THE ECONOMIC IMPACT OF INTERSTATE 95 IN SELECTED COUNTIES OF EASTERN NORTH CAROLINA

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Ralph T. Powers, Jr. THE ECONOMIC IMPACT OF INTERSTATE 95 IN SELECTED COUNTIES OF EASTERN NORTH CAROLINA. (Under the direction of Ronald J. Swager) Department of Geography, May 1975.

Eastern North Carolina has experienced significant industrial growth during the 1960s and early 1970s. The purpose of this thesis is to determine the impact of Interstate 95 on the industrial growth and economic development in 22 selected counties of eastern North Carolina between 1956 and 1973.

Six hundred and sixteen manufacturing industries located in the study area between 1956 and 1973. Based on the results of a questionnaire survey, it may be concluded that Interstate 95 is the fourth most important factor which industry considers in choosing the study area as a place to locate. Only one major Standard Industrial Classification industry group, tobacco processing, does not view Interstate 95 as important to its plant location decision.

Simple correlation analysis was used to examine the impact of industrial growth on the economic structure of the region. Seventeen economic growth variables were used in this analysis. These variables were grouped into four broad categories: employment, service sector, population growth, and income. Based on the correlation results, it may be concluded that industrial growth has been significant in increasing employment opportunities and service sector growth. However, the region's increased industrial growth is not statistically significant in increasing either the money income of the inhabitants in the region or the region's population base. Nevertheless, increased industrial growth has realistically increased the income of the inhabitants

of the region even though statistical significance was not achieved. Also, while the region's population base has not expanded due to industrial growth, increased industrial growth has been important in slowing down the outmigration rate. Therefore, it must be concluded that industrial growth has been significant in upgrading the economic structure of the region.

Interstate 95 has played an integral role in the region's industrial growth process. Likewise, the industrial growth which has occurred has been significant to the region's economic development. Therefore, it is concluded that the Interstate has fulfilled its catalytic role in the region's growth process by stimulating industrial growth and thus, economic development. This conclusion needs one qualification. Industrial growth is not statistically significant in increasing the money income of the inhabitants in the region. This result is due to the region's concentrated growth in low-wage, labor-intensive industries (textiles, apparels, lumber, and food processing). It is the contention of the author that local development policies which too often promote growth for growth's sake are the base of the problem. It is imperative that local officials become more aware of the negative long-range implications of low-wage industrial growth. Once this awareness is evident, local officials can use Interstate 95, along with other growth tools, to insure that future industrial development will have a more significant impact in upgrading the economic structure of the region.

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CHAPTER I

INTRODUCTION

Industrialization in North Carolina proceeded at an increasingly rapid rate during the 1960s and early 1970s. In the same period investments in new and expanded industries totaled almost 5.9 billion dollars. This growth has meant over 362,000 new jobs for North Carolinians.[1]

The Piedmont region of the State has been the primary recipient of these investments. Evidence of that is found in large industrial complexes which have grown up in the Piedmont Crescent cities of Charlotte, Winston-Salem, Greensboro, High Point, Burlington, Durham, and Raleigh. In recent years, however, the Coastal Plain region[2] has been receiving an increasing portion of the State's new industrial development. For example, in 1960 only 22 percent of the new industries which located in North Carolina did so in the Coastal Plain. In 1973 over 41 percent of the State's new industries located in the Coastal Plain. That industrial growth has provided over 100,000 new jobs during the 13 year period and has helped to increase per capita income within the region by almost 100 percent.[3]

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[1]Both the industrial investment and new job totals are based on estimates derived from the Statistical Services Section, Office of the State Budget, North Carolina Department of Administration.

[2]The Coastal Plains region of North Carolina is defined as the 44 counties governed by the Coastal Plains Regional Commission (Hansen, 1970).

[3]In 1960 per capita income in the Coastal Plain was $1,153, by 1973 it had risen to approximately $2,542.

Statement of Problem

Many factors have contributed to the increased industrial growth in the Coastal Plain region of North Carolina. The availability of land, labor, water, markets, and raw materials are but a few of them.

One factor, often overlooked in accounting for this industrial growth, is increased accessibility. In the past, transport costs have been treated as the major spatial input in industrial location decisions. As has been pointed out by Muraco (1972), recent emphasis on transport costs have been declining while the complex issues of accessibility, dependability, and flexibility of the transport surface have been gaining in importance. Muraco states (1972, p. 389) "it may be noted that accessibility is associated with the geographic notion of situation, thus it is related to the elements of spatial relationships, interaction, and connectivity." This leads Muraco to conclude (p. 404) that "The relationships of shifts in industrial locations may be evaluated with respect to changes in the accessibility surface." It is this notion of accessibility which defines the primary direction of this research.

Purpose of Research

There has been only one major change in the accessibility surface in the Coastal Plain region of North Carolina during the past 18 years; namely, Interstate 95 (I-95). The main purpose of this research is to determine how that one major change in the accessibility surface has affected industrial and economic growth within selected counties in the Coastal Plain of North Carolina between 1956 and 1973.

Industry must rely on some form of transport to receive needed

raw or semi-processed materials and to ship finished products to markets. Therefore, most industries consider the accessibility of a region as a factor in plant location. A major portion of this thesis is devoted to determining the role of I-95 in attracting new industry to the Coastal Plain region.

A second major thrust is to determine the effect of new industrialization on the economic growth of the region. Many factors are seen as having significant influence on a region's economic growth. Among them are the development of recreation areas, increased tourist trade, and a more productive agricultural sector of the economy. There is a general consensus, however, that industrial development is the quickest and most efficient means through which to expand the economic base of a region (North, 1966; Stokes, 1968; Isard, 1972; and Wheat, 1973). An analysis of the interrelatedness of industrialization and economic growth is necessary to draw meaningful conclusions concerning the impact of I-95.

Theoretical Framework

The interrelatedness of transportation, industrial development, and economic growth has no clear theoretical basis. Their relationships have been alluded to in generalities, not principles or laws. Transport specialists, industrial developers, and economists have known for many years that distinct relationships do exist; yet, in theory, these relationships are largely undefined.

As a means of providing a conceptual framework for this study, the transport factor as it relates first to industrial location theories

and secondly to economic growth theories will be reviewed. No attempt will be made to integrate these two bodies of theory. Hopefully, however, the study will provide useful and meaningful conclusions which, when coupled with other empirical works, can provide a basis for such a theoretical integration. Such an integration says Hurst (1974, p. 4) "would provide a unifying link both inside and outside geography, and might well pinpoint interrelationships which we presently overlook."

Transport and Industrial Location

There have been many theoretical attempts to explain the importance of transportation in industrial location. Historically, these attempts have treated transport only as a cost factor. The following is a discussion of the more important approaches which have been developed.

Alfred Weber (1929) derived his industrial location theory based on the least cost method of location. Weber assumed that costs vary from place to place, largely in accordance with transport cost and that a market exists at a particular point. Transport cost to Weber included raw material procurement and distribution costs.

August Losch (1954) assumed producers would seek a location allowing them greatest profit by controlling the largest market area. With production costs considered constant, the only limit on the extent of the market area was transport costs. Where these costs become too high they would force the price of the product upward to such an extent that consumers would buy from an alternative source.

Melvin Greenhut's theoretical approach to industrial location

(1956) seeks to maximize profits. In order to do so Greenhut has to consider pricing policies which would ensure maximum revenue and also various means by which to keep costs down. His primary variables were demand, transport costs, and personal factors. Transport costs in Greenhut's work were determined at least partially by topography, facilities, and product characteristics. With some exceptions, Greenhut concluded that optimum plant location was near the market.

Walter Isard (1956) was concerned with the process of substitution between transport costs, diverse outlays, diverse revenues, diverse outlays and revenues, and between combinations of these substitutions. The best location would be where no move elsewhere could result in further favorable substitution, that is, in reduction in total production and delivery costs.

Each of these theories has two elements in common. First, transport costs are considered a very specialized factor in the location of industry. Secondly, accessibility is not directly considered.

Transport and Economic Development

Economic base theory (North, 1955) assumes that the only reason for initiating economic growth is to achieve higher incomes for the inhabitants of an area by increasing production through economies of scale. The only way a region's economy can expand is to increase its basic, or export, industrial capacity. The expansion of a region's basic industrial capacity is limited only by the region's competitiveness in attracting these industries. A region's competitiveness is affected by several factors, one of which is its ability to provide adequate

transport facilities. The availability of these facilities reduces transport costs and increases accessibility. As noted in the preceding section, reduced costs and increased accessibility are significant industrial location factors.

Rostow (1952) has also done work in the field of theoretical economic development. Rostow sees economic growth as taking place in five distinct stages. The first stage is called the 'traditional society'. This stage is characterized by limited technology and subsistence type agriculture. 'Pre-conditions for take-off' is his second stage. In this stage there is a build-up of social overhead capital, notably in transportation. Also, there is a technological revolution in agriculture and also an expansion of trade, especially imports. The 'take-off' stage is the most critical of Rostow's five economic growth stages. Here the whole economy is transformed and becomes self-perpetuating due to advances in the application of modern industrial techniques. The fourth stage, 'drive to maturity', occurs when the growth process which started in the industrial sector is transmitted to all sectors of the economy. However, the industrial sector dominates. The 'age of mass consumption' is Rostow's fifth stage. Here the tertiary economic sector dominates the economy. Also, transportation is very important in this stage as it allows people and industry increased mobility as far as job opportunities and plant location is concerned.

The growth pole theory of economic development, as discussed by Cameron (1970, pp. 38-57), assumes that economic development will not occur uniformly over the landscape. Thus, there is a need to determine

where centers which have the greatest potential for economic growth exist within areas of economic deprivation. Once the location of these centers has been determined, it is felt that government investments should be concentrated in the centers. By doing so, the economy of the center is almost immediately upgraded and, in later years, the economic health of the entire region is upgraded. Although not precisely defined, the existence of transport facilities is seen as being very important in helping these designated centers grow.

In each of these theories the importance of transportation to economic growth is not defined. However, the importance of transportation to economic growth should not be underestimated. Owen (1966, p. 3) recognized this importance when he stated "transport facilities are only one of the many ingredients needed to accelerate the pace of economic progress, but in many instances they play a key role and in all instances they set the limits."

Past Research Relevant to the Economic Impact of Improved Transportation

New and improved transport routes and modes have had a major impact on many types of locational decisions. Weber (1929), Losch (1954), Isard (1956), and Greenhut (1956), among others, used transport as a factor in explaining industrial location. Brewster, Flinn, and Jurkat (1958) considered transport systems as a determining factor in their study of potential housing markets. Hoyt (1949) and Kelly (1956) viewed transportation as an important factor in shopping center locations. Garrison and Marble (1957) used transportation to help explain the spatial structure of agricultural activities. Many other

studies using transport as a locational factor have been conducted.

In 1956, with the advent of the program which created the National System of Interstate and Defense Highways, a new concept in land transport facilities was adopted. This system has had a significant impact on the spatial distribution of residential, commercial, and industrial areas.

Residential Impact

Hoyt (1958, p. 269) was one of the first to recognize the interstate's potential impact on residential areas when he noted "the new system of express highways . . . will create apartment sites of exceptional value" by opening up large tracts of land. McKain (1965) studied existing residential areas along the Connecticut Turnpike and concluded that the Turnpike was the primary reason for increased residential development and residential property values in the study area.

Other studies (Highway Research Board, 1970; Texas A&M University, 1973) have dealt with the impact of relocation, due to freeway construction, on area residents. Attitude sampling and analysis have been used to determine how residents within affected neighborhoods feel toward freeway construction near their homes (Century Research Corporation, 1967; Texas A&M University, 1971; Federal Highway Administration, 1973).

Commercial Impact

The impact of the Interstate System on the location of commercial firms has also been significant. Not suprisingly, the

location of interstate interchanges was seen as the major factor in explaining their spatial distribution (Garrison, 1961; Alabama State Highway Department, 1967). Other studies have dealt with commercial-business relocation due to freeway construction (Hooker and Potter, 1971; Texas A&M University, 1972). These studies have shown that businessmen desire to relocate near interstates due to increased accessibility and for advertising purposes. The negative aspects of commercial-business relocation near an interstate have been pointed out by Sanders (1973) when he concluded that the central business districts of small towns in north-central Oklahoma were damaged by the resulting loss of trade when these firms moved toward the interstate.

Industrial Impact

Local and regional studies have shown that the Interstate System has significantly influenced industrial location. Typically, these studies have shown that interstate highways have attracted new industry into surrounding areas. By doing so, the Interstate System has also enhanced economic development since new jobs and higher wage rates are associated with increased industrialization.

One of the earliest studies to document the impact of an interstate highway on industrialization and economic development was conducted by the Massachusetts Institute of Technology (1958). Massachusetts Route 128 was the highway being studied. Massachusetts Route 128, a circumferential highway located about 10 miles from the heart of Boston, has been called the 'miracle' highway because of the dramatic industrial development of adjacent land. In the study,

information on 99 industrial firms was obtained by personal interviews. Data obtained included type of operation at the plant, factors considered in choosing the site, other sites considered, and facts about the local labor market. The major conclusion of this study was that industry located adjacent to Route 128 because it afforded easy regional access.

Julia Connally (1968) studied the impact of the Capital Beltway (I-495) on industrial location and resulting employment patterns in northern Virginia. Using questionnaires, she surveyed 54 firms which had located along the beltway since its construction. Based on the survey results, she was able to determine the relative importance of a number of reasons these firms gave for selecting sites near I-495. The three most important reasons were all related to the Beltway's existence. They were 1) proximity to the Beltway, 2) access to local markets and clients, and 3) price of land. In addition, she concluded that some 3,000 new jobs had been created due to this increased industrialization.

Wilbur Smith and Associates (1968) also studied the Capital Beltway as it related to industrial growth and economic development in Maryland. This study also used the questionnaire technique and the findings were quite similar to Connally's. The Beltway provided industry with better access to labor, markets, and supplies. The study also showed that the spatial dimensions of the labor market had been greatly expanded as Maryland workers commuting by the Beltway had become part of the Virginia industrial work force and vice versa.

By influencing industrial location decisions and thus stimulating economic activity, the Interstate System has enhanced employment

opportunities. More employment opportunities increase the likelihood that individuals will find jobs which more nearly correspond to their levels of capability. Among the benefits are gains in productivity and earnings as well as increased job satisfaction. Both the Virginia and Maryland impact studies allude to these facts.

Wilbur Smith and Associates (1971), in a study conducted on the feasibility of a 277 mile segment of Louisiana's expressway system, were able to document the potential dollar value of the expressway's economic impact. The author (p. 13) contends that "private investment induced by the Louisiana expressway system in manufacturing and other businesses would amount to $700 million between 1975 and 1994; and would mean 17,000 permanent new jobs and $101 million in additional personal income." Other studies (Wallace and Lemly, 1969; California Division of Highways, 1973), while attaching no specific dollar amounts to the economic impact of interstate construction, have resulted in similar conclusions.

Just as the Interstate System has been related to economic growth, the lack of interstate highways, or the lack of adequate highways in general, has sometimes been associated with economic lag. The Connecticut Turnpike study mentioned earlier (McKain, 1965) is a classic example of how the lack of adequate highway facilities has depressed an area. The Connecticut General Assembly decided in 1958 to extend a four lane highway through eastern Connecticut, not to meet existing traffic demand, but to provide a stimulus to an economically depressed area resulting from a declining textile industry. This highway was so successful in attracting new industry, and thus

upgrading the economy, that manufacturing employment rose 27 percent and total wages rose 45 percent during the first four years it was open.

Clinton County, located in the middle of Pennsylvania, was the object of another study emphasizing the lack of highway facilities on the economy of an area. This county was primarily rural with a heavy agricultural orientation. Economic growth in the county was stagnant and the overall economy of the county was declining relative to the State. Gamble, et al (1966) studied the proposed construction of Interstate 80 through the county and concluded that increases in business and industrial activities due to the Interstate would mean an annual increase of about $5 million to the county's total economy.

Probably the most celebrated and extensively researched area concerning the lack of adequate transport facilities on a lagging economy is the Appalachia region. The Appalachian Regional Commission, created to find ways of stimulating industrial and economic growth, recommended (1966, p. 37) that "road construction be given the highest priority and the largest allocation of funds . . . " The Commission felt that a system of Interstate and Primary Federal-aid highways would open up the area and cause a realization of its economic potential through the attraction of industry and industrial related businesses.

The lack of adequate highways has also been associated with the lag in industrial-economic growth in the Southeastern United States. Policy studies such as the one conducted by Hoover and Ratchford (1951) have concluded that highway development in the region is a must if it is to attract its fair share of industrial growth. More recently, Lanham (1967) has pointed out that adequate highway facilities represent

a significant and integral part of the total economic and industrial complex of the southern region and the future of the region's total economy can not be separated from it.

The lack of adequate transport facilities has also been recognized within the Coastal Plain section of North Carolina. Saunders (1956, p. 5) stated that "our transportation facilities need to be upgraded . . . as they are essential to our proper industrial development."

Johnson (1962, p. 9), stated "the construction of Interstate 95 will permit fast and economical transportation . . . and will create unlimited opportunities for development in every area of agricultural, industrial, and financial activity."

Conclusion

The question must now be asked--what has been the role of I-95 in the industrial and economic growth of the Coastal Plain region of North Carolina? If past studies are any guide, I-95 can be credited with playing a major role. It would be dangerous, however, to take the results of another study, done at a different time and in a totally different context, and try to apply them to I-95 in eastern North Carolina. Thus, the results of this research should contribute to the fields of transport, industrial, and economic geography.

CHAPTER II

THE STUDY AREA AND RESEARCH PROCEDURES

The purpose of this chapter is to define and delimit the areal extent of the study area. In addition, the procedures used to determine the impact of Interstate 95 on industrial and economic growth are discussed in detail.

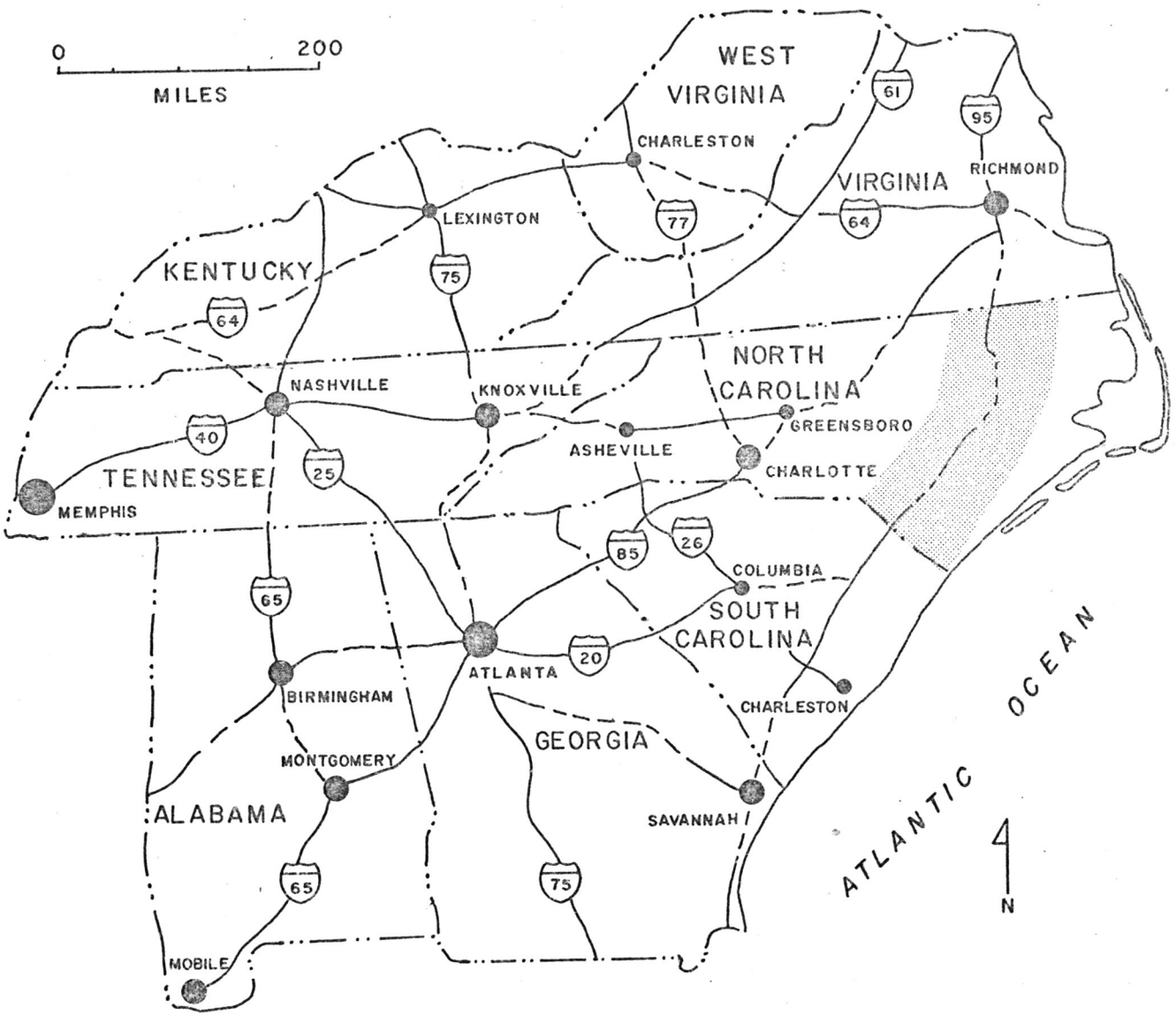
The Study Area

The Interstate System, scheduled for completion in the mid-1980s, will consist of approximately 42,500 miles of high speed, limited access highways which will connect over 90 percent of the Nation's urban areas of 50,000 population or more. Figure 1 shows the Interstate System as it runs through eight states in the Southeastern United States. This figure also shows the study area as it is situated within the eight state region.

Figure 2 offers a more detailed picture of the study area. The study area consists of 22 counties located in the Coastal Plain region of North Carolina. Counties are used as the primary areal analytical unit since the data necessary to conduct this research was compiled on a county-by-county basis.

The 22 counties which comprise the study area have been chosen for several reasons. First, the Interstate passes through or along the edge of 10 of the counties, and an analysis of I-95's

THE EXISTING AND PROPOSED INTERSTATE SYSTEM IN THE SOUTHEASTERN UNITED STATES 1972



Source: Rand McNally Road Atlas And Travel Guide, 1972

FIGURE 1

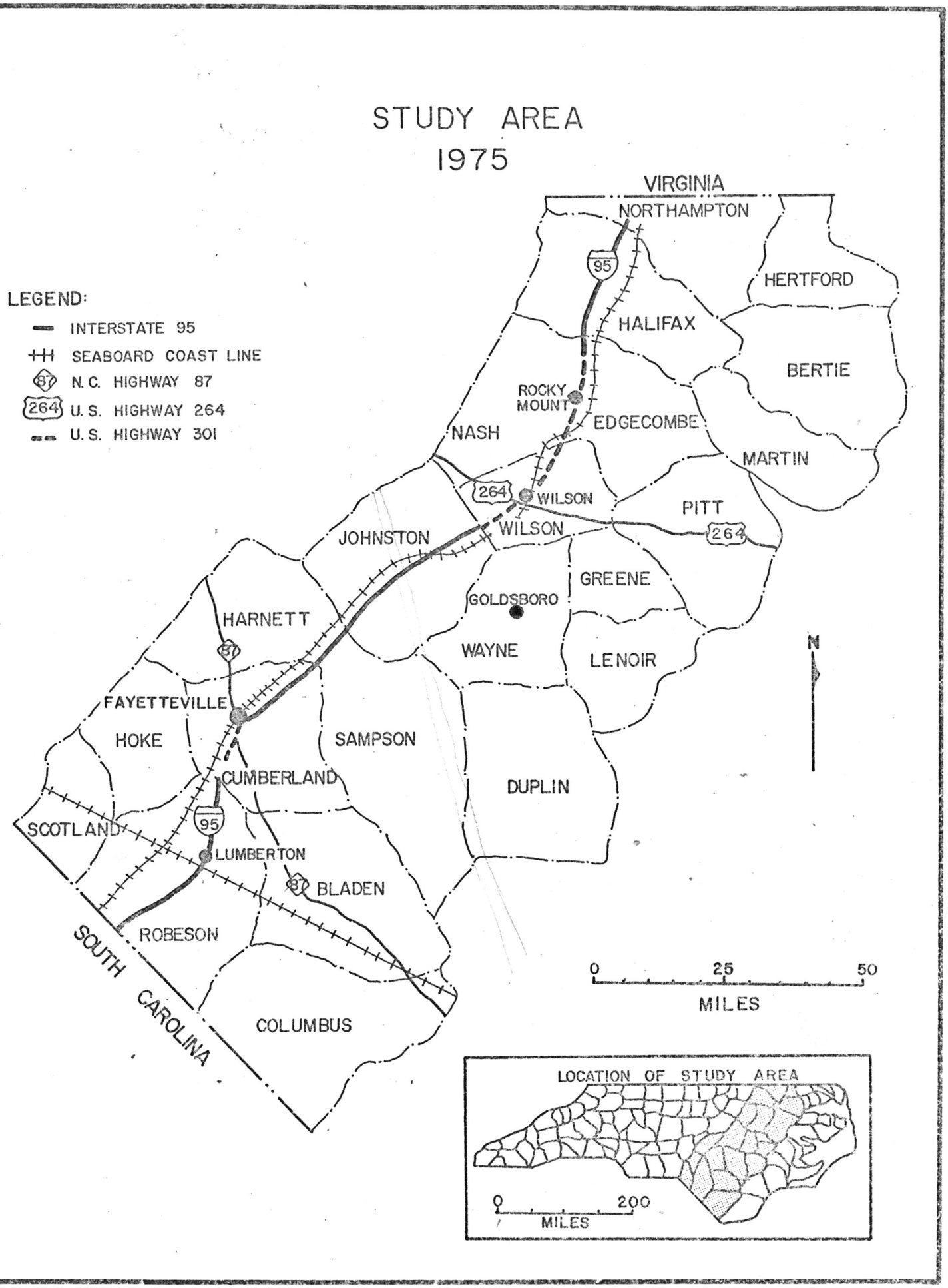

STUDY AREA
1975
LEGEND:
INTERSTATE 95
SEABOARD COAST LINE
N.C. HIGHWAY 87
U.S. HIGHWAY 264
U.S. HIGHWAY 301
VIRGINIA
NORTHAMPTON
HERTFORD
HALIFAX
BERTIE
ROCKY MOUNT
EDGECOMBE
NASH
MARTIN
WILSON
PITT
JOHNSTON
GREENE
GOLDSBORO
HARNETT
WAYNE
LENOIR
FAYETTEVILLE
HOKE
SAMPSON
CUMBERLAND
DUPLIN
SCOTLAND
LUMBERTON
BLADEN
ROBESON
SOUTH CAROLINA
COLUMBUS
N
0 25 50
MILES
LOCATION OF STUDY AREA
0 200
MILES

FIGURE 2

industrial/economic impact would naturally include these counties. Second, the remaining 12 counties are included in an attempt to determine any impact the Interstate may have had outside its immediate corridor.[4]

The western limit of the study area north of Hoke County is the western-most borders of the counties through which I-95 passes. It is felt that the influence of I-95 further west than this is probably negated by the population/distribution centers of Henderson, Durham, Raleigh, and Sanford and by the influence of I-85. At Cumberland County, the study area widens to include Hoke and Scotland Counties. These two counties are included since they are located relatively close to I-95 and there are no significant population/distribution nodes or major roads to detract from the influence of I-95.

Counties directly adjacent to the Atlantic Ocean and the Pamlico and Albemarle Sounds are not considered. These counties are omitted because of their distance from the Interstate and because the counties are served by another major north-south route, U.S. 17.

There is one major qualification which should be noted. Interstate 95 is not completed in North Carolina. There are two segments, totaling 57 miles in length, where U.S. 301 is used as a connector between the completed segments of I-95. The southern incomplete segment passes through the Fayetteville urbanized area. It is 14 miles long. The second segment is 43 miles long.

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[4]For the purpose of later discussion, the 10 counties through which I-95 passes are termed "I-95 counties" and the 12 counties through which I-95 does not pass are termed "non-I-95 counties."

It runs from Kenly to a point just north of Rocky Mount. For purposes of this research, these two segments are included as part of the I-95 corridor and any industrialization along these two segments of U.S. 301 will be treated in the same manner as industrialization which has occurred along I-95 proper. The inclusion of U.S. 301 should not detract from the validity of the research as the only major difference in the two highways is U.S. 301 is not a limited access highway.

Research Procedures

A questionnaire survey was conducted to determine the impact of I-95 in attracting industry to the study area. The questionnaire (appendix A) was mailed to each manager or owner of the 616 plants which located within the study area from 1956 through 1973. A list of these plants was obtained from the North Carolina Directory of Manufacturing Firms, 1974-75 which is published biennially by the North Carolina Department of Labor, Division of Statistics. 1956 was chosen as the base because it was the year Congress passed the Federal Aid Highway and Highway Revenue Acts which conceived the National System of Interstate and Defense Highways. This procedure allows the surveying of all industries which may have been affected by the planning or construction of I-95.

As a means of supplementing the information collected from the questionnaires, industrial developers, planners, academicians, and plant officials having knowledge of and interest in industrial location procedures and practices within the study area were interviewed. Their input helped to identify 'local' factors which have affected industrial

growth in one county but not in another. In addition, their knowledge of the local labor force, the county's industrial climate, future plans for industrial expansion, and industry's impact on the local economy provided valuable input into this research.

Since industrial growth has usually been equated with economic growth, the second portion of this research is devoted to determining the extent to which industrialization has affected economic growth and stability within the study area. Simple correlation is used in this industrial growth/economic development analysis. Specifically, the change in manufacturing employment within each county between 1956 and 1973 was correlated independently with the change in seventeen dependent variables which were chosen as indicators of economic growth within the study area during the time period. In each case it was necessary to normalize the data since at least one of the counties, usually Cumberland, exhibited traits which skew the raw data. In order to normalize the data each raw value was converted to common logarithms.

It is important to note that the correlation coefficient measures only the strength of linear relationships; it does not necessarily imply a cause-effect relationship. However, by calculating the coefficient of determination, the percent of the variation in each variable "explained" by the industrial growth in the study area can be identified. Thus, by using the coefficient of determination one can draw more meaningful conclusions concerning the effect industrialization has had on the economic development of the region (Freund, pp. 420-447, 1973).

Variables Used in the Economic Analysis

The seventeen variables[5] used in the economic analysis may be grouped into one of four categories. These four categories include employment, service sector, population growth, and income.

Five variables comprise the employment category. They are agricultural employment, wholesale-retail trade employment, construction employment, total employment, and unemployment. These variables are designed to measure the impact of industrialization on employment growth within various sectors of the region's economy.

The service sector category includes four variables which measure the amount of money spent by the inhabitants of the region as well as the amount of money taken in by various publicly and privately owned establishments. The four variables are gross retail sales, total bank deposits, total traveler's expenditures, and local government expenditures.

Three variables are included in the population growth category. They are number of new dwelling units, total population growth, and increases in urban population. This category is designed to measure the impact of industrial development on the region's overall population growth.

The income category includes five variables. These variables are designed to measure the effect increased industrialization has had on the money income of the inhabitants of the region. The five variables are average weekly earnings, farm income, per capita income,

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[5]See appendix B for a definition of each of the seventeen variables and the source from which the information was taken.

median family income, and the number of welfare families.

These seventeen variables which were chosen as meaningful measures of economic growth by no means comprise an exhaustive list. It is felt, however, that they adequately reflect the economic structure of the study area from 1956 through 1973. In addition, these variables have proven to be adequate economic measures in other research which have analyzed economic growth through employment, service sector, population and income growth trends.

Conclusion

This chapter detailed the study area and methodology used in the research. The study area consists of 22 counties in eastern North Carolina. A questionnaire survey is used to determine the significance of I-95 as an industrial location factor within these 22 counties. Simple correlation is used to determine the impact of industrial growth on the region's economic development. The remaining portion of this research will be devoted to analyzing the role of I-95 on industrial and economic growth within the study area.

CHAPTER III

INDUSTRIAL GROWTH TRENDS WITHIN SELECTED COUNTIES OF EASTERN NORTH CAROLINA, 1956-1973

The purpose of this chapter is to discuss the magnitude and significance of the industrial growth which has occurred within the study area between 1956 and 1973. In order to do this, the region's industrial structure is analyzed in two ways. First, the number, type, and location of two-digit Standard Industrial Classification (SIC)[6] industries is examined. (Appendix C contains a definition of each industrial type.) This examination provides an initial basis for analyzing the region's industrial growth. Secondly, industrial employment growth within the region, by SIC group, is analyzed. Such analysis should offer a more complete picture concerning the magnitude and significance of the region's increased industrial growth.

Industrial Plant Growth Trends Within Specific Counties

Currently there are 1,055 industrial plants located in the study area (table 1). Nash, Robeson, and Cumberland Counties, with 92, 88, and 82, respectively, account for the greatest number of these

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[6]The SIC defines industries by the type of economic activity in which they are engaged. The SIC definitions used in this research were obtained from the Standard Industrial Classification Manual, 1972. (See Bibliography for full reference.)

TABLE 1

INDUSTRIAL PLANT GROWTH TRENDS, 1956–1973

County	OVERALL TOTALS Number	Rank	TOTALS, 1956–1973 Number	Rank	Percent	Rank
*Nash	92	(1)	54	(2)	58.7	(12)
*Robeson	88	(2)	68	(1)	77.3	(1)
*Cumberland	82	(3)	32	(9)	39.0	(22)
*Wilson	69	(4)	42	(3)	60.9	(7)
Wayne	66	(5)	33	(8)	50.0	(18)
Pitt	60	(6)	36	(5)	60.0	(10)
*Johnston	59	(7)	34	(7)	57.6	(13)
Lenoir	56	(8)	40	(4)	71.4	(2)
*Edgecombe	54	(9)	35	(6)	64.8	(5)
*Halifax	52	(10)	26	(12)	50.0	(19)
Duplin	50	(11)	27	(11)	54.0	(17)
Columbus	47	(12)	28	(10)	59.6	(11)
*Sampson	44	(13)	21	(16)	47.7	(20)
*Harnett	43	(14)	26	(13)	60.5	(9)
Scotland	39	(15)	22	(14)	56.4	(15)
Bladen	32	(16)	22	(15)	68.8	(3)
Martin	28	(17)	17	(18)	60.7	(8)
*Northampton	26	(18)	17	(17)	65.4	(4)
Hertford	23	(19)	13	(19)	56.5	(14)
Bertie	21	(20)	9	(20)	42.9	(21)
Greene	13	(21)	8	(21)	61.5	(6)
Hoke	11	(22)	6	(22)	54.5	(16)
Totals	1,055		616			

Source: Derived by the author from the North Carolina Directory of Manufacturing Firms, 1974–75

*Denotes counties through which I–95 passes

industrial plants. At the bottom of the scale lie Hoke and Greene Counties which have only 11 and 13 plants, respectively. Six hundred and sixteen (58.2%) of the total 1,055 industrial plants have located within the region since 1956. This means that the number of plants more than doubled during the study period.

Other interesting trends are discernible. Robeson County has experienced the greatest amount of industrial growth since 1956. However, Cumberland County, which ranks third in terms of total number of industrial plants, ranks ninth in the number of plants which have located there since 1956 and twenty-second, or last, in percentage growth since 1956. This suggests that the industrial structure of Cumberland County is older and, to a certain extent, less dynamic than is Robeson County's. The same general conclusion may be drawn when comparing Wayne and Nash Counties with Robeson. It may be noted that Cumberland, Wayne, and Nash Counties each contain older, well established population centers and, therefore, would have attracted industry before any of the counties which lacked this significant population-market-labor cluster. Also, both Cumberland and Wayne Counties have sizeable military reservations in them which undoubtedly helped to attract industry.

There are, however, several counties in the study area which refute the above reasoning. They are Lenoir, Pitt, Edgecombe, and Wilson Counties. Each ranks high in the total number of industries and in percentage growth of new, post-1956 industrial plants. These four counties have received well over half of their industrial growth in recent years although each had significant, though not

outstanding, population-market-labor clusters in them prior to 1956. Several reasons help to explain this result. First, the economy of these counties is less dependent upon agriculture. Thus, people have left the farms, creating a labor surplus for industry. A second reason can be traced to the growth of East Carolina University in Pitt County and Atlantic Chrisitan College in Wilson County. These institutions have helped create a more viable residentiary economic sector than would ordinarily be found in these counties. Industry is more easily attracted to areas where the economy is sufficient to offer its labor force a more attractive living environment.

Most counties which rank low in terms of total number of industries and the number of new post-1956 industries also rank low in percentage growth. However, Bladen, Northampton, and Greene Counties are exceptions. They have been growing at a more rapid rate, given their insignificant industrial structure prior to 1956, than have most of the other counties within the region. However, caution should be exercised in interpreting this result. These counties have not had significant industrial growth even though their percentage growth rate is high. They do bear watching in the future, however, as these counties may be approaching the take-off stage in terms of their industrial growth.

Table 2 lists the counties and the number of industrial plants which have located in them, by year, during the study period. It is interesting to note that the counties through which I-95 passes account for 355 (57.6%) of the total 616 new industrial plants. Also,

TABLE 2

NEW PLANTS WHICH LOCATED IN THE STUDY AREA, BY YEAR AND COUNTY, 1956–1973

County	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	Total	Percent
Scotland			1	1	1					6		5	2	3	2		1		22	3.6
Hoke							1	1	1	1	1					1			6	1.1
*Robeson	1	3	1	2	2	3	4	2	4	3	5	6	8	6	4	1	8	4	68	11.0
Columbus		1	1	1	3	1		1	2	2	2	4		1	5	1	2	1	28	4.5
Bladen		1	1	1	1	1			3	1	1	2		1		5	3	1	22	3.6
*Cumberland		2	3		2	1	4		3	2	3	4	2	3		1		2	32	5.2
*Harnett		2		1		3	1		2	2	1	4	1	5		2	1	1	26	4.2
*Sampson	1	2	1				2	3	1	1	1	3	1	2	1		2		21	3.4
Wayne	2		3	2	1	2	1	1		5	1	1	2	2	1		3	6	33	5.4
*Johnston	1	1	5		2			3		4	3	2	3	6		2	2		34	5.5
*Wilson	1	2	1	1	3	4	2	1		5	4	2	6	2	4			4	42	6.8
Greene				1	1			1	1	1		1		1			1		8	1.3
Pitt		2	1	1	2		4	1	3	2	5	1	2	2	2	1	3	4	36	5.8
*Edgecombe			1		3	3	2	1	3	1	3	3	1	4	4	2	1	3	35	5.7
*Nash		1	3	3	2	2	2	3	2	3	6	4	3	3	5	4	6	2	54	8.8
*Halifax	1	1		1	2	2		2	2	3	3	5	1	1	1		1		26	4.2
*Northampton			1	2		1	1	1	1		2	2	2	1		1	2		17	2.8
Martin		1	1		1	2					2	2	1	1	3	1	1	1	17	2.8
Duplin	1		4	1	2	1		2		2	1	2	3	2		5		1	27	4.4
Bertie			1	1					1	1		1	3					1	9	1.5
Lenoir	1	2	2	2	2	4		2	3	4	3	2	2	3	2	1	3	2	40	6.5
Hertford			1			1				1	1		4	2	1	1	1		13	2.1
Total	9	21	32	21	30	31	24	25	32	50	48	56	47	51	36	29	41	33	616	
Percent	1.5	3.4	5.2	3.4	4.9	5.0	3.9	4.1	5.2	8.1	7.8	9.1	7.6	8.3	5.8	4.7	6.7	5.4		100[1]

Source: Derived by the author from the North Carolina Directory of Manufacturing Firms, 1974–75

*Denotes counties through which I–95 passes

[1]Percent total may not equal 100 due to rounding off error

with few exceptions, each I-95 county experienced some plant growth almost every year. This is a marked difference from the trend in non-I-95 counties where Scotland, Hoke, Greene, Bertie, and Hertford each have at least seven years when no industrial plant located in them.

Based on table 2, 1965 must be designated as the year in which intensive industrial growth began. From 1965 through 1973, 391 (63.5%) new plants located in the study area. Of these 391 new plants, 223 (57.0%) located in one of the 10 I-95 counties. This total represents only two less plants than the 225 (36.5%) which located in the entire study area between 1956 and 1964. Also, it is important to note that almost all of the existing sections of I-95 were completed by 1965.

A breakdown of the peak growth years (1965-1973) shows that most of the growth took place between 1965 and 1969. These five years accounted for 252 (64.4%) of the total 391 industrial plants which located in the study area between 1965-1973. Not surprisingly, this is the same period during which significant industrial growth was taking place within the United States as a whole.

Among the 252 plants which located within the study area between 1965 and 1969, 151 (59.9%) located in counties through which the Interstate passes. Based on the analysis of table 2, a pattern seems to have been established; namely, that I-95 counties have received the greater amount of industrial plant growth.

Industrial Plant Growth Trends by SIC Designation

Table 3 provides a summary of each SIC type which has located

TABLE 3

NEW PLANTS WHICH LOCATED IN THE STUDY AREA, BY COUNTY AND TWO-DIGIT SIC DESIGNATION, 1956–1973

County	SIC Code	Food 20	Tobacco 21	Textiles 22	Apparel 23	Lumber 24	Furniture 25	Paper 26	Printing 27	Chemicals 28	Petroleum, Coal 29	Rubber, Plastic 30	Leather 31	Stone, Clay, Glass 32	Primary Metals 33	Fabricated Metal 34	Machinery 35	Electric Machinery 36	Transport Equipment 37	Instruments 38	Miscellaneous 39	Total
Scotland				4	1		1		1	2		1		3	1	2	2	1	1	1	1	22
Hoke		1		4						1												6
*Robeson		6	1	16	18	5	2	3		3		2		2		4	2	1	3			68
Columbus		3		2	4	6				3		1				5	1	1	2			28
Bladen		1		4	9	4			1							1				1	1	22
*Cumberland		5		4	3	5				5		1		6		1	1		1			32
*Harnett		5		3	6	2				1				3			2	1	2		1	26
*Sampson		3		1	7	3	1					1		2		1	1	1				21
Wayne		2		4	8	5	2				1		3			1	3	2	1	1		33
*Johnston		4	1	3	8	5	2			1		1		2		1	1	4	1			34
*Wilson		7	2	5	5	6		1	4	1		2		3	1		3		1	1		42
Greene		1		1	3		1					1				1						8
Pitt		4	2	3	9				2	3				3	2	1	4		2		1	36
*Edgecombe		2		9	4	3	3	2		1		1		2	2	1	1	1	2		1	35
*Nash		4	2	10	11	8	2			2		2		1		5	3		3		1	54
*Halifax		1		6	7	4				2		1		3			1	1				26
*Northampton		2			2	7				4							1				1	17
Martin		3		3	3		1	1		2		1	1	1							1	17
Duplin		6		5	6	6				1		1		2								27
Bertie					2	5							1			1						9
Lenoir		11	1	6	8	2	1	2		2				2		2	2	1				40
Hertford				1	2	4				1	1			1	1		1		1			13
Total		71	9	94	126	80	16	9	8	35	2	16	5	36	7	27	29	14	20	4	8	616
Percent		11.5	1.5	15.3	20.5	13.0	2.6	1.5	1.3	5.7	.3	2.3	.8	5.9	1.1	4.4	4.7	2.3	3.2	.6	1.3	

Source: Derived by the author from the North Carolina Directory of Manufacturing Firms, 1974–75

*Denotes counties through which I–95 passes

in the study area, by county, between 1956 and 1973. Four industrial types stand out as being the most prevalent. They are the apparel, textile, lumber, and food processing industries. Together they account for 371 (60.2%) of the 616 industries which have located in the study area since 1956. Four other industrial types comprise a secondary group of growth industries. They are stone, clay, and glass, chemicals, machinery, and fabricated metals. These industrial types account for 20.6 percent of the increased industrial plant growth in the region. When combined, these eight industrial types account for 498 (80.8%) of the total number of new plants. Individually, the 12 remaining SIC groups did not experience particularly significant growth during the study period. However, as a group the tobacco, furniture, paper, printing, petroleum, rubber and plastic, leather, primary metal, electrical machinery, transport, instrument, and miscellaneous industries accounted for 118 (19.2%) of the new industrial plants which located in the region. A discussion of the region's industrial growth trends, by SIC type, follows.

Textiles and Apparels

The textile and apparel industries combine to account for 220 (35.7%) of the 616 industrial plants added to the region. Several reasons explain why these two SIC groups have grown at such a significant rate. First, these two industries left the northeastern United States when production costs, due in large part to unionization, became too high to ensure sufficient profits. Thus, they chose to locate in the region because unions are not prevalent and they can obtain large

quantities of cheap labor. Also, the effect of agglomeration economies is present. This effect can be seen in reduced shipping costs from textile to apparel plants and in their making more efficient use of the existing infrastructure by utilizing the same facilities.

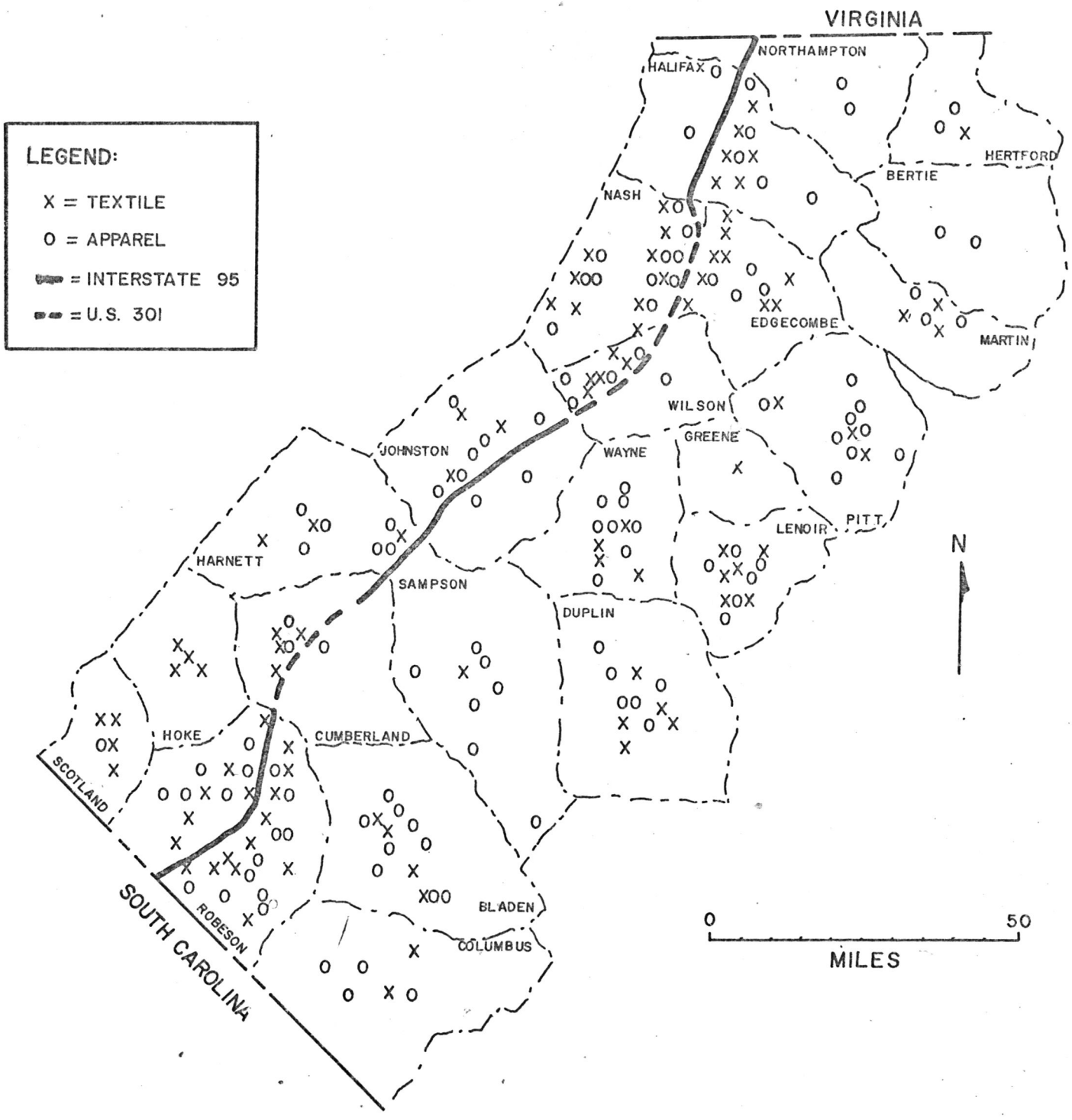
Since the effect of agglomeration economies is important to these two SIC groups, it is reasonable to assume that counties with a heavy concentration of textiles would likewise have a heavy concentration of apparels. This is the case (figure 3). Robeson County has the region's greatest concentration of both textile and apparel plants. Nash County has the second largest number of both textile and apparel plants. In fact, the significance of agglomeration economies is so pronounced that only three counties, Hoke, Bertie, and Northampton, have not experienced growth in both industrial types.

Lumber

Eighty lumber processing plants have located in the region during the study period. The main reason for this industry's growth is the abundance of raw materials found either in the region or in close proximity to it. Not only is there abundant acreage of commercial forest land within the study area but also large firms such as Weyerhaeuser and Georgia-Pacific have purchased land to cultivate additional acreage.

Plant growth in the lumber industry has been fairly evenly distributed within the study area (figure 4). Also, it is important to note that growth in the lumber industry has not stimulated significant growth in either the furniture or paper processing industries.

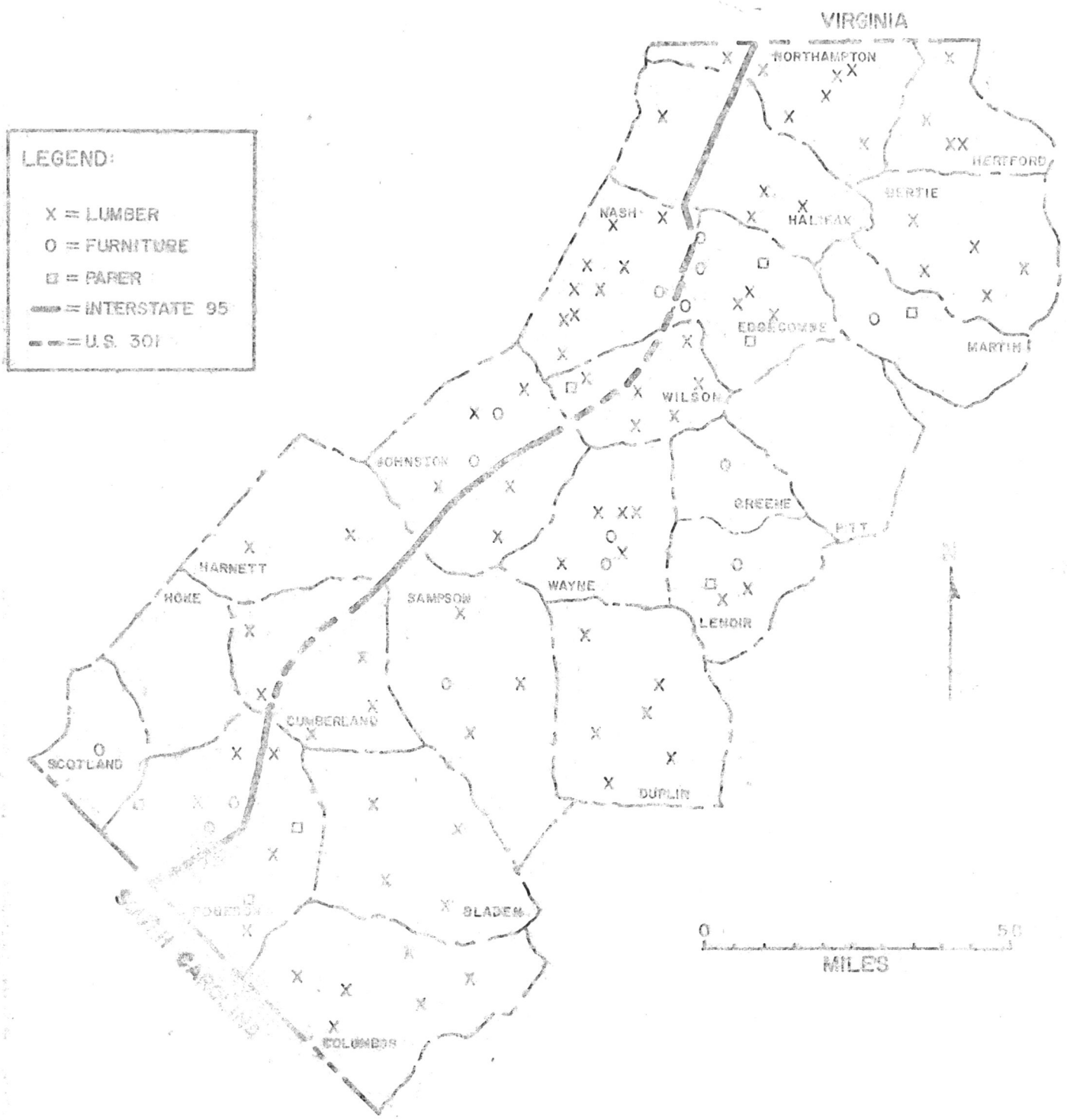
THE APPROXIMATE LOCATION OF NEW TEXTILE AND APPAREL PROCESSING PLANTS
1956 — 1973



SOURCE: N.C. DEPT. OF NAT. AND ECON. RES.

FIGURE 3

THE APPROXIMATE LOCATION OF NEW LUMBER, FURNITURE AND PAPER PROCESSING PLANTS, 1956–1973



SOURCE: N.C. DEPT. OF NAT. AND FOR. RES.

FIGURE 4

Apparently, industrial linkages between these three industries are not strong enough to warrant location in close proximity to each other.

Food Processing

The food processing industry is the region's fourth most significant industrial type in terms of new plant growth. Forty-two of the 71 food processing plants (59.2%) process feed for livestock. Thus, growth in this industry is primarily related to growth in the agricultural sector of the region's economy.

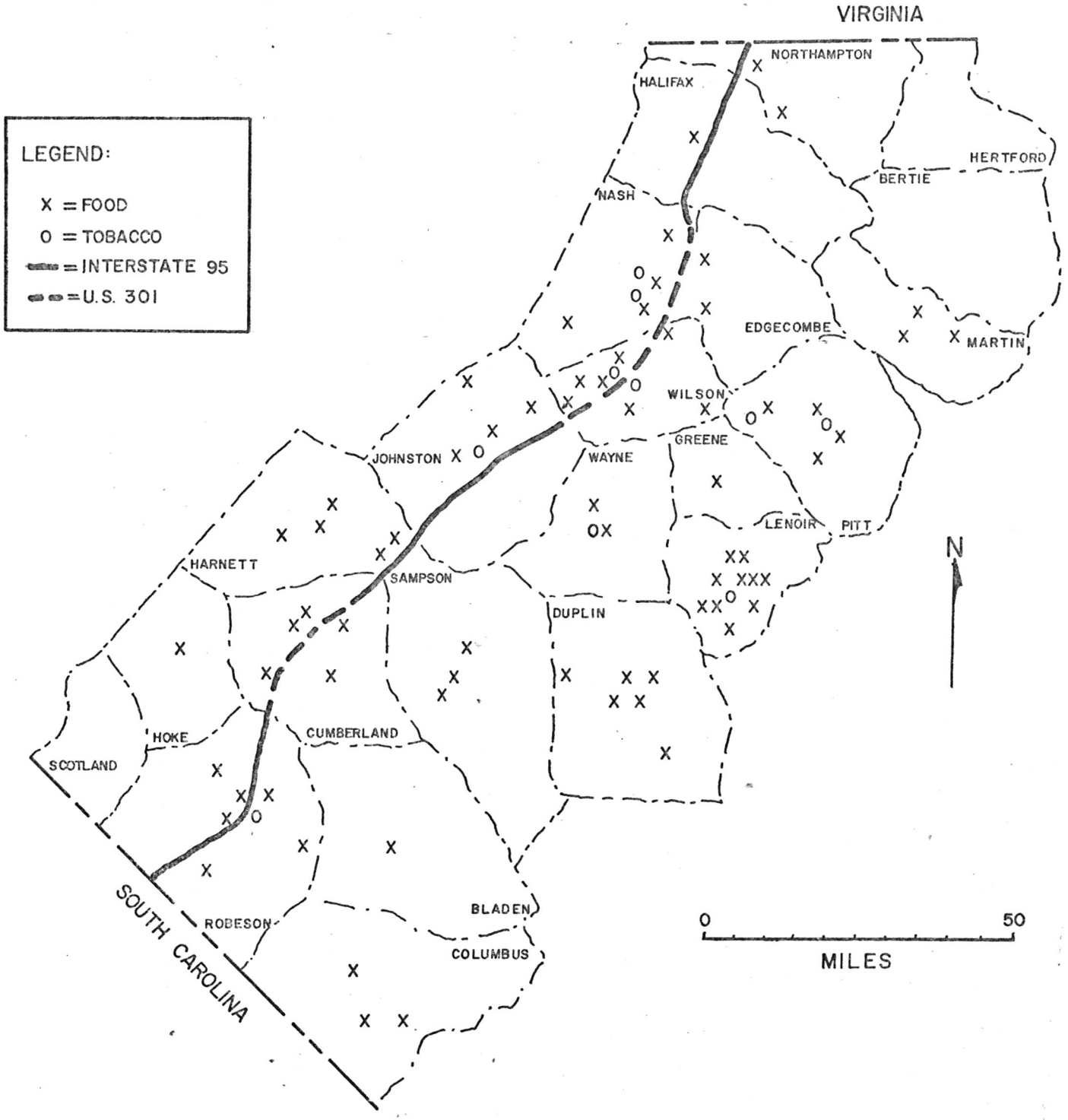
Plant growth in the food processing industry has been distributed fairly evenly within the region (figure 5). Only Lenoir County has a large concentration of this industrial type. Likewise, only Scotland, Bertie, and Hertford Counties have not experienced any food processing plant growth. Significantly, there is a correlation between the location of the food and tobacco processing plants. This result is expected since both industries are market oriented.

Stone, Clay, and Glass

The stone, clay, and glass processing industry is the region's fifth most significant growth industry with 36 new plants. Growth in this industrial type is due primarily to the region's abundant supply of raw materials necessary for this industry's manufacturing process.

Cumberland County, with six such plants, has the only concentration of this industrial type. No other county has had more than three stone, clay, and glass processing plants locate in them, and seven counties have experienced no growth in this industrial type (figure 6).

THE APPROXIMATE LOCATION OF NEW FOOD AND TOBACCO PROCESSING PLANTS
1956 — 1973



SOURCE: N.C. DEPT. OF NAT. AND ECON. RES.

FIGURE 5

Chemicals

Thirty-five chemical plants have located in the region between 1956 and 1973. Again, Cumberland County leads with five plants. Growth in this industry is based primarily on the production of agricultural chemicals. There are no large concentrations of chemical plants within the study area. However, 20 of the 35 chemical processing plants (57.1%) have located in I-95 counties (figure 6).

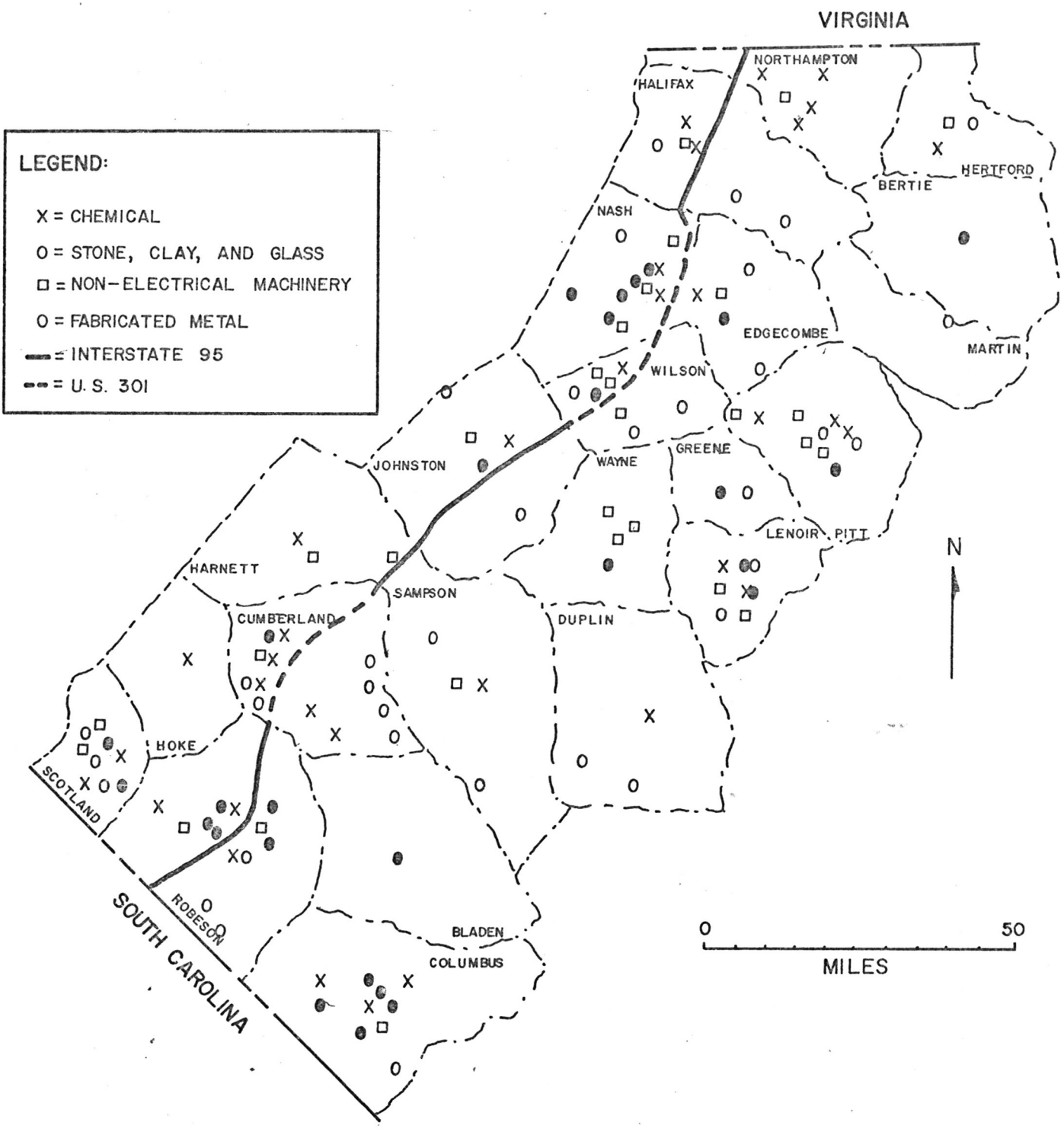
Non-Electrical Machinery and Fabricated Metals

The non-electrical machinery and fabricated metal industries have grown by 29 and 27 new plants, respectively. There are two discernable patterns concerning the locations of these two industrial types (figure 6). First, growth in these industries is concentrated in Nash, Robeson, Pitt, and Columbus Counties. Secondly, the non-electrical machinery industry is more evenly dispersed within the region.

The Remaining SIC Groups

As mentioned earlier, the 12 remaining SIC groups experienced little plant growth between 1956 and 1973. Thus, they are not discussed in detail here. However, it is interesting to note several location trends which have evolved (figures 7 and 8). First, 55.9 percent of the industries shown in figures 7 and 8 located in I-95 counties. However, no petroleum and coal or leather processing plant located in an I-95 county. It may be concluded then that the location of these two SIC groups is relatively unaffected by the existence of I-95. Likewise, it may be concluded that the location of electrical machinery, transportation

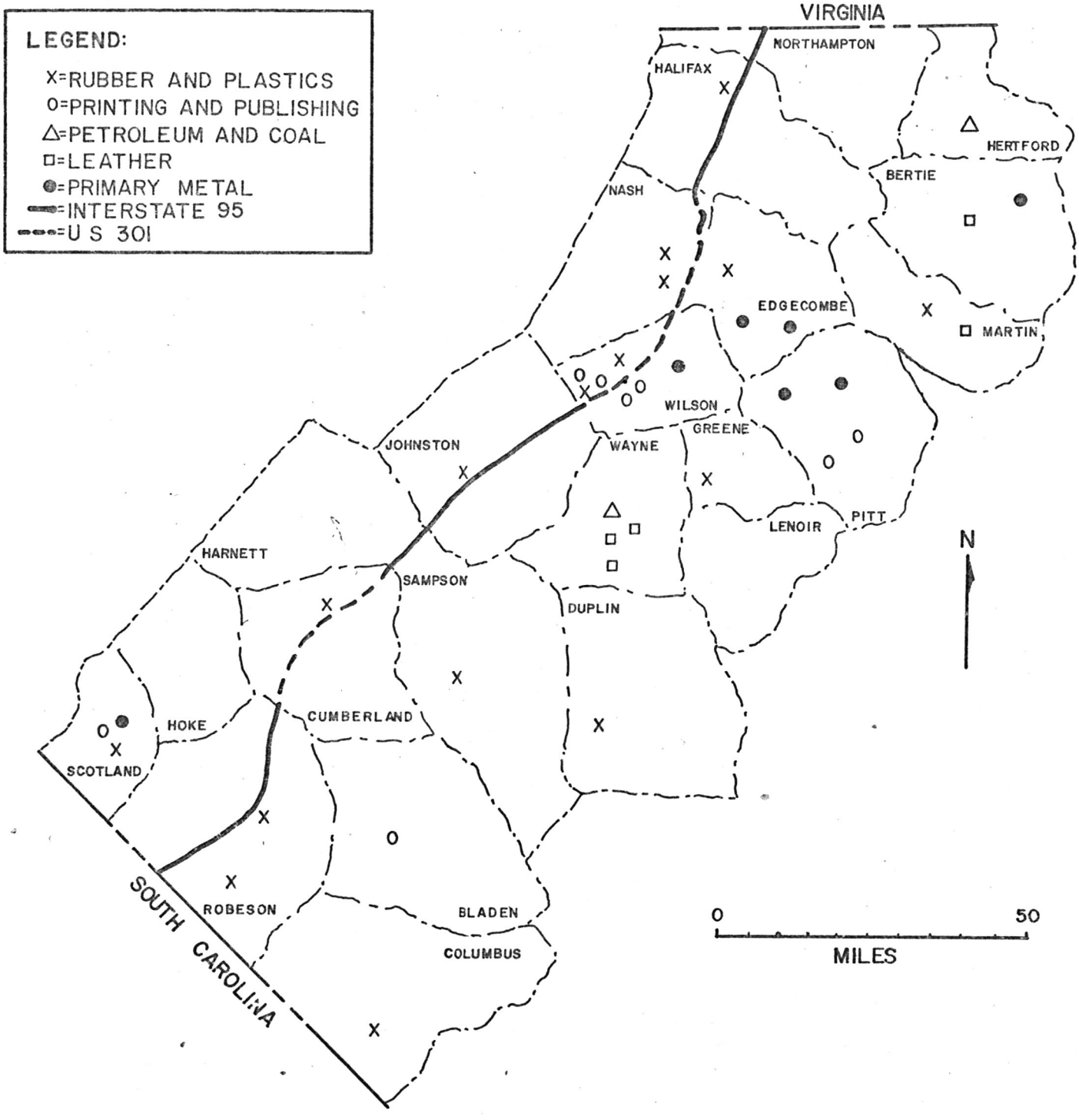
THE APPROXIMATE LOCATION OF NEW CHEMICAL, STONE, CLAY, AND GLASS, NON-ELECTRICAL MACHINERY, AND FABRICATED METAL PROCESSING PLANTS, 1956 — 1973



SOURCE: N.C. DEPT. OF NAT AND ECON. RES.

FIGURE 6

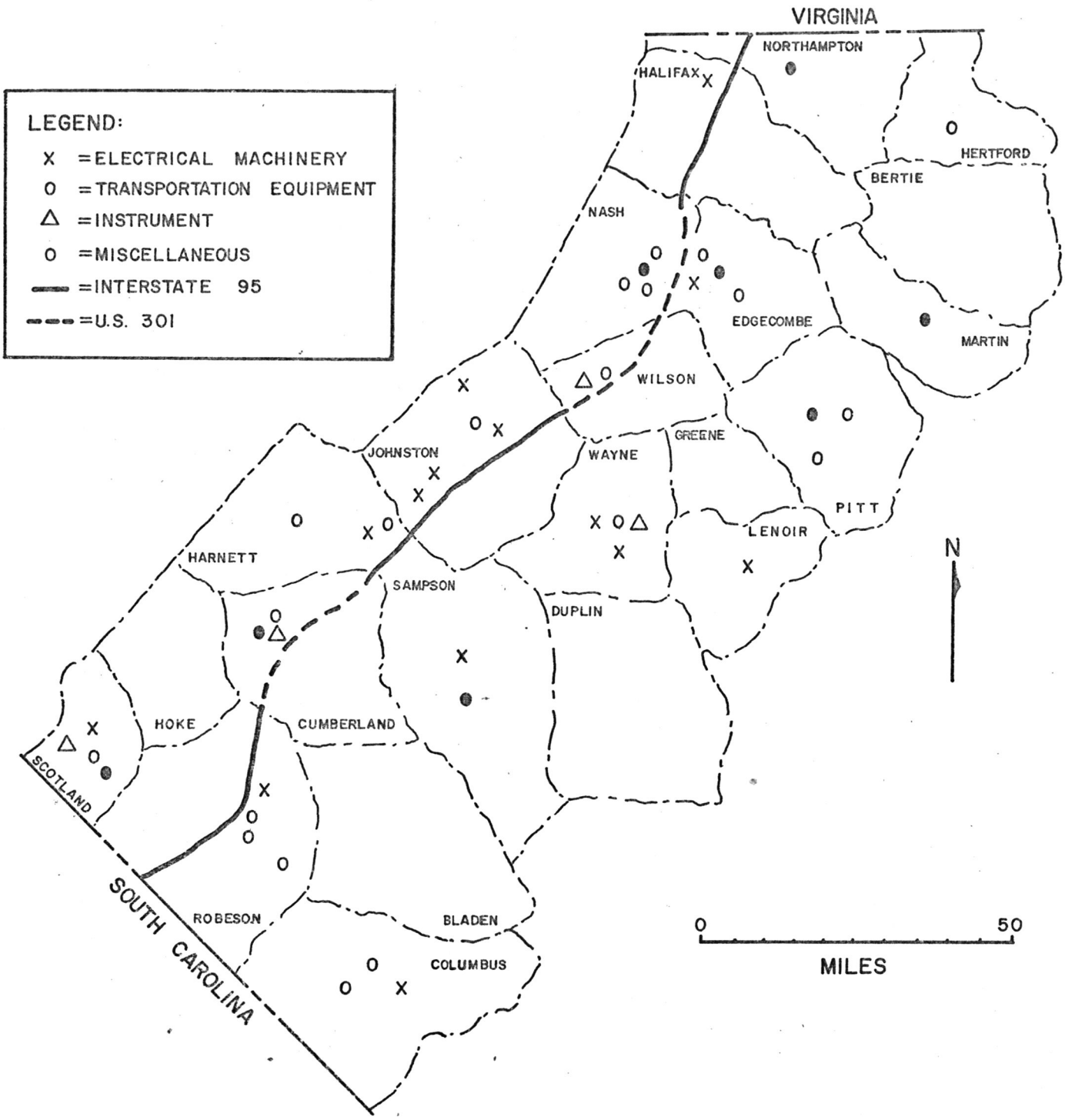
THE APPROXIMATE LOCATION OF NEW RUBBER AND PLASTICS, PRINTING AND PUBLISHING, PETROLEUM AND COAL, LEATHER AND PRIMARY METAL PROCESSING PLANTS
1956—1973



SOURCE: N.C. DEPT. OF NAT. AND ECON. RES.

FIGURE 7

THE APPROXIMATE LOCATION OF NEW ELECTRICAL MACHINERY, TRANSPORTATION EQUIPMENT, INSTRUMENT, AND MISCELLANEOUS PROCESSING PLANTS, 1956 — 1973



SOURCE: N.C. DEPT OF NAT. AND ECON. RES.

FIGURE 8

equipment, and rubber and plastic processing plants has been significantly affected by I-95 since 31 (64.6%) of the 48 new plants in these three SIC groups located in close proximity to the Interstate.

SIC Growth Trends by Year

Table 4 summarizes the growth trends of two-digit SIC groups according to the year they located in the region. Several significant growth trends are discernible. The first trend concerns the food, lumber, textile, and apparel industries. These four SIC groups experienced the most even growth rate of any of the industries. With the exceptions of 1956, 1958 and 1963, at least one of each of these four industrial types located within the region.

Although the food processing industry has grown significantly throughout the study period, 1965 marks the beginning of a general decline in this industry's growth. Between 1956 and 1965, 51 of the 71 food processing plants (71.8%) located in the area. However, the region as a whole experienced its most significant growth (over 63%) after 1965. Thus, while the region was experiencing its greatest industrial growth, the food processing industry was declining. This result is surprising since the number of fowl and pigs within the region increased significantly during the study period.[7] Apparently, the growth in this SIC type between 1956 and 1964 was sufficient to accommodate the increased livestock and fowl population.

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[7]The total number of fowl and pigs increased by approximately 700,000 and 100,000, respectively. However, the total number of cattle decreased by approximately 7,400. (North Carolina Agricultural Statistics, 1973-74, North Carolina Department of Agriculture, pp. 47, 50, 52.)

TABLE 4

GROWTH TRENDS OF TWO-DIGIT SIC INDUSTRY GROUPS
WHICH LOCATED IN THE STUDY AREA, 1956-1973

	SIC Code	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	Total
Food	20	4	6	13	2	6	8	4		3	5	4	1	3	4	3	2	1	2	71
Tobacco	21					1	1	1	1	1	1	1		1	1					9
Textiles	22		1		1	4	2	5	4	6	9	5	13	11	7	7	7	6	6	94
Apparel	23		5	1	3	8	4	4	4	8	13	8	13	9	9	4	11	13	9	126
Lumber	24	2	3	6	9	4	5	6	5	3	5	8	2	4	8	4	2	3	2	80
Furniture	25	1				1	3	1	2			2	1	1	2	1		1		16
Paper	26		1			1			1				1	2	1	1		1		9
Printing	27				1			1			2	1		1		1		1		8
Chemicals	28	1	2	3	1		1		4	2		2	10	3		2	1	1	2	35
Petroleum, Coal	29			1														1		2
Rubber, Plastic	30						1			1	1	2		1	1	3		4	2	16
Leather	31			1							2					1			1	5
Stone, Clay	32		1	3			5	1	2	2	4	5	5	3	1	2		1	1	36
Primary Metals	33					1	1	1		1	2	1								7
Fabricated Metal	34	1								3	2	1		2	6	2	3	5	2	27
Machinery	35		2	1	3	1			1	1	1	3	4	2	3	1	2	2	2	29
Electric Machinery	36			2	1	1						2	4	1	2				1	14
Transport Equipment	37			1		1					2	1	1	3	5	2	1	1	2	20
Instruments	38									1					2	1				4
Miscellaneous	39					2			1		1	2		1					1	8
Total		9	21	32	21	30	31	24	25	32	50	48	56	47	51	36	29	41	33	616
Percent		1.5	3.4	5.2	3.4	4.9	5.0	3.9	4.1	5.2	8.1	7.8	9.1	7.6	8.3	5.8	4.7	6.7	5.4	

Source: Derived by the author from the North Carolina Directory of Manufacturing Firms, 1974-75

The growth trends of the 18 remaining SIC groups have one characteristic in common. Each experienced by far its greatest growth between 1965 and 1973. This is a significant result since it suggests that the region has begun to diversify its industrial base. Such diversification suggests a strengthening of the region's industrial structure by decreasing the region's dependence on the textile, apparel, and lumber industries. This growth trend will be important in the future as the region moves into what should be a period of even greater industrial growth.

Industrial Growth Trends and Manufacturing Employment Growth

The real strength of any industrialization process lies not so much in the number of new plants that have been built as in the number of new jobs that have been created. In 1973 the Chamber of Commerce of the United States published a report (What 100 Extra Jobs Mean to a Community, 1973) in which they measured the impact of industrial growth in ten primarily rural counties in the United States. It showed that every new 100 factory workers meant a rise in personal income of $1,036,000 yearly, one more retail establishment, an increase in retail sales of $565,000 per year, an increase in bank deposits of $490,000, an additional 68 non-manufacturing jobs added to the economy, a total population increase of 351, and a school enrollment rise of 79 pupils. Of course, these figures are only averages but they do help stress the fact that industrial growth can, through increased job opportunities, have a positive impact on the entire economic structure of a region. Incidentally, Wayne County, which is part of the area under analysis

in this research, was one of the ten counties examined by the Chamber of Commerce.

Employment Growth Trends

Table 5 shows the number of new manufacturing jobs created by industrial growth in the region, by county and SIC designation, during the study period. Significantly, the region's 1956-1973 industrial growth has created approximately 68,471 new manufacturing jobs. Based on the preceding section, it is not surprising that the textile and apparel industries account for the bulk of these new jobs (50.2%). Employment growth in these two industrial types is dispersed throughout the region, although the greatest concentrations are in Robeson, Nash, and Cumberland Counties.

The chemical, rubber and plastics, tobacco, food, and lumber processing industries rank third through seventh, respectively, in industrial employment growth. With the exception of the tobacco industry, this result is expected. Interestingly enough, although the tobacco industry ranks sixteenth in new plant growth, it is nevertheless one of the region's most significant industrial employers. When combined, these seven industrial types account for 77.3 percent of the region's industrial employment growth.

An analysis of the least significant growth industries reveals no real surprise. The petroleum and coal, printing, instrument, primary metals, and leather processing industries rank as the region's least significant growth industries. Combined, they account for only 3.4 percent of the region's new industrial employment. This result is

TABLE 5

ESTIMATED NEW INDUSTRIAL EMPLOYMENT TOTALS FOR THE STUDY AREA, 1956–1973

SIC Employment Counties	Food 20	Tobacco 21	Textiles 22	Apparel 23	Lumber 24	Furniture 25	Paper 26	Printing 27	Chemicals 28	Petroleum, Coal 29	Rubber, Plastics 30
Scotland			2,180	170		108		27	250		114
Hoke	500		699						12		
*Robeson	408	115	2,738	2,157	60	72	213		30		1,149
Columbus	29		1,125	760	392				125		175
Bladen	33		235	381	323			3	2,139		
*Cumberland	203		1,037	1,131	248				4		1,649
*Harnett	122		761	670	30						
*Sampson	33		217	803	61	217					20
Wayne	19		428	1,690	235	163				150	
*Johnston	70	774	555	582	235	145			5		27
*Wilson	269	705	393	308	178		82	359	7		826
Greene	6		148	358		3					63
Pitt	279	1,119	500	1,424				12	465		
*Edgecombe	109		1,750	538	110	214	114		9		4
*Nash	130	240	1,625	1,160	224	252			470		154
*Halifax	2		1,360	679	57				4		76
*Northampton	9			46	297				168		
Martin	89		463	175		31	1,234		35		2
Duplin	495		1,769	590	88				5		9
Bertie				320	196						
Lenoir	198	171	574	1,392	19	7	23		1,403		
Hertford			186	275	250				18	8	
Total	3,003	3,129	18,743	15,609	3,003	1,212	1,666	401	5,149	158	4,268
Percent	4.39	4.57	27.37	22.79	4.39	1.77	2.43	.59	7.52	.23	6.23

TABLE 5—Continued

SIC Employment Counties	Leather 31	Stone, Clay, Glass 32	Primary Metals 33	Fabricated Metal 34	Non-elec. Machinery 35	Electric Machinery 36	Trans. Equip. 37	Instru-ments 38	Misc. 39	Totals	Percent
Scotland		230	71	142	108	188	50	39	73	3,750	5.48
Hoke										1,211	1.77
*Robeson		14		481	20	246	187			7,890	11.52
Columbus				327	35	73	90			3,131	4.57
Bladen				15				327	3	1,320	1.93
*Cumberland		310		3	707		353			7,780	11.36
*Harnett		21			148	68	32		14	1,870	2.73
*Sampson		122		9	43	435				1,960	2.86
Wayne	388			64	364	323	321	150		4,295	6.27
*Johnston		29		3	2	1,496	27			3,950	5.77
*Wilson		275	176		102		16	3		3,699	5.40
Greene				12						590	.86
Pitt		26	10	20	309		106		218	4,488	6.55
*Edgecombe		233	150	21	449	45	25		449	4,220	6.16
*Nash		2		267	52		77		107	4,760	6.95
*Halifax		93			3	15				2,289	3.34
*Northampton.					15				15	550	.80
Martin	72	3							14	2,118	3.09
Duplin		14								2,970	4.34
Bertie	160			14						690	1.01
Lenoir		96		32	5	79				3,999	5.84
Hertford		4	188		8		4			941	1.37
Total	620	1,472	595	1,410	2,370	2,968	1,288	519	893	68,471	
Percent	.91	2.15	.87	2.06	3.46	4.33	1.88	.76	1.30		100

Source: Derived by the author based on estimates in the North Carolina Directory of Manufacturing Firms, 1974–75 and County and City Data Book, 1962

*Denotes counties through which I–95 passes

due to several reasons. First, the petroleum and coal, primary metals, and leather processing industries are heavily raw material oriented and the region is not a significant producer of these raw materials. Also, the printing industry is heavily market oriented and the lack of sizeable markets has handicapped this industry's growth. Finally, the instrument industry requires a great deal of skilled labor and the region's labor force is not adequate to fulfill this demand.

Robeson and Cumberland Counties rank first and second, respectively, in terms of new employment growth. Textiles, apparels, and rubber and plastics are Robeson County's most significant industrial employers (76.6%). Likewise, chemicals, rubber and plastics, and apparels account for the bulk of Cumberland County's industrial employment growth (63.8%). These two counties experienced by far the greatest amount of industrial employment growth. When combined, their employment growth accounts for 22.9 percent of the region's total industrial employment growth.

Nash, Pitt, Wayne, and Edgecombe Counties rank third through sixth, respectively, in the number of new employees in the manufacturing industries. When combined, the textile and apparel industries account for the bulk of this growth. Significantly, the remaining industrial employment has been spread fairly evenly throughout these counties' industrial structures. Since these four counties are contiguous, it may be concluded that they constitute the most industrially diversified subregion within the study area. When combined, Nash, Pitt, Wayne, and Edgecombe Counties account for 25.9 percent of the region's industrial employment growth.

Lenoir, Johnston, Scotland, and Wilson Counties comprise a third set of counties which have experienced significant industrial growth. With the exception of Scotland County, employment growth in this set of counties is less dependent on the textile and apparel industries. For example, Lenoir County's most significant employment growth industry is chemicals, with apparels and textiles ranking second and third, respectively. In Johnston County, electrical machinery and tobacco processing rank first and second while Wilson County's most significant employment growth industries are rubber and plastics and tobacco. However, it should be noted that when combined, the textile and apparel industries account for 37.1 percent of the industrial employment growth in Lenoir, Johnston, and Wilson Counties. As a group, Lenoir, Johnston, Scotland, and Wilson Counties account for 22.5 percent of the region's total industrial employment growth during the study period.

Industrial employment growth in the remaining 12 counties accounts for 28.7 percent of the region's total growth. The textile and apparel industries account for 61.2 percent of these counties' industrial employment. No other single industrial type has experienced significant growth. Thus, it may be concluded that the industrial structure of these 12 counties is not sufficiently diversified to offer their inhabitants a full range of employment opportunities.

The Correlation Between New Plant and Employment Growth

Growth in new plants and new employment within any specific industrial type is not necessarily related. Table 6 documents this

fact.

Table 6 summarizes the rank of each county based on the total number of industries in it, the total number of industries which have located there since 1956, and the total estimated new employment growth between 1956 and 1973.

Robeson County again stands out as having received the most significant amount of industrial growth. It ranks first in both the number of new plants and the number of people employed since 1956. On the other hand, Cumberland County, which ranked ninth in the number of new post-1956 plants, ranks third in the number of new jobs which these plants have created. Thus, using a new plant/employment growth ratio, Cumberland County may be said to have experienced more significant employment growth than the region as a whole since fewer plants located in it, but these plants employed a greater number of people. In fact, this could be said of Lenoir, Halifax, Sampson, Scotland, Martin, and Hoke Counties since their ranking by number of new plants is greater than their employment growth rank. The opposite may be said about the counties of Nash, Wilson, Wayne, Pitt, Johnston, Edgecombe, Duplin, Columbus, Bladen, Northampton, Bertie, and Greene since these counties rank higher in plant growth than in employment growth. Only three counties, Robeson, Harnett, and Hertford experienced employment growth which was proportional to their plant growth since their rank according to number of new plants and employment growth was the same.

Industrial Plant Growth by Employment Range

Before concluding this chapter on plant and employment growth,

TABLE 6

COUNTY RANKINGS BASED ON TOTAL NUMBER OF INDUSTRIES, NUMBER OF NEW INDUSTRIES SINCE 1956, AND ESTIMATED NEW EMPLOYMENT SINCE 1956

County	Total No. Industries (Rank)	New Industries since 1956 (Rank)	Est. New Employment since 1956 (Rank)
*Nash	1	2	5
*Robeson	2	1	1
*Cumberland	3	9	3
*Wilson	4	3	4
Wayne	5	8	12
Pitt	6	5	6
*Johnston	7	7	10
Lenoir	8	4	2
*Edgecombe	9	6	7
*Halifax	10	12	9
Duplin	11	11	14
Columbus	12	10	16
*Sampson	13	16	15
*Harnett	14	13	13
Scotland	15	14	8
Bladen	16	15	17
Martin	17	18	11
*Northampton	18	17	20
Hertford	19	19	19
Bertie	20	20	21
Greene	21	21	22
Hoke	22	22	18

Source: Derived by the author from the North Carolina Directory of Manufacturing Firms, 1974–75

*Denotes counties through which I–95 passes

it is important to examine briefly the types of new plants, by employment size, which have located in the region between 1956 and 1973. This is important because when small industries move into an area, the area is often viewed as experiencing significant industrialization when in fact these small industries may not have created enough jobs to have significantly helped the people or the economy (Leven, 1964). However, as seen in table 7, industries which employ between 101 and 250 people are the most numerous. Also, plants which employ from 21 to 550 people account for 409 (66.7%) of the total 616 plants which moved into the study area since 1956. Certainly the smaller plants are represented as evidenced by the fact that they account for 26.1 percent of the total number of plants. However, it can be said that the industrialization which has occurred within the study area has been significant in terms of creating additional job opportunities for the region's inhabitants. Therefore, it may be concluded that the region's industrial employment growth has been of significant magnitude to have potentially upgraded the economic structure of the region.

Conclusion

This chapter has attempted to document the magnitude and significance of industrial growth which has taken place within the study area between 1956 and 1973. It has been shown that well over half of all industrial plants which have located in the area did so after 1956. Textile, apparel, lumber, and food processing industrial types have accounted for the majority of the region's growth in physical plants. The textile, apparel, chemical, and rubber and plastics

TABLE 7

NEW INDUSTRIES, BY COUNTY, IN EACH EMPLOYMENT RANGE

County	Employment Range 1-4 A	5-9 B	10-20 C	21-50 D	51-100 E	101-250 F	251-550 G	551-1000 H	1001-2500 I	Over 2500 J	Total No. New Indus. Since 1950
Scotland	2	2	3	2	3	5	3	1		1	22
Hoke		1				1	1	3			6
Robeson	3	4	6	10	12	21	8	3	1		68
Columbus	1	3	3	7	6	5	2	1			28
Bladen		2	3	2	5	8	1	1			22
Cumberland	2		4	9	4	4	5	2	2		32
Harnett	2	3	1	7	3	6	2	1	1		26
Sampson		1	2	7	2	4	4	1			21
Wayne	3	2	4	1	7	10	5	1			33
Johnston	3	3	4	7	5	6	2	3	1		34
Wilson	5	4	3	8	5	7	6	3	1		42
Greene	1	1	1		2	3					8
Pitt	2	4	3	7	6	4	6	3	1		36
Edgecombe		4	3	3	6	11	4	4			35
Nash	3	4	8	9	10	11	6	3			54
Halifax	3	3	1	4	3	7	3	1	1		26
Northampton	1	3	2	4	3	3	1				17
Martin	1	3		2	3	4	3			1	17
Duplin	2	4	4	4	3	4	5		1	1	27
Bertie			3	1	2	3					9
Lenoir	4	5	4	8	7	7	1	2	1	1	40
Hertford		2	3	2	1	1	4				13
Total	38	58	65	104	98	135	72	33	10	3	616
Percent	6.17	9.42	10.55	16.88	15.91	21.92	11.69	5.36	1.62	.49	100

Source: Derived by the author from the North Carolina Directory of Manufacturing Firms, 1974–75

industries have made the most significant contributions in creating new jobs. It is also shown that the industrial types which grew the most in terms of number of plants did not necessarily create the greatest amount of new jobs. Finally, it was found that, based on employment size, plants which have located within this 22 county region of North Carolina have been of sufficient size to adequately contribute to the economy of the region. The following chapter will attempt to define the role which I-95 has played in the region's industrial growth process.

CHAPTER IV

THE IMPACT OF INTERSTATE 95 ON INDUSTRIAL DEVELOPMENT

This chapter documents, through analysis of a questionnaire survey, the role Interstate 95 has played in the industrial growth of the study area between 1956 and 1973. The impact of I-95 is examined in two ways. First, the effect of the Interstate on the area's overall industrial growth is determined. Second, the importance of the Interstate to the growth of each two-digit SIC industrial group is analyzed. In addition, the location factors which are most significant in attracting industry to the study area are analyzed. This analysis is based on the questionnaire returns and enables us to determine any interrelationships which may exist between I-95 and other significant industrial location factors.

Research Methodology

A questionnaire survey was conducted to determine the impact of I-95 in attracting industry to the study area. The questionnaire (appendix A) was mailed to each of the 616 plant managers or owners who located in the study area between 1956 and 1973. The questionnaire is designed to provide information concerning the industries themselves, including why they decided to locate where they did, the importance of I-95 as a location factor, and the most important benefits the plant

derives by locating in close proximity to the Interstate. Also, information is provided concerning the respondent's degree of satisfaction with his plant's present location, the major transport mode each plant uses in freight shipment, and the market area for each plant's product. Finally, the questionnaire provides information about the two-digit SIC group to which the plant belongs, and whether or not the plant is located in a county through which I-95 passes.

Two hundred thirty-nine questionnaires were returned (38.8%). A surprisingly even number were returned from counties through which I-95 passes (126 of a possible 355, 35.5%) and counties through which I-95 does not pass (113 of a possible 261, 43.3%). The remaining portion of the chapter is devoted to the analysis of the questionnaire results.

The Impact of Interstate 95 on Industrial Growth

Table 8 lists the location factors, in order of importance, by which attracted industry to the study area between 1956 and 1973. Interstate 95 is mentioned by 105 respondents (43.9%) as being significant. The Interstate (along with proximity to markets) ranks as the region's third most significant industrial location factor. Thus, it may be concluded that I-95 has played a prominent role in the industrial growth of the region.

It may be further concluded that I-95 is relatively more important in attracting industry to counties through which it passes as compared to counties through which it does not pass. Sixty-three respondents (50.0%) from plants which located in I-95 counties

TABLE 8

INDUSTRIAL LOCATION FACTORS, IN ORDER OF IMPORTANCE, WHICH HAVE MOST INFLUENCED INDUSTRIAL GROWTH WITHIN THE STUDY AREA, 1956–1973

Factor	Times Mentioned		Times Mentioned by Plants in I–95 Counties		Times Mentioned by Plants in Non-I–95 Counties	
	Number	Percent	Number	Percent	Number	Percent
Abundant labor supply	174	72.8	85	67.5	89	78.8
Availability of suitable land	160	66.9	74	58.7	86	76.1
*Proximity to markets	105	43.9	55	43.7	50	44.2
*Proximity to I–95/U.S. 301	105	43.9	63	50.0	42	37.2
Availability of water and sewer	101	42.3	48	38.1	53	46.9
Availability of raw materials	83	34.7	39	31.0	44	38.9
Availability of rail service	79	33.1	39	31.0	40	35.4
Existence of building	67	28.0	44	34.9	23	20.4
Favorable tax structure	65	27.2	28	22.2	37	32.7
Favorable leasing or financing	58	24.3	30	23.8	28	24.8
Proximity to related industry	56	23.4	26	20.6	30	26.5
Nearby vocational training facility	24	10.0	16	12.7	8	7.1
Area's cultural/recreational assets	15	6.3	7	5.6	8	7.1
Other	12	5.0	4	3.2	8	7.1
*Advertising value of high visibility	9	3.8	8	6.3	1	0.9

Source: Derived by the author based on the survey questionnaire returns

*Factors related to highway accessibility

designate the Interstate as one of their five most important location factors. Only 42 responses (37.2%) from plants which located in non-I-95 counties designate the Interstate as being significant in their plant location decision.

Table 8, besides documenting I-95's positive impact on the region's industrial growth, also shows the relative strength and weakness of additional location factors. Two of these factors, abundant labor and the availability of suitable land, are much more important than any of the others. This is consistent with national trends. McCarthy (1963) surveyed 4,150 manufacturers across the Nation and determined that an abundant labor supply and the availability of suitable land ranked as the second and third most important location factors which management considered. Robert E. Leak (1970), in a speech presented to the Coastal Plains Traffic Club, made the following comment concerning Burlington Industries:

> Burlington use [sic] to concern itself with finding the location where raw materials could be assembled and distributed at the least cost. We still do. But now we go where labor is available, and worry about other factors later.

The high ranking of these two location factors, then, is expected. Likewise, it is shown that these two factors are of nearly equal significance to plant location in I-95 counties and non-I-95 counties. This is not surprising since the availability of either factor is not necessarily dependent on the existence of I-95. However, the Interstate is recognized as important in increasing the labor supply area for some industries which have located close to it (Lonsdale, 1966). Also, there can be little argument that I-95, merely by its existence, has increased

the availability of land suitable for industrial development.

Further analysis of table 8 shows there are three location factors which, based on number of times mentioned, may be termed secondary factors. They are proximity to markets, proximity to I-95/U.S. 301, and the availability of water and sewer. Market proximity and proximity to I-95/U.S. 301 are each mentioned 105 times. These two factors are related to highway accessibility. Also, they are strongly interrelated as I-95 connects not only the major markets in the study area but also major markets along the entire east coast.

The availability of water and sewer ranks fifth in importance, being mentioned 101 times (42.3%). Based on the percentage of responses from I-95 counties versus non-I-95 counties it may be concluded that water and sewer facilities in non-I-95 counties are greater attractive forces than in the I-95 counties. Two reasons account for this result. First, the more urbanized I-95 counties have a greater number of possible amenities which attract industry. Thus, the importance of any one of them, such as the water and sewer factor, is reduced. A second reason is that many of the less populated counties and towns can attract industry if they have available water and sewer facilities. By using federal grants, they have been able to construct such facilities, and it is therefore common to find many of the region's smaller, less wealthy towns with water and sewer facilities.

As a group, these first five factors are mentioned 645 times (58.0%) as compared to 468 (42.0%) times for the remaining 10 factors. These five factors are therefore the most important considerations which industry takes into account when evaluating this region as a

possible site for a plant. However, as a group, there is little difference in the number of times these five factors are mentioned by respondents in I-95 counties (325) compared to respondents in non-I-95 counties (320). Thus, it may be concluded that these five factors are significant throughout the region and are not especially dominant in either the I-95 or non-I-95 counties.

Six of the remaining 10 factors may be included in a third group of location factors. This group includes availability of raw materials, availability of rail service, the existence of a building at the site, a favorable tax structure, favorable leasing or financing, and proximity to related industry. Although they do not rank as the most significant factors, they should not be dismissed as having little location influence.

The availability of raw materials is mentioned by 83 respondents (34.7%) as being a significant location factor. Given the major growth in the apparel, textile, lumber, and food processing industries, all of which are raw material oriented, this result is not surprising. Likewise, the fact that this location factor is more significant in the non-I-95 counties is expected since a greater amount of local raw materials for these industries comes from the more rural non-I-95 counties.

The availability of rail service ranks as the seventh most important location factor. It was mentioned by 79 respondents (33.1%). This location factor is of approximately equal significance in I-95 and non-I-95 counties, a result which is expected since adequate rail service is present throughout the region. Local service lines are

connected to a major north-south trunk line (Seaboard Coast Line) which parallels I-95. They are also connected to a major east-west artery which passes through the southern part of the study area (Seaboard Coast Line).

The existence of a building at the site is mentioned by 67 respondents (28.0%) as being a significant location factor. It is the only factor in the third group which is significantly more important in the I-95 counties than in the non-I-95 counties. This result is reasonable since I-95 counties are more urbanized and thus contain more structures suitable for industrial use.

A favorable tax structure and favorable leasing or financing rank as the ninth and tenth most important industrial location factors, respectively. They are mentioned 65 and 58 times, respectively. A favorable tax structure is more important as a location factor in the non-I-95 counties. This result is expected since it is one of the few ways a rural area can outbid an urban area for a new plant. There is no appreciable difference in favorable leasing or financing as a location factor in I-95 and non-I-95 counties.

The sixth factor in this third group is proximity to related industry, mentioned by 56 respondents. This factor is more important to industries which locate in non-I-95 counties. This result is surprising since it was shown in chapter 4 that greater industrial growth occurred in I-95 counties and, therefore, proximity to related industry would seemingly be more significant in these counties. Two reasons account for this result. The major reason is due to the ample amount of textile and apparel plant growth and the fact that the

location of these two industrial types is not appreciably affected by the existence of I-95. Also, since the textile and apparel growth is fairly evenly distributed throughout the region, and the I-95 counties experienced the greater amount of industrial growth, it may be concluded that industrial growth in the I-95 counties is more diversified and thus the presence of agglomeration economies is less pronounced.

The last four factors shown in table 8 comprise the fourth, and least important, group of industrial location factors. As a group, they are mentioned only 60 times as being significant. Two of these factors, a nearby vocational training facility and advertising value of high visibility, are significantly more important in the I-95 counties. The significance of vocational training facilities is expected since nine of the ten I-95 counties have such a facility. The greater significance of advertising in I-95 counties is explained by the fact that respondents who desire increased plant exposure would naturally prefer a site adjacent to the Interstate.

Fifteen respondents consider the area's cultural/recreational assets important as a location factor. None of them elaborated as to the type of asset which attracted their plant. However, some interesting replies are given by the 12 respondents who list factors other than the ones mentioned on the questionnaire. For example, three respondents state they located their plant in the region because they were born and raised here and did not wish to move. Another respondent states that proximity to a municipal airport is his major location factor while another lists proximity to a river as being significant.

A weighted analysis of these location factors is conducted as

an additional means of analyzing the relative importance of each. This type of weighted analysis is used by Connally (1968) in analyzing the impact of the Capital Beltway on plant location in the Washington, D. C. area. The analysis in this research includes only the 11 most significant location factors (as identified in table 8) since they are by far the more important.

The methodology consists of assigning a weighted value (five through one) to each of the 11 factors based on the number of times it is mentioned as being the first, second, third, fourth, or fifth most important factor in each questionnaire.[8] For example, labor is mentioned by 47 respondents as being their most significant location factor. Forty-seven multiplied by five (the weight assigned to the most significant factor in each questionnaire) gives a weighted value of 235. Likewise, nine respondents view labor as their second most important location factor. Nine multiplied by four (the weight assigned to the second most significant factor in each questionnaire) gives a weighted value of 36. This procedure is repeated according to the number of times labor is mentioned as the third, fourth, or fifth most important factor. However, the number of times mentioned is multiplied by three, two, and one, respectively. This methodology is applied to each of the 11 location factors. Table 9 shows the results of this weighted analysis.

Several aspects of table 9 deserve mention. First, it strengthens the conclusion that labor and land are the most important

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[8]Not all respondents numerically identified their five most significant location factors. Rather, some respondents merely checked their most significant factors. Therefore, this analysis is based on 144 responses.

TABLE 9

A WEIGHTED ANALYSIS OF LOCATION FACTORS WHICH AFFECTED INDUSTRIAL GROWTH IN THE STUDY AREA, 1956–1973

Factor	Number of Times Mentioned					Weighted Value
	1st (x5)	2nd (x4)	3rd (x3)	4th (x2)	5th (x1)	
Abundant labor supply	235	36	33	18	3	325
Availability of suitable land	80	88	45	26	8	247
Proximity to markets	60	52	33	22	7	174
Proximity to I–95/U.S. 301	45	32	51	22	18	168
Availability of water and sewer	20	32	48	16	16	132
Availability of raw materials	35	36	21	16	7	115
Availability of rail service	15	52	30	14	3	114
Existence of building	25	36	27	12	4	104
Favorable tax structure	5	40	12	22	5	84
Favorable leasing or financing	10	24	12	22	6	74
Proximity to related industry	10	16	18	6	3	53

Source: Derived by the author based on the survey questionnaire returns

industrial location factors in the study area. Also, the table shows that although markets and I-95 are mentioned the same number of times, market proximity is somewhat more important since it is mentioned as the first or second most important location factor more times than I-95. In addition, it may be concluded that rail service, although mentioned four fewer times than raw materials, is nevertheless as significant. Finally, the respondents view the existence of a building as considerably more important than a favorable tax structure. It should be noted however, that while there are three changes from table 8 in the ordering of the location factors, there is no change in the major groupings discussed earlier. Thus, while table 9 offers a more refined ranking of the plant location factors, the lack of significant overall changes further strengthens the conclusions drawn based on table 8.

One hundred thirty-four respondents (56.1%) did not designate I-95 as being one of their five most important location factors. However, 28 of these respondents (21.0%) state that I-95 played a secondary role in their plant location decision. An additional 34 respondents (25.4%) state that while the Interstate played no part in their plant location decision, it has become important since locating at the site. These results further emphasize the positive effect I-95 has had on industrial growth within the study area.

The survey results show that over 98 percent of the plant owners and managers are satisfied with their plant's location. One hundred forty-one of the respondents (59.0%) state they are very satisfied while 84 (39.6%) state they are moderately satisfied. Of the 14 respondents who are not satisfied with their plant's location,

12 (85.7%) are located in non-I-95 counties. The dissatisfaction of these 14 respondents is probably due to their distance from markets and a dwindling labor supply. However, it should be noted that the respondents who are satisfied with their present location also note some major disadvantages. The disadvantages are a lack of skilled labor, inadequate east-west highway facilities, the lack of sufficient air transportation facilities, and the distance from plant to major markets.

Benefits Derived by Locating in Close Proximity to I-95

Table 10 shows the rank of the seven most frequently mentioned benefits which respondents derive by locating in close proximity to I-95. The three most significant benefits are, in order of importance, efficiency in procuring materials, efficiency in distributing products, and increased contact with suppliers and services. In addition, table 10 shows how respondents in I-95 and non-I-95 counties view these benefits. As expected, efficiency in receiving and shipping materials are more significant benefits to respondents who located in I-95 counties. However, it is surprising that these same respondents do not view I-95 as being more important in increasing contacts with suppliers and services, especially since I-95 increases accessibility to the plants which locate near it. A possible explanation is that no plant in the study area is more than 60 miles away from I-95.

Forty-four respondents mention that I-95 increases access to a larger labor pool. Thirty-six of these respondents (81.8%) are located in counties through which I-95 passes. Thus, it may be concluded that the Interstate is more significant in increasing the labor market of

TABLE 10

BENEFITS DERIVED BY PLANTS LOCATING ON OR NEAR I–95, IN ORDER OF IMPORTANCE, 1956–1973

Benefit	Times Mentioned		Times Mentioned by Plants in I–95 Counties		Times Mentioned by Plants in Non-I–95 Counties	
	Number	Percent	Number	Percent	Number	Percent
Efficiency in sending products out	163	68.2	100	79.4	63	55.8
Efficiency in bringing in materials	156	65.3	92	73.0	64	56.6
Contact with suppliers and services	84	35.7	40	31.7	44	38.9
Access to a large labor pool	44	18.7	36	28.6	8	7.1
Good working environment	43	18.0	26	20.6	17	15.0
Other	13	5.4	11	8.7	2	1.8
Advertising	6	2.5	4	3.2	2	1.8

Source: Derived by the author based on the survey questionnaire returns

plants in I-95 counties as compared to plants in non-I-95 counties.

Plants which locate in I-95 counties experience no particular advantage where a good working environment and advertising are concerned. This lack of an advertising advantage is surprising since earlier analysis showed that advertising value of high visibility is important only to plants which locate in I-95 counties. However, due to the more important benefits of increased shipping efficiency, contact with suppliers and services, and access to a larger labor pool, the advertising benefit is relatively less important.

There are other benefits to locating in close proximity to I-95. Among them are greater access to trucking terminals and service areas for trucks, increased access to parent plants, an expanded market area, more motel and restaurant accommodations, and increased access to customers. It is apparent, then, that plants which locate in I-95 counties experience greater benefits than those which locate in non-I-95 counties.

The Significance of Transport Modes Utilized by Industry

Another factor which further emphasizes I-95's significance as an industrial location attraction within the study area is the major transport mode utilized in both receiving and shipping freight. Table 11 shows the response rate for the four most utilized transport modes. Not surprisingly, trucking represents by far the most important transport mode. The fact that truck transport is of approximately equal significance in I-95 counties and non-I-95 counties is also expected.

Rail ranks as the second most utilized transport mode for both

TABLE 11

MAJOR TRANSPORT MODES UTILIZED BY PLANTS IN THE STUDY AREA, FOR INBOUND AND OUTBOUND FREIGHT, 1956–1973

INBOUND

Mode	Times Mentioned		Times Mentioned by Plants in I–95 Counties		Times Mentioned by Plants in Non-I–95 Counties	
	Number	Percent	Number	Percent	Number	Percent
Truck	194	81.2	103	81.7	91	80.5
Rail	41	17.2	25	19.8	16	14.2
Air	4	1.8	4	2.4	0	.9
Water	0		0		0	

OUTBOUND

Mode	Times Mentioned		Times Mentioned by Plants in I–95 Counties		Times Mentioned by Plants in non-I-95 Counties	
	Number	Percent	Number	Percent	Number	Percent
Truck	207	86.6	108	85.7	99	87.6
Rail	28	11.7	16	12.7	12	10.6
Air	4	1.8	4	3.2	0	
Water	0		0		0	

Source: Derived by the author based on the survey questionnaire results

inbound and outbound freight. Forty-one respondents mention rail as an inbound mode compared to 28 respondents who mention it as being a significant outbound transport mode. The reason it is mentioned more times as an inbound mode is directly related to the type of industry which has located in the area. A significant amount of this area's industrial growth is raw material oriented. These incoming raw materials are often heavy and bulky, as in the case of pulpwood, and such materials are shipped more easily and in larger per-load-quantities by rail. Once the raw material is processed, the finished product is lighter and less bulky which usually means it can be sent out quicker and less expensively by truck.

Four respondents list air as a major transport mode. Two of their plants process fabricated metal products, one produces rubber products, and the fourth produces high value transportation parts. Not surprisingly, these plants are in Lenoir and Cumberland Counties which contain the region's two largest commercial airports.

Major Market Areas for Plants Locating in the Study Area

The areal extent of a plant's market area is usually indicative of the plant's economic significance within a region. This result is due to several reasons. First, a large or expanding market area means that a plant produces more goods which, in turn, means that the plant must employ more people. Second, as the market area expands so does the plant's export base. Thus, more money is imported from outside the region. This increased money income is usually reflected in higher wages for the plant's workers and increased growth in the region's

residentiary economy.

Table 12 shows that most of the plants in the study area service either a regional or national market. Few plants are limited to serving only eastern North Carolina markets. Likewise, few plants serve either continental or international markets. Since the market areas are generally large, it may be said plants which have located in the study area have been significant in increasing total employment opportunities and upgrading the region's export base.

The Interstate is most significant as a location factor to plants which have either a regional or national market area. However, the Interstate is not a major location factor to plants with an eastern North Carolina, continental, or international market area. Also, it may be concluded that market areas of plants which locate in I-95 counties are neither larger nor smaller than the market areas of plants which locate in non-I-95 counties. However, this should not be construed to imply that I-95 has not increased the market area for plants in general since plants which require proximity to the Interstate did not necessarily locate in counties through which it passes.

Comments Concerning the Impact of I-95

Interstate 95 has proven to be a significant force in the industrial growth of the study area. Comments on many of the returned questionnaires emphasize the Interstate's impact even more. A furniture manufacturer states, "I-95 has most definitely attracted industry." A manufacturer of fabricated metals states, "For any area manufacturing and/or distribution facility, access to I-95 is most important and will

TABLE 12

MARKETS SERVED BY PLANTS WHICH LOCATED IN THE STUDY AREA, IN ORDER OF IMPORTANCE, 1956–1973

Market Area	Times Mentioned		Times Mentioned by Plants in I–95 Counties		Times Mentioned by Plants in Non-I–95 Counties	
	Number	Percent	Number	Percent	Number	Percent
National	82	34.3	47	37.3	35	31.0
Regional (state or multi-state)	66	27.6	37	29.4	29	25.7
Eastern North Carolina	44	18.4	22	17.5	22	19.5
International	31	13.0	16	12.7	15	13.3
Continental (USA, Canada, Mexico)	16	6.7	6	4.8	10	8.8

Source: Derived by the author based on the survey questionnaire returns

be a definite factor in plant location--it was in ours." The primary reason given for the importance of I-95 is decreased shipping costs and easier north-south access. A chemical manufacturer states, "I-95 not only speeds up deliveries . . . it also reduces truck operating costs." A lumber manufacturer says, "We believe I-95/U.S. 301 makes industrial transport easier, less expensive." An electrical machinery manufacturer says, "It is a big help to us in shipping our product to our customers in Pennsylvania, Georgia, and Florida. It is the most direct route." A chemical processor feels that I-95 is "indispensable to the efficient transportation of incoming raw materials, outgoing finished products, and the movement of people in and out of this area with northern and southern destinations." Some respondents commented on what the completion of I-95 will mean to them. A paper manufacturer comments, "With the completion of I-95, money, manhours, and dollars will be saved in delivery to our customers. Also, sales personnel may be able to make more calls." A Wilson County manufacturer says, "At present we are located approximately 19 miles from U.S. 301. The proposed route for I-95 will be about 12 miles from us, we are anxious for I-95 to open."

While the Interstate has helped attract industry, the generally poor non-Interstate highway facilities have no doubt hindered the area's industrial growth. The major complaint is the lack of adequate east-west connector routes. A tobacco manufacturer comments, "I-95/U.S. 301 highway system is extremely important for raw material movement from Georgia, Florida, South Carolina, and Virginia--lack of decent connecting systems to the west appears to have an extreme disadvantage as roads are becoming more difficult each year." A manufacturer in Lenoir

County states that I-95 "would be an advantage but when you are located as far east as Kinston the only hope is good roads that connect I-95/ U.S. 301." A similar statement is made by a Pitt County respondent.

Other comments on the subject are more blunt. One respondent states that the highway system in eastern North Carolina makes one "feel like he has left civilization and is driving on a pig path" while another says, "if the east-west highway system in Eastern [sic] North Carolina is not shortly improved it will deal a devastating blow to industrial growth in the area." The thrust of these comments is clear. Although I-95 has greatly aided industrial growth, if the region is to maintain and surpass its initial industrial growth rate, a system of east-west roads which connect markets to the west must be provided.

The Impact of I-95 on Individual Two-Digit SIC Industrial Growth

The primary purpose of this section is to analyze the impact of I-95 on the location of specific industrial groups within the study area. In order to do this, the questionnaires received from each two-digit SIC industrial type are grouped and analyzed as one. This analysis identified the main benefits each SIC group derives by locating in close proximity to I-95, the five location factors most important to each group, the major transport modes used by each SIC group, and the primary market area for each group's production.

There are two qualifying points to this analysis which deserve mention. First, although 239 questionnaires were returned, 19 respondents did not designate their SIC group. Therefore, the analysis in this section is based on 220 responses (92.1%). Second, no response

were received from the petroleum and coal industry, the leather industry, and the primary metal industry. Thus, these three SIC groups are not analyzed.

The Significance of I-95 to the Location of Specific Industries

Table 13 shows the significance of I-95 in attracting two-digit SIC industrial groups to the study area. The table rates I-95 in terms of being very significant, significant, or not significant in the location decision of each SIC group. The Interstate is a very significant locational requirement of the paper, printing and publishing, and miscellaneous industries. Thirteen SIC groups rate I-95 as significant in their location decision. Only the tobacco processing industry rates the Interstate as not significant to its plant location decision.

Interstate 95 is a very significant location factor to the paper processing industry for three reasons. First, I-95 increases access to paper manufacturer's markets. Second, the Interstate decreases the time and cost involved in shipping paper products to market. Third, I-95 increases the number of customer contacts each paper product salesman can make over a period of time.

The printing and publishing industry is heavily market oriented and its product is highly perishable. The Interstate is a very significant location factor since it increases market access and decreases the time and cost involved in shipping products to market. It should be noted that the industrial linkage evident between the paper and printing and publishing industries has no doubt elevated the significance of I-95 as a location factor since the Interstate saves time and money in the

TABLE 13

THE SIGNIFICANCE OF I–95 AS A LOCATIONAL REQUIREMENT
OF TWO–DIGIT SIC INDUSTRIAL GROUPS
WITHIN THE STUDY AREA

SIC Code	Industrial Type	Very Significant (Ranked 1 or 2)	Significant (Ranked 3, 4, or 5)	Not Significant (Not Mentioned in top 5 factors)
20	Food		x	
21	Tobacco			x
22	Textiles		x	
23	Apparel		x	
24	Lumber		x	
25	Furniture		x	
26	Paper	x		
27	Printing and publishing	x		
28	Chemicals		x	
30	Rubber and plastic		x	
32	Stone, clay, glass		x	
34	Fabricated metal		x	
35	Non-electric machinery		x	
36	Electrical machinery		x	
37	Transport equipment		x	
38	Instruments		x	
39	Miscellaneous	x		

Source: Derived by the author based on the survey questionnaire returns

transfer of goods and services between these two SIC groups.

The very significant rating of I-95 to the location of miscellaneous industries is easily explained. This is due in large part to the diversity of industries which constitute this industrial group within the region. Jewelry, toys, brooms and brushes, burial vaults, and writing instruments are examples of miscellaneous manufacturing industries which located in the study area between 1956 and 1973. The significance of I-95 is best summed up by a toy manufacturer who states that "being on the main northeast to Florida route encourages customers to stop and shop." This explanation is reasonable considering the fact that this SIC group is not export oriented (eastern North Carolina is the primary market area) and thus the industry must rely heavily on sales to customers in or passing through the region.

Thirteen SIC groups rate I-95 as being a significant locational requirement. These industries include food, textiles, apparel, lumber, furniture, chemicals, rubber and plastic, stone, clay, and glass, fabricated metal, non-electrical machinery, electrical machinery, transport equipment, and instruments. The Interstate is significant to these industries for many of the same reasons discussed above. Specifically, it increases market access, expands market areas, and decreases the time and cost involved in shipping products to market.

The tobacco processing industry is the only SIC group which does not view I-95 as a significant location factor. This is due to several reasons. First, this region supplies raw materials to major tobacco processing plants located in the Piedmont, and it was shown earlier that I-95 is not a significant location factor to industries

which ship freight in an east-west direction. Second, it has been pointed out that tobacco processing plants in the region ship the bulk of their products to the port at Norfolk. Interstate 95 is not the most direct route between this region and the port and thus, it is not used in shipping this industry's freight.

Benefits Specific Industries Derive by Locating Near I-95

Table 14 summarizes the benefits industry groups derive by locating in close proximity to I-95. The three most significant benefits are efficiency in bringing in materials, efficiency in sending products out, and increased contact with suppliers and services. The benefits of advertising and a good working environment are not significant to any SIC group.

Every SIC group designates efficiency in procuring materials and distributing products as benefits to locating along I-95. Also, 14 of the 17 groups view increased contact with suppliers and services as a significant benefit. The high rating of these three benefits is expected since I-95 offers a quick, cheap, and efficient route by which to ship freight in a north-south direction. Also, earlier analysis has shown that I-95 increases customer contacts by reducing the traveling time of salesmen.

Three SIC groups, electrical machinery, transport equipment, and instrument processing, view access to a larger labor pool as a significant benefit. This is not surprising since each industry requires a highly skilled labor force and I-95 significantly expands the labor market from which these firms can draw. Accordingly, a machinist, for example, is more likely to travel a greater distance to work if

TABLE 14

THE THREE MOST IMPORTANT BENEFITS EACH TWO–DIGIT SIC GROUP DERIVES BY LOCATING IN CLOSE PROXIMITY TO I–95

SIC Code	Industrial Type	Efficiency in bringing in materials	Efficiency in sending products out	Contact with suppliers and services	Access to a larger labor pool	Good working environment	Advertising
20	Food	x	x	x			
21	Tobacco	x	x	x			
22	Textiles	x	x	x			
23	Apparel	x	x	x			
24	Lumber	x	x	x			
25	Furniture	x	x	x			
26	Paper	x	x	x			
27	Printing and publishing	x	x	x			
28	Chemicals	x	x	x			
30	Rubber and plastic	x	x	x			
32	Stone, clay, glass	x	x	x			
34	Fabricated metal	x	x	x			
35	Non-electrical machinery	x	x	x			
36	Electrical machinery	x	x		x		
37	Transport equipment	x	x		x		
38	Instruments	x	x		x		
39	Miscellaneous	x	x	x			

Source: Derived by the author based on the survey questionnaire returns

the trip can be made on a safe, high speed highway.

No SIC group views advertising and a good working environment as important benefits derived by locating in close proximity to I-95. This result is somewhat surprising since I-95 is heavily traveled and passes through the region's more urbanized areas. Apparently, the benefits of increased shipping efficiency and contact with suppliers and services are so important as to completely overshadow the advertising and good working environment benefits.

Location Requirements Significant to Specific Industries

Table 15 shows the most significant location requirements for each of the two-digit SIC groups. Based on this table, it may be concluded that an abundant labor supply, the availability of suitable land, proximity to markets, and proximity to I-95/U.S. 301 are important location factors to almost all of the SIC groups. However, the area's cultural/recreational assets and advertising value of high visibility due to location along I-95 are not important to the SIC groups. These results are expected based on the analysis presented earlier in this chapter.

Several location factors are important to only one SIC group. These factors are a nearby vocational training facility, proximity to related industry, and favorable leasing or financing. They are most significant to the printing and publishing, textile, and apparel industries, respectively.

Two reasons account for the significance of a nearby vocational training facility to the printing and publishing industry. First, the

TABLE 15

THE MOST MENTIONED LOCATION FACTORS, BY SIC GROUP, FOR INDUSTRIES LOCATING IN THE STUDY AREA

Location Factor	SIC GROUP																
	20	21	22	23	24	25	26	27	28	30	32	34	35	36	37	38	39
Abundant labor supply		x	x	x		x	x		x	x	x	x	x	x	x		x
Availability of suitable land	x		x	x	x	x		x	x	x	x	x	x	x	x	x	x
Proximity to markets	x				x	x	x	x	x	x					x		
Proximity to I–95/U.S. 301	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Availability of water and sewer		x	x						x			x	x	x		x	
Availability of raw materials	x	x			x	x	x				x						
Availability of rail service	x				x		x				x	x					
Existence of a building at the site				x									x		x		
Favorable tax structure										x				x		x	
Favorable leasing or financing				x													
Proximity to related industry			x														
Near-by vocational training facility								x									
Area's cultural/recreational assets																	
Advertising value of high visibility																	

Source: Derived by the author based on the survey questionnaire returns

printing trade is taught at all vocational training facilities in the study area. This means that printing firms have access to a readily available, skilled labor force. Second, vocational training facilities are an important source of apprentice labor which is skilled and available at a lower wage.

Proximity to related industry is important to the textile industry for two reasons. First, textile plants are the primary raw material suppliers to apparel plants. Thus, a significant savings in transport costs may be realized by locating in close proximity to apparel plants. Also, there are many similarities in the labor force characteristics of the textile and apparel industries. Each industry employs the same type of labor, pays approximately the same wages, and demands basically the same skills. This means that labor is to a great degree interchangeable and it is therefore beneficial for the industries to locate in close proximity to each other.

Favorable leasing or financing is most significant to the apparel industry. This result is reasonable considering the small profit margin on which this industry operates. However, it is surprising that favorable leasing or financing is not mentioned by more industries. Apparently, the importance of favorable leasing or financing is offset by the strength of labor, land, markets, proximity to I-95, and water and sewer facilities.

Major Transport Modes Significant to Specific Industries

Table 16 shows the major mode each SIC group utilizes in receiving and shipping freight. The motor vehicle is by far the most

TABLE 16

MAJOR TRANSPORT MODES FOR INBOUND AND OUTBOUND FREIGHT FOR SIC GROUPS LOCATING IN THE STUDY AREA

SIC Code	Industrial Type	MAJOR TRANSPORT MODES							
		INBOUND				OUTBOUND			
		Truck	Rail	Air	Water	Truck	Rail	Air	Water
20	Food	x	x			x			
21	Tobacco	x				x			
22	Textiles	x				x			
23	Apparel	x				x			
24	Lumber	x	x			x			
25	Furniture	x				x			
26	Paper		x			x			
27	Printing and publishing	x				x			
28	Chemicals	x				x			
30	Rubber and plastic	x				x			
32	Stone, clay, glass	x	x			x			
34	Fabricated metal	x				x			
35	Non-electrical machinery	x				x			
36	Electrical machinery	x				x			
37	Transport equipment	x				x			
38	Instruments	x				x			
39	Miscellaneous	x				x			

Source: Derived by the author based on the survey questionnaire returns

utilized mode. Likewise, no SIC group uses air[9] and water as a major freight transport mode.

The importance of truck transport for shipping is not surprising. With the exception of the paper industry, each SIC group designates truck as its major transport mode in receiving materials. Also, each industry group designates truck as its major transport mode for outbound freight. Several reasons account for the importance of truck in freight movement. First, trucks are a cheap, quick, and efficient transport mode for short and intermediate distance shipping. In addition, trucks are a more flexible transport mode as they can go directly to the plant site or market and are not hampered by the lack of facilities such as rails, an airport, or a water body.

Four industry groups designate rail as significant in receiving freight. They are the food, lumber, paper, and stone, clay, and glass industries. However, no SIC group views rail as a significant transport mode for outbound freight.

Several reasons account for the importance of rail in procuring materials to the plant. Each SIC group which uses rail for this purpose is raw material oriented. The raw materials are generally bulky, low in value, and used in large quantities. The railroad is the most efficient agent for the movement of these types of commodities. Likewise, rail is less significant for shipping outbound freight since the processed product is less bulky and higher in value and demand.

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[9]Although not within the study period for this research, it is important to note that air freight pick-up service was initiated in the region in February 1975 by United Air Lines. Thus, the significance of air freight shipping to the industries in the region should increase.

The insignificance of air and water as freight transport modes is due to the lack of facilities. Similarly, there are only two deep water ports in eastern North Carolina and neither is in the study area. Finally, barge traffic is not significant due to the lack of rivers which are navigable to the region's major market centers and to the fact that the majority of raw materials are shipped overland from areas to the west.

Major Market Areas for Specific Industry Groups

Table 17 summarizes the major market area for SIC groups locating in the study area. The two most significant market areas are regional and national. The least significant market area is continental. Twelve SIC groups serve either a regional or national market.

There are few discernible patterns as to specific SIC groups serving specific markets. However, several generalizations may be made from the table. First, industries which produce higher value products serve a larger market area. Second, the more labor-intensive, raw material oriented industries serve smaller market areas.

Only three industry groups, food, stone, clay, and glass, and miscellaneous, are limited to serving solely eastern North Carolina. This is due to several reasons. First, these SIC groups are ubiquitous to the East Coast. Second, they are generally small scale producing firms. Thus, the nature of these industry groups dictates that they market their products locally.

Two groups, tobacco and instruments, serve international markets. The tobacco industry exports a great deal of its products to Europe while

TABLE 17

PRIMARY MARKET AREAS FOR SIC INDUSTRIAL GROUPS
LOCATING IN EASTERN NORTH CAROLINA

SIC Code	Industrial Type	MAJOR MARKET AREA				
		Eastern North Carolina	Regional	National	Continental	International
20	Food	x				
21	Tobacco					x
22	Textiles		x			
23	Apparel			x		
24	Lumber		x			
25	Furniture		x			
26	Paper		x			
27	Printing and publishing		x			
28	Chemicals		x			
30	Rubber and plastic			x		
32	Stone, clay, glass	x				
34	Fabricated metal			x		
35	Non-electrical machinery		x			
36	Electrical machinery			x		
37	Transport equipment			x		
38	Instruments					x
39	Miscellaneous	x				

Source: Derived by the author based on the survey questionnaire returns

the instrument industry supplies precision surgical equipment to markets in Europe and Asia.

The major market areas for SIC groups in the region are regional and national. It may be concluded that I-95 has been a significant factor in expanding market areas to the north and south since it has expanded the region's accessibility surface and reduced transport costs to these markets. However, I-95 has had little influence on the location of plants with a local or international market.

Conclusion

Interstate 95 has been significant to the increased industrial growth of the region. This conclusion has been documented in several ways. First, I-95 ranks as the fourth most significant location factor which industry considers in choosing the region as a place to locate. Also, plants which locate in close proximity to the Interstate experience greater benefits such as increased efficiency in receiving and shipping materials and increased contact with suppliers and services. Finally, it has been shown that I-95 increases the efficiency of truck transport by reducing operating costs and providing greater access to markets in the north and south.

The second analysis conducted in this chapter concerns the impact of I-95 on individual two-digit SIC industry groups. This analysis determined that I-95 is a significant location factor to all but the tobacco processing industry. Also, with the exception of the electrical machinery, transport equipment, and instrument industries, each SIC group views increased efficiency in receiving and shipping

freight and increased contact with suppliers and services as the main benefits they derive by locating in close proximity to the Interstate. The exceptions noted above view increased efficiency in receiving and shipping materials and access to a larger labor pool as their most significant benefits. Trucking is the major transport mode for all but the paper processing industry. The type material used in the paper manufacturing process necessitates the use of rail in receiving raw materials. Finally, it has been shown that most of the SIC groups serve a regional or national market. Only the food, stone, clay, and glass, and miscellaneous industries serve mainly eastern North Carolina markets. Likewise, only the tobacco and instrument industries serve international markets.

Now that I-95's importance to the increased industrial growth of the region has been documented, it is important to determine what effect this industrial growth has had on the economy of the region. The following chapter deals with this question.

CHAPTER V

THE IMPACT OF INDUSTRIAL GROWTH ON THE ECONOMIC DEVELOPMENT OF THE REGION

The term "industrial growth" has become synonymous with economic development in recent years (North, 1966; Isard, 1972). This is reasonable since industrial growth usually means higher wages for the inhabitants of an area, an increased tax base for local governments, and a more viable residentiary economic sector. Since it has been documented that the study area has experienced significant industrial growth during the time period examined, it is hypothesized that this industrial growth has significantly upgraded the economic structure of the region.

Selected employment, service sector, population growth, and income parameters are used as measures of the economic development of the region. It is particularly important to note that each parameter is designed to measure economic growth. This should not be construed to imply that parameters which reflect the social standing of the area are not important. However, it is felt that economic rather than social parameters offer a more complete picture of the effects of industrial growth.

Research Procedure

Simple correlation is used to determine the impact of industrial growth on the economic development of the region. The methodology

consists of correlating the change in manufacturing employment within each county between 1956 and 1973 and the change in 17 dependent variables which are indicators of economic growth within the study area during the same time period.[10] These 17 dependent variables are grouped according to whether they measure employment, income, service sector, or population growth. In each case it is necessary to normalize the data since at least one county (usually Cumberland County) exhibits traits which skew the raw data. The data are normalized by converting each raw value to common logarithms. In addition to the correlation coefficient (r) the coefficient of determination (r^2) is also calculated. This coefficient accounts for the percent of variation in each dependent variable which is attributable to the variation in increased industrial growth.

The Impact of Industrial Growth on Employment Growth

Five employment variables are used to determine the effect of the region's increased industrial growth on employment growth. The five variables include employment in agriculture, wholesale and retail trade, construction, total employment, and percent unemployed. The association between increased industrial growth and each of the employment variables is summarized in table 18.

Several important trends are discernible based on the results in table 18. First, agricultural employment and percent unemployed are negatively correlated with industrial growth. This result is

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[10]Appendix B contains a definition of each variable and the source from which it was obtained.

TABLE 18

MEASURES OF ASSOCIATION BETWEEN INDUSTRIAL EMPLOYMENT GROWTH AND CHANGES IN EMPLOYMENT IN OTHER SECTORS OF THE REGION'S ECONOMY, 1956–1973

Variable	I–95 Counties		Non-I–95 Counties		All Counties	
	r	r^2	r	r^2	r	r^2
Agricultural employment	-.54	.29	-.68*	.46	-.63*	.40
Wholesale and retail trade employment	.55	.30	.68*	.46	.62*	.38
Construction employment	.66*	.44	.44	.19	.63*	.40
Total employment	.67*	.45	.65*	.42	.66*	.44
Percent unemployed	-.31	.10	-.46	.21	-.45*	.20

Source: Derived by the author based on the correlation analysis

Where r = correlation coefficient

r^2 = coefficient of determination

* = significant at the .01 level of confidence

expected for the unemployment variable since increased industrial growth provides more jobs and thus decreases the unemployment roles. However, it is surprising that the region's increased industrial growth accounts for such a small percent of the variation in the unemployment variable. Apparently, the fact that most of the counties in the study area decreased in population during the study period (only Cumberland, Wayne, and Pitt Counties experienced significant gains) was as important as industrial growth in decreasing the region's unemployment total.

The negative correlation coefficient obtained for the agricultural employment variable is anticipated since employment in this economic sector decreased by 43.7 percent between 1956 and 1973.[11] However, the fact that industrial growth accounts for such a large percentage of the variation in agricultural employment is unexpected. Apparently, the increased industrial job opportunities have been quite important in attracting people from the farm.

The results obtained for wholesale and retail trade employment, construction employment, and total employment offer further evidence that industrial growth stimulates growth in other economic sectors. However, it is important to note that employment in wholesale and retail trade is statistically insignificant when correlated with increased industrial employment in the I-95 counties. This is due primarily to the fact that industrial growth has had relatively less impact on the generally stronger, more diversified economic base

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[11]The estimates were derived by the North Carolina Cooperative Agricultural Extension Service.

found in I-95 counties. Also, increased industrial growth is statistically insignificant in explaining construction employment growth in non-I-95 counties. This result is due to the fact that construction employment increased by 51 percent in non-I-95 counties during the study period while construction employment in the I-95 counties increased by 112 percent.[12]

There is one other important conclusion which may be drawn based on table 18. Generally, the non-I-95 counties have received relatively greater impact from increased industrial growth. This result is due primarily to the insignificant employment totals in the non-I-95 counties in 1956.

The Impact of Industrial Growth on the Service Sector

Four variables are used to determine the effect of increased industrial growth on the service sector of the region's economy. These four variables are gross retail sales, total traveler's expenditures, bank deposits, and local government expenditures. The association between industrial growth and each of the service sector growth variables is summarized in table 19 which serves as the basis for this discussion.

Increased industrial growth within the region has had a significant impact on almost every service sector variable analyzed. The exception is total traveler's expenditures in I-95 counties.

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[12]The estimates were derived from the County and City Data Book 1962 and the County and City Data Book 1972. (See Bibliography for full reference.)

TABLE 19

MEASURES OF ASSOCIATION BETWEEN INDUSTRIAL EMPLOYMENT GROWTH AND CHANGES IN THE SERVICE SECTOR OF THE REGION'S ECONOMY, 1956–1973

Variable	I–95 Counties		Non-I–95 Counties		All Counties	
	r	r^2	r	r^2	r	r^2
Gross retail sales	.65*	.42	.85*	.72	.74*	.55
Total travelers' expenditures	.58	.34	.77*	.59	.65*	.42
Bank deposits	.76*	.58	.83*	.69	.80*	.64
Local government expenditures	.67*	.45	.82*	.67	.75*	.56

Source: Derived by the author based on the correlation analysis

Where r = correlation coefficient

r^2 = coefficient of determination

* = significant at the .01 level of confidence

This result is surprising since the bulk of the region's industrial growth and growth in new motel, restaurant, and traveler's service facilities occurred in I-95 counties. One possible explanation is that industrial growth is relatively less significant to the stronger, more diversified economies found in the Interstate counties.

Two important conclusions may be drawn based on the results in table 19. First, the positive impact which industrial growth has on other economic sectors is evident. Secondly, increased industrial growth has had a greater impact in stimulating growth in the service sector of non-I-95 counties. One major reason accounts for this conclusion. Growth in the more rural non-I-95 counties is more easily detected due to the relative insignificance of each counties' service sector in 1956.

The Impact of Industrial Growth on Population Growth

Three variables are used to determine the effect of the region's industrial growth on population growth. The three variables are total population growth, number of new dwelling units, and increased urban population. The association between industrial growth and each of these population growth variables is summarized in table 20.

Several interesting trends are discernible concerning the region's population growth. Between 1956 and 1973 the population base of the region grew by 85,305 persons. However, by excluding Cumberland County, the region's population base decreased by 4,525 persons. Furthermore, excluding Wayne and Pitt Counties, the region's second and third most significant growth counties, respectively, the remaining

TABLE 20

MEASURES OF ASSOCIATION BETWEEN INDUSTRIAL EMPLOYMENT GROWTH AND CHANGES IN POPULATION WHICH HAVE OCCURRED WITHIN THE STUDY AREA, 1956–1973

Variable	I–95 Counties		Non-I–95 Counties		All Counties	
	r	r^2	r	r^2	r	r^2
Total population growth	-.30	.09	.37	.14	.05	.00
New dwelling units	.79*	.62	.60*	.36	.69*	.48
Urban population	.84*	.71	.30	.09	.54*	.29

Source: Derived by the author based on the correlation analysis

Where r = correlation coefficient

r^2 = coefficient of determination

* = significant at the .01 level of confidence

population base decreased by approximately 24,000 people. The growth of Cumberland, Wayne, and Pitt Counties is not related to increased industrial growth, rather, it is related to the growth of Fort Bragg Military Reservation, Seymour Johnson Air Force Base, and East Carolina University, respectively.[13] Thus, the statistically insignificant results achieved for the total population variable is not surprising. An important observation may be drawn based on this result. Fort Bragg Military Reservation, Seymour Johnson Air Force Base, and East Carolina University attract more people to the region than all the industrial growth combined.

Table 20 shows other interesting results. First, since industrial growth has not significantly affected total population growth, it may be concluded that the majority of new manufacturing jobs have been filled by persons who have been living in the region. Also, it may be concluded that the majority of the new industrial work force migrated from non-I-95 to I-95 counties since increased industrial growth is statistically significant in accounting for increases in urban population in the I-95 counties but not in the non-I-95 counties. Unfortunately, this conclusion means that poorer, less-skilled workers have been attracted to urban areas.

Increased industrial growth accounts for a significant percent of the variation in dwelling unit growth. However, this result is misleading. In the late 1950s and early 1960s there was a significant shortage of adequate, safe dwelling units in the region. With the

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[13]Military reservations are very significant to the population and economic growth of the Coastal Plain region (Floyd and Robertson, 1975).

advent of more Federal housing programs in the 1960s, many of the older, dilapidated dwellings were demolished and replaced with Federally subsidized housing. Thus, Federally subsidized dwelling unit growth is as significant as industrial growth in accounting for new dwelling unit increases.[14]

The Impact of Industrial Growth on Income

Five income variables are used to determine the effect of industrial growth on the money income of the region's inhabitants. The five variables are farm income, average weekly earnings, per capita income, median family income, and families receiving welfare payments. The association between industrial growth and each of the income variables is summarized in table 21 which serves as the basis for the following discussion.

Increased industrial growth is statistically insignificant in accounting for the increase in the money income of the inhabitants of the region. This result is surprising, especially since numerous studies have shown that industrial growth increases income. However, this result may be explained based on the type of industries which have located in the region and the wage rates of these industries.

Table 22 summarizes the growth and wage rates for industries which located in the study area between 1956 and 1973. Six industrial types combined to account for 69.3 percent of the region's 1956-1973 manufacturing employment growth. These six industries are textiles,

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[14]This information was supplied by Jerry Pifer, Market Analyst, Department of Housing and Urban Development, Greensboro, North Carolina.

TABLE 21

MEASURES OF ASSOCIATION BETWEEN INDUSTRIAL EMPLOYMENT GROWTH AND CHANGES IN THE INCOME OF THE REGION'S INHABITANTS, 1956–1973

Variable	I–95 Counties		Non-I–95 Counties		All Counties	
	r	r^2	r	r^2	r	r^2
Farm income	.23	.05	.43	.19	.30	.10
Average weekly earnings	-.13	.02	.33	.11	.03	.00
Per capita income	.18	.03	.48	.23	.36	.13
Median family income	.39	.15	.05	.00	.21	.05
Families receiving welfare payments	.37	.14	.21	.05	.30	.10

Source: Derived by the author based on the correlation analysis

Where r = correlation coefficient
r^2 = coefficient of determination

TABLE 22

PERCENT OF NEW EMPLOYMENT GROWTH, ESTIMATED HOURLY WAGE RATES AND ESTIMATED 1973 GROSS WEEKLY AND ANNUAL EARNINGS, BY SIC GROUP

SIC Code	Industrial Type	Percent of New Employment Growth 1956-1973	1955 Hourly Wage Rate	1973 Hourly Wage Rate	Gross 1973 Average Weekly Earnings	Gross 1973 Average Annual Earnings
20	Food	4.39	$ 1.05	$ 2.78	$ 111.20	$ 5,337.60
21	Tobacco	4.27	.95	2.25	90.00	4,680.00
22	Textiles	27.37	1.29	2.66	106.40	5,107.20
23	Apparel	22.79	1.03	2.12	84.87	4,073.76
24	Lumber	4.39	1.05	2.60	104.00	4,992.00
25	Furniture	1.77	1.21	2.87	114.80	5,510.40
26	Paper	2.43	1.81	4.26	170.28	8,173.44
27	Printing and publishing	.59	1.83	3.50	140.00	6,720.00
28	Chemicals	7.52	1.49	3.78	151.37	7,265.76
32	Stone, clay, glass	2.15	1.17	3.25	130.00	6,240.00
33	Primary metal	.87	1.79	3.81	152.29	7,309.92
34	Fabricated metal	2.06	1.41	3.62	144.90	6,955.20
35	Non-electrical machinery	3.46	1.42	3.60	144.14	6,918.72
36	Electrical machinery	4.63	1.64	3.14	125.60	6,028.80
37	Transport equipment	1.88	1.72	3.31	132.29	6,349.92

Source: Derived by the author based on statewide estimates from the North Carolina Department of Labor in cooperation with United States Department of Labor, Bureau of Labor Statistics

Note: Wages represent earnings of production workers and/or non-supervisory employees

apparels, chemicals, tobacco, food, and lumber processing. However, only one industry, chemicals, pays a high wage. Excluding growth in the chemicals industry, over 65 percent of the region's industrial employment growth has been in low-paying industries.

The low-wage rate which the textile, apparel, tobacco, food, and lumber industries pay offers a more precise explanation of why the region's increased industrial growth is statistically insignificant in accounting for the variation in increased income. On the average, a person working in either of these five low-paying industries earns $99.47 per week. It is important to note that this is a gross income figure. Based on 1973 Federal, State, and Social Security tax rates (on the basis of a family of four), a person working in one of these low-paying industries 'takes home' approximately $86.48 per week.

These two examples help to explain why increased industrial growth is statistically insignificant in accounting for the variation in the income variables. However, the income picture within the region is not as dismal as the above examples indicate. This is due to two reasons. First, the textile and apparel industries employ mostly female labor.[15] In doing so, these two industries provide a second source of income to families in which both the husband and wife work. Secondly, what would the income status of the region's inhabitants be if increased industrial growth had not occurred? Had the region remained predominately agricultural, the 1973 average

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[15]According to the County and City Data Book 1972, the textile and apparel industries employ over 70 percent female labor.

hourly wage rate would have been approximately $1.50.[16] However, due in large part to increased industrial growth, the inhabitants of the region earned approximately $2.78 per hour in 1973.[17] Thus, it may be concluded that industrial growth has been realistically significant in increasing wage rates even though statistical significance was not achieved.

Conclusion

The relationship between industrial growth and four sets of economic measures were analyzed in this chapter. The analysis yielded mixed results. First, the research hypothesis that industrial growth has positively affected employment and service sector growth may be accepted. However, with one qualification, increased industrial growth has not significantly affected income. The qualification is that while industrial growth is not statistically significant in increasing income, it is nevertheless realistically significant in income growth. Finally, increased industrial growth was not statistically significant in increasing the region's population base.

The results concerning the income and population measures were not expected. However, it should be noted that the analysis, despite yielding statistically insignificant results, does not point out increases in income which did result from increased industrialization. Also, while evidence was presented which clearly showed that industrial

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[16]This estimate was derived by the North Carolina Agricultural Extension Service.

[17]This estimate was derived by the North Carolina Department of Revenue, Tax Research Division.

growth was not significant to the region's population growth, industrial growth has helped to decrease the outmigration rate. This can be seen by the fact that the bulk of the new manufacturing jobs have been filled by people who live in the region. Therefore, the hypothesis that industrial growth has significantly upgraded the economic structure of the region is accepted.

CHAPTER VI

INTERSTATE 95, INDUSTRIAL GROWTH, AND ECONOMIC DEVELOPMENT

This research has yielded several significant results. First, the study area has experienced the bulk of its new industrial growth between 1956 and 1973. Interstate 95 has played a prominent role in this growth. Finally, industrial growth has proven to be significant in upgrading the economic structure of the region. The purpose of this chapter is to put the findings of the different phases of the study in perspective. In addition, several industrial growth/economic development strategies are presented as alternatives to the region's present growth process. The presentation of these alternative growth strategies is important since several questions have been raised concerning the significance of industrial growth in upgrading the region's economic structure.

Interstate 95 and Industrial Growth

There is little doubt that I-95 has been a major stimulus to the region's increased industrial growth. This conclusion is based on the following facts as identified in this research. First, 105 of 239 questionnaire respondents (43.8%) state that I-95 is one of their five most significant locational requirements. Second, trucking is the leading transport mode for inbound and outbound freight for the

industries examined. Also, respondents feel that I-95 increases their efficiency in procuring raw materials, distributing processed products, and increasing contact with suppliers and services. Finally, the majority of respondents feel that the Interstate expands their north-south market area.

The most significant documentation concerning I-95's impact on increased industrial growth comes from plant managers and owners who, with few exceptions, state that the Interstate plays an integral role in the region's industrial growth process. In addition, industrial development specialists recognize I-95's contribution to the region's industrial growth. Wilbur Rose, Industrial Development Director for Nash County, states (The Nashville Graphic, November 11, 1974) that industrial growth in the Rocky Mount area is directly attributable to " . . . our good labor supply, and a prestigious site overlooking U.S. Highway 301 and I-95 on the one side and the railroad on the other . . . " Robert Brinkley, Market Analyst with the North Carolina Department of Natural and Economic Resources, states (Personal Interview, December 12, 1974) "I-95 plays a very important role, especially in locating the larger industries." Other sources, cited in chapter IV, provide further documentation for the conclusion that I-95 is significant to the region's increased industrial growth.

Industrial Growth and Economic Development

Increased industrial growth has created many new job opportunities within the region. The majority of these new jobs is directly related to new plant growth. In addition, industrial

growth has indirectly created new jobs in the tertiary sector. However, industrial growth has not been statistically significant in increasing either the money income of the inhabitants in the region or the region's population base. This result is due to the region's growth in low-wage industries.

There are several reasons for the region's growth in low-wage, labor-intensive industries. The most obvious reasons are the availability of cheap labor and the lack of union organization. However, there are three less obvious reasons. First, local governments have encouraged industrial growth based on the mistaken assumption that such growth automatically upgrades the economic status of the region. Second, there is a strong industrial linkage between the low-paying, labor-intensive textile and apparel industries. This linkage breeds additional growth in similar, less desirable industrial types. A third reason concerns the State's industrial recruiting policy. According to Brinkley (Personal Interview, December 12, 1974), the State promotes new industrial growth in the coastal area first, the mountain region second, and the piedmont section last. While he made it clear that North Carolina does not actively recruit low-wage, labor-intensive industries, he also said that the State does not close its doors to these types of industries. Thus, the coastal area is too often the recepient of these less desirable industries.

As noted earlier, it is unfair to imply that the region's increased industrial growth has not, to some degree, increased the money income of the region's inhabitants even though the increase

has not proven to be statistically significant. A case in point is Greene County. In 1973, over 48 percent of Greene County's labor force was employed in agriculture. Also, between 1956 and 1973, only eight new plants located in the county. In comparison, the 1973 labor force employed in agriculture in the four adjacent counties (Lenoir, Pitt, Wayne, and Wilson) averaged 13.3 percent. Also, between 1956 and 1973, an average of 38 new plants located in these adjacent counties. Thus, it may be concluded that Greene County's economy has not been affected by increased industrial growth to the same extent as have the economies of Lenoir, Pitt, Wayne, and Wilson Counties. Also, it should be noted that Greene County ranks at or near the bottom in each of the income growth measures. Likewise, Lenoir, Pitt, Wayne, and Wilson Counties rank at or near the top in each of the income growth measures. The implication, therefore, is that increased industrial growth in Lenoir, Pitt, Wayne, and Wilson Counties probably has increased the money income of their inhabitants even though the statistical evidence does not allow such a conclusion.

Interstate 95, Industrial Growth, and Economic Development

Interstate 95 has been an important factor in attracting industry to the region. Also, the industrial growth which has occurred has been significant in upgrading the region's economic structure. However, these results should not be construed to imply that I-95 has been significant in attracting industry and upgrading the economy of every small town or other subareal unit within the region. Based on other studies of this nature (Hooker and Potter,

1971; Buboltz and Bootsma, 1972), it may be stated that I-95 has probably attracted some industries to it which would have otherwise located in another part of the study area. In doing so, it may be concluded that the Interstate has detracted from the potential industrial and economic development of other areas. However, this negative impact has not been widespread as the research results have shown that industrial growth has had relatively greater significance on the economic growth of the more rural non-I-95 counties. Also, it has been shown that I-95 has been of nearly equal significance in attracting industry to both I-95 and non-I-95 counties. Finally, the Interstate has been a positive factor in increasing accessibility into and through the region. Therefore, it must be concluded that I-95 has been significant in the overall industrial growth/economic development process within the study area.

Alternative Industrial Growth - Economic Development Strategies

Industrial growth within the region has been an important factor in the upgrading of the economy of the region. However, there are several alternative strategies which could insure that the region's future industrial growth contributes more significantly to the economic development of the region. One such strategy is to promote industrial diversification. Another is to promote stronger linkages between the region's primary and secondary economic sectors. Of course, there exists the possibility of 'laissez faire' growth. A discussion of each strategy follows.

Industrial Diversification

Industrial diversification is probably the best strategy for insuring the region's sound economic development. Such diversification would mean more job opportunities for skilled labor, higher wages through greater competition, and more industrial types to help ease the shock when unemployment and business cycles affect a few industrial types severely. This third reason is especially relevant during the recession-inflation period being experienced in the United States at the time of this writing.

There are several significant industries whose growth can surely aid in the diversification of the region's industrial structure and contribute to the improvement of the region's economy. One such industry is paper products manufacturing. Currently this industry accounts for only 3.3 percent of the region's 1956-1973 employment growth, yet it is the region's second highest paying industry. Growth in this industrial type seems feasible since the necessary raw materials are available and markets in the south and southeast are growing.

Chemical and instrument industries can be important vehicles for diversifying the region's industrial base. These two SIC groups deserve special attention not only because they pay high wages but also because they can service the new medical school at East Carolina University.

The petroleum processing industry represents another possible instrument to achieve industrial diversification. Once considered unrealistic for this area, the possibilities of off-shore oil extraction are presently being given serious consideration. Growth in this

industrial type can significantly aid the region's economic development and stimulate growth in the high-wage rubber and plastics industry.

Industrial diversification through growth in the above mentioned industries seems to be the most feasible approach for creating a stronger industrial base and thereby further upgrading the region's economic status. However, this should not imply that growth in the transportation equipment, electrical and non-electrical machinery, printing and publishing, and leather industries would not contribute to raising the region's economic status. Rather, the paper, chemical, instrument, and petroleum industries seem to be the most feasible growth industries since the required raw materials and/or markets are either in or near the region. Also, these four industrial types pay high wages and would attract skilled labor.

Primary and Secondary Industrial Linkages

Traditional economic growth theory states that for a region to grow it must have an industrial rather than agricultural export base. However, North (1955, p. 254) states:

> The shift from an agricultural to an industrial base has been looked upon as the difficult, but indispensable, step for sustained economic growth . . . such a step may be neither necessary nor desirable and the evidence customarily advanced to support this argument proves nothing of the sort. There is nothing to prevent population and per capita income from growing in a region whose export base is agricultural. Moreover, there is nothing difficult about developing secondary and tertiary industry in such a region.

North's conclusions deserve attention. Perhaps the region's economic status can be upgraded based on its agricultural production. However,

in order to do so the region would have to process its agricultural production rather than export it. Admittedly, this is not feasible for tobacco, given the existing dominance of the cigarette manufacturing industry in the piedmont. However, it is feasible to process corn, soybeans, and certain other products within the region. Also, the possibility of peanut processing seems feasible, although the Suffolk, Virginia area presently dominates this industry. By processing agricultural products within the region, higher-value products would be exported and thus the inhabitants in the region would receive a more significant money income.

There is another approach which could be undertaken concerning improvements in the region's agricultural export base. Such an approach would entail major changes in the agricultural production of the region from tobacco, corn, and soybeans to vegetables and livestock. The activities currently being conducted at First Colony Farms lends credence to such an approach. These activities consist of growing and processing both crop and animal products at the same site. Thus, every operation, from planting, to harvesting, to processing, which must be completed before the product is consumed is being performed at one central location. This approach means greater profits for producers, reduced costs to the consumer, and keeps the money from the latter stages of processing within the region.

There are, however, certain drawbacks to this approach. One drawback concerns the farmers in the region. The local farmers have specialized in certain crop productions and are not necessarily willing to try another approach. Also, large initial capital outlays

would be necessary to convert the region's farms. However, the farmers in the region may in the future be presented with a meaningful alternative to their current practice of crop specialization. The success of First Colony must therefore be demonstrated.

'Laissez Faire' Industrial Growth

A final alternative growth strategy is to do nothing and allow the region to grow industrially as it has in the past. This strategy has some merit. Traditional economic growth theory states (Nicholls, 1960, p. 463):

> Typically the early stages of industrialization are based on the products of agriculture and forestry and include such activities as the processing of food, the manufacture of wood products, and the preparation of textile fibers. If industrialization continues, mineral and energy resource processing become critical.

Thus, the region is no worse off than any other area which is in the early stages of industrialization. Perhaps the industrial growth which has occurred in the region represents only the first stage in the region's natural evolution toward a more complex industrial structure. However, if the region is to move into the period of economic maturity, growth in low-wage industries must be curbed or else these industries will become so numerous as to completely offset any positive effects which later industrial growth may have on the region's economy.

Conclusion

It has too often been the policy for the region's local governing bodies to seek industrial growth for industrial growth's sake. Local officials generally feel that any type of industrial

growth upgrades their area's economic status simply because such growth creates more jobs. Leven substantiates this sentiment when he states (1964, p. 585) that usually:

> The desired economic end embodied in most community and regional development programs is a simple one - dimensional goal: to secure the largest possible increase in the number of available jobs in the region. In many instances, the expansion of the region's employment base is accepted virtually without question as an expression of development policy.

The fallacy in this argument has been pointed out in this research. Growth in low-wage, labor-intensive industries (textiles and apparels in the study area) must not be viewed as the total answer to upgrading the region's employment base and economic status. The question then becomes: What can be done to alleviate this feeling that any industrial growth is significant in building a stronger economy? It is the contention of the author that local officials must be more aware of both the short and long run implications industrial growth may have. Ultimately, local officials hold the key to upgrading the region's economy. This is true for several reasons. First, local officials are in the position to promote and carry out sound industrial growth/economic development strategies. Also, they can 'screen' perspective industries to insure that the region's export base is not built solely in low-wage, labor-intensive industries. And in the future, the role of local officials in the region's industrial growth/economic development process will be even more critical since the region should continue to grow industrially. The basis for increased industrial growth may be seen even now. Due to the release of previously impounded Federal highway funds, the completion of I-95 from Kenly to Gold Rock

is eminent. Also, the 1970-1974 population growth trends in many of the counties indicate that the region's population base is increasing. Finally, there is an increasing supply of land suitable for industrial development due primarily to the change over of previously used farm land to industrial parks. Hopefully, the region's development tools, such as I-95, abundant labor, and available land, will be used to insure that the region's industrial and economic growth is of the highest possible quality and will have the most significant positive impact on the region's inhabitants.

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APPENDICES

APPENDIX A: SAMPLE QUESTIONNAIRE SENT TO 616 MANUFACTURING INDUSTRIES WHICH LOCATED IN THE STUDY AREA FROM 1956 THROUGH 1973

1. Is your plant located in (check one)

___ a county through which I-95/U.S. 301 passes?
___ a county through which I-95/U.S. 301 does not pass?

2. Please number, in order of importance, the five factors most important to your firm in picking the location of your plant.

___ Abundant labor supply
___ Advertising value of high visibility
___ Area's cultural/recreational assets
___ Availability of rail service
___ Availability of raw materials
___ Availability of suitable land
___ Availability of water and sewer
___ Existence of building
___ Favorable leasing or financing
___ Favorable tax structure
___ Nearby vocational training facility
___ Proximity to I-95/U.S. 301
___ Proximity to markets
___ Proximity to related industry
___ Other (please specify) _____

3. If you did not include 'Proximity to I-95/U.S. 301' above as one of the five most important factors, did it play any part at all as a locational factor?

___ Yes ___ No

If not, has it become important since locating on your site?

___ Yes ___ No

4a. To what degree are you satisfied with the plant's present location? (check one)

___ Very satisfied
___ Moderately satisfied
___ Indifferent
___ Moderately dissatisfied
___ Very dissatisfied

b. What are some of the major disadvantages to your present location?

_____

5. Please number, in order of importance, the three most important benefits your plant has derived by locating on or near I-95/U.S. 301.

___ Access to a large labor pool
___ Advertising
___ Contact with suppliers and services
___ Efficiency in bringing in materials
___ Efficiency in sending products out
___ Good working environment
___ Other (please specify) _____
_____

6. Very generally, what major product does your plant produce? (An SIC code definition will suffice.)

_____

7. What is the major transport mode for your freight?

Inbound: ___ Rail ___ Truck ___ Air ___ Water

Outbound: ___ Rail ___ Truck ___ Air ___ Water

8. What is the market area for your plant's production? (check one)

___ Eastern North Carolina
___ Regional (State or Multi-state)
___ National
___ Continental (U.S.A., Canada, or Mexico)
___ International

9. Please use the space below for any comments you wish to make relevant to the impact of I-95/U.S. 301 on industrial location.

APPENDIX B: DEFINITION AND SOURCE OF THE SEVENTEEN ECONOMIC VARIABLES DISCUSSED IN CHAPTER II AND APPLIED IN CHAPTER V

Employment Indicators

Agricultural Employment - Includes persons working in farming and agricultural services; also, persons employed as farm mechanics, truck drivers, bookkeepers, crop dusters, cotton ginners, and landscape gardeners. (The 1956 and 1973 Agricultural Employment Estimates were obtained from the North Carolina Cooperative Agricultural Extension Service.)

Wholesale-Retail Trade Employment - Employment in this group includes 18 subgroups classified as wholesale trade and 29 subgroups classified as retail trade. Included in this group are wholesale merchants and jobbers, industrial distributors, exporters, importers, and the like. Retail employment includes food, bakery, and dairy stores, eating and drinking places, general merchandising, etc. (Estimates derived from the County and City Data Book 1962, County and City Data Book 1972, and the North Carolina Employment Security Commission.)

Construction Employment - Employment in construction includes general building contractors, plumbers, roofers, electricians, painters, and general contract construction. (Estimates derived from the County and City Data Book 1962, County and City Data Book 1972, and the North Carolina Employment Security Commission.)

Total Employment - This variable includes all persons 16 years

of age and older gainfully employed in either the public or private sector of the economy. (Estimates derived from the County and City Data Book 1962, County and City Data Book 1972, and the North Carolina Employment Security Commission.)

Unemployment - Persons who are 1) looking for a job, 2) available to accept a job, or 3) temporarily out of work are classified as unemployed. (The 1956 and 1973 unemployment estimates were derived from the North Carolina Employment Security Commission.)

Service Sector Growth Indicators

Gross Retail Sales - These sales include merchandise sold plus receipts from repairs and other services to customers. Gross retail sales are estimated based on sales tax revenue. (Estimates derived from the County and City Data Book 1962, County and City Data Book 1972, and the North Carolina Department of Revenue, Tax Research Division.)

Total Bank Deposits - This includes total deposits for all commercial and mutual savings banks. It also includes interbank and governmental deposits. (Estimates derived from the County and City Data Book 1962, County and City Data Book 1972, and the North Carolina State Banking Commission.)

Total Traveler's Expenditures - The total dollar amount spent by all tourist travelers in the State. These expenditures include such things as food, gas, lodging, recreation, and gifts. To be considered a tourist a person must live outside of North Carolina or, if he resides in North Carolina, be at least 100 miles from his permanent

home. (The 1956 and 1973 total traveler's expenditure estimates were derived from the North Carolina Department of Natural and Economic Resources, Travel and Promotion Division.)

Local Government Expenditures - These include expenditures for educational institutions, highways, local public welfare, public health, community services, and capital outlay not pertaining to any of the aforementioned. (Estimates derived from the County and City Data Book 1962, and the County and City Data Book 1972.)

Population Growth Indicators

Number of New Dwelling Units - Includes all year round housing units except vacant units held for seasonal occupancy or migratory labor. (Estimates derived from the County and City Data Book 1962, and the County and City Data Book 1972.)

Total Population Growth - Includes all persons residing within the county during the time when the count was undertaken. (The 1956 and 1973 estimates were obtained from the Department of Administration, Statistical Services Center and the Carolina Population Center.)

Increase in Urban Population - Includes all persons 1) living in a place of 2,500 inhabitants or more living in incorporated cities, villages, or towns 2) unincorporated places of 2,500 inhabitants or more, and 3) any other territory included in urbanized areas. (Estimates derived from the U. S. Bureau of the Census, Census of Population: 1960 and Census of Population: 1970, and the North Carolina Department of Administration, Statistical Services Center.)

Income Indicators

Average Weekly Earnings - This variable reflects the average weekly dollar amount earned by each person employed in the economy of the county. (The 1956 and 1973 estimates were derived from the North Carolina Department of Revenue, Tax Research Division.)

Farm Income - Farm income figures are estimates based on income from tobacco, soybeans, cotton, peanuts, corn, grain, potatoes, fruits and vegetables, greenhouses and nurseries, hay and other crops, livestock products and government payments. (The 1956 and 1973 estimates were derived from the North Carolina Agricultural Extension Service.)

Per Capita Income - Per capita income is computed by dividing the aggregate money income of all persons 14 years old and over by the total population. (Estimates derived from the County and City Data Book 1962, County and City Data Book 1972, and the North Carolina Department of Revenue, Tax Research Division.)

Median Family Income - This is the income amount which divides the distribution into two equal groups, one with income less than the median and the other with incomes greater than the median. Median family income is the income received before any tax, social security, union dues, etc. are deducted. (Estimates derived from the Census of Population: 1950, Census of Population: 1960, and the Census of Population: 1970.)

Welfare Families - This includes number of families who receive government financed assistance for living expenses, medical care, and social services under the Aid to Families with Dependent Children welfare program. (The 1960 estimates were derived from the Census of Population:

1960, and the 1973 estimates from the North Carolina Department of Social Services.)

APPENDIX C: A DESCRIPTION OF EACH OF THE TWENTY TWO-DIGIT MANUFACTURING INDUSTRIES RESEARCHED IN THIS THESIS[1]

SIC No.	Industry	Description
20	Food and Kindred Products	This major group includes establishments manufacturing or processing foods and beverages for human consumption, and certain related products, such as manufactured ice, chewing gum, vegetable and animal fats and oils, and prepared feeds for animals and fowl.
21	Tobacco Manufactures	This major group includes establishments engaged in manufacturing cigarettes, cigars, smoking and chewing tobacco, and snuff, and in stemming and redrying tobacco.
22	Textile Mill Products	This group includes establishments engaged in the following operations: preparation of fiber, manufacturing woven fabric, dyeing and finishing fiber, fabric treatment, the integrated manufacture of knit apparel and other finished articles from yarn, and the manufacture of felt goods, lace goods, non-woven fabrics, and miscellaneous textiles.
23	Apparel and Other Finished Products Made From Fabrics and Similar Materials	This major group includes establishments producing clothing and fabricating products by cutting and sewing purchased woven or knit textile fabrics and related materials such as leather, rubberized fabrics, plastics, and furs.
24	Lumber and Wood Products, Except Furniture	This group includes logging camps engaged in cutting timber and pulpwood; merchant sawmills, lath mills, shingle

[1]These descriptions were taken from the Standard Industrial Classification Manual, 1972 (see Bibliography for full reference).

		mills, cooperage stock mills, planing mills, and plywood and veneer mills engaged in producing lumber and wood basic products; and establishments engaged in manufacturing finished articles made entirely or mainly of wood or wood substitutes.
25	Furniture and Fixtures	This manufacturing group includes establishments engaged in manufacturing household, office, public building, and restaurant furniture; and office and store fixtures.
26	Paper and Allied Products	This major group includes the manufacture of pulps from wood and other cellulose fibers, and from rags; the manufacture of paper and paperboard; and the manufacture of paper and paperboard into converted products such as paper coated off the paper machine, paper bags, paper boxes, and envelopes.
27	Printing, Publishing, and Allied Industries	This group includes establishments engaged in the following: printing, such as letterpress, lithography, gravure, or screen; services for the printing trade, such as bookbinding, typesetting, engraving, photoengraving, and eletrotyping; and publishing newspapers, books and periodicals.
28	Chemicals and Allied Products	This group includes the manufacture of the following: basic chemicals such as acids, alkalies, salts, and organic chemicals; chemical products such as synthetic fibers, plastics, dry colors, and pigments; and finished chemical products such as drugs, cosmetics, and soaps, also, paints, fertilizers, and explosives.
29	Petroleum Refining and Related Industries	This major group includes establishments primarily engaged in petroleum refining, manufacturing paving and roofing materials, and compounding lubricating oils and greases from purchased materials.

30	Rubber and Miscellaneous Plastics Products	This group includes establishments which manufacture from natural, synthetic, or reclaimed rubber, gutta percha, balata, or gutta siak, rubber products such as tires, rubber footwear, mechanical rubber goods, heels and soles, flooring, and rubber sundries.
31	Leather and Leather Products	This major group includes establishments engaged in tanning, currying, and finishing hides and skins, and establishments manufacturing finished leather and artificial leather products.
32	Stone, Clay, Glass, and Concrete Products	This group includes establishments engaged in manufacturing flat glass and other glass products, cement, structural clay products, pottery, concrete and gypsum products, cut stone, abrasive and asbestos products, etc., from materials taken principally from the earth in the form of stone, clay, and sand.
33	Primary Metal Industries	This group includes establishments engaged in the smelting and refining of ferrous and nonferrous metals from ore, pig, or scrap; in the rolling, drawing, and alloying of ferrous and nonferrous metals, and in the manufacture of castings, nails, spikes, and insulated wire and cable.
34	Fabricated Metal Products, Except Machinery and Transportation Equipment	This group includes establishments engaged in fabricating ferrous and nonferrous metal products such as metal cans, tinware, hand tools, cutlery, general hardware, nonelectrical heating apparatus, fabricated structural metal products, metal forgings, and metal stampings.
35	Machinery, Except Electrical	This major group includes establishments which manufacture machinery and equipment, other than electrical and transportation equipment. Machines powered by built-in or detachable motors, portable tools, both electric and pneumatic, are included in this major group.

36	Electrical and Electronic Machinery, Equipment and Supplies	This group includes establishments engaged in manufacturing machinery, apparatus, and supplies for the generation, storage, transmission, transformation, and utilization of electrical energy.
37	Transportation Equipment	This group includes establishments which manufacture equipment for transportation of passengers and cargo by land, air, and water. Some important products include motor vehicles, aircraft, guided missiles and space vehicles, ships, boats, railroad equipment, bicycles, motorcycles, and snowmobiles.
38	Measuring, Analyzing, and Controlling Instruments; Photographic, Medical, and Optical Goods; Watches and Clocks	This group includes the manufacture of instruments for measuring, testing, analyzing, and controlling, and their associated sensors and accessories; optical instruments and lenses; surveying and drafting instruments; surgical, medical, and dental instruments, equipment and supplies, ophthalmic goods; photographic equipment and supplies; and watches and clocks.
39	Miscellaneous Manufacturing Industries	This group includes establishments not previously classified such as jewelry, silverware, and plated ware; musical instruments; toys, sporting, and athletic goods; pens, pencils, and other office materials; buttons, costume novelties; brooms and brushes; and caskets.