries, museums, etc.)
27.	Local Recreational Amenities
5.	Crime Rate
7.	Quality of Area for Raising Children
2.	Local Public Schools
31.	Local Private Schools
<u>Transportation</u>	
11.	State-to-State Accessibility by Highway
15.	City-to-City Accessibility Within North Carolina
10.	Accessibility Within Your Local Area by Road Travel
14.	Accessibility to Scheduled Passenger Air Services
33.	Accessibility to Non-Scheduled (corporate plane) Air Services
32.	Accessibility to Rail Freight Services
34.	Accessibility to Port and Water Freight Services
17.	Accessibility to Market
12.	Accessibility to Input Materials
<u>Business Services</u>	
8.	Local Tax Rates
13.	Local Business Climate
21.	State Business Assistance
24.	Local Business Support Programs
16.	Technical Support Programs
30.	R & D Support from Governmental, Private or Institutional Sources, either locally or elsewhere in North Carolina.
28.	Quality of Higher Education Facilities (Universities, etc.)

Note: Numbers represent rank ordering of index of concern, as shown in Figure 6.

TABLE 13 HIGHEST AND LOWEST RATING FACTORS, ALL RESPONSES

(a) Most Important		(b) Highest Satisfaction	
Worker Attitudes	3.73	Local Union Activity	3.28
Labor Availability	3.65	Nat. Environ. Quality	3.14
Public Schools	3.49	Quality of Higher Educ.	3.14
Labor Trainability	3.46	Non-Scheduled Air Service	3.09
Quality for Children	3.40	Site Costs	3.06
State-State Access	3.33	Cost of Living	3.04
Electricity Cost & Supply	3.31	Access to Market	3.02
Access to Input Materials	3.26	Local Wages	3.02
Local Tax Rates	3.24	State-State Road Access	3.01
Local Access by Road	3.21	Water-Port Freight	2.98
(c) Least Important		(d) Lowest Satisfaction	
Water and Port Freight	2.01	Public Schools	2.44
Rail Freight Service	2.03	Labor Availability	2.52
Non-Scheduled Air Ser.	2.15	Labor Skill Level	2.54
Private Schools	2.19	Crime Rate	2.59
R & D Services	2.34	Air Pass. Service	2.72
Local Cultural Facilities	2.52	Local Tax Rates	2.74
Local Bus. Support Prog.	2.64	R & D Service	2.74
Local Recrea. Activities	2.65	Electricity Cost & Supply	2.76
State Business Assistance	2.70	Technical Support Program	2.78
Nat. Gas Cost & Supply	2.73	State Business Assistance	2.80

Note: Respondents were asked to rate a factor (1) if very unsatisfactory (2) unsatisfactory (3) satisfactory (4) very satisfactory.

factor is considered to be very important. An index of concern was calculated for this purpose by simply subtracting the satisfaction rating (S) from each factor's importance value I :

$$\text{Index of concern} = I - S$$

Negative values result when satisfaction exceeds the level of importance. Those factors with high positive index values (importance exceeds satisfaction by a large margin) are the ones of greatest concern for policy makers and economic development officials.

The results of this calculation for the entire sample are presented in Table 14, in descending index values. Figure 6 shows the data in graphic form. What emerges is a clear picture in which labor-related factors are of dominant concern. This concern is made up of a combination of concerns over labor availability, attitudes, supply and trainability, and public schools. Despite the overall high satisfaction levels noted earlier, the respondents are concerned about supply and quality of labor over the long term. Some volunteered comments by respondents illustrate these concerns:

- "Train school children in the work ethic."
- "Don't graduate students who are illiterate."
- "Companies in this area are exporting work or importing labor from Asia while teenagers won't work at a job."
- "Better education, better education, better education!"
- "Better elementary schools."
- "We hire mostly untrained employees and then train them. Reading job applications will just make you cry over the education our kids are leaving school without, even when they have graduated."

The foregoing quotes were included in responses from 10 widely scattered counties. They represent the mountains, piedmont, and coastal plain regions; rural and metropolitan areas; printing, furniture, electronics, and other industries. Thus the concerns over labor and education span a broad range of situations.

Additional analysis was performed on the data using Automatic Interaction Detector (AID). This program examines the relationship between several independent variables and one dependent variable. The program splits the data into two groups that explain the greatest percent of variance in the dependent variable. These groups are determined by grouping together observations that have the same values of the independent variable. All the values of the independent variable are then split into two groups, which partitions the whole data set.

The attitude variables analysis indicated once again that the satisfaction and importance of local public schools is the key important factor influencing the respondents' overall satisfaction with their location. One result stated that those with an average satisfaction with location of 3.00 had rated public schools with a 1 or 2, compared with the average of 3.27 for those who rated public schools with a 3 or 4. Another run of AID indicated that those respondents with an average location rating of 3.30 were less concerned with cultural activity in their area, but were satisfied with the skill of the labor; those with an average satisfaction of 2.72 were less satisfied with the housing and the skill of the labor. Overall, the attitude variables that explained the most variance of satisfaction with location were the importance of input materials and the satisfaction with public schools (Figure 7).

TABLE 14 IMPORTANCE AND SATISFACTION EVALUATIONS, ALL RESPONDENTS

Factor	Importance	Satisfaction	Index of Concern
1 Labor Availability	3.65	2.52	1.13
2 Local Public Schools	3.49	2.44	1.05
3 Work Attitudes of Workers	3.73	2.84	0.89
4 Trainability of Labor	3.46	2.83	0.63
5 Crime Rate	3.16	2.59	0.57
6 Electricity Costs & Supply	3.31	2.76	0.55
7 Quality of Area for Raising Children	3.40	2.90	0.50
8 Local Tax Rates	3.24	2.74	0.50
9 Skill Level (labor)	3.02	2.54	0.48
10 Local Access by Road	3.21	2.84	0.37
11 State-State Highway Access	3.33	3.01	0.32
12 Access to Input Materials	3.26	2.96	0.30
13 Local Business Climate	3.16	2.95	0.21
14 Scheduled Passenger Air Service	2.90	2.72	0.18
15 City-City Access within N.C.	3.03	2.87	0.16
16 Tech. Support Programs	2.85	2.78	0.07
17 Accessibility to Market	3.09	3.02	0.07
18 Cost of Living	3.09	3.04	0.05
19 Local Wage Rates	3.06	3.02	0.04
20 Site Costs	2.98	3.06	-0.08
21 State Business Assistance	2.70	2.80	-0.10
22 Natural Gas Costs & Supply	2.73	2.83	-0.10
23 Local Union Activity	3.17	3.28	-0.11
24 Local Business Support Programs	2.64	2.77	-0.13
25 Quality-Availability of Housing	2.80	2.95	-0.15
26 Natural Environmental Quality	2.95	3.14	-0.19
27 Local Recreation Amenities	2.65	2.88	-0.23
28 Quality Higher Education	2.88	3.14	-0.26
29 Local Cultural Facilities	2.52	2.82	-0.30
30 R & D Support	2.34	2.74	-0.40
31 Local Private Schools	2.19	2.82	-0.63
32 Rail Freight Service	2.03	2.91	-0.88
33 Non-Scheduled Air Services	2.15	3.09	-0.94
34 Port-Water Freight Services	2.01	2.98	-0.97

Policy Implications

North Carolina manufacturers are generally satisfied with their current locations. But, there is wide agreement among North Carolina manufacturers that poor education in the public

schools and poor work attitudes are looming threats to continued economic viability. If there are "Shadows in the Sunbelt," they are the shadows of poor education and lax worker attitudes, not foreign competition. This statement suggests that the time has come to balance the policy focus between

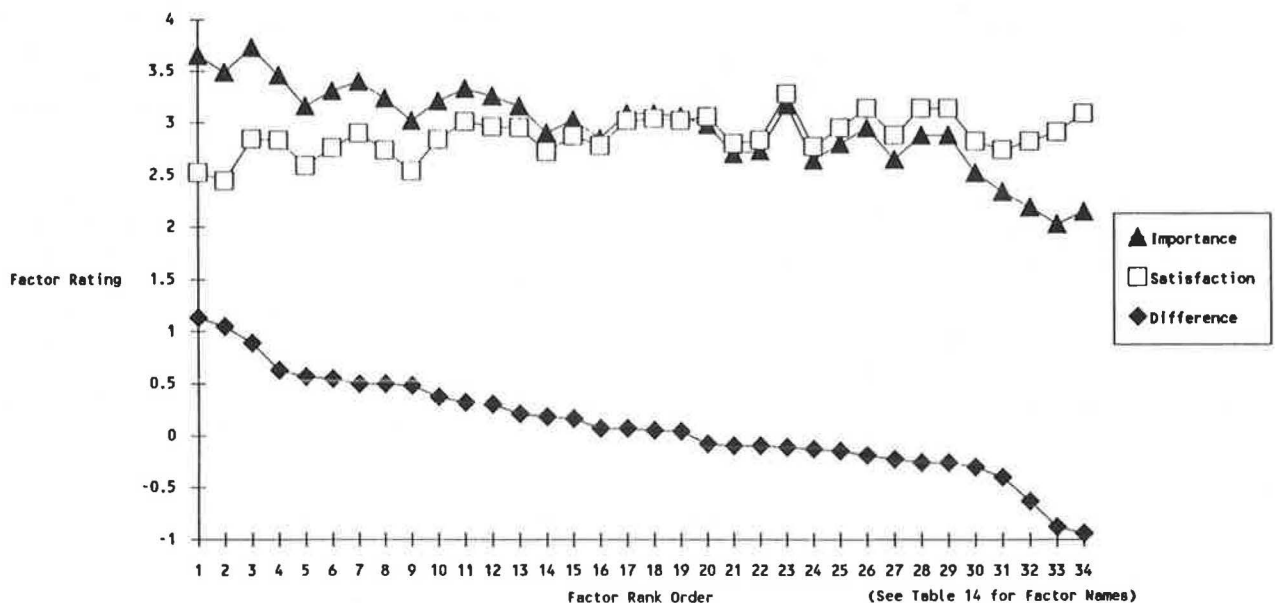


FIGURE 6 Importance and satisfaction evaluations, all respondents.

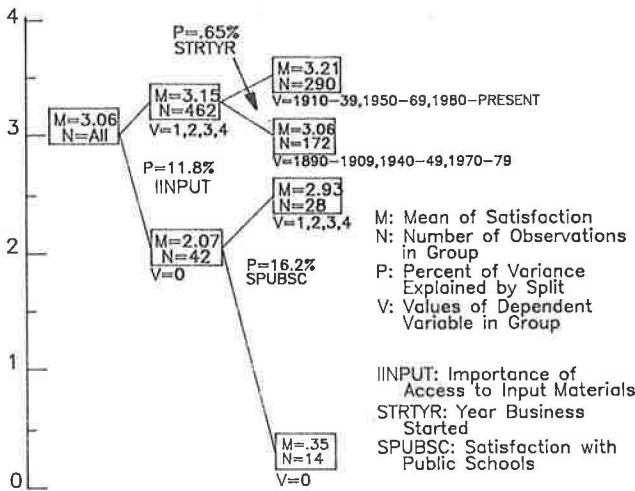


FIGURE 7 Main components of variance of satisfaction with location statistic.

these issues, even if they present difficult and expensive problems.

Another conclusion from the present survey of manufacturers is that transportation access is important in overall satisfaction ratings, but is less important in retaining industry than are labor and other factors. Transportation access was noted as a key reason for coming to North Carolina, and for overall high satisfaction, but it is not a key reason for staying. Airport, port, and rail access are perceived as satisfactory, but less important by manufacturers. Air service and ports may become more important in the future for foreign or import-export businesses, but for now highways are the vital aspect of accessibility, and manufacturers are generally satisfied with the situation.

The survey results do not support the idea that rural industries might be more inclined to leave than those in urban areas. Rural areas still remain more heavily dependent on their manufacturing sectors, and they still have high proportions in declining, labor-intensive industries, but, for now, their satisfaction levels are also high. However, rural economies may be enjoying only a temporary interlude between the declines of the late 1970s and early 1980s and some future downturn. Declining dollar values on world markets may have helped decrease international competition, but a sluggish economy in 1990, associated with chronic high interest rates, may be pointing toward future losses for many industries. Current high satisfaction levels could mean that rural manufacturers do not realize their precarious position in the new global economic environment.

The long-term perspective may be less pleasant than the present, because of educational deficiencies, a perceived worsening of worker attitudes, and a demographic blip in which the number of people in the young-adult, "post-baby boom" groups will decrease or grow slowly for a few years. Comparison of the results of the present study with others show that industrial location factors may have changed in recent years as part of a long-term trend. Late 1970 surveys (5) revealed that transportation, proximity to customers, un-

skilled labor, energy supply and productivity were the top concerns, in that order. Another national survey, taken in 1982 (6), suggested that an increase in concern over labor factors had occurred, but that they were not the top considerations. A survey of manufacturing firms that had located plants in North Carolina, South Carolina, or Virginia during the 5 years prior to 1982 (5) revealed that the top factors were (a) state-local business climate, (b) labor productivity, (c) transportation, (d) land availability or room for expansion, and (e) cost of land and construction. The emphasis on site considerations reflects the fact that these were initial location decisions, rather than evaluations of existing locations by currently operating concerns. The high priority given to business climate and transportation in the late 1970s and early 1980s, when a number of new plants were opened, differs from the current survey results. Labor factors rated fairly high in the earlier survey but they did not get the emphasis that the present survey revealed. Furthermore, in 1982 the educational system was regarded as the top quality of life factor, but that category generally was rated as substantially less important than were business-economic factors.

The opportunity to compare the results of the earlier survey with the present one is limited by the differing emphasis of each and by differences in the phrasing of questions. Nonetheless, it does appear that the high priority given in the present survey to labor supply and quality, and especially to primary and secondary education, is new. There is not much that the state or local communities can do directly to increase the labor supply. In fact, there may be plenty of people available. What can be done is to ensure that workers have an adequate education to make them trainable and employable.

The trends of a worsening of labor and education factors are national, and not unique to North Carolina. However, they may be more acute in rural areas because historically the factor that has drawn industry to rural areas has been labor. It would not be overly dramatic to assert that North Carolina's economic future depends on how successful the state meets the looming labor and educational crises.

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