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INFLUENCE OF LOCATION FACTORS IN THE TULSA

AREA PLANT LOCATION DECISION,

1958 - 1969

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CHAPTER I

INTRODUCTION

Issue and Purpose

Economists, concerned with sustained economic development, have long been interested in the factors that determine plant location for the following reason: industrialization is usually considered to be synonomous with continuing economic development. Industrialization is both a consequence of and contributes to the economic growth of an area by increasing job opportunities, fostering rising personal incomes, and expanding the local markets as well as contributing to nation-wide and export markets.

This study, a plant location decision-making study of the Metropolitan Tulsa Area, investigates the relative importance of factors influencing the location decision of entrepreneurs who established manufacturing plants in the Greater Metropolitan Tulsa Area, 1958-1969. An understanding of the process by which industrial firms are located in a specific geographic area is crucial not only in anticipating future industrial expansion and directing industrial development but also in formulating public policies which foster a diversified economic base and prolonged economic growth.

Brief Summary of Area's Growth

The manufacturing sector of the Greater Metropolitan Tulsa Area experienced dynamic growth during the decade, 1958 - 1969. During this time period, 387 industrial establishments located in the Area. The 387 establishments produce 149 products, as classified by the Standard Industrial Classification 4-digit Code. The new establishments created job opportunities for 13,875 workers, an increase in manufacturing employment of 56.4 per cent for the 4-county area of Creek, Osage, Rogers, and Tulsa Counties.

Expansion of the industrial sector of the Area was primarily in the durable goods industries. Outstanding growth occurred in the Fabricated Metal Products Industry; Machinery Industry; and the Ordnance and Accessories (Aerospace) Industry.

Methodology

Economic theoreticians, since the industrial revolution, have sought to answer the questions: "What causes industry to locate at a given geographic point? What are the general economic laws determining these movements?" Development of location theory of today is the result of years of observation and research by many individuals, with each successive economist building on the ideas of the earlier writers by expanding, revising, and refining the previous contributions.

Location theory, as developed by leading theoreticians, sets the framework for analysis of the basic question of this study: What factors were relatively the most influential on the judgment of the entrepreneurs who established plants in the Tulsa Area? The location factors investigated in this study are considered by location theoreticians as the foremost elements influencing the location decision-making process of entrepreneurs. Chapter 2 presents in detail and justifies the factors theoreticians today conceive affect the plant location decision of entrepreneurs.

To provide perspective to the industrial growth of the Tulsa Area, employment growth is related to that of the Nation and the State of Oklahoma, by shift and share analysis. Although the Area experienced outstanding industrial growth, the expansion rate of the various industry groups differed. Chapter 3 presents a detailed description of the Area's industrial growth. In this Chapter, shift and share analysis provides a rational and orderly method for sorting out the factors which relate to the differences in the rate of growth of the major industry classifications. Shift and share analysis also identifies the industries in which Oklahoma and the Tulsa Area realized a spatial advantage.

The basic information used in determining the factors of the greatest influence in the location decision was obtained from a questionnaire survey. All entrepreneurs, who established a plant in the Area between the years 1958 - and 1969, were sent a questionnaire. A top executive of the establishment, hopefully an individual involved in the plant decision-making process, was asked to rate the importance of each factor on their Tulsa Area plant location decision.

A total of 387 questionnaires were mailed. Of this number, 48 were "out-of-business" or "address unknown." Thus, the total number of possible responses was 339. One hundred and sixty-six questionnaires were completed, thus the overall response rate is 48.9 per cent. In some instances, as many as three follow-up letters were employed to clarify answers. In addition, some plants were visited personally, and telephone surveys were made to complete the questionnaire of non-respondents as well as to check responses.

Chapters 4 and 5 present a detailed evaluation of the responses to the questionnaire. In these Chapters the location factors are evaluated by major industry group, as to their relative importance on the location-decision of the entrepreneurs. In general, the findings of the study reflect the belief that: (1) owners of small employee size plants have slightly different location forces and objectives than owners of larger employee organizations; and (2) owners of establishments engaged in the manufacture of heterogeneous products were influenced by dissimilar sets of location factors in their Greater Metropolitan Tulsa Area location decision. Chapter 6 sets forth the findings of the study in detail.

CHAPTER II

PRESENTATION OF LEADING THEORIES

The development of an economic theory is the product of years of observation and research by many individuals, with each successive theoretician building on the ideas of the earlier writers by expanding, revising, and refining the previous contributions. Location theory has evolved slowly. For many years economists treated economic theory from a static approach with respect to both time and space, assuming an economy in which all producers, factors of production, commodities, and consumers were congregated at a point. German economists were among the first to investigate the question: Why does economic activity take place at a particular spatial location? Gradually as other writers contributed to the field, location theory slowly developed until today it is a highly complex theory.

The purpose of this chapter is to present locational factors which have been set forth by locational theoreticians as influencing plant location. In subsequent chapters the industrial sector of the Tulsa Metropolitan Area will be examined in an attempt to determine which factors were relatively most important in influencing the recent location of firms in the area. Location theory sets the framework for analysis of the question: What factors were of foremost importance in influencing the locational decisions of those individuals who recently situated industrial plants in the Tulsa Metropolitan Area?

Early Writers

Little is found among the works of the classical economists. J. S. Mill, writing in the early nineteenth century, and Alfred Marshall, writing in the late nineteenth century, more or less systematically surveyed the various elements which economists today designate as locational factors, but they did so only incidentally in developing their theories on rent and value, and then immediately these factors disappear.

John Stuart Mill in his analysis of rent in its relation to value states:

> Land is used for other purposes than agriculture, especially for residence; and when so used, yields a rent . . . The ground rent of a building, and the rent of a garden or park attached to it, will not be less than the rent which the same land would afford in agriculture: but may be greater than this to an indefinite amount; the surplus being either in consideration of beauty or of convenience, the convenience often consisting in superior facilities for pecuniary gain . . . The ground rent of a house in a small village is but

> little higher than the rent of a similar patch of ground in the open fields: but that of a shop in Cheapside will exceed these, by the whole amount at which people estimate the superior facilities of money-making in the more crowded place.[1]

But, Mill does not explain why Cheapside happens to be a more desirable location and thus will yield "superior facilities for pecuniary gain."

Alfred Marshall mentions the influence of location in his discussion of the theory of markets:

> The difficulties of the problem depend chiefly on variations in the area of space, and the period of time over which the market in question extends; the influence of time being more fundamental than that of space.[2]

But, even after stating that the problem depends chiefly on variation in the area of space, he does not develop further the influence of this factor.

Johann Heinrich von Thunen

From the point of view of anyone interested in the history of economic ideas in general and in the history of the theory of location in particular, it is interesting that Alfred Marshall, in the introduction to the first edition of his Principles of Economics, acknowledges his indebtedness to Johann Heinrich von Thunen.

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[1]J.S. Mill, Principles of Political Economy, (London: Longman, Green and Co., 1929), pp. 475-476.

[2]Alfred Marshall, Principles of Economics, (London: MacMillan Co., Ltd., 1920), p. 496.

Von Thunen, a German economist, writing in 1826, advanced a theory of the location of agricultural production, and in developing his theory also developed the basic methodology of analysis of general location problems.[3] Thus, Johann Heinrich earned the title of "the father of location theorists."

Von Thunen developed a simplified model which supposes a consuming center (town) within a fertile plain, without navigable rivers or canals, of given fertility throughout. The plain ends somewhere far away from the town in the wilderness so that analysis is based on a totally isolated economic system.[4] The inhabitants of the town provide the outlying districts with their manufactures in exchange for agricultural products, food, and raw materials. Von Thunen ignores the problem of transporting manufactured goods to the outlying regions.[5] At no place does von Thunen introduce the capital factor. The cost of production of a product is composed only of: (a) land rent, (b) labor costs, and (c) transportation costs.

At the beginning of his analysis, von Thunen assumes equal labor costs throughout the plain. Subsequently, he

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[3]Philip Newman, The Development of Economic Thought, (Englewood Cliffs, New Jersey: Prentice Hall, Inc.), p. 122.

[4]Carl J. Friedrich, Alfred Weber's Theory of the Location of Industries, (Chicago: The University of Chicago Press, 1929), p. xx.

[5]Ibid.

introduces the effect of a disparity in wages due to varying skills and consequently a divergence in labor cost.[6] However, he treats the variation in the wage level as a differential in land rent, and proceeds to isolate cost of transporting the product to market as the basic element in determining the location of a particular type of economic activity.

According to von Thunen, land rent per unit of output is relatively low per unit of output close to the consuming center and increases per unit of output, the farther the geographic region from the consuming center. Von Thunen makes this assumption based on the observation that agricultural production carried on relatively close to the consuming center requires intensive land cultivation, thus a higher yield per acre. However agricultural production located far from the consuming center usually requires extensive land use and a relatively low degree of cultivation, thus a lower yield per acre. Consequently, the closer the region is located to the town, the lower the land rent per unit of output; the farther the region, the higher the per unit land rent.

Von Thunen concludes farm produce is sold at each outlying region at the city price less the cost of transporting the goods to town. In other words, the price of farm produce at each outlying region is the sum of the land rent and labor

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[6] M. L. Greenhut, Plant Location in Theory and in Practice, (Chapel Hill: The University of North Carolina Press, 1956), p. 6.

costs per unit of output. However, the total cost of production at the consuming center includes transportation costs to the town, and it is this cost that von Thunen proceeds to isolate as the basic element in determining the location of production of a given agricultural product.

He observes that some agricultural products, such as truck farm, require rapid transport and, in some instances, special handling. Thus the transportation rates per ton-mile on these products are higher than on other products, such as firewoods, which do not have such requirements.

Von Thunen's approach to the location problem is presented diagrammatically in Figure 1. Let O be the town, the consuming center, with outlying regions A, A', B, B', C, and C', concentrically related to the town. OY^o is the land rent of a dollar's worth of a truck-farm crop and Y'T' (Y"T") is the cost per dollar's worth of transporting the crop over a distance of OA (OA') miles. The total cost of production of truck-farm crops from the outlying edge of region OA (OA') is the sum of the land rent OY^o and transportation cost Y'T' (Y"T").

OZ^o represents the land rent of a dollar's worth of firewood and Z'W' (Z"W") represents the transportation cost per dollar's worth. Total cost of production per dollar's worth of firewood at the outlying edge of region C, OC (OC') miles from the consuming center is the sum of the land rent OZ^o and transportation cost Z'W' (Z"W").

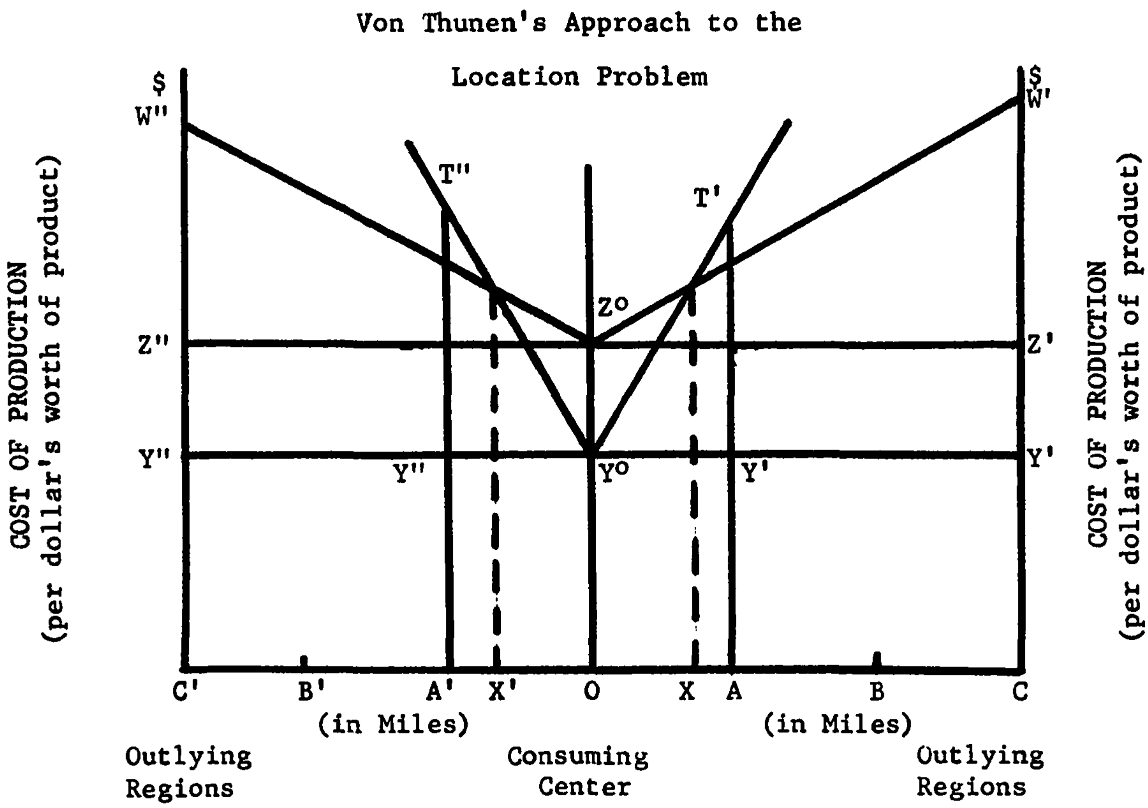

Figure 1

The freight rate per dollar's worth is higher on the truck-farm crop than on firewood as the steeper the slope of the line $Y^{O}T'$ ($Y^{O}T''$) than $Z^{O}W'$ ($Z^{O}W''$) implies. Within a range of OX (OX') miles from the consuming center, the cost of production per dollar's worth of truck crops is less than the cost of production of firewood. Therefore, the producers of truck-farm crops will be found at no greater distance than OX (OX'). If delivery at the consuming center is included, the producers of firewood will be found in the regions beyond OX (OX') miles from the consuming center in that the least-cost of production of firewood lies in these outlying regions

In summary, von Thunen was primarily interested in the type of farm crops which is most advantageously cultivated at a particular location. He concluded, when the land rent plus the cost of transportation of one product is equal or less than the land rent plus the cost of transportation of another product, then production will be shifted away from the more costly crop to the least-costly crop.

Von Thunen's theory is a theory of agricultural location which was a by-product of his effort to determine which type of agricultural production would best be carried on at a given place. While his scheme of concentric circles around a central town may not be fully applicable to all industrial locations, his theory is important to locational theory, as he sets forth a point of departure for advanced analysis and isolates transportation cost as an element in influencing the location decision.

Alfred Weber

It was almost a half-century after von Thunen's attempt to explain agricultural location before further investigation was undertaken into the question: why economic activity locates at a certain spatial point. Alfred Weber,[7] also a German economist, observing the movements of manufacturing industries attempted to develop a general theory of location: a theory applicable to all manufacturing

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[7]Friedrich, p. xxii.

industries.

Weber expanded von Thunen's analysis by depicting many consuming centers scattered over the plain rather than a single consuming center. Also, whereas von Thunen assumes location to be given and the type of production to be determined, Weber reverses the procedure and assumes the type of industry as given and the location site is the variable element.

Weber makes the following simplifying assumptions:[8]

(1) the entrepreneur will select the plant site which minimizes the sum of all expenditures, thus the location decision involves finding the optimum in substitution between the factors of cost.

(2) the geographic distribution of materials is given.

(3) the market area is a given phenomena.

(4) the labor supply is fixed at several locations, (i.e., not mobile).

(5) the wages of each branch of industry is also fixed, although the amount of labor available at this price is unlimited, (i.e., price elasticity of demand is infinity).

(6) equal transportation rates throughout the plain.

(7) equal costs of fuel and raw materials at the point of deposit, however, deposits of fuel and raw materials are distributed unevenly throughout the plain.[9]

(8) a <u>locational factor</u> is defined to be an advantage, (i.e., a saving in cost) which is gained when economic activity takes place at a

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[8] *Ibid.*, p. 37.

[9] *Ibid.*, p. xxiii.

> particular geographic point or at several such points rather than elsewhere on the plain. If the cost of producing and distributing product X at point Z on the plain is less than the cost of producing and distributing the identical product at any other location, then there is a production advantage at the geographic point Z.[10]

Weber classified major determinants of location influences as either general or special. The general determinants of location are further classified into _regional_ factors, and agglomerative (deglomerative) factors. These factors are primary and secondary causes of redistribution of industry, respectively. As used by Weber, an agglomerative factor is an advantage that lowers production or marketing costs and results from the fact that production is carried on to some considerable extent at _one_ place. A deglomerative factor lowers costs as a consequence of decentralization of production (production in more than one place).[11]

The primary causes are attributed to two sets of costs: transportation and labor costs. Special determinants are categorized into institutional and cultural factors. In summary, the classification is:

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[10] _Ibid._, p. 18.

[11] _Ibid._, p. 126.

LOCATION DETERMINANTS

I. General

  A. Regional

    1. Transportation Costs
    2. Labor Costs

  B. Agglomerative (Deglomerative)

    1. Land Costs

II. Special

  A. Institutional

  B. Cultural

Weber limited his analysis to the influence of the general determinants of location because he attempted to develop a theory applicable to all manufacturing industries. Special factors, arising from the specific characteristics of particular industries are unique and therefore are not useful in developing a general explanation of industry location.

Weber concludes only labor and transportation costs are to be considered as general regional factors. Geographic differences in transportation and labor costs direct industry to quite definite points on the plain. In justifying his use of only transportation and labor costs as general regional factors, Weber isolates the following cost elements incurred in the productive and distributive process:[12]

[12] _Ibid._, p. 29.

1. the cost of grounds
2. the cost of buildings, machines, and other fixed capital costs
3. the interest rate
4. the rate of depreciation of fixed capital
5. the cost of labor
6. the cost of transportation
7. the cost of securing materials, power, and fuel

According to Weber, variations in the cost of land are the consequence of agglomeration. Land costs may vary with the amount of local agglomeration but not regionally, therefore, land costs are an agglomerative but not a general regional factor.

The cost of buildings, machines, and other fixed capital are the result of price-making of previous stages of industrial production. They contain no new elements of cost and thus no new and unknown locational factors.[13]

The interest rate, in the Weberian analysis, does not have regional location significance. Weber states that the interest rate may vary according to the quality of the enterprise or management. However, it does not vary according to regions within a given country, thus interest rate is not a regional locational factor nor does it require consideration as an agglomerative factor since the interest rate does not seem to vary significantly between rural and urban areas.

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[13] Ibid., p. 32.

Interest, insurance, taxes, and other similar forces are regarded by Weber as institutional factors. Weber considers these elements to be artificial enhancements of the expense of production created by political or other agencies and, as such, are outside the realm of technical or natural factors influencing the location decision.

The rate of depreciation of fixed capital is also independent of geographic location. The rate of depreciation might vary according to climatic conditions, if it causes a great amount of rust on the machines. However, this is considered by Weber to be a special, not a general regional factor.[14] He also excludes management as regional locational factors because his theory includes only those natural and general forces which influence all industrial locations, regardless of the type of economy.[15]

The cost of labor is Weber's second regional factor of location. Locally different labor costs exert locational pull to and from certain regions, and thus must be considered as a regional locational factor.[16]

The cost of transportation which is incurred in procurraw materials, fuel, and power, and in shipping the finished market to the consuming center will vary according to distance, nature of terrain, and sometimes the type of

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[14] *Ibid.*, p. 30.

[15] Greenhut, *Plant Location*, p. 12.

[16] Friedrich, p. 33.

transportation system will affect transportation costs. These costs are thus also regional factors of location of a general nature, according to Weber.[17]

Finally, Weber introduces the cost of securing materials, power, and fuel as new elements of cost which vary geographically. The price at which materials, fuel, and power can be acquired will vary at the various points of deposit, depending on the quality of the deposit, difficulties in procuring the material, and the location of the plant in relationship to the deposit.[18] However, Weber treats the different price levels of raw materials, power, and fuel as if the prices were equal throughout the plain. In other words, there is no difference in the prices at the point of deposit. Materials, fuel, and power which are actually more costly at the point of deposit are treated as if the location were more remote than alternative deposits, which in turn, increases the transportation cost of the material. Materials, fuel, and power which are easier to procure, are of a higher quality, or in other words are less costly at the point of deposit, are treated as if the point of deposit is located closer to the plant and the difference in price is reflected in lower transportation costs.

In summary, on the basis of the above analysis, Weber concludes only labor and transportation costs are general

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[17] Ibid., p. 34.

[18] Ibid., p. 33.

regional factors of location of every industry, and that land costs are a general agglomerative (deglomerative) factor.[19]

Having isolated the relevant cost factors, Weber assumes that industrial production will seek the point on the plain where the transportation costs will be a minimum.

Costs of transportation depend upon: (a) the type of transportation system, (b) the extent of use, (c) the nature of the region, (d) the kind of roads, and (e) the nature of the material, fuel and power of the finished good. However, all of these variables, by appropriate transformation, may be expressed in terms of distance and weight. For example, when the transportation system is used with varying degrees of intensity, average cost varies inversely to that intensity. Lowering costs by increasing intensity of use has the same effect on total costs that increasing the distance between the consuming center and the industrial location does with costs constant. Thus, the distance alternately is either increased or decreased proportionately to the change in cost. If a special train must be utilized, the cost will be higher than for an existing train. The same effect of additional cost is obtained by extending the distance proportionately to the additional cost. Likewise if the cost of transportation varies among places because of differences in terrain, then the difference in costs is

[19] _Ibid._, pp. 31-32.

treated by either extending or decreasing the distance covered proportionately. In this way, all variations in rates are expressed in terms of weight and distance, permitting the ton-mile to be the rate-making unit.[20]

Weber classifies materials used in the production of a product as either ubiquitous, materials distributed throughout the plain; or localized, materials found only at given deposits scattered throughout the plain. Ubiquitous materials are so extensively available within the region that there are deposits of the material, or opportunities for producing the material, at the consuming center.[21] For example, at the time Weber wrote his original work, he states: "Water is a practically unlimited, and therefore an 'absolute' ubiquity in many German regions." Cotton in southeast United States was considered to be a ubiquitous material. Minerals and coal, however, are localized materials as these materials are found only in well-defined localities.[22]

In the production process materials may be either weight-gaining or weight-losing. Weight-gaining materials enter into the finished good with residue, that is, increase the weight of the manufactured product. Materials which do

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[20] *Ibid.*, p. 46.

[21] *Ibid.*, p. 51.

[22] *Ibid.*

not increase the weight of the final product, are weight-losing. Clay used in manufacturing pottery is a weight-gaining localized material, but coal used in the production of bricks is a weight-losing localized material. A residue of the weight of coal is not found in bricks, but a residue of the weight of clay is found in pottery.

The production of finished goods usually requires different combinations of materials. In some instances the production process may require the use of only ubiquitous materials while in other situations only localized materials are used. Usually a combination of both localized and ubiquitous materials is required and depending on the type of production, the materials may be either weight-gaining or weight-losing. All of these variables influence the total weight of the materials used, the final product, and subsequently transportation costs. Thus, the entrepreneur, in seeking an industrial location of minimum transportation costs must consider the type of materials combined in the production process, the location of deposits of localized materials, and the weight of the final product at the consuming center.

Weber considers the following situations in which various combinations of materials are used in the production process: (a) use of ubiquities only, (b) use of localized materials only, (c) use of localized weight-gaining materials combined with ubiquities, and (d) use of localized weight-losing materials combined with ubiquities.

Weber develops what he calls the material index which is the ratio of the weight of used localized materials relative to the weight of the product. It is a measure of the significance of localized materials which must be moved relative to the weight of the product.[23] The weight of the ubiquities that are used is omitted in considering the transported weight units merely because they contribute no additional weight to be moved except in their manufactured form within the product.

If a product can be manufactured completely from ubiquitous materials, the material index, or weight units to be transported is 0/1, or 0, since no localized materials are used per unit of finished product. If one ton of clay, a localized material, is used to produce one ton of product, the material index is 1/1, or 1. If one ton of coal, a localized material, is combined with one ton of earth, a ubiquity, to produce one ton of product, the material index is likewise 1/1, or 1. If two tons of localized materials are used to produce one ton of product, (i.e., weight-losing materials) the material index is 2. Symmetrically, if one ton of localized materials is used to produce two tons of product, (i.e., weight-gaining materials) the material index is 1/2.

Weber reaches the following conclusions about the

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[23] Ibid., p. 60.

effects of different combination of ubiquitous and localized materials on location:

(a) If only ubiquities are used, the locational decision will always be at the point of the consuming center for if production occurs at the place of consumption, there is nothing to be transported.[24]

(b) If only localized materials are used and if the material index is equal to one, the locational decision may be at any point on a line between the place of deposit and the consuming center. The same weight is transported, whether in finished product form or raw material. However, if the material index is less than one, the location site will be at the place of consumption for then the weight of used localized materials to be transported is less than the weight of the finished product. If the material index is greater than one, the location will be at the place of deposit because the localized materials used are weight-losing.

(c) If weight-gaining localized materials are combined with ubiquities, the locational decision is further strengthened toward the site of the consuming center as the total transportation weight of materials used and product will be minimized at the point of consumption.

(d) However, in the situation where weight-losing localized materials are combined with ubiquities, the location

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[24] *Ibid.*, p. 62.

decision is not quite as obvious. If only one localized material is used, the location remains at the deposit site as long as the material index is larger than 1, that is, if the weight of the used localized material continues to be greater than the sum of the weight of the product plus the weight of ubiquities in their finished form. But if the material index is less than 1, then the location moves to the place of consumption. Thus, the location site is determined by the comparative size of the losses of weight of localized materials and of the weight of the ubiquities.

When more than one weight-losing localized material is used, it is impossible to state precisely the position of the site. Weber concludes, using mathematically illustrations, that if the weight of one of the localized materials is greater than the sum of all the weights of all other localized materials plus the weight of the finished product, the location site will be at the point of the deposit. For example, coal has the power to attract the location at its deposit. However, if no one localized material has predominance in weight, then the location site may be at any point within an arc running through the material deposits. Location at the consuming center in this instance will occur only if the place of consumption is within the arc.[25]

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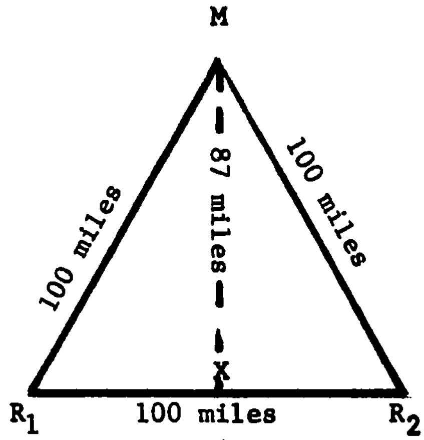
[25] *Ibid*.

Weber's Least-Cost Location: Using

Two Localized Weight-losing Materials.



R_1 Source of one raw material

R_2 Source of another raw material

M Market

Figure 2

For example, suppose the customers for a product are in only one place (M), as illustrated in Figure 2, and the product is manufactured from two raw materials (R_1 and R_2). Further suppose R_1 and R_2 are localized weight-losing materials with a material index of 2. Both R_1 and R_2 lose 50 per cent of their weight in the manufacturing process, and that 2000 tons of each are required a year. If the factory were located at M, the total transport cost for a year would be 400,000 ton-miles: 2,000 tons of R_1 plus 2,000 tons of R_2 x 100 miles. If the factory were located at the source of R_1 the total transport cost would be 200,000 ton-miles on R_2 from the source of R_2 to the location of R_1, plus

200,000 ton-miles on the finished product from R_1 to the market M, thus also 400,000 ton-miles transportation costs.

However, suppose the factory were located a point X, midway between R_1 and R_2, the transport burden would be as follows: 2,000 ton x 50 miles = 100,000 ton-miles on R_1 plus another 100,000 ton-miles on R_2, a total of 200,000 ton-miles transport burden on the raw materials. Transport cost to market from point X involves another 2,000 ton x 87 miles = 174,000 ton-miles on the finished product from points X to M, thus a total transport cost of 374,000 ton-miles. This is less than the burden facing an enterprise located at either M or R_1 or R_2.

If the two raw materials do not have the same weight-loss ratio, and if different amounts are required, the factory would tend to locate nearer one of the raw material sources so as to lessen the burden of transportation costs.

In summary, the material index indicates how transportation cost will affect the choice of the locational site. In any given industrial process it is the proportion of the weight of the ubiquities used to the weight losses of localized materials which determines whether the particular site location is at the place of consumption or place of the material deposits.

In relating plant location theory to realistic situations Weber observes that industry location is not a static situation but a constantly changing one. Industrial development concentrates the population and produces an ever-increasing demand for ubiquities, which in turn depletes the existing supply. The elimination of ubiquities from production at these points lowers the weight of the product at the point of consumption. Also, constantly changing technology and the use of new materials, especially in the area of fuel and power, influences the amount of loss of weight of the localized materials and increases loss in weight during the production process. For example, shifting from coal to natural gas as a source of energy will influence the weight of used localized materials and the material index. As a consequence of such developments, the trend is for industry to shift away from places of consumption towards the site of raw material deposits, according to Weber.[26]

Weber's second general determinant of location is labor costs. Indeed, he states that labor cost advantages sometimes may be the dominant influence on the location decision and evoke the movement of industry from the point of least transportation cost to a site of greater transportation cost when the savings in labor costs are larger than the additional transportation costs.[27]

The labor costs of an industry are defined as

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[26] Ibid., p. 75.

[27] Ibid., p. 103.

expenditures for the use of human labor. Labor costs influence the location decision only if they vary from place to place in the spatial plain. Variations in labor costs, are the consequence of: (1) differences in the level of labor efficiency, and (2) wage rates. Weber clearly states he is <u>not</u> interested in the circumstances which cause the differences in efficiency or wage rates, and thus confines his analysis solely to the impact of variations in labor costs from place to place, (i.e., points on the spatial plain) on the location decision.

The following assumptions are made in an effort to trace the effect of varying labor costs:[28]

(1) wage rates at given spatial points are fixed; and

(2) the labor supply available at each spatial location at the given wage rate is unlimited, i.e., price elasticity of demand is infinite.

Weber visualizes the process of production and distribution as located at the point of minimum transportation costs. However, deviation from this point is a possibility if the savings in the cost of labor at a specific location is greater than the additional costs of transportation.

To illustrate how deviation from the point of minimum transportation costs might take place, Weber creates the concept of isodapanes. Isodapanes are lines representing equal total transportation costs incurred as production

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[28] <u>Ibid</u>., p. 101.

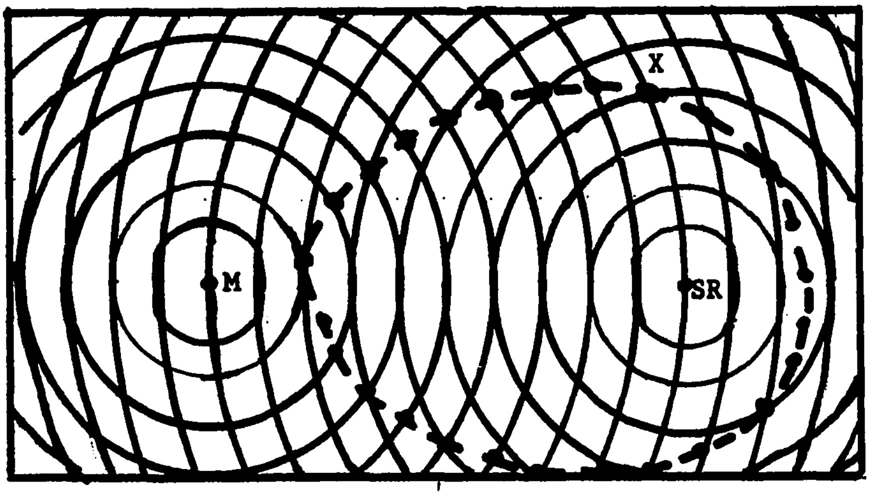
moves away from the point of least transportation cost; with the points of very high additional transportation cost located the farthest distance from the loci of least transport cost.

Figure 3 illustrates an isodapane. Suppose a single market, M, and a single raw material source, SR. Assume: (1) the raw material is localized and has a material index of 2, which means that two tons of material enter the factory for every ton of product that leaves it; (2) transport costs are the same per ton-mile for raw materials and finished product. The concentric circles around M portray transport charges from all points to M; those around SR portray transport charges to all points from SR. Both sets of circles are spaced to represent one unit of transport cost per ton.

If the factory were located at SR, every ton of product shipped from SR to M would bear 10 units of transport cost. If the factory were located at M, the amount would be 20 units of transport cost, since two tons of material would have to move the ten distance units from SR to M for every ton of product made at the factory. Thus, if transport costs are the sole location determinant, point SR is the minimum cost location.

Suppose the factory were at X. The aggregate transport cost would consist of eight units on raw materials (two tons to the fourth concentric circle around SR), plus

Weber's Isodapane Concept



M Market City
SR Source of Raw Material
—— Distance Units
●—●—● Isodapane
Source: Alexander, John W. Economic Geography. Englewood Cliffs: Prentice-Hall, Inc., 1963.

Figure 3

ten units on the finished product (one ton to M from the tenth concentric circle around M), or 18 units in all. The heavy line is an isodapane connecting all points at which transport cost would total only 18 units.

Isodapanes reveal how great the advantage has to be in order to offset the disadvantage in terms of increased transport costs. All points on the isodapane in Figure 3 bear a transport cost burden of 18 units, a handicap of eight cost units when compared to SR. Accordingly, all points on that line would have to possess an advantage or saving of at least eight units in labor cost per ton of finished product in order to lure a factory from point SR to a point on the isodapane.

Weber's isodapane has very little value if transport costs are the sole determinant in the location of industry. However, as soon as any other variable is introduced, it may well be that some place other than the raw material source or market would have a great advantage. Weber's contribution of isodapanes provides a technique for the systematic introduction of a new variable (such as labor) into a theoretical scheme.

Weber classifies those industries which are drawn away from the point of minimum transport cost as <u>labor oriented</u>; and industries which do not migrate from the minimum point as <u>transport oriented</u>. Whether or not an industry is labor or transport oriented depends on the general characteristics of the industry. In developing a general rule, Weber concludes that industries with a high labor cost per ton of product tend to be labor oriented and locate away from the point of minimum transport costs to a point of low labor costs. Industries with a low labor cost per ton of product tend to be transport oriented.

The influence of the two general regional factors, transportation and labor costs, are either counteracted or intensified by agglomerative factors, identified by Weber as a secondary cause of redistribution of industry. As used by Weber, an agglomerative factor is an advantage or a cheapening of production or marketing which results from the fact that production is carried on to some considerable extent at <u>one</u> place. These factors tend either to draw industry closer together or disperse it, depending on the respective strength of each force and are partly a consequence of the two general regional factors.

Weber is solely concerned with the final impact of agglomeration and deglomeration as it effects the location decision. However, unlike his analysis of the impact of labor and transport costs on the location decision, in which case it is possible to determine by pure deduction the degree each individual industry is influenced by each factor, analysis of agglomerative factors is limited.

Agglomeration comes from the concentration of people attracted to one place because many firms are in that place or because one large plant is in that place. The first stage of agglomeration occurs through internal economies of scale to the firm, or by simple enlargement of plant.

Additional stages of agglomeration result from the social nature of production. Firms may profit by locating adjacent to each other, thus gaining an advantage through external economies of scale to the firm that are internal to the industry such as: (a) The development of technical equipment. For example, the use of highly specialized machines that even large-scale plants are not able to use full time. (b) The development of labor organizations, such as the creation of trades and trade associations based on the division of labor. (c) More effective marketing situations, such as the grouping of several plants which obtain advantages in the purchase of raw materials and develops its own market. And, (d) lower general overhead costs, such as in gas, water, and street improvements.[29]

Assume a plant uses a highly specialized machine in the production process. As the industry expands, it is possible for the maintenance and repair of the machine to be performed by a separate firm because of the demand from many plants rather than from just one. Thus, the specialized plant obtains an economy of scale that each production plant could not achieve on its own. For example, as illustrated in Figure 4, the total average cost for a single plant (TAC_o) with a rate of output of OX might be OA. The average cost of a specialized firm (AC_s) at a rate of production of OX might be OB. However, when the industry is expanded, the specialized firm is able to take advantage of increasing returns to scale and at an output of OZ sell to all producers at the average cost of OC. The total average cost of the original firm falls to OD at the rate of production of OX. The new total average cost of each firm shifts to the dotted TAC_o.

Deglomerative forces oppose the agglomerative factors and tend to weaken the agglomerative forces. Deglomerative factors are essentially higher land costs caused by the increase in the demand for land, more expensive utilities, and higher labor costs. These factors are the consequence of

[29] Ibid., p. 131.

Cost Effect of Agglomeration

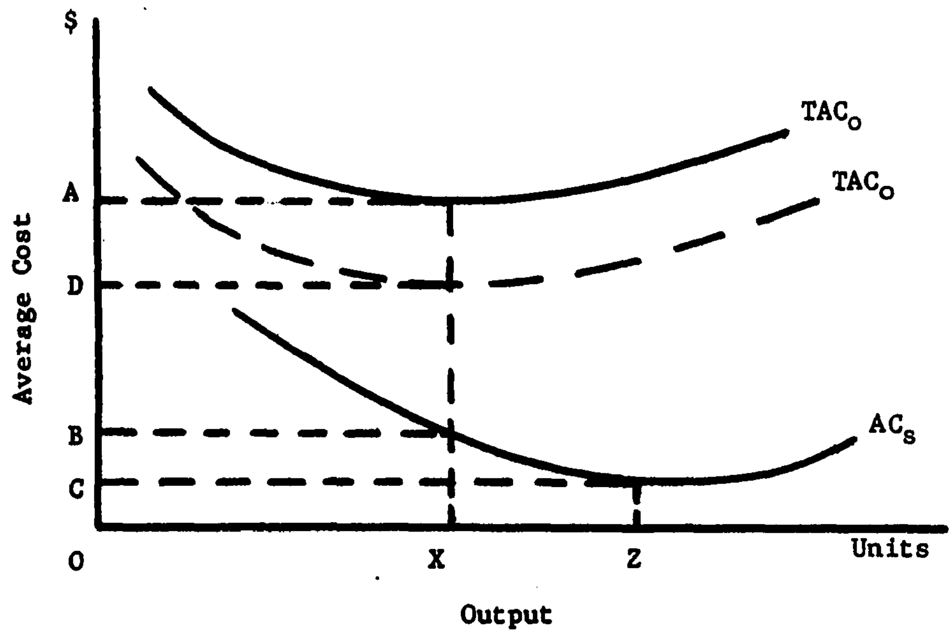


Figure 4

the agglomeration of people and tend to decentralize industry.

Theoretically, Weber illustrates when agglomeration will take place and to what extent also by the use of isodapanes. Whenever an industry deviates from the point of minimum transport cost, it will necessarily incur additional costs. If an industry is to move, the deviation cost per ton of product must be less than the economies per ton of product realized from agglomeration.

Weber finds a rather close relationship between labor and agglomerating factors and concludes that only industries with high processing costs can reduce expenses by agglomerating. High processing costs have two main components:

(1) labor costs, and (2) the cost of machinery, which includes interest, amortization of fixed capital, and cost of power. All of the latter costs are considered by Weber by transformation as a transportation cost and consequently tend to strengthen location at the point of minimum transportation costs.

Thus, in general, the real force of agglomeration exists when labor is the vital part of the processing cost. Weber goes on to add, however, that even in this case the force of agglomeration is usually not of very great influence due to the extreme variability of labor cost at alternative location and concludes agglomerative advantages are governing factors in location only when transportation and labor differentials at alternative sites are relatively slight. Only then, such advantages as proximity to auxiliary industries, better marketing outlets, or economies of scale are the governing factors.[30]

In summary, Weber's theory of location involves substitution between transport costs and non-transport cost factors. It is a problem of substitution, seeking a least-cost combination of transport, labor, and agglomerative factors.

Edgar M. Hoover

The essential problems of location are further analyzed and evaluated by Edgar M. Hoover, a Harvard economist,

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[30] *Ibid.*, p. 167.

writing in the 1930's. Hoover's[31] theory, though expanded, is quite similar to Weber's theory. Hoover focuses attention on the factors determining the relative advantages of different types of location from the standpoint of the individual producing enterprise. However, Hoover approaches the problems not only from a cost of production point of view but also from a viewpoint of access to suppliers of and to markets for the product.

To Hoover the location decision is a problem of substitution of transport and processing costs, the ultimate objective being the minimization of these expenses. Like Weber, Hoover stresses the least-cost transportation location. However, unlike Weber, Hoover modifies transportation costs and emphasizes that they do not vary simply and directly with distance. Cost and rates are generally less than proportionately greater for longer hauls on one route, lower in the direction of lighter traffic flows, graduated discontinuously upward with increasing distance, lower for large shipments and large shippers, and lower for compact and easily handled goods and goods of low value in proportion to weight.[32]

Normally, the least-cost transportation location will be at the source of materials or at the market. However,

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[31] Edgar M. Hoover, The Location of Economic Activity, (New York: McGraw-Hill Paperback, 1963).

[32] *Ibid.*, p. 26.

when there are transshipment points or junctions and the plant draws from several material sources or sells to several markets, then the ideal location may be at an intermediate point. In this case, the sequence of material sources, junctions, and markets on the transfer network plays a large part in determining the orientation of production in different regions.

Hoover's findings are similar to Weber's in that he concludes: (1) plants entailing a larger volume of materials than of products is likely to be more influenced by consideration of nearness to materials source, as are plants with large fuel requirements. Orientation to materials is also found when the relative weights of material and product are roughly equal, but procurement cost per ton-mile are for some reason greater than distribution costs.[33] (2) Analogously, orientation to markets may be based either on a "weight-gain" in the production process or on higher transfer costs per ton-mile on products than on materials. (3) Sometimes there is a peculiar conformation of the gradients of procurement and distribution cost that makes the total transfer cost least at some intermediate point, usually where two different mediums of transport, (i.e., water and rail) meet. A plant located at the transshipment point minimizes total transport costs since neither material nor

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[33] *Ibid.*, pp. 31-32.

product will then have to be shifted from ship to car. In all probability, material will use water transport only; and the product rail transport only. This usually happens when the transfer cost on material and product are nearly equal and both material and product are cheap and bulky so that the expense of transshipment is relatively great.[34]

Hoover does not change the basic theory developed by Weber but he does emphasize some aspects of transportation costs which explain the transport orientation of certain industries.

The Weberian analysis considered labor costs as a general determinant of location. Hoover considers processing costs as a locational factor and includes in his processing costs direct labor costs, costs of administration, interest, rents and royalties, maintenance and depreciation, and taxes.[35] He concludes that in those industries where there is little variation in transfer costs, in comparison with processing costs, then the latter will be the significant locating factor.

Hoover analyzes processing costs on the basis of marginal productivity theory. To minimize processing costs, since factors of production are imperfectly mobile and imperfectly divisible, the entrepreneur seeks a plant location

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[34] Ibid., pp. 39-40.

[35] Ibid., p. 67.

conducive to high utilization of the productive capacity of factors and scale of output appropriate to that location. The best combination of factors involves more intensive utilization of any factor where its price is high. The scale of production is determined primarily by the economies of larger scale processing as against either increasing transfer costs over wider areas or the diseconomies of larger administrative control units.

Rent as a locational factor is significant chiefly in determining which of several industries oriented to the same markets shall occupy the sites nearest those markets and in what sequence the other users arrange themselves with increasing distance from markets.

Hoover considers the property tax burden as an element of land cost which affects location in much the same manner as the interest burden. Both stimulate the producer to seek a location of least-cost per unit of output:

> a tax that becomes a fixed cost regardless of rate of output, e.g., a general property tax, has about the same effect as a higher interest rate: it penalizes localities where plant and equipment are less fully utilized and sharpens the producer's incentive to find a location where less capital investment is required per unit of output.[36]

Labor costs, according to Hoover, are an important locational factor in many industries and a decisive factor in a few. Labor, like land or capital, is not required in rigidly fixed quantity for any given process, thus, a firm

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[36] *Ibid.*, p. 254

can economize on labor, chiefly by mechanization, where wages are high. Like land, labor varies greatly in productivity from place to place, and the quality of a local labor force is subject to improvement or deterioration with use or disuse. Unlike land, however, labor is both mobile and reproductive, so that differences in labor cost rest partly on migration responses and on geographical difference in rates of reproduction.[37]

Large cities offer an advantage in labor costs by providing an extremely elastic supply of all kinds of labor; an advantage which may show up not in wage rates but merely in the avoidance of costly interruptions of work due to labor turnover or a sudden need of more hands.[38] Wage rates in urban areas are higher than rural areas, however, Hoover concludes this does not necessarily attract job seekers or repel employers, as the employer is interested essentially in low processing costs, which depend on labor productivity and also on how the local labor supply lends itself to low overhead, (i.e., good utilization of fixed investment, and to improvement in production techniques). Thus, the best labor supply from the employer's standpoint may be found in places with relatively high wage rates.[39]

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[37] Ibid., p. 103.

[38] Edgar M. Hoover, Location Theory and the Shoe and Leather Industries, (Cambridge: Harvard University Press, 1937), p. 74.

[39] Hoover, Location of Economic Activity, p. 103.

Local concentration of an industry fosters the development of a labor force particularly productive in that industry, which also tends to reinforce and perpetuate the concentration of plants using similar skills. However, this may or may not be a favorable location situation as concentration of a large part of an industry in one place, the above-average skill level of the employees, the weakness of the employers, and the dependence upon experienced manpower all combine toward rising wage levels in such situations faster than they are raised elsewhere or among other groups of workers.[40] Furthermore, institutional inflexibilities in long-established urban labor markets (i.e., development of restrictive practices embodied in agreements, tradition, or legislation or the more frequent interruption of work by disputes) tend to counteract the labor cost advantages.

Furthermore, the advantages in processing cost at large urban centers may be offset in some cases by the lower wages prevailing in areas of surplus population (chiefly rural). These lower labor costs may arise from the willingness of people to accept lower wages in order to be where living is pleasant and cheap, from people's tendency to reproduce faster in places providing poorer employment opportunities, from the inability of people to migrate promptly out of depressed or stagnant areas, and from the production

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[40] _Ibid._, pp. 113-114.

advantages of a diverse, experienced, and adaptable local labor supply.[41]

Hoover's analysis of the agglomerating and deglomerating forces is much more penetrating than that of Weber who believed that the force of agglomeration would reenforce the attraction of a cheap-labor location. Hoover contends concentration of industry need not take place merely at locations of cheap labor. It may occur at a source of materials, at a strategically-located distributing point, or at a site with any sort of advantage in production costs,[42] as Hoover included in agglomeration such advantages as better transfer services, a broader more flexible labor market, more advanced banking facilities, better police and fire protection, and lower insurance costs and utility rates. In addition, by agglomerating, firms specialize to a greater degree. Therefore, certain operations and services that a plant in a less industrialized area would have to do for itself can now be farmed out economically.[43] Other interindustry advantages of agglomerating are: industries may be linked by the use of each other's by-product, complementary use of labor, or a policy of hand-to-mouth purchasing of inventory.

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[41] *Ibid.*, p. 115.

[42] Hoover, *Location Theory and the Shoe and Leather Industries*, p. 90

[43] Greenhut, *Plant Location in Theory*, p. 19.

Hoover not only includes institutional factors as influencing plant location but also discusses special factors such as climate stating: where the climate is excessively hot, labor may be sluggish and labor cost high; if air refrigeration units are used to counteract this tendency, the land cost rises. Where the climate is very cold, the heating system becomes very costly.

Though Hoover's theory places emphasis on the least-cost combination of factors, he also attempts to explain the geographic groupings and spatial relationships of entrepreneurs; the basis for the various shapes and sizes of the market areas; conditions which favor the overlapping of market areas; and the conditions under which rival sellers or buyers experience a mutual location attraction rather than repulsion.[44]

Hoover concludes that the location relationship of producers competing for markets is generally one of mutual repulsion represented by the efforts of each seller to find a market area where there is not too much competition. To the extent that this mutual repulsion outweighs conflicting location considerations, producers tend to be spread out in a pattern similar to that of market demand.[45] However, if the product is standardized, affording no grounds for customer preference except cheapness, each market point

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[44]Hoover, Location of Economic Activity, pp. 47-48.

[45]Hoover, Location Theory and the Shoe and Leather Industries, pp. 94-95.

will buy from whatever production center can supply it most cheaply.

Hoover illustrates and defines the market and supply area by the use of margin lines. A margin line is the boundary points equally well served by one or more centers of production. The cost of a product at the market point is the sum of the costs incurred in the three states of production: (1) costs incurred in procuring the materials, (2) costs incurred in processing, and (3) costs incurred in distribution. If the costs of the product at rival production centers are equal, then the market will be divided on the basis of relative distribution costs alone. Markets nearer one production center are likely to have lower distribution costs from that point, hence will be served from it rather than from any other.

For example, in Figure 5, three production points with equal total costs are shown, (A, B, and C,) and the margin lines indicate the points so situated that the distribution cost is the same from two of the production centers, and at one point all three market areas touch.[46]

However, since Hoover assumes situations of both increasing and decreasing returns, dependent upon the economies of scale, costs of procurement plus processing costs may not be equal at each center of production. Hoover points out that this is a more realistic case, and in such

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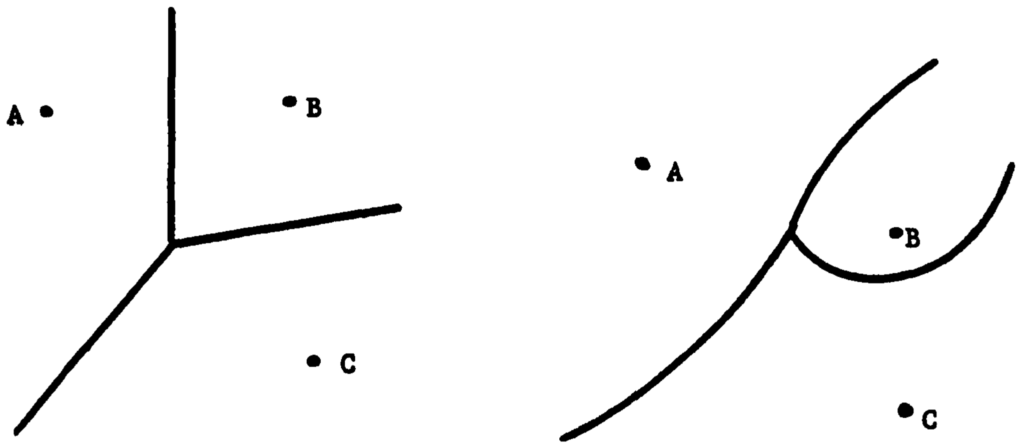
[46]Hoover, Location of Economic Activity, p. 50.

Hoover's Market Areas

Equal Cost Situation | Unequal Cost Situation



Market Area | Market Area

Figure 5

a situation, the market-area boundary between any two centers is nearer the center with the high costs.

Hoover finds that usually distinct market-area boundaries do not exist as there will be zones of indifference in which part of the trade goes to sellers at one location and part to sellers at another location. Hoover states that overlapping of market areas implies an absorption of distribution costs by one of three parties: the transfer agency, the seller, or the buyer.[47] Transfer agencies absorb the added distribution cost when they engage in the universal practice of bracketing their rates by "mileage blocks."

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[47] *Ibid.*, p. 65.

Further overlapping of market areas is involved in sellers' absorption of freight costs. Still another basic cause of market area overlap is the fact that two production centers sometimes cater to the same want by supplying different though substitutable products.[48]

In summary, although Hoover recognizes that consumers and producers are interdependent, in his analysis he is primarily concerned with those factors determining the relative advantages of different locations from the standpoint of the individual producing enterprise. Hoover focuses attention primarily on the costs of procuring, processing and distributing the product. He classifies distribution and procurements costs as a function of transportation costs; processing costs as a function of prices of factors of production and the amounts of those factors needed per unit of output. To Hoover, the location decision is a problem of substitution of transport and processing costs, the ultimate objective being the minimization of these expenses.

Although Hoover's major emphasis is on a least-cost combination of processing and transportation costs, he does investigate the shape of the market and supply area of a producer and concludes that the shape of the market-area is influenced by the advantages of different locations for procurement and processing and by the structure of transfer costs.

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[48] Ibid.

August Losch

The work, The Economics of Location,[49] written by August Losch in 1941, is becoming a "classic" in the sphere of location theory. The main ideas presented by Losch are few and simple but have many consequences in that Losch synthesizes, as variables influencing the location decision of entrepreneurs, market demand and the least-cost combination of factors.

Losch attempts to describe general spatial relations by presenting a model of the space economy operating under conditions of monopolistic competition.

Losch's model assumes:[50]

(1) Uniform distribution of industrial raw materials;

(2) Ubiquitous transportation possibilities, hence equal transportation rates at all points over a homogeneous plain;

(3) An even distribution of population;

(4) Identical consumer tastes and preferences;

(5) Free entry into the market, thus production opportunities are open to all;

(6) Each producer seeks to maximize his profits which involves equality of marginal cost and marginal revenue;

(7) The number of independent selling units are maximized, thus all areas are served by at least one firm;

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[49] August Losch, The Economics of Location, translated from the second revised edition by William H. Woglom with the assistance of Wolfgang F. Stolper, (New Haven: Yale University Press, 1954).

[50] *Ibid.*, pp. 65, 66, 72.

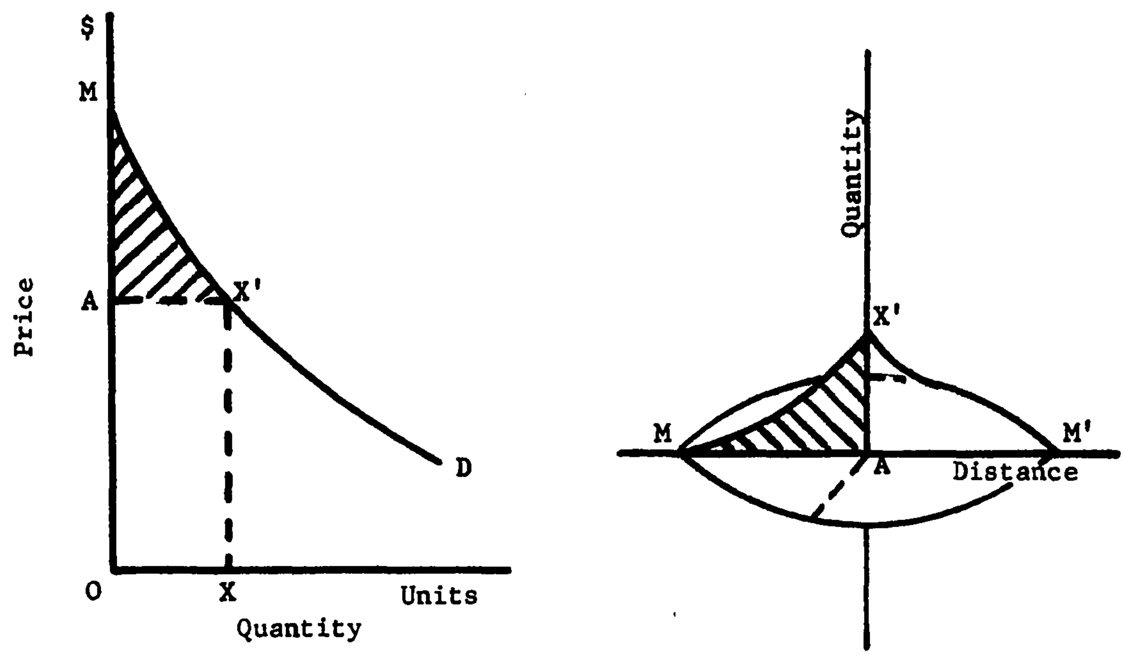
(8) All profits are eliminated, as under the competitive free entry assumption, new rivals will eventually eliminate all rent-like income;

(9) Any consumer on a boundary line is indifferent to the possible sources from which he can obtain a given commodity at minimum costs.

Given these assumptions, the amount demanded of a commodity is a function of its delivered price, and unless demand is infinitely inelastic, a firm may increase its dollar volume of sales by: increasing consumer demand at the factory site; or extending the boundary of its market area. However, distant consumers have to pay the factory price plus the freight cost involved in carrying the goods to them, and given that the demand curve of each consumer is the same, obviously the quantity which distant consumer will purchase because of the higher price is less than the quantity individuals in close proximity to the factory site are willing to consume.

For example, as illustrated in Figure 6, if D is an individual demand curve for a product, and OA is the price at the factory site, which is located at point A, those individuals living at the factory site will buy OX units. Farther away from plant site A, the price is higher by the amount of the freight, and the quantity demanded is consequently smaller. At a price of OM the amount demanded is zero units. Thus, AM is the extreme sales radius of the plant, and total sales are equal to the volume of the cone

The Loschian Demand Cone



Demand

Demand Cone

Figure 6

produced by rotating triangle AX'M around the axis AX'.[51]

As long as profits are made, new plants are established. Suppose new satellite plants are established at points B, C. D. E, F, and G, as illustrated in Figure 7. The spatial market area of Plant A overlaps the spatial market of Plant B in the area j, c, k, b. Plant A is able to service the area k, b, j, at a lower delivery price from its plant site than Plant B. Likewise, Plant B is able to deliver, at a lower price than Plant A, its product to customers living in the area j, c, k. Thus, competition

[51]Harry W. Richardson, Regional Economics, (New York: Praeger Publishers, 1969), p. 70.

The Loschian Hexagonal Market Area Concept

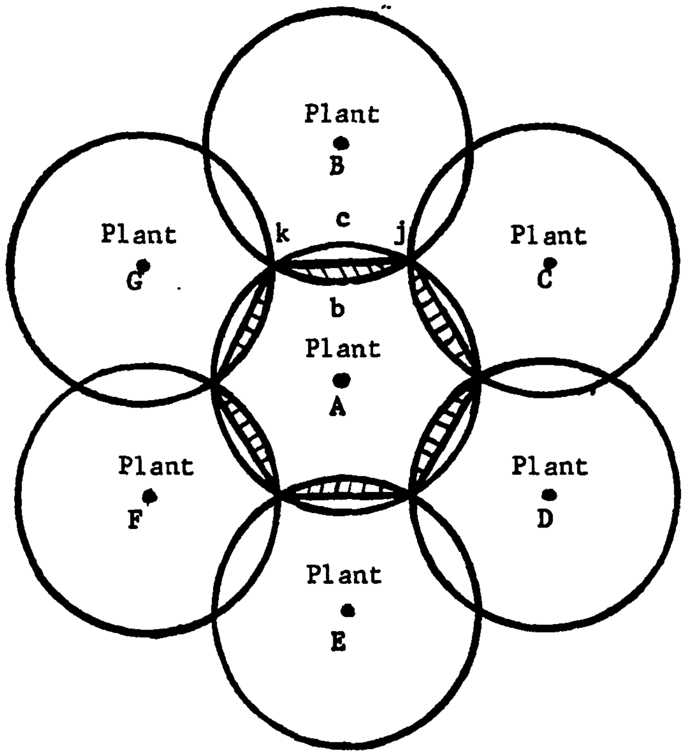


Figure 7

squeezes together the round sales areas into equal regular hexagons until both profits have disappeared and all spatial areas are served by a producer. A hexagon market area minimizes total transport costs for all plants.

Losch views the trading area of all the various products of a country as nets of hexagons. The size of the hexagon is a function of consumer demand, and once the market area has been compressed into a hexagon, spatial equilibrium has been attained and profits are completely eliminated. The respective sizes vary from very small hexagons to very large ones, depending upon the nature of demand for the product.

Because of the regularity of the honeycomb of hexagons created by each industry, the centers of various industrial hexagons tend to bunch into regular patterns. Consequently, industrial centers emerge and metropolitan areas develop in spite of continuous and uniform population. The coincidence of many of the centers bunching concentrates the population, minimizes the freight burdens, and enhances consumer demand by enabling diverse purchases from many local plants.[52] The demand in an industrialized community is more attractive than the rural demand, not only because of the greater number of buyers but also because at the identical price the amount demanded by buyers in the manufacturer's city is greater than the amount demanded by the rural buyer as a result of freight costs. Thus, Losch maintains industry tends to agglomerate.

The number of self-sufficient systems which come into existence throughout a nation depends upon the commodity having the largest necessary shipping radius. The self-sufficient regions are Losch's ideal economic region.

In summary, according to Losch's theory, in the long run, each firm sells over a hexagonal market area, for this type of shape minimizes total distances from its center to all points within the polygon. Because the trading area of each firm is in the form of a hexagon, a system of hexagons exists, with concentrations of individuals and industries

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[52]Stefan Valavanis, "Losch on Location," The American Economic Review, Vol. 45 (September, 1955), p. 642.

at the centers of the hexagon. The polygon pattern fosters interindustry and interconsumer agglomerating advantages while, within a given industry, the entrepreneurial scattering maximizes total effective demand for each product. Thus, in Losch's theory, the agglomerating advantages, in the form of lower costs, promotes interindustry concentration. But, the demand factor leads to a honeycomb type of dispersion of firms within an industry.[53]

Losch fails to consider cost factors other than those attributable to agglomeration or transportation and consequently does not fully combine, into one model, an analysis of cost and demand. However, Losch sought to define the economic region: it's minimum size, maximum size, localization and dispersion and in so doing, he was the first economist to present a full general equilibrium system describing, in abstract, the spatial interrelationship of all agricultural and industrial locations.

Locational Interdependence

According to Von Thunen, Weber, and Hoover, basically the foremost endeavor of the entrepreneur is to establish the plant at the least-cost location. However, realistically manufacturing plants sell to buyers who are scattered over an area rather than to consumers who are concentrated at a geographic market center. When buyers are scattered,

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[53]Greenhut, Plant Location in Theory, p. 263.

sellers tend to disperse in an effort to monopolize a part of the demand; similarly, when proximity to consumers influences buyers demand, a dispersion by sellers may take place.

The locational interdependence school of economic thought[54] is interested primarily in the spatial interdependence of firms, and the factors causing industrial concentration and dispersion. Proponents of the locational interdependence school abstract from cost and stress the impact of demand on location thereby confining their interest largely to the factors which cause firms to be attracted to, or repulsed by, each other. The locational interdependence theoreticians assume the costs of procuring and processing raw materials are equal at all locations and explain the location of firms as the endeavor to monopolize the largest market area. They assume the attempt to monopolize the largest number of buyers at prices yielding the greatest returns is the driving force behind orientation to market areas.

According to locational interdependence economists,

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[54] See F. Fetter, "The Economic Law of Market Areas," Quarterly Journal of Economics, Vol. 38 (1924), 520-529. H. Hotelling, "Stability in Competition," Economic Journal, Vol. 39 (1929), 41-57. A. P. Lerner and H. W. Singer, "Some Notes on Duopoly and Spatial Competition," Journal of Political Economy, Vol. 45 (1937), 145-186. A. F. Smithies, "Optimum Location in Spatial Competition," Journal of Political Economy, Vol. 49 (1941), 423-439; and E. H. Chamberlin, The Theory of Monopolistic Competition, 5th ed. (Cambridge: Harvard University Press, 1946), Appendix C.

in seeking the most profitable plant site, the entrepreneur must consider not only costs but also demand potential, the existence of other firms in the industry, their locations, and their possible responses to actions taken by the incoming firm. In other words, location decisions have to consider the interdependence between the incoming and the existing firms in the industry.

Locational interdependence proponents make the following assumptions:[55]

(1) Buyers are indifferent to sellers; neither sellers nor products are differentiated, except for location.

(2) Sellers are indifferent to buyers; all buyers are homogeneous in every respect, except location.

(3) The seller's procurement and production costs are the same everywhere.

(4) Each competitor sells on a nondiscriminatory, f.o.b. mill basis.

(5) Each competitor is capable of supplying the entire market.

(6) Cost of transport is at the same rate per unit of distance throughout the market area.

(7) Each competitor is free to move his location instantaneously and without cost.

The conclusions of the locational interdependence

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[55]See Melvin L. Greenhut, Microeconomics and the Space Economy, (Chicago: Scott Foresman and Company, 1963), pp. 165-167; A. P. Lerner and H. W. Singer, "Some Notes on Duopoly and Spatial Competition," Journal of Political Economy, Vol. 45, (1937), 445-486; and A. F. Smithies, "Optimum Location in Spatial Competition," Journal of Political Economy, Vol. 49, (1941), 423-439.

Locational Interdependence: Duopoly Model,

Identical Costs

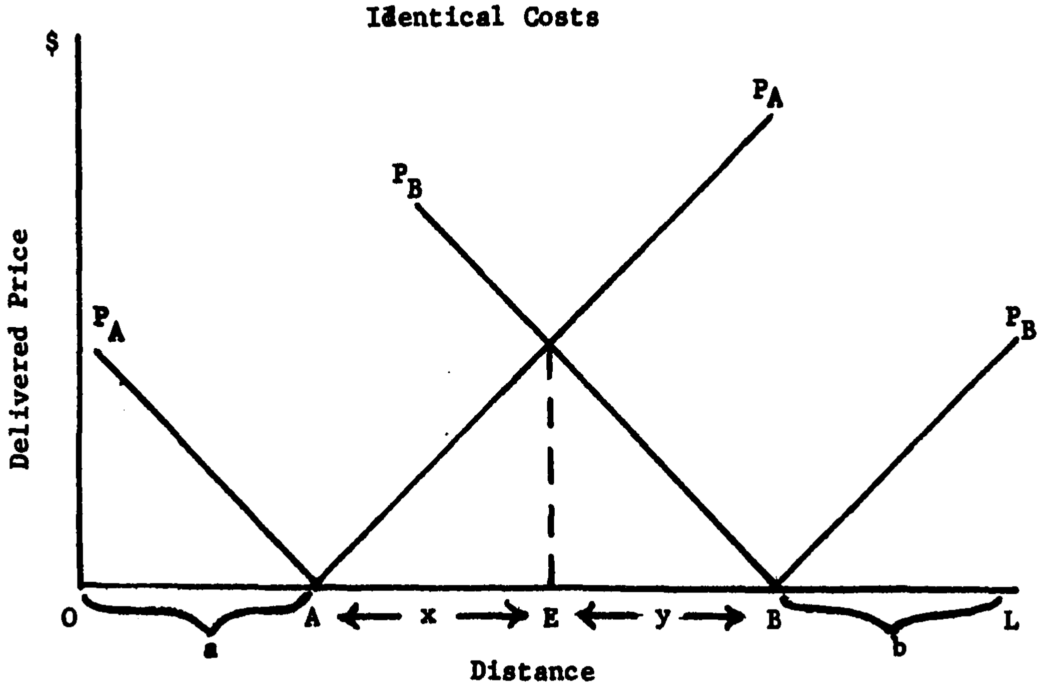

Figure 8

approach can be illustrated with the duopoly situation, as first outlined by Hotelling.[56]

Suppose buyers are uniformily distributed along a line of length OL, as illustrated in Figure 8. There are two producers, A and B. The good produced is differentiated in the eyes of buyers only because of the location of A and B, but the price paid by each buyer differs because he has to go to the production site and transport his purchases home. P_A and P_B illustrate the delivered price of the goods produced at the respective plants.

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[56] H. Hotelling, "Stability in Competition," Economic Journal, Vol. 39, pp. 41-57.

Suppose the demand for the product is infinitely inelastic, and since production costs are identical, for simplification purposes, assume they are zero. Firm A will monopolize the market to his left, consisting of a buyers, and firm B will monopolize the market to his right, or b buyers. The x plus y buyers, located between A and B, will be divided at point E, the point where the delivered prices of A and B are equal. Plant A will monopolize x buyers; Plant B, y buyers. Given the f.o.b. mill price and zero costs, the profits of Firm A = P_A ($a + x$) and B's profits = P_B ($b + y$).

In Hotelling's model, the impact of a change in price by either firm can also be illustrated. Maintaining the assumption of perfectly inelastic demand, let Firm B increase its f.o.b. mill price to OC, as shown in Figure 9.

The impact of the price increase is as follows: The sheltered markets of Firms A and B do not change, however, Firm B looses a portion of its buyers in the market area x plus y, and the buyers of Firm A increases. As illustrated in Figure 9, the location at which the delivered price of a good produced at Plant A equals the delivered price of a good produced at Plant B moves toward the higher priced firm. Consequently, the lower priced firm gains a larger share of the buyers and the higher priced firm looses a portion of his previous buyers.

Locational interdependence economists conclude, under conditions of perfectly inelastic demand, firms tend to

Locational Interdependence: Duopoly Model,

Unequal Costs

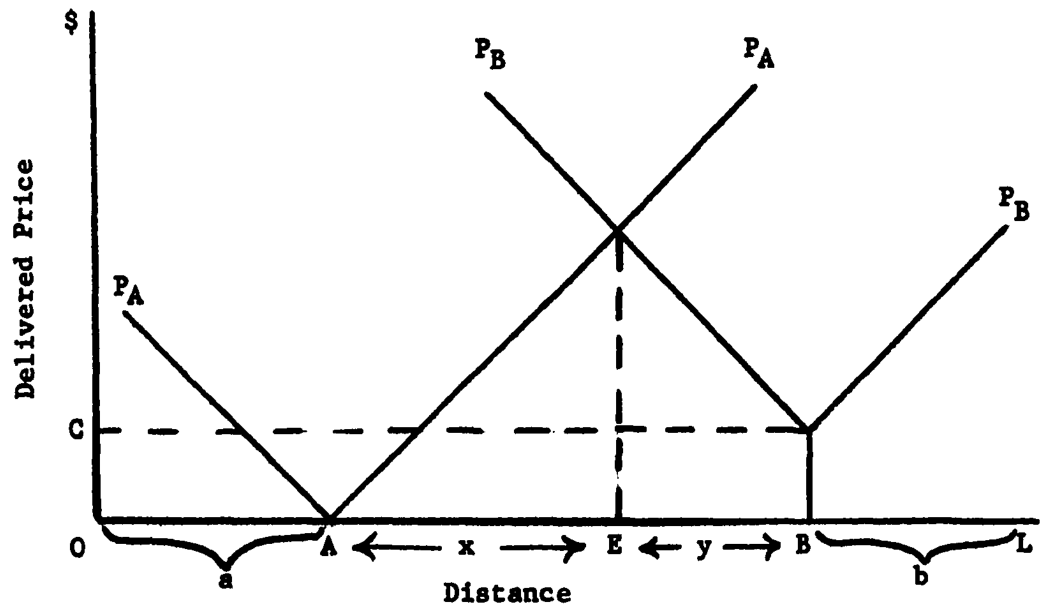

Figure 9

cluster. Firm A has an incentive to move toward B, thus increasing his sheltered market a and decreasing the portion of the market shared with Firm B. But, B has a similar incentive and will maximize the number of buyers it monopolizes by shifting location toward A. Eventually the two producers will locate side by side at point E, thus monopolizing the largest market area possible. The prices will be equal because if they were unequal, the higher priced firm would lose a portion of its sheltered market.

Hotelling's model is an explanation of the tendency of firms to agglomerate even though the central location involves maximum transport costs.

The assumption of perfectly inelastic demand is artificial and restrictive. Dropping the assumption of perfectly inelastic demand, and assuming elastic demand, economists explain the tendency of firms to disperse on the basis of elasticity of demand and transport costs.[57]

As is shown in Figure 10, let E_a represent the delivered price of a good produced by Firm A when located at point E, and E_b represent the delivered price of an identical good produced by Firm B when also located at point E. If the market price is OP, Firm A will sell to buyers located in market area EX, and Firm B to buyers located in the area EY.

However, if the firms disperse, each will monopolize a larger number of buyers. Let P_a and P_b represent the delivered prices of Firm A and B when Firm A locates at the first quartile and Firm B locates at the third quartile. Given the new locations, at the market price of OP, Firm A will sell to buyers located in the spatial market area JH; Firm B, to buyers in the MN area. By locating at the first and third quartiles, transport costs are minimized and sales maximized. However, the market area HM is not serviced by either Firm A or B at a price of OP, which will entice additional firms to enter the market. If one additional firm enters the market, the new firm will locate

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[57] Greenhut, <u>Microeconomics</u>, pp. 167-168.

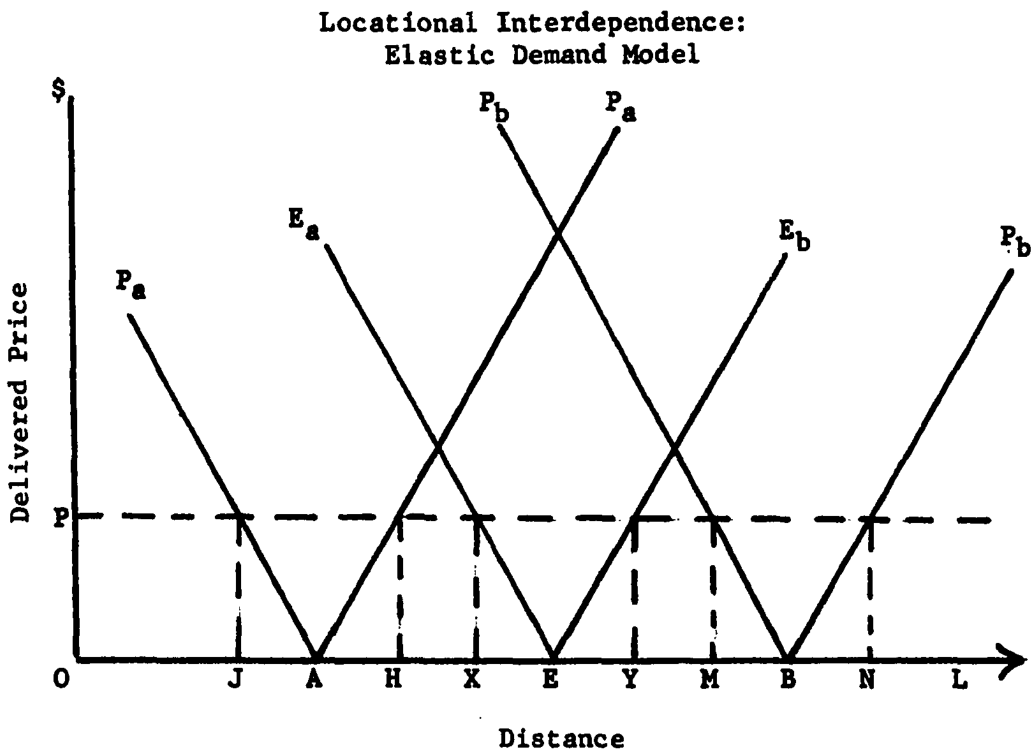

Figure 10

at the second quartile, thus selling to buyers located in the spatial market XY. As more firms enter the market, additional dispersion will take place as the firms seek to monopolize the greatest number of buyers.

In summary, the elasticity of demand is a critical factor in locational interdependence theory. The more inelastic the demand for an industry's product the greater the tendency to concentrate; conversely, the more elastic the demand the greater the probability of perfect scattering of firms over the spatial market.

When demand is elastic, the need to minimize freight costs becomes more important in seeking the profit-maximizing location, which tends to result in a dispersed location pattern, because when competitors are separated geographically, each seller becomes a spatial monopolist.

The theory of locational interdependence, like the theory of least-cost combination of factors, is a one-sided theory. The least-cost theory abstracts from demand; the theory of locational interdependence abstracts from cost. Similarly, both least-cost and locational interdependence stress the site which offers the maximum profit.

Non-Economic Factors

It is widely believed by many contemporary economists[58] that non-economic considerations help to determine plant location decisions. They indicate the assumption of economic rationality may be reasonable for most managerial decisions but not necessarily justifiable when applied to the plant site location decision.

Contemporary economists indicate an entrepreneur may obtain non-pecuniary satisfactions from working and living

[58] Cypert, R. M. and March, J. G. (1963) A Behavioural Theory of the Firm; Cohen, K. J. and Cyert, R. M. (1965) Theory of the Firm: Resource Allocation in a Market Economy; Baumol, W. J. (2nd ed., 1965) Economic Theory and Operations Analysis, and (2nd ed., (1967) Business Behaviour, Value and Growth; Richardson, H. W., (1969) Regional Economics; George Katona and James N. Morgan, "The Quantitative Study of Factors Determining Business Decisions," Quarterly Journal of Economics, LXVI (1952); Melvin L. Greenhut, Plant Location, op. cit.; Greenhut, "Observations of Motives to Industry Locations," Southern Economic Journal, XVIII (1951); G. H. Ellis, "Why New Manufacturing Establishments Located in New England: August 1945 to June 1948," Monthly Review (Federal Reserve Bank of Boston, Vol. 31, No. 4 (April, 1949); G. E. McLaughlin and Stephen Robock, Why Industry Moves South, (National Planning Association, (1949).

in a particular area and may locate his plant there if the psychic income derived from the site outweighs the profits sacrificed by not locating at the maximum profit point. The entrepreneur may be influenced in his location decision by non-economic factors such as: ties to his "home-town," the wishes of his wife and family, recreational and cultural facilities, and/or climatic conditions. All of these factors, though non-pecuniary, are important in the location decision.

The entrepreneur may obtain psychic income by keeping his plant sufficiently small so that he is able to retain control of the day-to-day operations thus avoiding the problems associated with delegation of responsibility and the complexities of bigness. In this situation profits resulting from economies of scale are sacrificed for psychic income, a non-pecuniary reward.

Another psychic income factor which influences the location decision is security, such as fire and police protection. The availability and efficiency of police and fire protection affects community environment. When the effectiveness of police and fire protection are measured in terms of insurance rates, it is considered as a cost factor. However, when evaluated from the viewpoint of personal and family security, security assumes the dimensions of a psychic income value.

Other personal considerations which influence the location decision of an entrepreneur are: (1) availability of capital when the bankers of the community are familiar with a particular type of business and/or the personal background of the entrepreneur, and because of such an understanding the bankers will make loans more readily than to other types of businesses; (2) locating near a particular raw material supplier because the entrepreneur believes friendship influences the availability of materials; and (3) many entrepreneurs believe personal contacts established with potential customers will promote sales. For example, an entrepreneur may build a potential clientel while an employee of another firm. Thus, the new entrepreneur will locate his plant in the area where he can serve his old contacts rather than first to locate his plant at a possibly more profitable site and then seek buyers for his product. The knowledge of an established market provides the entrepreneur psychic income.

Purely personal considerations are indirectly related to cost and demand factors. However, psychic income derived from the personal factors may dominate the plant location decision. Contemporary economists believe that if psychic income is to be included as a locational factor, it would appear that the objective of a plant location decision must be stated in terms of maximizing satisfaction rather than maximizing profits, or psychic income must be awarded a pecuniary value.

Summary of Factors Influencing Plant Location Decisions

Obviously plant location theorists have identified many factors which influence the industrial plant location decision.

Von Thunen set the framework for location analysis and identified transportation costs as the primary factor in the location decision.

Alfred Weber supports Von Thunen's conclusions relative to transportation costs as a basic location factor. However, Weber expands Von Thunen's analysis and sets forth labor costs and elements which effect labor costs, such as quality and quantity of labor and the existence of labor organizations, as foremost factors in the location decision. Although Weber does not consider institutional factors such as governmental attitudes, land costs, availability of capital, interest rates, availability of materials, and industrial fuels, *per se*, as being relevant to the development of a general theory of plant location, nevertheless, Weber identifies these factors as influencing the location decision of a specific type of industry.

Weber also emphasizes transportation costs, labor costs, location of raw materials relative to the consuming center, and agglomeration as primary factors influencing the location decision of the entrepreneur.

Edgar M. Hoover supports Weber's conclusions regarding the importance of transportation costs in the location decision but also expands and emphasizes the importance of processing costs as a location factor. Hoover considers the following elements as processing costs: labor, cost of administration, rent and royalties, maintenance and depreciation, and taxes. In addition, Hoover supports and refines Weber's analysis of the effect of agglomeration as a location factor and also includes institutional factors, such as the existence of labor organizations and climatic elements, as factors influencing the plant location decision.

Though Hoover basically emphasizes the least-cost combination of factor input, he also introduces the concept of buyer location and the location of competitive firms in the spatial area as locational factors.

August Losch, in developing a theory of industrial plant location, places foremost emphasis on the location of buyers and competitive firms. Thus, Losch introduces the existing market situation as a basic location factor.

Losch's theory is supported and expanded by the proponents of locational interdependence theory of plant location. Locational interdependence theoreticians stress the condition of elasticity of demand as of foremost influence in the spatial relationship of plants. Thus, the entrepreneur in making the plant location decision must not only consider the least-cost combination of factors but also the present and future market as well as the reaction of competitive firms to his location decision.

Contemporary economists question the validity of profit maximizing as the primary motive of an entrepreneur's plant location decision. Contemporary economists introduce the concept of maximizing satisfaction as the foremost motive in the plant location decision. With the introduction of this assumption, plant location becomes a behavioral rather than a purely economic objective. As such, contemporary economists introduce factors which provide psychic income such as availability of recreation and cultural facilities, community environment, effectiveness of protection facilities, availability to and quality of educational facilities, and a purely personal consideration, "home-town ties," as factors effecting the location decision.

In summary, factors of primary importance in the industrial plant location decision, as identified by leading plant location theoreticians, are classified as follows:

Factors Effecting Industrial Plant Location

I. <u>Location of Production Materials</u>

Nearness to raw materials
Nearness to component parts

II. <u>Labor Force</u>

Availability of skilled labor
Availability of unskilled labor
Potential for managerial labor
Attitudes and activities of labor unions
Wage rates

III. <u>Industrial Sites</u>

Accessibility and cost of:
- Industrial land
- Developed industrial parks

IV. Transportation Facilities

Availability and adequacy of:
- Airway facilities
- Highway facilities
- Railroad Facilities
- Pipeline facilities
- Waterway facilities
- Shipping costs of raw materials
- Shipping costs of finished goods

V. Distributional Facilities

- Warehousing and storage facilities
- Availability of wholesale outlets

VI. Market

- Existing consumer market
- Potential consumer market
- Nearness to related industries
- Attainment of favorable competitive position

VII. Water Supply and Waste Disposal Facilities

- Availability of water supply
- Quality and dependability of water
- Cost of water
- Disposal facilities for industrial waste

VIII. Governmental Structure and Attitudes

- Nuisance and stream pollution laws
- Building ordinances
- Zoning codes
- Compensation laws
- Insurance laws and regulations

IX. Tax Structure

- Industrial property tax rates
- State corporate tax structure
- Local tax assessment basis

X. Capital Structure

- Availability of capital funds
- Attitudes of lending institutions
- Community industrial development projects
- Insurance rates

XI. Industrial Fuels

Availability of coal, oil, gas, electric
Cost of industrial fuels

XII. Community Environment

Community leadership and attitudes
Availability and quality of schools
Nearness to universities and colleges
Recreation and cultural facilities
Availability and cost of housing
Real estate tax
Effectiveness of protection facilities
Climatic conditions

CHAPTER III

INDUSTRIAL GROWTH OF THE GREATER METROPOLITAN TULSA AREA, 1958 - 1969

Introduction

The industrial sector of the Greater Metropolitan Tulsa Area experienced marked economic growth during the decade 1958 to 1969. During this time period, 387 manufacturing plants, producing 149 products, as classified by the Standard Industrial Classification Code of the Bureau of the Census, located in the Greater Metropolitan Tulsa Area.

The 387 manufacturing plants created employment for 13,875 workers,[1] an increase in manufacturing employment of 56.4 per cent in the 4-county area of Creek, Rogers, Osage, and Tulsa Counties. The rate of increase in manufacturing employment of the 4-county area surpasses the rate of increase of both the State of Oklahoma and the United States, which increased 17.4 per cent and 39.7 per cent respectively.

The increase in manufacturing employment in the 4-county area was primarily concentrated in the Greater Metropolitan Tulsa Area as only one-tenth of one per cent of

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[1]Compiled from data contained in the following publications: Oklahoma Industrial Development and Park Department, Oklahoma Directory of Manufacturers' and Products, 1967-edition; Tulsa Chamber of Commerce, Tulsa Area Manufacturers Directory, 1967-1968, and 1969-1970; and Claremore Chamber of Commerce, Industrial Sheet of Claremore, 1969.

the increase in manufacturing employment originated outside the Greater Metropolitan Tulsa Area.

The marked expansion of the industrial sector of the area is further accentuated in that the Fantus Report[2] of May, 1969, lists fifteen employers in the four-county area with 500 employees or more. of the fifteen, three, or twenty per cent, of the employers[3] were established during the decade 1958 to 1968.

The Physical Setting

The Greater Metropolitan Tulsa Area, for the purpose of this study, is defined to include The City of Tulsa and satellite communities which contain one new manufacturing firm or more. Although most of the satellite communities are situated within a radius not greater than 30 miles from The City of Tulsa, they lay in four counties: Osage, Creek, Rogers, and Tulsa Counties. Within this radius, in addition to The City of Tulsa, at least one or more manufacturing establishments located in 12 communities. They are: Broken Arrow, Bixby, Catoosa, Claremore, Collinsville, Kiefer, Jenks,

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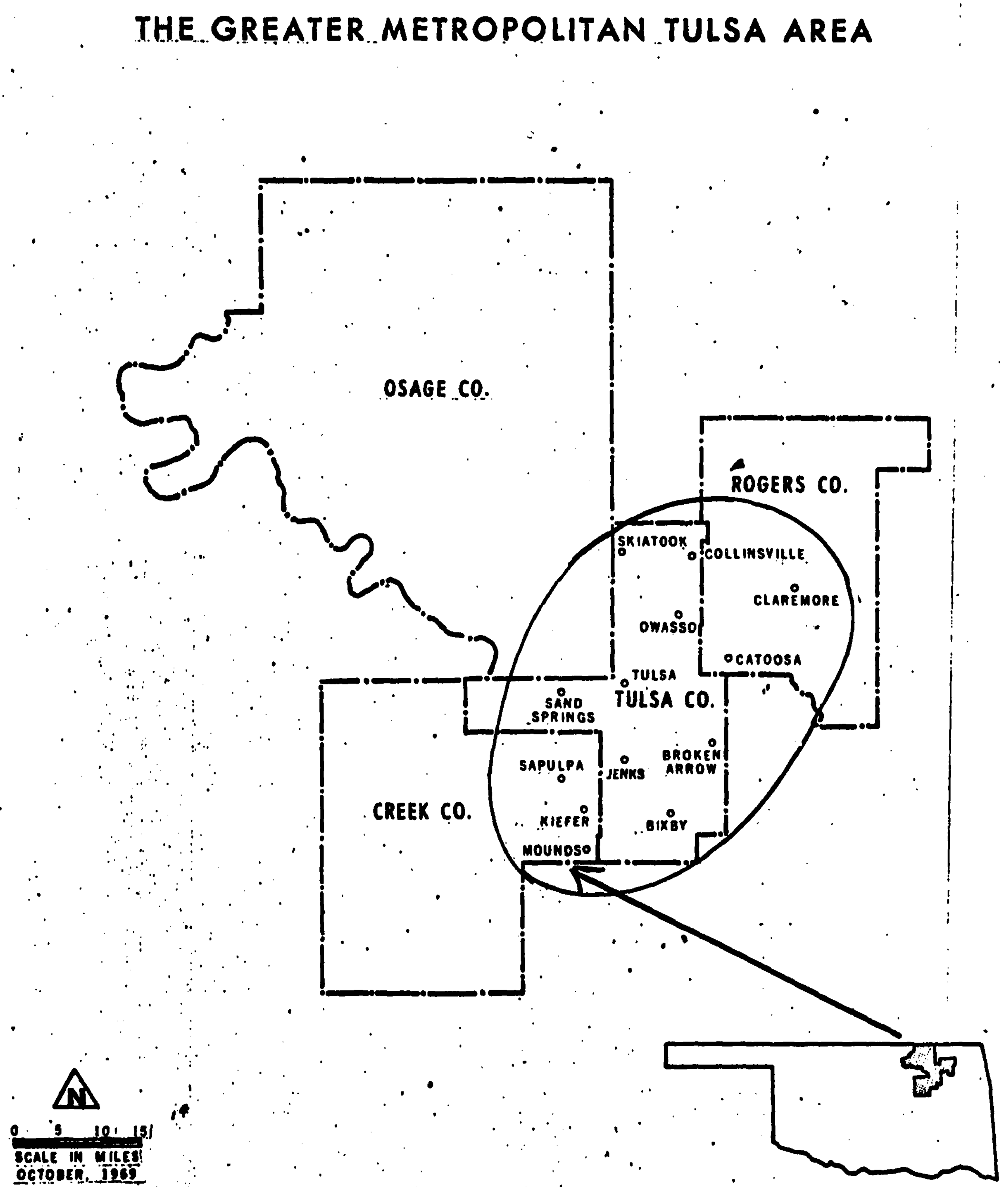
[2]The Fantus Company, Industrial Location Appraisal Oklahoma Economic District No. 6, The Fantus Co., An Incorporated Subsidiary of Dun & Bradstreet, Inc., May, 1969. Exhibit 6-C.

[3]Byron Jackson Pump Division of Borg-Warner Corp., North American Rockwell Corp., and Yuba Heat Transfer Corp.

Figure 11


THE GREATER METROPOLITAN TULSA AREA
OSAGE CO.
ROGERS CO.
SKIATOOK
COLLINSVILLE
CLAREMORE
OWASSO
CATOOSA
TULSA
SAND SPRINGS
TULSA CO.
SAPULPA
JENKS
BROKEN ARROW
CREEK CO.
KIEFER
BIXBY
MOUNDS
N
0 5 10 15
SCALE IN MILES
OCTOBER, 1969

Mounds, Owasso, Sand Springs, Sapulpa, and Skiatook. The geographic location of the municipalities in the counties and state is shown in Figure 11.

As anticipated, the new plants primarily concentrated in The City of Tulsa. However, outstanding expansion occurred in the manufacturing sector of Broken Arrow, Sand Springs, Claremore, and Sapulpa. The data in Table 1 show the location of the new establishments by community and jobs created.

TABLE 1

APPRAISAL OF JOBS CREATED AND COMMUNITY SELECTED BY ESTABLISHMENTS LOCATING IN THE GREATER METROPOLITAN TULSA AREA, 1958 - 1969

Community	Number of Plants	Jobs Created
Broken Arrow	15	649
Bixby	2	13
Catoosa	1	4
Claremore	6	179
Collinsville	2	6
Kiefer	1	3
Jenks	8	138
Mounds	1	1
Owasso	1	3
Sand Springs	12	540
Sapulpa	13	169
Skiatook	1	5
City of Tulsa	324	12,165
TOTAL	387	13,875

Source: See Appendix Table 1

The site location of the establishments in the Tulsa Metropolitan Area is illustrated by Figure 12. Within the Tulsa Metropolitan Area, the greatest concentration of manufacturing establishments took place in the Central Business District. Three square miles in and slightly north of the Central Business District have a density of six new manufacturing establishments per square mile. Other areas of relatively high concentration of new plants appear along and directly north of Admiral Blvd.; south of Admiral Blvd. along and east of Sheridan Ave. to 21st St., S.; and the Katy Industrial District, which has a density of 5 new extablishments per square mile.

With the exception of the high concentration of establishments in the Central Business District, the site location of the new plants primarily is explained by the development of the following dedicated industrial districts: Santa Fe - Harvard Ave.; Sheridan; Greater Tulsa; Midland Valley; Katy Industrial District; and Gilcrease Freeway Industrial Park.

This study reveals, at a lesser degree of density, manufacturing establishments located north on Peoria Ave. and south on Yale Ave. Marked increased activity in the Port of Catoosa Area also is apparent by examining the degree of plant location density fringing the southwest corner of Rogers County.

The importance of air transportation to manufacturing establishments is accentuated by the increase in

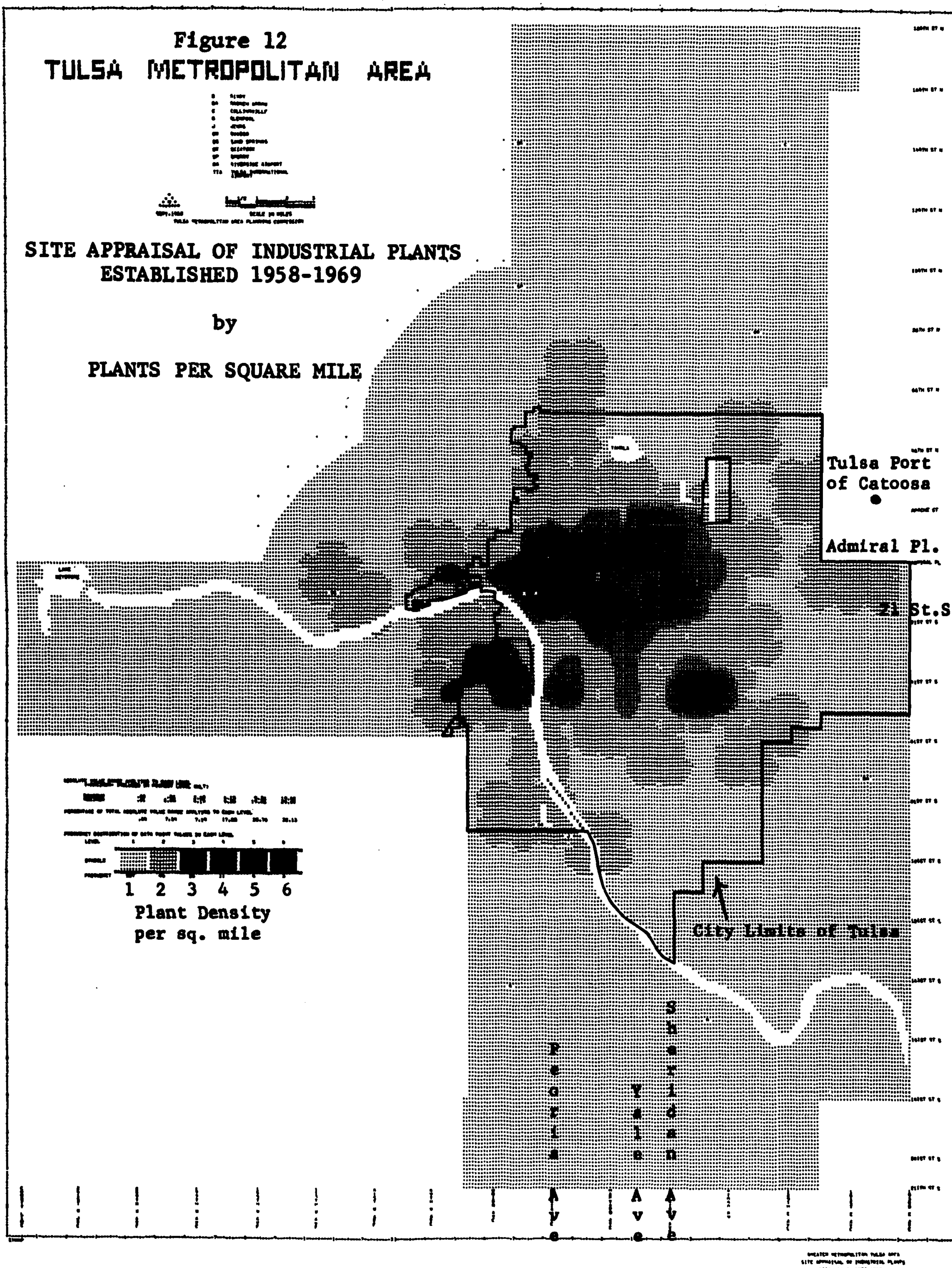


Figure 12
TULSA METROPOLITAN AREA
SITE APPRAISAL OF INDUSTRIAL PLANTS
ESTABLISHED 1958-1969
by
PLANTS PER SQUARE MILE
Tulsa Port of Catoosa
Admiral Pl.
21 St.S
City Limits of Tulsa
Peoria Ave
Yale Ave
Sheridan Ave
1 2 3 4 5 6
Plant Density
per sq. mile

density of manufacturing establishments bordering the Tulsa International Airport and Riverside Airport.

Population Change

Reflecting the industrial expansion of the Area, since 1960, the population of both the Greater Metropolitan Tulsa Area and the 4-county area steadily increased. The population of the 4-county area was 480,100 in 1968, as compared to 439,588 in 1960, an increase of 9.2 per cent over the eight year period, as illustrated by the data in Table 2.

TABLE 2

ESTIMATED POPULATION CHANGE FOR THE FOUR COUNTY AREA: CREEK, OSAGE, ROGERS, AND TULSA COUNTIES, 1960 - 1968

County	1960	1968	Change (Per Cent)
CREEK	40,495	44,600	10.1
OSAGE	32,441	31,800	2.0
ROGERS	20,614	23,200	12.5
TULSA	346,038	380,500	10.0
TOTAL	439,588	480,100	9.2

Sources: 1960 data from U.S. Census of Population: 1960 Oklahoma PC (1) - 38A, Table 6. Estimates for 1968 were prepared by The Research and Planning Division, Oklahoma Employment Security Commission: Oklahoma Population Estimates, Nov. 1968, Table 3.

As the data in Table 3 indicate, the population of the Greater Metropolitan Tulsa Area increased 16.4 per cent during the same time period.

The 4-county population increase is slightly greater than the 8.4 per cent population increase of the State of Oklahoma and slightly less than the 11.5 per cent growth rate of the United States. However, the 16.4 per cent population growth rate of The Metropolitan Tulsa Area is markedly higher than the population growth rate of either the State or the United States, as illustrated by the data in Table 4.

The population increase in the 4-county area was concentrated in three of the four counties: Creek, Rogers, and Tulsa. The population in Osage County, during the time period, decreased 2 per cent. The decrease is explained, in part, on the basis that although a portion of the City of Tulsa is located in Osage County, the county is primarily rural. The downward trend in population of the County reflects both the statewide and national trends of movement of people from rural to urbanized areas.

The population increase of the Greater Metropolitan Tulsa Area communities was primarily concentrated in the eastern and northeastern regions of the Area. Broken Arrow is estimated to have the largest population increase, 83.8 per cent. This increase, in part, is explained by the completion of the Broken Arrow Expressway during the period

TABLE 3

ESTIMATED POPULATION CHANGE FOR THE GREATER METROPOLITAN TULSA AREA BY COMMUNITY, 1960 - 1968

Community	1960	1968	Change (Per Cent)
Bixby	1,711	2,290	33.4
Broken Arrow	5,928	10,900	83.8
Catoosa	638	928	4.0
Claremore	6,639	7,942	19.6
Collinsville	2,526	3,040	20.3
Jenks	1,734	2,320	33.8
Kiefer	489	535	9.2
Mounds	674	714	5.9
Owasso	2,032	3,120	53.5
Sand Springs	7,754	10,846	39.8
Sapulpa	14,282	15,400	7.8
Skiatook	2,503	2,765	10.0
Tulsa	261,614	298,500	14.0
TOTAL	308,524	359,300	16.4

Sources: 1960 data calculated from: U.S. Bureau of the Census. U.S. Census of Population: 1960. Detailed Characteristics. Oklahoma. (Washington: U.S. Government Printing Office). Vol. 1, Part A, Tables 7 and 8. 1968 data calculated from: Oklahoma Employment Security Commission. Oklahoma Population Estimates,(Oklahoma City, Okla), Nov., 1968, Table 3 and Tulsa Metropolitan Area Planning Commission, Tulsa Metropolitan Area Population Estimates, 1969, (Tulsa, Okla.) June, 1969, Table 1.

which enhanced the geographic location of Broken Arrow as a "bedroom" community as well as a developing industrial community. Other communities with marked increase in the population growth rates are: Owasso, 53.5 per cent; Collinsville, 20.3 per cent; Bixby, 33.4 per cent; and Jenks, 33.8 per cent.

TABLE 4

ESTIMATED POPULATION CHANGE FOR THE UNITED STATES; THE 4-COUNTY AREA: CREEK, OSAGE, ROGERS, AND TULSA COUNTIES; AND THE GREATER METROPOLITAN TULSA AREA, 1960-1968

Region	1960	1968	Change (Per Cent)
United States	183,285,009	204,362,785	11.5
Oklahoma	2,328,284	2,525,000	8.4
4-County Area	439,588	480,100	9.2
Greater Metropolitan Tulsa Area	308,524	359,300	16.4

Sources: 1960 data calculated from: U.S. Bureau of the Census, Statistical Abstract of the United States; 1966. (Washington: U.S. Government Printing Office) 87th Edition.

1968 data calculated from: Oklahoma Employment Security Commission, Oklahoma Population Estimates, (Oklahoma City, Oklahoma), Nov. 1968, and the Tulsa Metropolitan Area Planning Commission, Tulsa Metropolitan Area Population Estimates, 1969, (Tulsa, Okla.), June, 1969, Table 1.

The population of Sand Springs, located on the western perimeter of the Area, increased 39.8 per cent. However, a substantial portion of the increase is due to the annexation of Prattville in November of 1962. The City of Tulsa increased in population 14 per cent during the eight year period. A substantial portion of the growth rate of The City of Tulsa is the consequence of annexation of some 116 square miles in 1960.

Types of Industry

The Office of Statistical Standards[4] classifies establishments by the type of economic activity in which they are engaged. Such classification facilitates the collection, tabulation, presentation, and analysis of data relating to establishments; and promotes uniformity and comparability in the presentation of statistical data collected. The manufacturing sector is categorized into 19 major industrial groups.

Between 1958 and 1969, establishments engaged in the manufacture of products classified in all but two of the major industry groups located in the Greater Metropolitan Tulsa Area. The two exceptions are tobacco manufactures, SIC 21, and leather and leather products, SIC 31.

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[4]Office of Statistical Standards, Standard Industrial Classification Manual, 1964, U.S. Government Printing Office, Washington, D. C., (1968).

TABLE 5

DISTRIBUTION OF MANUFACTURING PLANTS IN CREEK, OSAGE, ROGERS, AND TULSA COUNTIES, BY MAJOR INDUSTRY GROUP AND RELATIVE CHANGE, 1958-1969

SIC	MAJOR INDUSTRY GROUP	Number in 4-Counties (1958) (A)	New G.M.T.A.[a] Plants (Number) (B)	Increase[b] (Per Cent) (C)
19	Ordnance and Accessories (Aerospace)	--	2	--
20	Food and Kindred Products.	79	21	27.8
22	Textile Mill Products.	2	1	50.0
23	Apparel and other Finished Products.	14	6	42.9
24	Lumber and Wood Products	15	22	160.0
25	Furniture and Fixtures	18	27	150.0
26	Paper and Allied Products.	5	1	20.0
27	Printing and Publishing Industries .	93	38	41.9
28	Chemicals and Allied Products. . . .	24	7	33.3
29	Petroleum Refining Industries. . . .	8	3	37.5
30	Rubber and Plastic Products.	9	21	222.2
31	Leather and Leather Products	1	--	--
32	Stone, Clay and Glass Products . . .	38	29	76.3
33	Primary Metal Industries	17	8	47.0
34	Fabricated Metal Products.	93	105	112.8
35	Machinery, Except Electrical	160	68	41.3
36	Electrical Machinery and Equipment .	15	24	160.0
37	Transportation Equipment	27	20	77.8
38	Professional and Controlling Instruments	15	17	113.33
39	Miscellaneous Manufactures	21	36	171.4
	TOTAL.	654	454	69.4

[a]By definition, The Greater Metropolitan Tulsa Area consists of the following communities: The City of Tulsa, Catoosa, Claremore, Owasso, Collinsville, Skiatook, Sand Springs, Sapulpa, Kiefer, Bixby, Jenks, Broken Arrow, and Mounds.

[b]Increase represents the relative change attributable to the new plants established in the G.M.T.A. The number is calculated by dividing the number in Column B by the number in Column A.

Sources: Compiled from the Oklahoma Industrial Development and Park Department, Oklahoma Directory of Manufacturers and Products, 1967 Edition. Tulsa Chamber of Commerce, Tulsa Area Manufacturers Directory, 1967-68, and 1969-70. The Claremore Chamber of Commerce, Industrial Sheet of Claremore, Claremore, 1969. U.S. Bureau of the Census, Census of Manufacturers, 1958 Area Statistics: Oklahoma, U.S. Government Printing Office, Washington D.C., 1959.

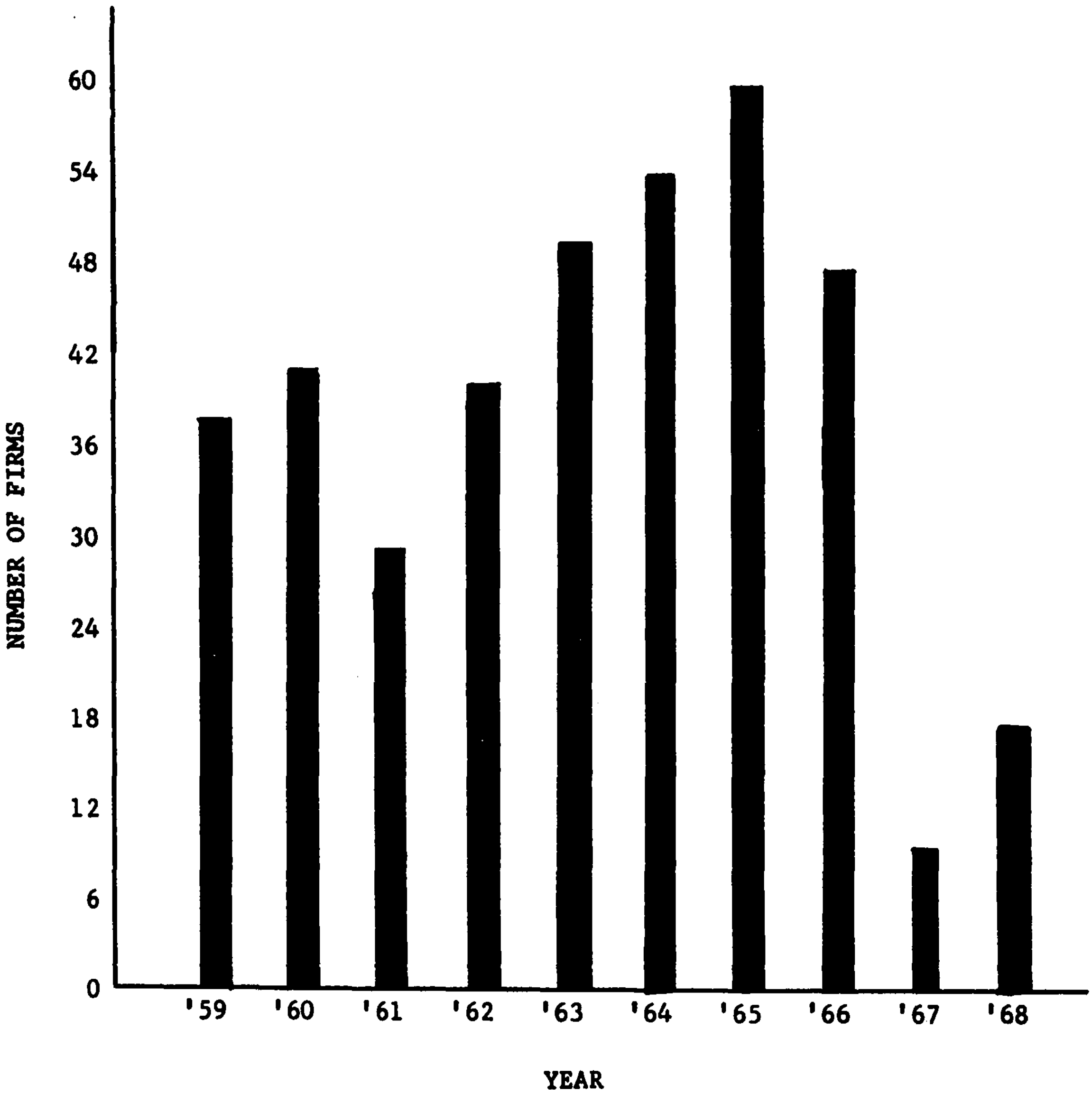
The data in Table 5 show the increase in the number of establishments in each industry classification by absolute number and relative increase. On the basis of this information, marked expansion is apparent in the following industries: Rubber and Miscellaneous Plastics Products Industry, SIC 30; Lumber and Wood Products, Except Furniture, SIC 24; Furniture and Fixtures, SIC 25; Fabricated Metal Products, Except Ordnance, Machinery, and Transportation Equipment, SIC 34; Electrical Machinery, Equipment and Supplies, SIC 36; and Professional, Scientific and Controlling Instruments, SIC 38.

Of the industrial expansion in the 4-county area, 69.4 per cent of the increase in the number of new establishments located in the Greater Metropolitan Tulsa Area.

The data in Chart 1 illustrate the number of new plants established in the Greater Metropolitan Tulsa Area, by year, for the ten year period. Following a slight decrease in the number of new plants established in 1961 as compared to 1959, from 1961 to 1965, the number of new plants established each year in the area increased at an increasing rate. However, in the years of 1966 and 1967, although there continued to be an absolute increase in the number of new plants located in the area, there was a marked decrease in the rate of increase. This trend, however, was reversed in 1968 with the establishment of 18 new plants as compared to 11 new plants in the year of 1967.

CHART 1

MANUFACTURING PLANTS ESTABLISHED IN THE GREATER METROPOLITAN TULSA AREA[a], BY YEAR, 1959-1968.



[a]The Greater Metropolitan Tulsa Area is defined to include: The City of Tulsa, Broken Arrow, Bixby, Catoosa, Claremore, Collinsville, Kiefer, Jenks, Mounds, Owasso, Sand Springs, Sapulpa, Skiatook.

Source: See Appendix, Table 1.

The decline in the rate of increase experienced in 1961 is explained, in part, by the general economic condition of the total economy of the United States. Over the nation, the year of 1961 was a year of slow industrial expansion marked by declining wholesale prices, rising unemployment rates, excess plant capacity, build-up of inventories, and declining rate of increase in disposable personal income. All of these economic factors deter expansion of the industrial sector. The decrease in the rate of increase of industrial expansion in the Greater Metropolitan Tulsa Area in 1961 reflects the national economic trend.

The accelerated rate of increase in the establishment of new manufacturing plant facilities experienced between 1961 and 1965, in part, also is explained by the general economic conditions of the nation. From 1961 through 1965, the general economic condition of prosperity created an environment conducive to the establishment of new industrial plants as well as the expansion of existing facilities.

Nationwide, 1961 through 1965 were years of general economic prosperity. These years were characterized by relatively stable monetary and fiscal policy, accompanied by a declining rate of unemployment; rising corporate profits; increasing utilization of plant capacity; expanding real disposable personal income and retail sales.

Between 1961 and 1965, corporate profits after taxes, rose. The favorable profit situation, in part, contributed to the expansion of the manufacturing sector and, in part, was a consequence of the expansion. Plant capacity utilization in manufacturing, nationwide, expanded during the years of 1961 to 1965 at the annual rate of increase of two per cent per year. In 1961, manufacturing plants were operating at 78.5 per cent of utilization. By 1966, they were operating at 90.5 per cent of plant capacity utilization.[5] During the same period, personal disposable income rose approximately eight per cent per year while consumer prices rose only 5.7 per cent per year, thus the real purchasing power of the consumer increased approximately 2.3 per cent per year. Concomitantly, reflecting the rising real income, retail sales also increased 46 per cent over the period.

The national economic condition of prosperity which prevailed during the period was shared by both the State of Oklahoma and the economy of the Greater Metropolitan Tulsa Area.

However, just as the economy of the Greater Metropolitan Tulsa Area shared in national prosperity, the marked decrease in the rate of industrial expansion of the area in 1966 and 1967 also reflects a nation-wide trend. By 1967, manufacturing establishments were operating at 84.3 per cent of plant capacity, and in the first quarter of 1968,

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[5]Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, Number 11, Volume 54, November, 1968 Washington, D.C., Table A-60.

the same level of operation is still apparent.[6] During the time period, 1966 to 1968, consumer prices were rising at a rapid rate, concomitantly decreasing the real income of consumers; interest rates also increased, concomitantly increasing the cost of plant expansion or the creation of new operations. All of the above economic factors tend to inhibit industrial expansion as is reflected by the decrease in the rate of increase of manufacturing establishments locating in The Greater Metropolitan Tulsa Area.

The data in Table 6 show the increase in the number of manufacturing establishments by year, per cent of total increase, and the jobs created. The year with the greatest number of new establishments does not necessarily indicate the largest number of new jobs created in that year. In the year of 1962, the largest number of job opportunities was created by the location of one major employer located in the area. However, in 1969 the greatest number of new establishments located in the area.

Primary Market Orientation

The historical trend in the rate of increase of manufacturing establishments in the area not only mirrors national economic activity but also reflects the market orientation of the establishments.

From 1959 to 1963, new establishments located in the Area were primarily nation-wide market oriented. However,

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[6] Ibid.

TABLE 6

INDUSTRIAL PLANTS ESTABLISHED AND JOBS CREATED IN THE GREATER METROPOLITAN TULSA AREA,[a] 1958-1969

YEAR	NUMBER	PER CENT OF TOTAL INCREASE	JOBS CREATED
1959	37	9.6	1,096
1960	41	10.6	988
1961	29	7.6	949
1962	40	10.4	5,831
1963	49	12.7	1,230
1964	54	13.9	1,558
1965	60	15.4	836
1966	48	12.4	863
1967	11	2.8	148
1968	18	4.6	376
TOTAL	387	100.0	13,875

[a]The Greater Metropolitan Tulsa Area by definition includes the following municipalities and towns: The City of Tulsa, Claremore, Sand Springs, Broken Arrow, Bixby, Sapulpa, Jenks, Kiefer, Owasso, Collinsville, Mounds, Catoosa, and Skiatook.

Source: Oklahoma Industrial Development and Park Department, Oklahoma Directory of Manufacturers and Products. 1967 Edition. Tulsa Chamber of Commerce. Tulsa Area Manufacturers Directory, 1967-68. Tulsa: 1967. Tulsa Chamber of Commerce. Tulsa Area Manufacturers Directory, 1969-70. Tulsa: 1969. Claremore Chamber of Commerce. Industrial Sheet of Claremore. Claremore: 1969.

after 1963, a different pattern is apparent, with the establishments located in the Area between 1963 and 1967, primarily confining their market to the local geographic region. The change in market emphasis, in all probability, is the result of increased population; expanding consumer incomes; developing job opportunities created by the establishments located prior to 1963; and growth of component part and associated product industries.

The data in Table 7 indicate the primary market orientation of the new establishments located in The Greater Metropolitan Tulsa Area.

TABLE 7

PRIMARY MARKET ORIENTATION OF ESTABLISHMENTS LOCATED IN THE GREATER METROPOLITAN TULSA AREA, 1958-1969

Market	Number of Firms
Local	119
State	49
Regional	71
National	150
Export	89

Sources: Compiled from the Oklahoma Industrial Development and Park Department, Oklahoma Directory of Manufacturers and Products, 1967 Edition. Tulsa Chamber of Commerce, Tulsa Area Manufacturers Directory, 1967-68, and 1969-70. The Claremore Chamber of Commerce, Industrial Sheet of Claremore, Claremore, 1969. U.S. Bureau of the Census, Census of Manufacturers, 1958 Area Statistics: Oklahoma, U.S. Government Printing Office, Washington, D.C., 1959.

Jobs Created

The 387 manufacturing establishments located in The Greater Metropolitan Tulsa Area created job opportunities for 13,875 persons. The establishments as measured by employee size primarily are small. Of the establishments, 260, or 66.6 per cent, employ 10 or less persons; only 8 plants, or 1.9 per cent, employ more than 200 persons. The data in Table 8 show the number of establishments by employee size grouping.

Establishments classified in the Ordnance and Accessories (Aerospace) Industry, SIC 19, created the largest number of job opportunities, employing 4,693 persons. However, dynamic employment growth also is revealed in the Fabricated Metal Products, Except Ordnance, Machinery, and Transportation Equipment Industry, SIC 34, and the Machinery, Except Electrical, SIC 35, with the creation of 2,883 and 2,560 job opportunities, respectively.

The data in Table 9 illustrate the number of jobs created in each Major Industry Group as well as the number of establishments located in the Area.

Within the Metropolitan Tulsa Area, the highest density of establishments is in the Central Business District, when measured by plants per square mile, Figure 12. However,

TABLE 8

ESTABLISHMENTS LOCATED IN THE GREATER METROPOLITAN TULSA AREA, 1958-1969, BY EMPLOYEE SIZE

Employees	Plants (Number)	Per Cent of Total
10 or less	260	66.6
11-20	47	12.1
21-30	32	8.4
31-40	5	1.5
41-50	12	3.2
51-75	9	2.5
76-100	7	2.0
101-200	5	1.3
201-300	3	.7
301-500	4	1.0
4,000 and over	1	.2
Q[a]	2	.5
TOTAL	387	100.0

[a]Number of employees is not available.

Source: See data in Appendix Table 1.

a different pattern of concentration is apparent when evaluated by employment density per square mile. Figure 13 illustrates employment density per square mile of manufacturing establishments located in the Greater Metropolitan Tulsa Area, 1958 to 1969. The location pattern of establishments of relatively large employee size is in the east and southeast portion of the Area. The areas of highest employment

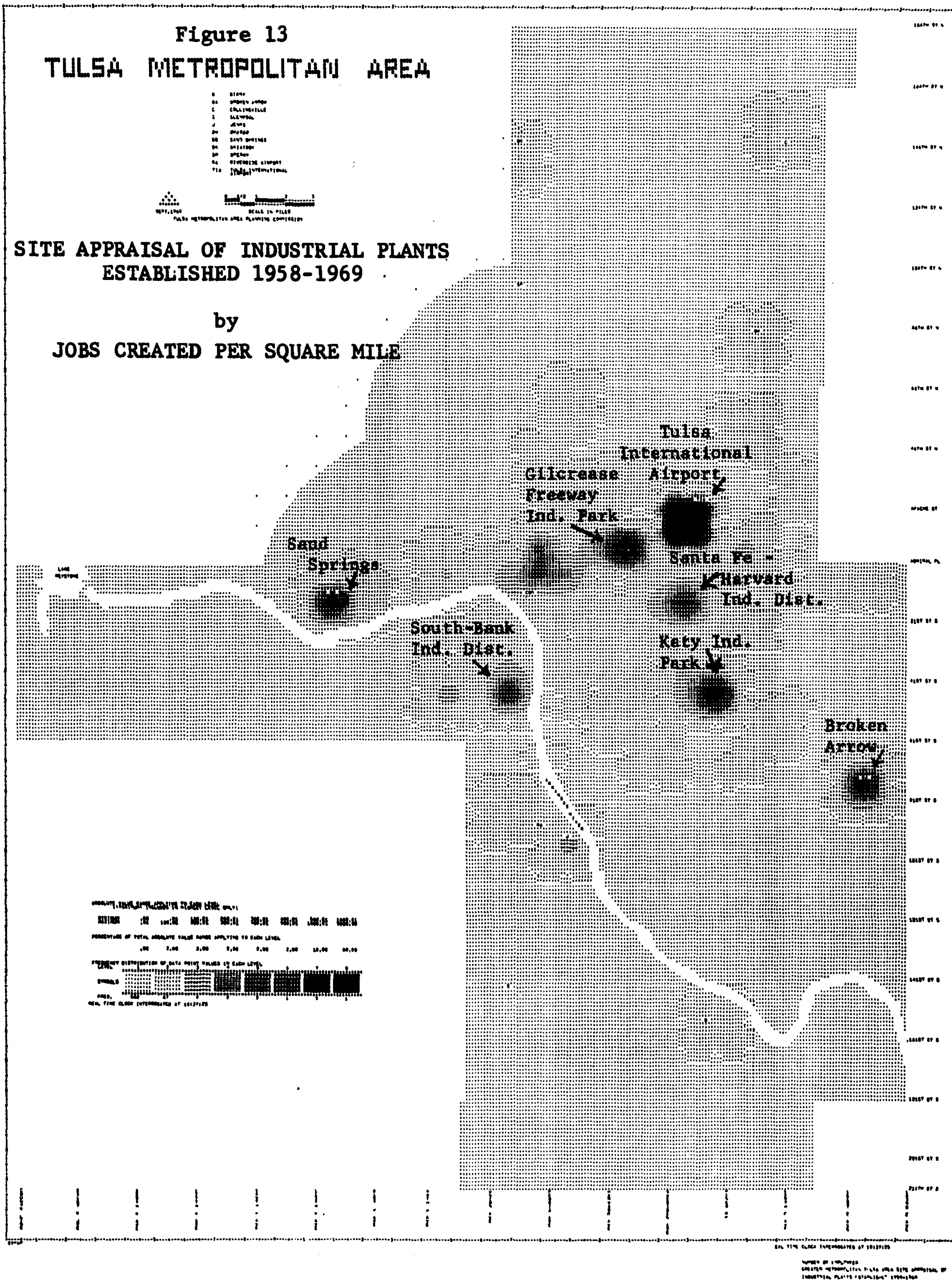
Figure 13
TULSA METROPOLITAN AREA
SITE APPRAISAL OF INDUSTRIAL PLANTS ESTABLISHED 1958-1969
by
JOBS CREATED PER SQUARE MILE
Tulsa International Airport
Gilcrease Freeway Ind. Park
Sand Springs
Santa Fe - Harvard Ind. Dist.
South-Bank Ind. Dist.
Kety Ind. Park
Broken Arrow

density are concentrated in the neighborhood of the Tulsa International Airport; Gilcrease Freeway Industrial Park; the Santa Fe - Harvard Ave. Industrial District; the Katy Industrial Park; and Broken Arrow. Two areas of high employment concentration appear on the west side of the Tulsa Metropolitan Area. They are: Sand Springs and the South-Bank Industrial District.

Employment Trends, 1958 - 1967

Measuring the increase in manufacturing employment created by the new industrial plants, by major industry group, the data in Table 9 indicate substantial increase in employment in some industry groups and relatively little increase in employment in other major industry groups. Though many broad generalizations can be made concerning employment change, the most common explanation for differential industry growth is that the area's spatial location relative to such factors as raw material sources, labor force, wage rates, transportation facilities and costs, potential and existing market, and community environment differs from that of other regions, thus endowing the area with a comparative advantage relative to other locations.

TABLE 9

JOBS CREATED BY INDUSTRIAL PLANTS, ESTABLISHED IN THE GREATER METROPOLITAN TULSA AREA[a], 1958 - 69, BY MAJOR INDUSTRY GROUP

SIC CODE	MAJOR INDUSTRY GROUP	NUMBER OF EMPLOYEES (1968)	NUMBER OF PLANTS
19	Ordnance and Accessories (Aerospace)	4,693	2
20	Food and Kindred Products	215	21
22	Textile Mill Products	85	1
23	Apparel and Other Finished Products Made from Fabrics and Similar Materials	279	6
24	Lumber and Wood Products, Except Furniture	237	22
25	Furniture and Fixtures	171	27
26	Paper and Allied Products	30	1
27	Printing, Publishing and Allied Industries	261	38
28	Chemicals and Allied Products	114	7
29	Petroleum Refining and Related Industries	13	3
30	Rubber and Miscellaneous Plastics Products	869	21
32	Stone, Clay and Glass Products	414	29
33	Primary Metal Industries	179	8
34	Fabricated Metal Products, Except Ordnance Machinery, and Transportation Equipment	2,883	105
35	Machinery, Except Electrical	2,560	68
36	Electrical Machinery, Equipment and Supplies	660	24
37	Transportation Equipment	373	20
38	Professional, Scientific and Controlling Instruments	632	17
39	Miscellaneous Manufactures	431	38
	TOTAL[b]	15,289	458

[a]By definition, the Greater Metropolitan Tulsa Area consists of the following communities: The City of Tulsa, Catoosa, Claremore, Owasso, Collinsville, Skiatook, Sand Springs, Sapulpa, Kiefer, Bixby, Jenks, Broken Arrow, and Mounds.

[b]Sum will not equal total number of new establishments since some plants are multi-industry and thus entail multi-counting. Also, the multi-industry plants entail multi-counting of employees, thus this total is greater than the actual number of jobs created during the ten year period.

Shift and share analysis[7] provides a rational and orderly method for sorting out the factors which relate to the differences in the rates of growth of the major industry classifications. The principal standard of reference is the growth rates of the Nation as a whole, both in total employment and in employment within the various industries.

The rate of growth of a particular major industry group is characterized as rapid or slow in terms of the growth rate of all national industries combined over the time period 1958 to 1967. The rate of growth of the State of Oklahoma within a particular industry is characterized as rapid or slow in terms of the growth rate of that industry nationally.

Between 1958 and 1967, employment increased 20.68 per cent in all manufacturing industries nationally. Employment in six industries, as the data in Table 10 illustrates, increased faster than 20.68 per cent, thus, are characterized as rapid growth industries. These industries were: Ordnance and Accessories (Aerospace), SIC 19; Rubber and Miscellaneous Plastic Products, SIC 30; Fabricated Metals and Machinery, SIC 34, 35, and 36; and Professional, Scientific and Controlling Instruments, SIC 38.

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[7]Lowell D. Ashby, "The Geographic Redistribution of Employment: An Examination of the Elements of Change," Survey of Current Business, (October, 1964), p. 14.

TABLE 10.

MANUFACTURING EMPLOYMENT AND COMPONENTS OF CHANGE FOR THE UNITED STATES, BY MAJOR INDUSTRY GROUP, 1958-1967.

SIC CODE	MAJOR INDUSTRY GROUP	EMPLOYMENT (in thousands)		CHANGE[a]	
		1967	1958	Number (000)	PER CENT
ALL	All Industries.	19,339.2	16,025.2	3,314.0	20.68
19	Ordnance and Accessories (Aerospace).	410.3	189.6	221.7	111.63
20	Food and Kindred Products	1,653.9	1,781.5	−127.6	− 7.16
21	Tobacco Manufactures.	74.9	92.0	− 17.1	−18.59
22	Textile Mill Products	926.3	918.6	7.7	0.83
23	Apparel and Other Finished Products Made from . . . Fabrics and Similar Materials.	1,357.1	1,188.5	−168.6	−14.19
24	Lumber and Wood Products, Except Furniture.	556.1	591.1	− 35.0	− 5.92
25	Furniture and Fixtures.	424.9	357.2	67.7	18.95
26	Paper and Allied Products	638.1	573.6	64.5	11.24
27	Printing, Publishing and Allied Industries.	1,024.6	871.7	152.9	17.54
28	Chemicals and Allied Products	849.2	783.9	65.3	8.33
29	Petroleum Refining and Related Industries	141.7	247.4	−105.7	−42.72
30	Rubber and Miscellaneous Plastics Products.	518.4	356.1	162.3	45.57
31	Leather and Leather Products.	329.9	358.5	− 28.6	− 7.97
32	Stone, Clay and Glass Products.	591.4	574.8	16.6	2.88
33	Primary Metal Industries.	1,279.3	1,129.5	149.8	13.26
34	Fabricated Metal Products, Except Ordnance. . . . . Machinery, and Transportation Equipment.	1,340.5	1,090.3	250.2	22.94
35	Machinery, Except Electrical.	1,857.9	1,385.8	472.1	34.06
36	Electrical Machinery, Equipment and Supplies. . . .	1,857.1	1,218.6	638.5	52.39
37	Transportation Equipment.	1,824.3	1,641.9	182.4	11.01
38	Professional, Scientific and Controlling. . . . . . Instruments.	391.7	293.8	97.9	33.32
39	Miscellaneous Manufactures.	442.1	370.9	71.2	19.19

Source: Compiled from data contained in the U.S. Bureau of the Census of Manufacturers, 1967, Area Series: Oklahoma, MC 67(3)-37, U.S. Government Printing Office, Washington, D.C., 1970; and U.S. Bureau of the Census, Census of Manufacturers, 1963, Summary Statistics: General Summary, MC63(1)-1, U.S. Government Printing Office, Washington, D.C., 1966.

Four other industries actually experienced a decline in employment. These four industries were: Food and Kindred Products, SIC 20; Tobacco Manufacturers, SIC 21; Apparel and Other Finished Products, SIC 23; and Petroleum Refining and Related Products, SIC 29.

If between 1958 and 1967, manufacturing employment in each major industry group in the State of Oklahoma kept pace with the national average, it should increase 20.68 per cent.

The data in Table 11 indicate manufacturing employment in the State of Oklahoma, 1958 to 1967, by major industry group. The entries in Column C in Table 11 indicate the expected increase in manufacturing employment, between 1958 and 1967, for the various major industry groups based on overall national growth of 20.68 per cent, and thus an overall standard of performance is implied in the numbers. For example, the total change in employment, in SIC 35, the Machinery, except Electrical, Industry increased from 9,300 to 15,000 employees, an increase of 5,700 persons. However, if employment in this Industry kept pace with the national rate for all industries, employment would have increased only 1,920 persons. This number is computed as follows: (9.3) (0.2068) = 1.92 thousand persons. Obviously

TABLE 11.

EMPLOYMENT AND COMPONENTS OF CHANGE, STATE OF OKLAHOMA, BY MAJOR INDUSTRY GROUP, 1958-1967.

(Thousands of employees)

SIC	EMPLOYMENT 1958 (A)	EMPLOYMENT 1967 (B)	Expected Change[a] Due to National Growth (C)	Expected Change[a] Due to Industrial Group (D)	Expected Change[a] Actual State Growth (E)	Total Change C+D+E (F)	Net Relative Change (G)
All	91.6	117.7	18.94	--	7.06	26.0	7.06
19	0.007	(DD)	--	--	--	--	--
20	15.4	13.8	3.18	− 0.59	− 0.99	− 1.6	− 1.58
21	--	--	--	--	--	--	--
22	(DD)	(DD)	--	--	--	--	--
23	3.4	6.5	0.70	− 0.22	2.62	3.1	2.40
24	2.1	1.8	0.43	− 0.56	− 0.17	− 0.3	− 0.73
25	1.1	1.5	0.23	− 0.02	0.19	0.4	0.17
26	0.6	1.0	0.13	− 0.06	0.33	0.4	0.27
27	6.0	7.0	1.24	− 0.19	− 0.05	1.0	− 0.24
28	1.2	1.0	0.25	− 0.15	− 0.30	− 0.2	− 0.45
29	6.5	5.1	1.34	1.43	− 1.37	− 1.4	0.06
30	(DD)	3.1	--	--	--	--	--
31	(DD)	(DD)	--	--	--	--	--
32	6.7	6.9	1.38	− 1.19	.01	0.2	− 1.18
33	2.9	4.2	0.60	− 0.21	0.91	1.3	0.70
34	7.9	13.0	1.64	0.18	3.28	5.1	3.46
35	9.3	15.0	1.92	1.24	2.54	5.7	3.78
36	2.2	7.9	0.45	0.70	4.55	5.7	5.25
37	10.2	13.9	2.11	− 0.99	2.58	3.7	1.59
38	(DD)	0.6	--	--	--	--	--
39	(DD)	1.3	--	--	--	--	--

[a]Derivation of each component is explained on pages 92 to 97.

(DD) denotes data withheld to avoid disclosing figures for individual companies. (-) sign indicates a decrease in direction of employment change.

Source: Calculated from data contained in the U.S. Bureau of the Census of Manufacturers, 1967, Area Series: Oklahoma, MC 67(3)-37, U.S. Government Printing Office, Washington, D.C., 1970; and U.S. Bureau of the Census, Census of Manufactures, 1963, Summary Statistics: General Summary, MC63(1)-1, U.S. Government Printing Office, Washington, D.C., 1966.

this industry is a rapid growth industry when related to national growth for all industries.

The entries in Column D in Table 11 represent the expected employment growth based on the different national industrial expansion rates. For example, the data in Table 10 indicates national employment in the SIC 35, Manufacturing, except Electrical, Industry increased 472,100 persons or 34.06 per cent. Since all industries grew at the rate of 20.68 per cent, this industry grew 13.38 per cent more rapidly than the aggregate. Thus, because of the rapid national expansion rate of this industry, an additional 1,240 persons were expected to be employed in Oklahoma. This number is computed as follows: $(34.06 - 20.68)\ (9.3) = (13.38)\ (9.3) = 1.244$ thousand persons.

Not all major industry groups were in the rapid growth category. Some industries, such as SIC 20, and Food and Kindred Products; SIC 24, Lumber and Wood Products, except Furniture; and SIC 32, Stone, Clay and Glass Products were slow growth industries. The employment change entries for these and several other industries are negative.

In some particular major industry groups, state employment increased at a faster rate than the national industry growth rate; in others, the state employment growth rate was less than the national rate. The data in Table 12 indicate, by major industry group, the employment expansion rate of the Nation, the State, and the differential. The entries in Column E, Table 11, indicate the expected employment change based on the state industry group differential. For example, in the SIC 35, Machinery, except Electrical, Industry, as the data in Table 12 indicate, employment increased nationally 34.06 per cent. However, in the State of Oklahoma, employment in this industry increased 61.29 per cent. Employment in the State of Oklahoma grew 27.23 per cent more rapidly in the State than in the Nation. Thus, because of the rapid state expansion rate of this industry, an additional 2.54 thousand persons were employed. This number is computed as follows: (9.3) (0.6129 - 0.3406) = (9.3) (0.2723) = 2.54 persons.

In an overall sense, from 1958 to 1967, the State of Oklahoma did very well when measured by industrial employment growth. On an aggregate basis, the State exceeded the national employment growth standard by 7,060 workers, as the entry in Column G, Table 11 indicates. In the SIC 35, Machinery, except Electrical, Industry it is also evident from Column G that the State had a positive net relative change or deviation from the overall national performance standard.

TABLE 12

EMPLOYMENT GROWTH RATES AND DIFFERENTIAL, BY MAJOR INDUSTRY GROUP, FOR THE UNITED STATES AND OKLAHOMA, 1958-1967.

(in per cent)

SIC	MAJOR INDUSTRY GROUP	United States (A)	Oklahoma (B)	Differential[a] (A)-(B) (C)
All	All Industries Combined.	20.68	28.49	7.81
19	Ordnance and Accessories (Aerospace) . .	111.63	--	--
20	Food and Kindred Products.	− 07.16	− 10.39	− 03.23
21	Tobacco Manufactures	− 18.59	--	--
22	Textile Mill Products.	00.83	--	--
23	Apparel and other Finished Products. . .	− 14.19	61.76	76.98
24	Lumber and Wood Products	− 05.92	− 14.28	− 8.36
25	Furniture and Fixtures	18.95	36.36	17.41
26	Paper and Allied Products.	11.24	66.67	55.43
27	Printing and Publishing Industries . . .	17.54	16.67	− 0.87
28	Chemicals and Allied Products.	8.33	− 16.67	− 25.00
29	Petroleum Refining Industries.	− 42.72	− 21.53	− 21.19
30	Rubber and Plastic Products.	45.57	--	--
31	Leather and Leather Products	− 7.97	--	--
32	Stone, Clay and Glass Products	2.88	2.99	0.11
33	Primary Metal Industries	13.26	44.83	31.57
34	Fabricated Metal Products.	22.94	64.56	41.62
35	Machinery, Except Electrical	34.06	61.29	27.23
36	Electrical Machinery and Equipment . . .	52.39	259.09	206.70
37	Transportation Equipment	11.01	36.27	25.26
38	Professional and Controlling Instruments	33.32	--	--
39	Miscellaneous Manufactures	19.19	--	--

[a]U.S. SIC Growth Rate - State SIC Growth Rate = SIC Differential Growth Rate. The Differential is the rate at which State employment growth increased or decreased faster or slower than the national expansion rate.

Source: Calculated from data contained in the U.S. Bureau of the Census of Manufacturers, 1967, Area Series: Oklahoma, MC 67(3)-37, U.S. Government Printing Office, Washington, D.C., 1970; and U.S. Bureau of the Census, Census of Manufactures, 1963 Summary Statistics: General Summary, MC63(1)-1, U.S. Government Printing Office, Washington, D.C., 1966.

In this industry, employment increased 3.78 thousand persons more than the expected national growth. Of this increase the employment of 1,240 persons was due to the rapid growth of the industry (Column D, Table 11); and the employment of 2,540 persons was due to the state-wide rapid expansion of the industry.

The data in Table 12 indicates, between 1958 and 1967, the State of Oklahoma apparently realized a location advantage which increased industrial employment at a faster rate than the national major industry group employment rates in the following industries:

SIC 23, Apparel and Other Finished Products Made from Fabrics and Similar Materials,

SIC 25, Furniture and Fixtures,

SIC 26, Paper and Allied Products,

SIC 32, Stone, Clay and Glass Products,

SIC 33, Primary Metal Industries,

SIC 34, Fabricated Metal Products, Except Ordnance Machinery, and Transportation Equipment,

SIC 35, Machinery Except Electrical,

SIC 36, Electrical Machinery, Equipment and Supplies, and

SIC 37, Transportation Equipment.

Similarity between national industrial employment expansion and state growth is apparent with few exceptions.

Although national employment decreased in the SIC 23, Apparel and Other Finished Products Made from Fabrics and Similar Materials Industry, state employment in this industry increased. Conversely, although the national employment in the SIC 28, Chemical and Allied Products Industry increased, State employment in this industry decreased.

Of the total increase of 26,000 persons in state employment, 13,875 jobs were created by new industrial plants located in the Greater Metropolitan Tulsa Area. In other words, 52.7 per cent of the increase in manufacturing employment in the State of Oklahoma can be attributed to the establishment of new industry in the area during the time period.

Unfortunately, data currently is not available to determine the share of the Greater Metropolitan Tulsa Area increase in employment which is the result of the national expansion rate; the state growth rate; and Tulsa's regional share.

In all probability, the largest increase in employment occurred in the SIC 19, Ordnance and Accessories (Aerospace) Industry. Data indicating the number of persons employed in the industry in the State of Oklahoma in 1967 currently is not available, but in 1958, there were only seven persons employed in the State in this industry group, (Table 13).

TABLE 13.

EMPLOYMENT FOR THE STATE OF OKLAHOMA AND THE GREATER METROPOLITAN TULSA AREA, 1958-1967,[a] BY MAJOR INDUSTRY GROUP

Line	SIC	MAJOR INDUSTRY GROUP	EMPLOYMENT				
			State of Oklahoma (in thousands)			Created by New GMTA Plants	
			1958 (A)	1967 (B)	Total Change (C)	Number (000) (D)	Per Cent of Total Change (E)
1	ALL	All Industries Combined.	91.6	117.7	26.0	13.685	52.7
2	19	Ordnance and Accessories (Aerospace)	0.007	(DD)	--	4.693	--
3	20	Food and Kindred Products.	15.4	13.8	− 1.6	0.211	--
4	21	Tobacco Manufactures	--	--	--	--	--
5	22	Textile Mill Products.	(DD)	(DD)	--	0.085	--
6	23	Apparel and Other Finished Products Made . . from Fabrics and Similar Materials. . . .	3.4	6.5	3.1	0.279	9.0
7	24	Lumber and Wood Products, Except Furniture .	2.1	1.8	− 0.3	0.400	--
8	25	Furniture and Fixtures	1.1	1.5	0.4	0.171	42.7
9	26	Paper and Allied Products.	0.6	1.0	0.4	0.030	7.5
10	27	Printing, Publishing and Allied Industries .	6.0	7.0	1.0	0.259	25.9
11	28	Chemicals and Allied Products.	1.2	1.0	− 0.2	0.112	--
12	29	Petroleum Refining and Related Industries. .	6.5	5.1	− 1.4	0.013	0.9
13	30	Rubber and Miscellaneous Plastic Products. .	(DD)	3.1	--	0.845	--
14	31	Leather and Leather Products	(DD)	(DD)	--	--	--
15	32	Stone, Clay and Glass Products	6.7	6.9	0.2	0.403	201.5
16	33	Primary Metal Industries	2.9	4.2	1.3	0.179	13.7
17	34	Fabricated Metal Products, Except Ordnance . Machinery, and Transportation Equipment .	7.9	13.0	5.1	2.850	55.9

(See Footnotes at bottom of table.)

TABLE 13 (Continued)

EMPLOYMENT FOR THE STATE OF OKLAHOMA AND THE GREATER METROPOLITAN TULSA AREA, 1958-1967,[a] BY MAJOR INDUSTRY GROUP

Line	SIC	MAJOR INDUSTRY GROUP	EMPLOYMENT: State of Oklahoma (in thousands) 1958 (A)	1967 (B)	Total Change (C)	Created by New GMTA Plants: Number (000) (D)	Per Cent of Total Change (E)
18	35	Machinery, Except Electrical.	9.3	15.0	5.7	2.522	44.2
19	36	Electrical Machinery, Equipment and Supplies. .	2.2	7.9	5.7	0.626	10.9
20	37	Transportation Equipment.	10.2	13.9	3.7	0.358	9.7
21	38	Professional, Scientific and Controlling. . . . Instruments.	(DD)	0.6	--	0.632	--
22	39	Miscellaneous Manufactures.	(DD)	1.3	--	0.431	--

[a]The Greater Metropolitan Tulsa Area is defined to include: The City of Tulsa, Broken Arrow, Bixby, Catoosa, Claremore, Collinsville, Kiefer, Jenks, Mounds, Owasso, Sand Springs, Sapulpa, and Skiatook.

Note: (DD) Withheld to avoid disclosing figures for individual companies.

Sources: Calculated from data contained in: Oklahoma Industrial Development and Park Department, Oklahoma Directory of Manufacturers' and Products, 1967 edition; Tulsa Chamber of Commerce, Tulsa Area Manufacturers Directory, 1967-1968, and 1969-1970; Claremore Chamber of Commerce, Industrial Sheet of Claremore, 1969, the U.S. Bureau of the Census of Manufacturers, 1967, Area Series: Oklahoma, MC 67(3)-37, U.S. Government Printing Office, Washington, D.C., 1970; and U.S. Bureau of the Census, Census of Manufactures, 1963, Summary Statistics: General Summary, MC63(1)-1, U.S. Government Printing Office, Washington, D.C., 1966.

Between 1958 and 1967, 4,693 jobs were created in this industry by the establishment of new plants in the Greater Metropolitan Tulsa Area.

Nationally, employment in the following industries either decreased or were characterized as slow employment growth industries:

SIC 20, Food and Kindred Products;

SIC 24, Lumber and Wood Products, Except Furniture;

SIC 25, Furniture and Fixtures;

SIC 26, Paper and Allied Products;

SIC 27, Printing, Publishing and Allied Industries;

SIC 29, Petroleum Refining and Related Industries.

However, new plants in these industries located in the Greater Metropolitan Tulsa Area created employment for 1,030 persons. These industries were basically consumer goods oriented and primarily limited their geographic market to the local area. Outstanding employment growth is apparent in the SIC 25, Furniture and Fixtures Industry, (Table 13). In this industry, of the total state employment increase, 42.75 per cent, or 171 of the workers were the outgrowth of new jobs created by the new industrial plants located in the area.

In all probability, the employment growth of these industries was due to the rapidly expanding population, rising consumer incomes, and concomitant expansion of the local market. Expansion of the local economy, stimulating growth of these industries, was in all probability the natural consequence of markedly expanded activity of the SIC 19, Ordnance and Accessories (Aerospace) Industry. Thus, relative to the above industries, apparently the Tulsa Area deos not realize a spatial advantage other than local market expansion.

Consistent with the national employment trend, in the Greater Metropolitan Tulsa Area the durable and capital goods industries such as fabricated metal products, machinery, and professional, scientific and controlling instruments grew rapidly. New plants in these industries created employment for 7,895 persons. The plants in these industries primarily marketed their goods nation-wide.

Specifically, in the Tulsa Area outstanding growth is apparent in the following industry groups:

SIC 30, Rubber and Miscellaneous Plastic Products,

SIC 34, Fabricated Metal Products, Except Ordnance, Machinery, and Transportation Equipment,

SIC 35, Machinery, Except Electrical, and

SIC 38, Professional, Scientific, and Controlling Instruments.

Of the total increase in state employment, in these industries plants located in the Tulsa Area accounted for 27.3 per cent of the increase in workers in the Rubber and Plastic Products; 55.9 per cent, in the Fabricated Metal Products;

44.2 per cent, in the Machinery Industry; and approximately 100 per cent of the increase in workers in the Professional, Scientific and Controlling Instruments Industry, (Table 13, Column E).

Since the plants were primarily nation-wide market oriented, apparently in these industries the Tulsa Area realized a location advantage relative to other regions in the state.

In the SIC 28, Chemicals and Allied Products Industry, state-wide employment decreased 200 persons. However, new plants located in the area created 112 jobs, (Table 13). Apparently, the Tulsa area also realized a location advantage in this industry which stimulated the establishment of new plants.

State employment in the SIC 32, Stone, Clay and Glass Products Industry, increased 200 workers. In the Greater Metropolitan Tulsa Area, new plants created employment for 403 persons, thus increasing the area employment share 201.5 per cent. In all probability, the employment increase in this industry, is explained by the location of specialized raw materials, a location advantage.

The Tulsa Area compared to state employment growth realized relatively slow growth in the following industries:

SIC 33, Primary Metal Industries,

SIC 36, Electrical Machinery, Equipment and Supplies, and

SIC 37, Transportation Equipment.

Although these industries are characterized state-wide as rapid growth industries, (Table 12), apparently the expansion was the consequence of new plants located in other sections of the state or enlargement of existing plant facilities.

In summary, the Greater Metropolitan Tulsa Area in terms of employment growth, experienced rapid expansion, in the following specific industry groups: SIC 27, Printing, Publishing and Allied Industries; SIC 32, Stone, Clay and Glass Products; SIC 34, Fabricated Metal Products, Except Ordnance Machinery, and Transportation Equipment; SIC 35, Machinery, Except Electrical; and SIC 38, Professional, Scientific and Controlling Instruments. Also reflecting the state employment growth, the following industries are characterized as slow growth industries during the decade in the Greater Metropolitan Tulsa Area: SIC 20, Food and Kindred Products; and SIC 29, Petroleum Refining and Related Industries.

Apparently the location decision of entrepreneurs producing consumer goods was highly influenced by the existing and potential local market situation. In the durable and capital goods industries, other factors obviously influenced the judgment of the entrepreneurs.

It is noted that the Greater Metropolitan Tulsa Area realized new employment opportunities in all major industry groups with the exception of SIC 21, Tobacco Manufactures, and SIC 31, Leather and Leather Products. In these specific industry groups, apparently the Greater Metropolitan Tulsa Area does not realize a location advantage of such a nature as to encourage entrepreneurs to undergo the risks involved with the establishment of a new manufacturing plant.

Survival

Of the 387 establishments locating in the Greater Metropolitan Tulsa Area, between 1958 and 1969, forty-eight of the firms, doing-business in November, 1966, were "out-of-business" or "address unknown" by November, 1969. The over-all attrition rate during the three year period, based on the total number of new plants is 12.4 per cent, approximately the national average rate of attrition. However, this figure may not be too meaningful since it compares the number of establishments going "out-of-business" in a three year period with the total number of establishments locating during a ten year period.

A marked correlation is evident between the employee size of the firms and survival. As the data in Table 14 indicates, the establishments no longer in operation, were relatively small in employee size. Approximately fifty-two per cent of the plants employed less than seven workers.

One of the plants no longer in business, the Sand Springs Weaving Co., a subsidiary of the Bibb Manufacturing Co., headquartered in Macon, Georgia, employed eighty-five workers. However, this was the only plant, located in the area, manufacturing Textile Mill Products, SIC 22. Using National employment growth as a standard of reference, the Textile Industry is characterized as a slow growth industry.

TABLE 14

MANUFACTURING PLANTS LOCATING IN THE GREATER METROPOLITAN TULSA AREA, 1958-1969, DOING-BUSINESS IN NOVEMBER, 1966, AND "OUT-OF-BUSINESS", NOVEMBER, 1969, BY EMPLOYEE SIZE.

Employee Size Limits	Number of Plants
1 - 3	9
4 - 6	16
7 - 10	10
11 - 15	7
16 - 30	3
31 - 60	2
61 -100	1

Source: Appendix Table 4

The failure of this plant apparently not only reflects the national slow employment growth trend of the industry but also indicates, in all probability, that the Tulsa Area lacks a spatial advantage relative to other locations in the nation. Since factors other than employee size obviously influenced the demise of the Sand Springs Weaving Co., the relationship of new plants of small employee size and survival is further intensified.

Although apparently a relationship between survival and employee size seems to be evident, as the data in Table 15 indicate, many small firms were successful. Thus, small employee size cannot be interpreted as the reason for ceasing operation. In general, a relationship between survival and employee size of the firm is apparent. When measured by employee size, in all probability, the rate of survival is higher among plants with many employees than among firms with few employees.

When major industry groups of the Area are measured by employee growth, using the national all-industry growth rate as a standard of reference, the Greater Metropolitan Tulsa Area realized a spatial location advantage in the SIC 19, Ordnance and Accessories (Aerospace); SIC 25, Furniture and Fixtures; SIC 27, Printing, Publishing, and Allied Products; SIC 32, Stone, Clay and Glass Products; SIC 34, Fabricated Metal Products, Except Ordnance, Machinery, and Electrical; SIC 35, Machinery, Except Electrical; and

SIC 38, Professional, Scientific and Controlling Instruments Industries. Employment growth in the Greater Metropolitan Tulsa Area in these industries expanded at a faster rate than the national industrial growth rate. However, no definite relationship is apparent between survival of the plants and the rapid employment growth industries. As the data in Table 15 indicate, although some of the slow employment growth industries have the lowest survival rates; others have a one hundred per cent survival rate. Similarly, some rapid growth industries have a high survival rate; but others, relatively low survival rates. Obviously survival or cessation of operation is the result of factors other than employee size and the rate of employment growth.

Among the plants ceasing operation, no definite market orientation is revealed, as the data in Table 15 indicate. Sixteen, or 33.3 per cent, of the establishments confined their geographic market to the local area; nineteen, or 41.3 per cent, offered their products on a nation-wide market. However, a characteristic common to the Major Industry Groups with one hundred per cent survival rate is that all the plants sold their products in at least a statewide market and the majority marketed their products nationwide.

The firms ceasing operation primarily sold their products in a monopolistically competitive market. Thus, these plants operated in a market environment which permitted easy entry and exit. This type of market situation

TABLE 15

PLANTS LOCATED IN THE GREATER METROPOLITAN TULSA AREA, 1958-1969, IN BUSINESS, 1966; OUT-OF-BUSINESS, 1969, BY SIC CODE, EMPLOYEE SIZE, NUMBER, SURVIVAL RATE, AND MARKET AREA.

SIC	MAJOR INDUSTRY GROUP	Plants		Survival Rate in (Per Cent)	Employees (Median)	Primary Market Area[a]
		Total Est.	Out-of-Business			
19[c]	Ordnance and Accessories(Aerospace). . .	2	0	100.0	(DD)	N
20	Food and Kindred Products.	21	6	71.4	10	L
22	Textile Mill Products.	1	1	0.0	85	N
23	Apparel and other Finished Products. . .	6	0	100.0	13	N
24	Lumber and Wood Products	22	2	90.1	6	S
25[c]	Furniture and Fixtures	27	4	85.2	4	L
26	Paper and Allied Products.	1	0	100.0	30	R
27[c]	Printing and Publishing Industries . . .	38	2	94.8	3	L
28	Chemicals and Allied Products.	7	0	100.0	6	N
29	Petroleum Refining Industries.	3	0	100.0	6	S
30	Rubber and Plastic Products.	21	2	85.7	12	L
32[c]	Stone, Clay and Glass Products	29	3	99.7	8	L
33	Primary Metal Industries	8	0	100.0	16	R
34[c]	Fabricated Metal Products.	105	9	91.5	10	N
35[c]	Machinery, Except Electrical	68	8	88.9	9	N
36	Electrical Machinery and Equipment . . .	24	5	79.1	6	N
37	Transportation Equipment	20	4	80.0	8	N
38[c]	Professional and Controlling Instruments.	17	2	88.2	5	N
39	Miscellaneous Manufactures	36	5	86.9	6	N
	TOTAL	456[b]	48			

[a]The Geographic market area is denoted by: L for Local, S for State, R for Regional, N for National, and E for Export.

[b]Total will not equal the total number of establishments due to 5 multi-industry operations which entails double-counting.

[c]Rapid employment growth industries in the Greater Metropolitan Tulsa Area.

Note: (DD) withheld to avoid disclosure of individual firms.

is quite evident in the SIC 20, Food and Kindred Product Industry, an industry with only a 71.4 per cent survival rate during the time period.

The plants ceasing operation engaged in a wide range of economic activity but were primarily single product operations in that they manufactured products classified in one category, according to the Standard Industrial Classification 4-digit Code.

In summary the plants ceasing operation primarily were: (1) of small employee size; (2) produced a single products; (3) sold their products in a monopolistically competitive market; and (4) plants with a nation-wide market had a higher probability of success than plants solely dependent upon the local market.

Obviously, The Greater Metropolitan Tulsa Area experienced outstanding industrial growth during the decade. Apparently success or cessation of operation of the manufacturing plants was the consequence of a combination of many factors influencing the profitability of operation, such as managerial ability, capitalization, existing and potential market, availability of raw materials, transportation costs, accessibility to industrial lands, community environment and so forth. In Chapter 5 these location factors and others are evaluated as to their relative importance on the decision of the entrepreneurs establishing plants in the Area during the time period under study.

CHAPTER IV

STATISTICAL PROCEDURE AND GENERAL FINDINGS OF STUDY

Statistical Procedure

The basic information used in this study was the Oklahoma Industrial Development and Park Department's list of new industrial plants.

In an effort to contact the individuals who took part in the location decision, only plants established in 1959 through 1968 were utilized. The data was gathered by a questionnaire survey. A complete canvass was made of all new plants, the number being 387. Table 1 in the Appendix lists the plants contacted. As many as three follow-up letters were sent out per plant in order to build up the response rate. In addition, a large number of telephone calls were made to check responses; to complete questionnaires of non-respondents, and to fulfill partially completed returned questionnaires. Finally, some plants were visited personally in order to bring back or to check completed questionnaires. The telephone survey and the on-the-spot survey revealed that many of the non-respondents were no longer in business.

The original cover letter was co-signed by Dr. Kermit Brown, Vice President of Research, The University of Tulsa, and Mr. Fred Setzer, Chairman of the Economic Development Commission of Tulsa, representatives of the sponsoring institutions of this study. In addition, the ensuing follow-up steps were taken: (1) a reminder post card succeeded by a reminder letter was mailed to non-respondents. Both of these items were signed by the Director of the Study. (2) Approximately twenty-one days after the original mailing another follow-up letter was mailed to non-respondents. This letter was signed by Mr. Clyde Cole, Executive Director of the Tulsa Chamber of Commerce and encouraged entrepreneurs to co-operate with the project. (3) Early in the data collecting period, ten 30-second radio spot announcements were made seeking entrepreneurs co-operation; and (4) soon after the questionnaires were mailed, an article appeared in <u>Tulsa</u>, the monthly Chamber of Commerce Magazine, explaining the purpose and importance of the project.

The survey elicited an overall 48.9 per cent response rate. The response rate ranged from 100 per cent, secured from two major industry groups, to 14.3 per cent response rate secured from the Food and Kindred Products plants. A great source of satisfaction was the high degree of co-operation from the larger employee size plants. The lower response rates were secured from small employee size plants. Table 2 in the Appendix indicates the response rate by industry group.

Respondents were asked to signify the relative importance of the location factors on their site selection decision. Five ratings were possible: highest, high, medium, low, and lowest. A numerical value was assigned to each classification, as follows: value of 5, if the factor was considered of highest importance; value of 4, if high; value of 3, if medium; value of 2, if low, and value of 1, if lowest. In evaluating the relative importance of the factors, the above five classifications were grouped in two categories: (A) Factors considered by the respondents to be of lowest, low, and medium importance were classified as of little influence on the judgment of an entrepreneur in seeking a plant site. (B) Factors considered by the respondents to be of high or highest importance were classified as greatly influencing the judgment of decision-makers in their site selection.

The respondents also were classified as to major industry group, single or multi-product operations, employee size, major form of transportation, and market area.

General Findings

In general, two factors apparently were highly influential on the judgment of businessmen who located plants in the Greater Metropolitan Tulsa Area. The overall market situation was cited by 60 per cent of the respondents as of great influence on their site selection decision. The importance of the market situation is further intensified by 55 per cent and 58 per cent of the respondents, respectively, stating that the existing and potential consumer market greatly influenced their decision, (Table 16).

Community environment is the second location factor which markedly influenced the judgment of the businessmen. Of the respondents, 60 per cent indicated the local community environment, leadership, attitudes, and availability and quality of schools greatly influenced their site selection decision.

The Greater Metropolitan Tulsa Area's central placement in the United States also apparently is an important location force. This factor was cited by 61 per cent of the respondents as greatly influencing their Tulsa location by providing the attainment of a favorable competitive position in the industry relative to other geographic locations.

TABLE 16

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, COMPOSITE OF ALL PLANTS ESTABLISHED, 1958-1969.

Factor	Influence[a] Little (A)	Great (B)
I. Location of Production Materials:	84.34	15.66
Nearness to raw materials	82.54	17.46
Nearness to component parts	84.34	15.66
II. Labor Force:	59.64	40.36
Availability of skilled labor	61.45	38.55
Availability of unskilled labor	69.88	30.12
Potential for managerial labor	74.10	25.90
Attitudes and activities of labor unions	83.14	16.86
Wage Rates	78.32	21.68
III. Industrial Sites:	73.50	26.50
Accessibility and cost of:		
Industrial land	65.66	34.34
Developed industrial parks	85.54	14.46
IV. Transportation Facilities:	59.64	40.36
Availability and adequacy of:		
Airway facilities	75.30	24.70
Highway facilities	51.20	48.80
Railroad facilities	73.50	26.50
Pipeline facilities	97.00	3.00
Waterway facilities	90.36	9.64
Shipping costs of raw materials	73.50	26.50
Shipping cost of finished goods	66.27	33.73
V. Distributional Facilities:	89.76	10.24
Warehousing and storage facilities	91.57	8.43
Availability of wholesale outlets	86.14	13.86
VI. Market:	40.36	59.64
Existing consumer market	44.58	55.42
Potential consumer market	42.17	57.83

(See Footnote at bottom of table.)

TABLE 16, (Continued)

	Factor	Influence[a] Little (A)	Great (B)
	Nearness to related industries	54.82	45.18
	Attainment of favorable competitive position	39.16	60.84
VII.	Water Supply and Waste Disposal Facilities:	89.16	10.84
	Availability of water supply	87.96	12.04
	Quality and dependability of water	84.94	15.06
	Cost of water	90.96	9.04
	Disposal facilities for industrial waste	91.57	8.43
VIII.	Governmental Structure and Attitudes:	83.14	16.86
	Nuisance and stream pollution laws	88.56	11.44
	Building ordinances	78.92	21.08
	Zoning codes	77.72	22.28
	Compensation laws	86.14	13.86
	Insurance laws and regulations	86.14	13.86
IX.	Tax Structure:	79.53	20.47
	Industrial property tax rates	78.32	21.68
	State corporate tax structure	80.73	19.27
	Local tax assessment basis	78.32	21.68
X.	Capital Structure:	74.10	25.90
	Availability of capital funds	66.27	33.73
	Attitudes of lending institutions	68.07	31.93
	Community industrial development projects	84.34	15.66
	Insurance rates	81.93	18.07
XI.	Industrial Fuels:	79.52	20.48
	Availability of coal, oil, gas, electricity	75.90	24.10
	Cost of industrial fuels	78.92	21.08
XII.	Community Environment:	40.36	59.64
	Community leadership and attitudes	32.54	67.46
	Availability and quality of schools	39.76	60.24
	Nearness to universities and colleges	44.58	55.42
	Recreation and cultural facilities	45.18	54.82
	Availability and cost of housing	48.20	51.80
	Real estate tax	49.40	50.60
	Effectiveness of protection facilities	45.78	54.22
	Climatic conditions	44.58	55.42

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

In general, availability of production materials, Tulsa's labor force, distributional facilities, governmental structure and attitudes, and tax structure appear to be location factors of relatively little influence on the location decision. In one instance, the general attitude towards government structure and taxes was "we have these necessary evils wherever we locate.[1]" Although this was the expressed opinion of one individual, it seems to correctly reflect the general opinion of many of the businessmen. The data in Table 16 indicate the composite response to the questionnaire.

The relative influence of the location factors on the judgment of the entrepreneurs varied with product produced, the employee size of the establishment, and market area. Thus, the following chapter explains, in detail, the relative importance of the factors by major industry group.

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[1]Interview with President of Waner Corporation, February, 1970.

CHAPTER V

FACTORS INFLUENCING SITE SELECTION

As previously mentioned, the relative influence of location factors on site selection apparently varies with market area, employee size, and product produced. This chapter presents and explains the formost reasons recent entrepreneurs located in the Greater Metropolitan Tulsa Area.

Food and Kindred Products, SIC 20

Between 1958 and 1969, twenty-one plants in the Food and Kindred Products industry were established in the Greater Metropolitan Tulsa Area. Twenty-one plants produced, as classified by the Standard Industrial Classification 4-digit Code, ten products. Seven plants manufactured prepared and miscellaneous food specialities such as chocolate and cocoa products, potato, corn, and other chips; vinegar and cider. Six plants manufactured bread and other baker products primarily for sale by home service delivery, or through one or more non-baking retail outlets. The remaining eight plants were diversified with no more than 3 plants engaged in the production of an identical product.

The plants were of relatively small employee size. Forty-two per cent of the plants employed ten or more persons; fifty-eight per cent employed less than ten. The 4 largest establishments employed 79.0% of the workers.

The plants in the industry were primarily single product operations. Only two plants manufactured more than one product.

The food and kindred product industry was primarily local market oriented. Two-thirds of the plants operated within the local geographic region. Of the establishments, 14.3 per cent offered their products on a state-wide market; 14.3 per cent, on a nation-wide market. Only one plant defined its market area as a regional geographic area. Apparently, there is a relationship between the number of products produced and the market area. All single-product plants operated within the local market area; the multi-product plants identified their market area as a nation-wide or regional.

The industry was highly truck transportation oriented. One hundred per cent of the respondents indicated they acquired their raw materials and component parts primarily by trucking facilities. Eighty-three per cent of the plants primarily used trucking facilities to transport their finished products. The plant, selling in a nation-wide market, indicated rail transportation was primarily used to distribute the finished products.

Six plants were out-of-business or whereabouts unknown by November, 1969. This is a survival rate of 71.4 per cent. As measured by employee size, these firms were relatively small. The majority produced Bread and Other Bakery Products, Except Cookies and Crackers, SIC 2051.

The following location factors were cited by one-hundred per cent of the respondents as of <u>great influence</u> on their location decision, as the data in Table 17 indicates:

(1) Market situation

(2) Community environment

(3) Availability and adequacy of highway facilities.

Apparently, the strongly expanding local consumer economy created an environment conducive to anticipation of profitable expansion of the food industry in the area. Of secondary importance in the site selection, but reinforcing the local market orientation, were the non-pecuniary factors: community leadership and attitudes, availability and quality of the schools, nearness of universities

TABLE 17

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 20, FOOD AND KINDRED PRODUCTS INDUSTRY, 1958-1969.

Factor	Influence[a] Little (A)	Great (B)
I. Location of Production Materials:	100.00	0.00
Nearness to raw materials	100.00	0.00
Nearness to component parts	100.00	0.00
II. Labor Force:	66.67	33.33
Availability of skilled labor	66.67	33.33
Availability of unskilled labor	66.67	33.33
Potential for managerial labor	100.00	0.00
Attitudes and activities of labor unions	100.00	0.00
Wage Rates	100.00	0.00
III. Industrial Sites:	66.67	33.33
Accessibility and cost of:		
Industrial land	33.34	66.66
Developed industrial parks	33.34	66.66
IV. Transportation Facilities:	33.34	66.66
Availability and adequacy of:		
Airway facilities	66.67	33.33
Highway facilities	0.00	100.00
Railroad facilities	33.34	66.66
Pipeline facilities	66.67	33.33
Waterway facilities	66.67	33.33
Shipping costs of raw materials	33.34	66.66
Shipping costs of finished goods	33.34	66.66
V. Distributional Facilities:	100.00	0.00
Warehousing and storage facilities	100.00	0.00
Availability of wholesale outlets	100.00	0.00
VI. Market:	0.00	100.00
Existing consumer market	0.00	100.00
Potential consumer market	0.00	100.00

(See footnote at end of table.)

TABLE 17, (Continued)

	Factor	Influence[a] Little (A)	Great (B)
	Nearness to related industries	100.00	0.00
	Attainment of favorable competitive position	0.00	100.00
VII.	Water Supply and Waste Disposal Facilities:	33.34	66.66
	Availability of water supply	33.34	66.66
	Quality and dependability of water	33.34	66.66
	Cost of water	33.34	66.66
	Disposal facilities for industrial waste	66.67	33.33
VIII.	Governmental Structure and Attitudes:	100.00	0.00
	Nuisance and stream pollution laws	100.00	0.00
	Building ordinances	100.00	0.00
	Zoning codes	100.00	0.00
	Compensation laws	100.00	0.00
	Insurance laws and regulations	100.00	0.00
IX.	Tax Structure:	100.00	0.00
	Industrial property tax rates	100.00	0.00
	State corporate tax structure	100.00	0.00
	Local tax assessment basis	100.00	0.00
X.	Capital Structure:	100.00	0.00
	Availability of capital funds	100.00	0.00
	Attitudes of lending institutions	100.00	0.00
	Community industrial development projects	100.00	0.00
	Insurance rates	100.00	0.00
XI.	Industrial Fuels:	100.00	0.00
	Availability of coal, oil, gas, electricity	100.00	0.00
	Cost of industrial fuels	100.00	0.00
XII.	Community Environment:	0.00	100.00
	Community leadership and attitudes	0.00	100.00
	Availability and quality of schools	0.00	100.00
	Nearness to universities and colleges	33.34	66.66
	Recreation and cultural facilities	0.00	100.00
	Availability and cost of housing	0.00	100.00
	Real estate tax	33.34	66.66
	Effectiveness of protection facilities	0.00	100.00
	Climatic conditions	0.00	100.00

[a]The method by which the degree of influence was determined is explained in detail in Chapter 4.

and colleges, availability of recreation and cultural facilities, cost of housing, effectiveness of protection facilities, and climatic conditions. The importance of adequate highway facilities, as a location factor, is validated by the industry's heavy reliance on the trucking industry as the primary means of transporting both raw materials and finished products.

As measured by employment growth trends, employment in this industry decreased nationally. Obviously, expansion in the Tulsa Area was the natural outgrowth of the rapid population increase, expanding job opportunities, and rising consumer incomes. Growth of this industry, in all probability, was the consequence rather than the cause of industrialization.

Apparel and Other Finished Products Made from Fabrics and Similar Materials, SIC 23.

In this industry six plants producing, by 4-digit classification, six products were established in the Greater Metropolitan Tulsa Area. The survival rate was 100 per cent.

The industry was evenly divided between single and multi-product operations. The single product plants were the larger employers, however, and marketed their products nation-wide. The multi-industry establishments were relatively small, as measured by employee size and limited their market to either the local or state region.

This industry created employment for 279 persons. However, two-thirds of the plants employed 10 or more workers; and one-third employed less than 10 workers.

The industry was highly oriented to truck transport facilities. All plants used trucking facilities both to acquire raw materials and component parts as well as to transport the finished product to market.

Only one location factor was consistently identified as of great influence on the Tulsa Area site selection. One-hundred per cent of the respondents identified the factor, <u>attainment of a favorable competitive position</u>, as greatly influencing their site selection judgment, (Table 18). When the location factors are related to the employee size of the plants, however, other factors apparently influenced the judgment of the businessmen.

The respondents associated with the smaller firms identified the following additional factors as greatly influencing their site selection:

(1) existing and potential consumer market,

(2) community environment, and

(3) availability of recreational and cultural facilities.

TABLE 18

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 23, APPAREL AND OTHER FINISHED PRODUCTS MADE FROM FABRICS AND SIMILAR MATERIALS INDUSTRY, 1958-1969.

Factor	Influence[a] Little (A)	Great (B)
I. Location of Production Materials:	100.00	0.00
Nearness to raw materials	100.00	0.00
Nearness to component parts	100.00	0.00
II. Labor Force:	100.00	0.00
Availability of skilled labor	50.00	50.00
Availability of unskilled labor	100.00	0.00
Potential for managerial labor	50.00	50.00
Attitudes and activities of labor unions	50.00	50.00
Wage Rates	50.00	50.00
III. Industrial Sites:	50.00	50.00
Accessibility and cost of:		
Industrial land	50.00	50.00
Developed industrial parks	50.00	50.00
IV. Transportation Facilities:	100.00	0.00
Availability and adequacy of:		
Airway facilities	100.00	0.00
Highway facilities	50.00	50.00
Railroad facilities	100.00	0.00
Pipeline facilities	100.00	0.00
Waterway facilities	100.00	0.00
Shipping costs of raw materials	50.00	50.00
Shipping costs of finished goods	50.00	50.00
V. Distributional Facilities:	100.00	0.00
Warehousing and storage facilities	100.00	0.00
Availability of wholesale outlets	100.00	0.00
VI. Market:	50.00	50.00
Existing consumer market	50.00	50.00
Potential consumer market	50.00	50.00

(See footnote at end of table.)

TABLE 18, (Continued)

	Factor	Influence[a] Little (A)	Great (B)
	Nearness to related industries	100.00	0.00
	Attainment of favorable competitive position	0.00	100.00
VII.	Water Supply and Waste Disposal Facilities:	100.00	0.00
	Availability of water supply	100.00	0.00
	Quality and dependability of water	100.00	0.00
	Cost of water	100.00	0.00
	Disposal facilities for industrial waste	100.00	0.00
VIII.	Governmental Structure and Attitudes:	100.00	0.00
	Nuisance and stream pollution laws	100.00	0.00
	Building ordinances	100.00	0.00
	Zoning codes	100.00	0.00
	Compensation laws	100.00	0.00
	Insurance laws and regulations	100.00	0.00
IX.	Tax Structure:	50.00	50.00
	Industrial property tax rates	50.00	50.00
	State corporate tax structure	50.00	50.00
	Local tax assessment basis	50.00	50.00
X.	Capital Structure:	50.00	50.00
	Availability of capital funds	50.00	50.00
	Attitudes of lending institutions	50.00	50.00
	Community industrial development projects	50.00	50.00
	Insurance rates	100.00	0.00
XI.	Industrial Fuels:	100.00	0.00
	Availability of coal, oil, gas, electricity	100.00	0.00
	Cost of industrial fuels	100.00	0.00
XII.	Community Environment:	50.00	50.00
	Community leadership and attitudes	50.00	50.00
	Availability and quality of schools	50.00	50.00
	Nearness to universities and colleges	50.00	50.00
	Recreation and cultural facilities	50.00	50.00
	Availability and cost of housing	100.00	0.00
	Real estate tax	100.00	0.00
	Effectiveness of protection facilities	50.00	50.00
	Climatic conditions	50.00	50.00

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

The smaller firms in all probability, were created by entrepreneurs living in the community and who were enticed to undertake the risk of a new manufacturing operation by the expanding local economy.

The site selection for the larger employee size plants apparently was influenced by a different set of location factors. Economic factors strongly, if not completely, influenced the location decision of these business executives. Entrepreneurs, operating plants with 10 or more employees, cited the following factors as of great influence in their Tulsa Area location decision:

(1) potential for managerial labor,

(2) attitudes and activities of labor unions,

(3) attainment of a favorable competitive position,

(4) capital structure,

(5) shipping costs of raw materials and finished goods,

(6) developed industrial parks, and

(7) availability and adequacy of highway facilities.

In all probability, in this industry Tulsa's central location in the nation is a cost advantage and fostered the attainment of a favorable competitive position in the industry by permitting the plants to market their product over a larger geographic region than if they were located at any other spatial point. The one-hundred per cent truck transport orientation of the industry not only substantiates the above premise but also supports the selection of the factor, adequate highway facilities, as an influential location factor in the judgment of the entrepreneurs.

Obviously the entrepreneurs of larger employee size plants were more selective than the smaller plants in their location decision. The site selection of the smaller employee plants apparently was influenced by non-pecuniary factors. However, it is reasonable to assume that if the individuals associated with the smaller employee plants were established in the community, the community environment results in both personal cost-reducing and personal revenue-increasing situations, such as set forth by Greenhut and Baumol in their plant location theories. Since the small firms were considered "small" only on the basis of employee size, managerial labor potential and the attitudes and activities of labor unions are of lesser importance in the location decision of these plants.

Employment growth in this industry decreased nationally. However, state employment increased 61.76 per cent during the time period. Apparently the State of Oklahoma and the Tulsa Area realized a location advantage relative to other regions in the nation in this industry. This premise is substantiated by the 100 per cent survival rate of the plants located in the area, the rapid state employment growth rate, and the complete accord of the entrepreneurs that by locating in the area they would attain a favorable competitive position relative to other geographic locations.

Lumber and Wood Products Industry, SIC 24.

Twenty-two plants producing lumber and wood products were located in the Tulsa Area between 1958 and 1969. The twenty-two establishments produced, as classified by the Standard Industrial Classification 4-digit Code, five products. Fifty per cent of the plants manufactured Miscellaneous Wood Products, SIC 2499. These establishments primarily engaged in turning and shaping wood, and manufacturing miscellaneous wood products such as lasts and related products, cork products, mirror and picture frames, and particle board. One-third of the establishments engaged in Millwork, SIC 2431. These plants primarily manufactured fabricated millwork, for example, cabinets, to be built in; door trim; door and window shutters; stair railings; wainscots; and interior and ornamental woodwork.

The twenty-two plants created employment for 427 individuals. The establishments, however, were relatively small in employee size. Sixty-four per cent of the plants employed less than ten persons; thirty-six per cent, ten and more persons.

In general, the establishments produced a single product. However, eight plants were multi-industry operations. Since six, or seventy-five per cent, of the multi-industry plants also manufactured fabricated metal products, apparently an advantage is realized by the concurrent production of the two products.

The majority of the plants sold their products within a state-wide geographic area. The respondents indicated the industry was highly oriented to truck transport facilities. One hundred per cent of the plants indicated they acquired their raw materials and component parts primarily by truck transportation facilities. One establishment used railroad facilities to transport their finished product, however, the other plants used truck facilities as the primary means of shipping their finished products to market.

The plants in this industry, were highly successful. Only two of the twenty-two plants were out-of-business by November, 1969. Both establishments were relatively small.

One operation engaged in the manufacture of Millwork Products, SIC 2431. The other establishment engaged in the manufacture of Wood Products, Not Elsewhere Classified, SIC 2499. The latter plant was a "one-man-operation". Both plants indicated their market as the local geographic area.

Of the respondents to the questionnaire, 62.5 per cent cited the following factors were of great influence in their Tulsa Area location decision, as the data in Table 19 indicates:

(1) Existing and potential consumer market,

(2) Community leadership and attitudes,

(3) Nearness to universities and colleges, and

(4) Effectiveness of protection facilities.

The market orientation of the plants and the factors relating to the community environment are complementary and consistent with the market area in which the majority of the plants sold their products.

Of the plants with ten or more employees, in addition to the above factors, two-thirds of the respondents cited the factor, <u>nearness to related industries</u>, strongly influenced their plant-location decision. Consideration of this factor supports the relationship previously observed between this industry and the Metal Fabrication Industry.

TABLE 19

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 24, LUMBER AND WOOD PRODUCTS INDUSTRY, 1958-1969.

Factor	Influence[a] Little	Great
I. Location of Production Materials:	87.50	12.50
Nearness to raw materials	87.50	12.50
Nearness to component parts	87.50	12.50
II. Labor Force:	75.00	25.00
Availability of skilled labor	87.50	12.50
Availability of unskilled labor	62.50	37.50
Potential for managerial labor	75.00	25.00
Attitudes and activities of labor unions	87.50	12.50
Wage Rates	87.50	12.50
III. Industrial Sites:	75.00	25.00
Accessibility and cost of:		
Industrial land	62.50	37.50
Developed industrial parks	87.50	12.50
IV. Transportation Facilities:	62.50	37.50
Availability and adequacy of:		
Airway facilities	87.50	12.50
Highway facilities	75.00	25.00
Railroad facilities	87.50	12.50
Pipeline facilities	100.00	0.00
Waterway facilities	100.00	0.00
Shipping costs of raw materials	87.50	12.50
Shipping costs of finished goods	87.50	12.50
V. Distributional Facilities:	75.00	25.00
Warehousing and storage facilities	62.50	37.50
Availability of wholesale outlets	75.00	25.00
VI. Market:	50.00	50.00
Existing consumer market	37.50	62.50
Potential consumer market	37.50	62.50

(See footnote at end of table.)

TABLE 19, (Continued)

	Factor	Influence[a] Little	Great
	Nearness to related industries	62.50	37.50
	Attainment of favorable competitive position	62.50	37.50
VII.	Water Supply and Waste Disposal Facilities:	100.00	0.00
	Availability of water supply	87.50	12.50
	Quality and dependability of water	75.00	25.00
	Cost of water	87.50	12.50
	Disposal facilities for industrial waste	100.00	0.00
VIII.	Governmental Structure and Attitudes:	100.00	0.00
	Nuisance and stream pollution laws	100.00	0.00
	Building ordinances	87.50	12.50
	Zoning codes	75.00	25.00
	Compensation laws	100.00	0.00
	Insurance laws and regulations	100.00	0.00
IX.	Tax Structure:	75.00	25.00
	Industrial property tax rates	75.00	25.00
	State corporate tax structure	87.50	12.50
	Local tax assessment basis	75.00	25.00
X.	Capital Structure:	75.00	25.00
	Availability of capital funds	62.50	37.50
	Attitudes of lending institutions	62.50	37.50
	Community industrial development projects	87.50	12.50
	Insurance rates	87.50	12.50
XI.	Industrial Fuels:	87.50	12.50
	Availability of coal, oil, gas, electricity	87.50	12.50
	Cost of industrial fuels	87.50	12.50
XII.	Community Environment:	62.50	37.50
	Community leadership and attitudes	37.50	62.50
	Availability and quality of schools	50.00	50.00
	Nearness to universities and colleges	37.50	62.50
	Recreation and cultural facilities	50.00	50.00
	Availability and cost of housing	62.50	37.50
	Real estate tax	62.50	37.50
	Effectiveness of protection facilities	37.50	62.50
	Climatic conditions	62.50	37.50

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

Apparently given today's level of technology and transportation facilities, which were _not_ mentioned as being important elements in the decision, in this industry materials and labor are ubiquitous. Thus, the plants were highly market oriented and located primarily close to an existing or potential market.

The factor, _effectiveness of protection facilities_, was considered by the respondents in this industry as of great influence in their location decision. In this industry, materials are usually highly inflammable. A fire may result in a high dollar loss to the plant, thus, protection facilities are an important economic locational factor. The degree of effectiveness of the protection facilities affects the fixed costs of the plant by influencing insurance rates.

During the decade, employment in this industry decreased both nationally and state-wide. The increase in employment and the establishment of new plants in the Tulsa Area apparently was the outgrowth of the expanding local economy and increased activity of the construction industry to meet the housing needs of rapid population growth. Thus, development of the Lumber and Wood Products Industry, in all probability, was the consequence of industrialization rather than the cause.

Furniture and Fixtures, SIC 25.

Between 1958 and 1969, twenty-seven establishments in this industry located in the Tulsa Area. These plants engaged in manufacturing household, office, public building, and restaurant furniture; and office and store fixtures. The twenty-seven plants produced nine products, as classified by the Standard Industrial Classification 4-digit Code. Fifty-five per cent of the plants primarily manufactured upholstered furniture on wood frames, or wood frames for upholstered furniture. These operations should not be confused with reupholstering shops or shops upholstering frames to individual order, as such activities are considered as nonmanufacturing industries.

The industry was primarily single product oriented. Seventy per cent of the establishments engaged in the manufacture of only one product. Six establishments were multi-industry operations. Of the multi-industry establishments, three manufactured products classified in the Fabricated Metal Products Industry. One establishment produced cutlery, hand tools and general hardward, in addition to the manufacture of metal household furniture. One establishment engaged in the manufacture of architectural and ornamental metal work such as stairs and staircases, fences and gates as well as metal household furnishings. One plant in addition to manufacturing mattresses and bedsprings, produced miscellaneous fabricated wire products from purchased wire, such as cages, clips and fasteners, kitchen wire goods, potato mashers, sieves, and so forth. In the latter situation, in all probability, the plant maximized its profit situation by making products from materials which otherwise would have to be considered as waste.

The twenty-seven plants created employment for 171 individuals. However, the establishments were extremely small in employee size. Six plants had ten employees and more; 21, or 77.8 per cent, employed less than ten persons.

The industry was local market oriented. Of the plants, 59.2 per cent limited their geographic market area to the local area. Apparently there is a sharp correlation between employee size and market area of the plants. All plants with ten or more employees identified their market area as either regional or nation-wide; the small employee size establishments identified their market area as the local area.

The industry was highly truck transport oriented. One hundred per cent of the respondents used truck facilities to both acquire materials and ship the finished product. This relationship is expected in view of the high degree of "local" market orientation and small size of the operations.

Of the 27 establishments only four were out-of-business by November 1969. Of these plants, three were engaged in manufacturing upholstered wood furniture, SIC 2512, and each was a "one-man-operation" selling in the local market. One plant employing 4 persons, engaged in the manufacture of wood partitions and fixtures.

The following location factors were considered by entrepreneurs in this industry as of great influence on their location judgment, (Table 20):

(1) Existing consumer market, and

(2) Potential consumer market.

The high degree of market orientation of plants in this industry supports the above factors as greatly influencing the site-selection. Of the respondents, eighty per cent cited the existing and potential consumer market was of great influence in their location decision, as shown by the data in Table 20. Sixty per cent also considered shipping cost of raw materials and finished product, and the attainment of a favorable competitive position as prime factors influencing their judgment.

Obviously the local economy strongly influenced development of this industry in the Tulsa Area. As measured by

TABLE 20

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 25, FURNITURE AND FIXTURES, 1958-1969.

Factor	Influence[a] Little	Great
I. Location of Production Materials:	80.00	20.00
Nearness to raw materials	60.00	40.00
Nearness to component parts	100.00	0.00
II. Labor Force:	80.00	20.00
Availability of skilled labor	80.00	20.00
Availability of unskilled labor	100.00	0.00
Potential for managerial labor	80.00	20.00
Attitudes and activities of labor unions	100.00	0.00
Wage Rates	80.00	20.00
III. Industrial Sites:	60.00	40.00
Accessibility and cost of:		
Industrial land	40.00	60.00
Developed industrial parks	60.00	40.00
IV. Transportation Facilities:	60.00	40.00
Availability and adequacy of:		
Airway facilities	80.00	20.00
Highway facilities	60.00	40.00
Railroad facilities	80.00	20.00
Pipeline facilities	100.00	0.00
Waterway facilities	80.00	20.00
Shipping costs of raw materials	40.00	60.00
Shipping costs of finished goods	40.00	60.00
V. Distributional Facilities:	80.00	20.00
Warehousing and storage facilities	100.00	0.00
Availability of wholesale outlets	80.00	20.00
VI. Market:	40.00	60.00
Existing consumer market	20.00	80.00
Potential consumer market	20.00	80.00

(See footnote at end of table.)

TABLE 20, (Continued)

	Factor	Influence[a] Little	Great
	Nearness to related industries	80.00	20.00
	Attainment of favorable competitive position	40.00	60.00
VII.	Water Supply and Waste Disposal Facilities:	80.00	20.00
	Availability of water supply	80.00	20.00
	Quality and dependability of water	80.00	20.00
	Cost of water	100.00	0.00
	Disposal facilities for industrial waste	80.00	20.00
VIII.	Governmental Structure and Attitudes:	100.00	0.00
	Nuisance and stream pollution laws	100.00	0.00
	Building ordinances	100.00	0.00
	Zoning codes	100.00	0.00
	Compensation laws	80.00	20.00
	Insurance laws and regulations	80.00	20.00
IX.	Tax Structure:	60.00	40.00
	Industrial property tax rates	60.00	40.00
	State corporate tax structure	60.00	40.00
	Local tax assessment basis	60.00	40.00
X.	Capital Structure:	80.00	20.00
	Availability of capital funds	60.00	40.00
	Attitudes of lending institutions	60.00	40.00
	Community industrial development projects	80.00	20.00
	Insurance rates	40.00	60.00
XI.	Industrial Fuels:	100.00	0.00
	Availability of coal, oil, gas, electricity	100.00	0.00
	Cost of industrial fuels	80.00	20.00
XII.	Community Environment:	80.00	20.00
	Community leadership and attitudes	80.00	20.00
	Availability and quality of schools	100.00	0.00
	Nearness to universities and colleges	100.00	0.00
	Recreation and cultural facilities	100.00	0.00
	Availability and cost of housing	60.00	40.00
	Real estate tax	60.00	40.00
	Effectiveness of protection facilities	80.00	20.00
	Climatic conditions	80.00	20.00

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

employment growth, this industry was a slow growth industry nationally. However, in the state, employment expanded rapidly, and of the state employment increase, 42.7 per cent of the increase (Table 13) was the result of new plants located in the Tulsa Area.

In all probability, again expansion of this industry is the consequence of the expanding local economy rather than the cause of industrialization. This premise is supported by increased activity in commercial construction in the area during the decade, and the high degree of local market orientation of the plants.

<u>Paper and Allied Products, SIC 26</u>.

One establishment in the Paper and Allied Products Industry located in The Greater Metropolitan Tulsa Area between 1958 and 1969. This establishment primarily manufactured corrugated and solid fiber boxes and related products from purchased paperboard of fiber stock, SIC 2653. The plant employed approximately thirty individuals, and distributed its products throughout a regional market. The establishment primarily used truck facilities to both acquire raw materials and distribute the finished product.

Historically, growth in this industry parallels total industrial output as fiber boxes are used by nearly all industries. However, the development of a waterproof fiber box and new machinery have recently revolutionized this industry.

The following location factors were cited as of great influence on his judgment by the entrepreneur responsible for the site selection, (Table 21):

(1) Availability and Cost of Industrial Lands

(2) Availability and Adequacy of Highway and Rail Transportation Facilities

(3) Availability of Capital Funds

(4) The Existing and Potential Market

(a) Attainment of a favorable competitive position in the industry

(5) Community Environment

Obviously the expanding local economy was important in the site selection of this plant. However, also of primary consideration was the attainment of a favorable competitive position in the industry which, in all probability, was fostered by Tulsa's central location in the nation. In the final plant location decision, consideration of these factors was apparently enhanced by the availability of capital funds and the community environment.

Employment growth trends in this industry were characterized as slow, nationally. The Tulsa Area expansion was con-

TABLE 21

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 26, PAPER AND ALLIED PRODUCTS, 1958-1969.

Factor	Influence[a] Little	Great
I. Location of Production Materials:	100.00	0.00
Nearness to raw materials	100.00	0.00
Nearness to component parts	100.00	0.00
II. Labor Force:	100.00	0.00
Availability of skilled labor	100.00	0.00
Availability of unskilled labor	100.00	0.00
Potential for managerial labor	100.00	0.00
Attitudes and activities of labor unions	100.00	0.00
Wage Rates	100.00	0.00
III. Industrial Sites:	0.00	100.00
Accessibility and cost of:		
Industrial land	0.00	100.00
Developed industrial parks	0.00	100.00
IV. Transportation Facilities:	0.00	100.00
Availability and adequacy of:		
Airway facilities	100.00	0.00
Highway facilities	0.00	100.00
Railroad facilities	0.00	100.00
Pipeline facilities	100.00	0.00
Waterway facilities	100.00	0.00
Shipping costs of raw materials	100.00	0.00
Shipping costs of finished goods	100.00	0.00
V. Distributional Facilities:	100.00	0.00
Warehousing and storage facilities	100.00	0.00
Availability of wholesale outlets	100.00	0.00
VI. Market:	0.00	100.00
Existing consumer market	0.00	100.00
Potential consumer market	0.00	100.00

(See footnote at end of table.)

TABLE 21, (Continued)

	Factor	Influence[a] Little	Great
	Nearness to related industries	100.00	0.00
	Attainment of favorable competitive position	0.00	100.00
VII.	Water Supply and Waste Disposal Facilities:	100.00	0.00
	Availability of water supply	100.00	0.00
	Quality and dependability of water	100.00	0.00
	Cost of water	100.00	0.00
	Disposal facilities for industrial waste	100.00	0.00
VIII.	Governmental Structure and Attitudes:	100.00	0.00
	Nuisance and stream pollution laws	100.00	0.00
	Building ordinances	100.00	0.00
	Zoning codes	100.00	0.00
	Compensation laws	100.00	0.00
	Insurance laws and regulations	100.00	0.00
IX.	Tax Structure:	100.00	0.00
	Industrial property tax rates	100.00	0.00
	State corporate tax structure	100.00	0.00
	Local tax assessment basis	100.00	0.00
X.	Capital Structure:	100.00	0.00
	Availability of capital funds	0.00	100.00
	Attitudes of lending institutions	100.00	0.00
	Community industrial development projects	100.00	0.00
	Insurance rates	100.00	0.00
XI.	Industrial Fuels:	100.00	0.00
	Availability of coal, oil, gas, electricity	100.00	0.00
	Cost of industrial fuels	100.00	0.00
XII.	Community Environment:	0.00	100.00
	Community leadership and attitudes	0.00	100.00
	Availability and quality of schools	0.00	100.00
	Nearness to universities and colleges	0.00	100.00
	Recreation and cultural facilities	0.00	100.00
	Availability and cost of housing	0.00	100.00
	Real estate tax	100.00	0.00
	Effectiveness of protection facilities	100.00	0.00
	Climatic conditions	0.00	100.00

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

sistent with the national growth trend and, in all probability, was brought about by the developing local economy.

Printing and Publishing, SIC 27.

In the Printing and Publishing Industry, thirty-eight establishments were located in the Tulsa Area between 1958 and 1969. These plants engaged in printing by one or more of the common processes; such as letterpress, lithography, gravure, or screen; and performed services for the printing trade, such as bookbinding, typesetting, engraving, photo-engraving, and electrotyping. This major industry group also includes establishments engaged in publishing newspapers, books, and periodicals, regardless of whether or not they do their own printing. The thirty-eight establishments produced 11 products, as classified by the Standard Industrial Classification 4-digit Code.

Seventeen of the thirty-three establishments primarily engaged in commercial or job printing, except lithographic, SIC 2751. Plants in this classification included general printing shops, as well as shops specializing in printing newspapers and periodicals for others, and those which specialize in gravure, rotogravure, and screen printing. Sixteen of the thirty-three Commercial Printing establishments engaged primarily in printing by the lithographic process, SIC 2752. The greater part of the work of these plants was performed on a job or custom basis, but in some cases lithographed calendars, maps, posters, decalcominaias, etc. were made for sale.

The plants primarily manufactured a single product, and created employment for 261 persons. However, the plants were of extremely small employee size. Only four of the establishments had ten employees and more.

The plants were basically local market oriented. Fifty per cent of the establishments offered their product for sale within the local geographic market area. Twenty-one per cent of the establishments offered their products for sale on a nation-wide basis.

A relationship is apparent between employee size and market area. Of the plants selling in the national market, seventy-five per cent employed ten or more persons. The small employee size plants primarily limited their geographic market to the local area.

The data in Table 22 indicate the 4-digit classification of plants located in the area during the decade.

TABLE 22

SIC 27, PRINTING, PUBLISHING, AND ALLIED INDUSTRIES PLANTS LOCATED IN THE GREATER METROPOLITAN TULSA AREA: BY 4-DIGIT CLASSIFICATION, 1958 - 1969.

SIC	Product	Number
2711	Newspapers	2
2731	Book Publishing and Printing	5
2752	Printing, Lithographic	16
2761	Manifold Business Forms	3

Source: Appendix Table 3.

The newspaper plants, SIC 2711, identified their geographic market area as "local". The recent establishment of newspaper plants in the Area was consistent with a basic trend underlying this industry. In the past decade, there has been an explosion in the interest and need for the printed work, reflecting the rapidly growing and better educated population and the increasing complexity of an advanced technological environment. Since both the rate of population increase and the median level of education of persons twenty-five and over, living in the Greater Tulsa Area, was higher than that for the nation as a whole, expansion of this industry, was consistent with the national growth pattern.

In the book publishing and printing category, SIC 2731, plants located in the area likewise identified their market area as the "local" region. Apparently, the local environment greatly influenced the local expansion of this industry. Educational needs and demands of a rapidly growing population were an importnat element in the growth of this industry.

The rapid expansion of the lithographic printing category SIC 2752, both on the national level and the local level, was a consequence of rising expenditures for printed advertising, development of photographic typesetting, which lends itself well to the lithographic process, lower preparation costs, coupled with the demand for more color in all printing. Again, the expanding local economy of the Tulsa Area stimulated the development of this industry at the local level and enhanced the local market orientation of lithographic printing establishments.

Establishment of Manifold Business Forms plants, SIC 2761, also reflected the national growth trend of the industry. Growth in this industry was primarily attributed to the tremendous upsurge in the use of computers and other automated data processing equipment by both business and government. The growing complexity and size of business and government generates increasing need for improved internal control. Such improved controls also results in the need for forms to be used by businesses in the procurement, regulation, control, and taxation activities. In addition, the growth of credit card use has greatly stimulated this industry.

The establishments in this industry were primarily truck transport oriented, both as a means of acquiring materials and component parts, and to distribute the finished product. One firm, engaged in aerial commercial printing services, acquired their needed materials and distributed their finished products by air transport facilities. However, this was a unique operation within the industry.

Of the thirty-eight establishments, only two plants were out-of-business by November, 1969. Thus, 94.8 per cent of the establishments survived.

Of the respondents to the questionnaire, one hundred per cent cited the factor, the <u>market situation</u> was of great influence in their Tulsa Area site selection, (Table 23). The existing consumer market ranked second in importance: Ninety-one per cent of the respondents cited the existing market was of great influence in their location decision; and eighty-three per cent indicated the potential consumer market also was important in this plant site selection, (Table

TABLE 23

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 27, PRINTING AND PUBLISHING, 1958-1969.

Factor	Influence[a] Little	Great
I. Location of Production Materials:	92.86	7.14
Nearness to raw materials	85.72	14.28
Nearness to component parts	78.58	21.42
II. Labor Force:	71.43	28.57
Availability of skilled labor	78.57	21.43
Availability of unskilled labor	92.86	7.14
Potential for managerial labor	100.00	0.00
Attitudes and activities of labor unions	85.72	14.28
Wage Rates	85.72	14.28
III. Industrial Sites:	85.72	14.28
Accessibility and cost of:		
Industrial land	78.57	21.43
Developed industrial parks	85.72	14.28
IV. Transportation Facilities:	64.30	35.70
Availability and adequacy of:		
Airway facilities	85.72	14.28
Highway facilities	57.15	42.85
Railroad facilities	92.86	7.14
Pipeline facilities	92.86	7.14
Waterway facilities	92.86	7.14
Shipping costs of raw materials	64.30	35.70
Shipping costs of finished goods	57.14	42.86
V. Distributional Facilities:	78.57	21.43
Warehousing and storage facilities	85.72	14.28
Availability of wholesale outlets	71.43	28.57
VI. Markets:	0.00	100.00
Existing consumer market	14.30	85.70
Potential consumer market	21.43	78.57

(See footnote at end of table.)

TABLE 23, (Continued)

	Factor	Influence[a] Little	Great
	Nearness to related industries	42.86	57.14
	Attainment of favorable competitive position	28.57	71.43
VII.	Water Supply and Waste Disposal Facilities:	78.57	21.43
	Availability of water supply	71.43	28.57
	Quality and dependability of water	78.57	21.43
	Cost of water	85.72	14.28
	Disposal facilities for industrial waste	85.72	14.28
VIII.	Governmental Structure and Attitudes:	71.43	28.57
	Nuisance and stream pollution laws	85.72	14.28
	Building ordinances	71.43	28.57
	Zoning codes	71.43	28.57
	Compensation laws	85.72	14.28
	Insurance laws and regulations	85.72	14.28
IX.	Tax Structure:	71.43	28.57
	Industrial property tax rates	71.43	28.57
	State corporate tax structure	78.57	21.43
	Local tax assessment basis	64.30	35.70
X.	Capital Structure:	78.57	21.43
	Availability of capital funds	78.57	21.43
	Attitudes of lending institutions	78.57	21.43
	Community industrial development projects	92.86	7.14
	Insurance rates	85.72	14.28
XI.	Industrial Fuels:	71.43	28.57
	Availability of coal, oil, gas, electricity	57.14	42.86
	Cost of industrial fuels	64.30	35.70
XII.	Community Environment:	50.00	50.00
	Community leadership and attitudes	42.86	57.14
	Availability and quality of schools	35.72	64.28
	Nearness to universities and colleges	50.00	50.00
	Recreation and cultural facilities	57.14	42.86
	Availability and cost of housing	50.00	50.00
	Real estate tax	57.14	42.86
	Effectiveness of protection facilities	50.00	50.00
	Climatic conditions	50.00	50.00

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

23). The high degree of local market orientation substantiates and is consistent with citing these factors as influential on the judgment of the entrepreneurs seeking plant location. Apparently, in this industry the local economy strongly influenced establishment of plants in the area.

Of the respondents with ten or more employees, 100 per cent cited the following location factors as of great influence on their location decision:

(1) Availability and adequacy of transportation facilities

(2) Shipping costs of raw materials and finished goods

(3) Market Situation

(4) Tax Structure

  (a) Local Tax Assessment Rate

(5) Availability of Industrial fuels (electricity).

National and state-wide employment growth in this industry is characterized as slow. However, of the total increase in state employment, 25.9 per cent of the increase (Table 13) is attributed to the new Tulsa Area plants. Obviously, easy entry was possible in this industry. Although entrepreneurs locating larger employee size plants were influenced by a wider range of economic factors, nevertheless, the expanding local economy apparently was the prime stimuli to development of this industry.

Chemicals and Allied Products, SIC 28.

Between 1958 and 1969, seven establishments in the Chemical and Allied Products Industry located in the Greater Metropolitan Tulsa Area. Plants in this industry produced basic chemicals, and manufactured products by predominantly chemical processes. The seven plants produced six products, as classified by the Standard Industrial Classification 4-digit Code. They were:

SIC 2821, Plastic Materials, Synthetic Resins, and Elastomers;

SIC 2841, Soap and Other Detergents, Except Specialty Cleaners;

SIC 2842, Specialty Cleaning, Polishing, and Sanitation Preparations, Except Soap and Detergents;

SIC 2851, Paints, Varnishes, Lacquers, Enamels, and Allied Products;

SIC 2879, Agricultural Pesticides, and Other Agricultural Chemicals; and

SIC 2899, Chemicals and Chemical Preparations, Not Elsewhere Classified.

The industry was primarily single product oriented. None of the establishments were multi-industry. This feature was unique to this industry. Although establishments usually were characterized primarily as single industry establishments, in general, one or more plants engaged in the manufacture of products classified in two or more industries.

The seven plants created employment for 112 persons. The establishments were, however, relatively small in employee size. Of the seven plants, seventy-one per cent employed less than ten persons; twenty-nine per cent employed ten or more individuals.

The plants were national market oriented. Of the establishments, 71.4 per cent indicated their geographic market area was nation-wide. Apparently a relationship between the employee size of the plant and market area does not exist as some of the smallest establishments as well as the largest plants, when measured by employee size, indicated they offered their products on the national market. None of the plants indicated they offered their product for sale only within the local market area.

The industry primarily used truck transport facilities both to acquire raw materials and distribute the finished product. One plant indicated its primary form of transportation was rail facilities to both acquire materials and distribute the finished product.

In November, 1969, all the plants were in-business. Thus, the survival rate in this industry is one-hundred per cent.

The following factors were cited as of great influence on their site selection by entrepreneurs who established plants in the area, (Table 24):

(1) Availability and adequacy of highway facilities,

(2) Availability and quality of schools, and

(3) Nearness to universities and colleges.

The high degree of truck transport orientation of the plants, as well as the nation-wide market area of the establishments supports the importance of the factor, <u>availability and adequacy of highway facilities</u>, as an influential force in the site-selection. Of the plants with ten or more employees, 100 per cent indicated this factor was of prime consideration in their location decision. Since this industry is basically science oriented, consideration of educational facilities as influential factors in the location decision was consistent with the industry's characteristics.

The entrepreneurs of relatively small employee size plants were swayed by three additional factors. Of these respondents, 80.0 per cent indicated the following factors greatly influenced their site-selection:

TABLE 24

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 28, CHEMICALS AND ALLIED PRODUCTS, 1958-1969.

Factor	Influence[a] Little	Great
I. Location of Production Materials:	75.00	25.00
Nearness to raw materials	75.00	25.00
Nearness to component parts	75.00	25.00
II. Labor Force:	75.00	25.00
Availability of skilled labor	62.50	37.50
Availability of unskilled labor	75.00	25.00
Potential for managerial labor	87.50	12.50
Attitudes and activities of labor unions	100.00	0.00
Wage Rates	100.00	0.00
III. Industrial Sites:	87.50	12.50
Accessibility and cost of:		
Industrial land	75.00	25.00
Developed industrial parks	100.00	0.00
IV. Transportation Facilities:	37.50	62.50
Availability and adequacy of:		
Airway facilities	87.50	12.50
Highway facilities	14.20	85.80
Railroad facilities	50.00	50.00
Pipeline facilities	100.00	0.00
Waterway facilities	87.50	12.50
Shipping costs of raw materials	75.00	25.00
Shipping costs of finished goods	62.50	37.50
V. Distributional Facilities:	75.00	25.00
Warehousing and storage facilities	87.50	12.50
Availability of wholesale outlets	87.50	12.50
VI. Market:	62.50	37.50
Existing consumer market	50.00	50.00
Potential consumer market	50.00	50.00

(See footnote at end of table.)

TABLE 24, (Continued)

	Factor	Influence[a] Little	Great
	Nearness to related industries	87.50	12.50
	Attainment of favorable competitive position	62.50	37.50
VII.	Water Supply and Waste Disposal Facilities:	100.00	0.00
	Availability of water supply	100.00	0.00
	Quality and dependability of water	87.50	12.50
	Cost of water	100.00	0.00
	Disposal facilities for industrial waste	100.00	0.00
VIII.	Governmental Structure and Attitudes:	100.00	0.00
	Nuisance and stream pollution laws	100.00	0.00
	Building ordinances	87.50	12.50
	Zoning codes	87.50	12.50
	Compensation laws	100.00	0.00
	Insurance laws and regulations	87.50	12.50
IX.	Tax Structure:	87.50	12.50
	Industrial property tax rates	87.50	12.50
	State corporate tax structure	87.50	12.50
	Local tax assessment basis	75.00	25.00
X.	Capital Structure:	50.00	50.00
	Availability of capital funds	37.50	62.50
	Attitudes of lending institutions	50.00	50.00
	Community industrial development projects	87.50	12.50
	Insurance rates	75.00	25.00
XI.	Industrial Fuels:	87.50	12.50
	Availability of coal, oil, gas, electricity	87.50	12.50
	Cost of industrial fuels	87.50	12.50
XII.	Community Environment:	50.00	50.00
	Community leadership and attitudes	37.50	62.50
	Availability and quality of schools	28.50	71.50
	Nearness to universities and colleges	28.50	71.50
	Recreation and cultural facilities	62.50	37.50
	Availability and cost of housing	50.00	50.00
	Real estate tax	62.50	37.50
	Effectiveness of protection facilities	37.50	62.50
	Climatic conditions	37.50	62.50

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

(1) Capital structure,

(a) Availability of capital funds,

(b) Attitudes of lending institutions,

(2) Effectiveness of protection facilities, and

(3) Climatic conditions.

All the above factors affect the fixed costs of operation. Availability of capital funds and favorable attitudes of lending institutions, as developed by Greenhut, may result from personal contact or from personal knowledge by the lender of the entrepreneurs background, thus fostering a location advantage. Therefore, local funds may be available which would not be available in another location.

The chemical and allied products industry is highly susceptible to catastrophic fires. A fire in a chemical plant may mean the loss of material goods and perhaps life. The degree of effectiveness of protection facilities influences the fixed costs of the plant by affecting the insurance rates and degree of risk of the entrepreneur.

Climatic conditions, in all probability, was a nonpecuniary factor. However, climate is known to affect chemical content mix, and consequently the cost of storage facilities. Thus, climatic conditions may also have an impact on the fixed costs of the establishments.

During the decade, state employment in this industry decreased, and employment growth nationally was less than the all-industries average. Apparently, a location advantage relative to other locations in the form of highway facilities, availability of capital funds, effectiveness of protection facilities, and climatic conditions was realized by plants locating in the area. This premise is supported by the fact that although state employment decreased, the recently established plants created 112 new jobs and marketed their products nation-wide.

Petroleum Refining and Related Industries, SIC 29.

In this industry, three establishments located in the Tulsa Area. These plants primarily engaged in petroleum refining, manufacturing paving and roofing materials, and compounding lubricating oils and greases from purchased materials. The three plants produced three products, as classified by the Standard Industrial Classification 4-digit Code. Each plant manufactured a single product. They were: SIC 2911, Petroleum Refining; SIC 2951, Paving Mixtures and Blocks; and SIC 2992, Lubricating Oils and Grease.

The plants were extremely small in employee size, creating a total employment for only 13 persons. They confined market area to either the state or regional geographic area. All plants were in business as of November, 1969.

Since none of the entrepreneurs establishing these operations responded to the questionnaire, the factors influencing the site selection cannot be identified.

Rubber and Miscellaneous Plastic Products, SIC 30

In this industry, between 1958 and 1969, twenty-one establishments located in the Tulsa Area. Establishments in this industry manufactured 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. The establishments also manufactured or rebuilt retreaded tires, but automobile tire repair shops engaged in recapping and retreading automobile tires are excluded, as they are classified as a service industry rather than manufacturing. In addition to the above rubber products, plants molded primary plastics and manufactured miscellaneous finished plastic products.

The twenty-one plants produced two products, as classified by the Standard Industrial Classification 4-digit Code. They were SIC 3068, Rubber Products and SIC 3079, Plastic

Products. Ninety per cent of the plants primarily molded and fabricated plastic products; ten per cent, manufactured industrial and mechanical rubber goods, rubberized fabrics and vulcanized rubber clothing and miscellaneous rubber specialties and sundries.

One rubber products plant was a multi-industry operation. In addition to manufacturing rubber products, this establishment also manufactured Special Dies and Tools, on a job or order basis, SIC 3544. Although the manufacture of the two products might seem incongruous, establishments classified in SIC 3544 manufacture not only metal molds for use with foundry plaster working, plastic working, and glass working but also rubber working and similar machinery. Thus, a plant primarily manufacturing rubber products, when making their own molding machinery, logically might also manufacture molds for rubber working.

Of the nineteen establishments manufacturing plastic products, 73.7 per cent of the plants are single product operations. The remaining 26.3 per cent are multi-industry plants. The six multi-industry establishments, in addition to primarily manufacturing plastic products produced the following products: SIC 2341, Women's and Children's Underwear; SIC 2431, Millwork; SIC 2541, Wood Partitions and

Fixtures; SIC 3281, Cut Stone and Stone Products; SIC 3461, Metal Stampings; and SIC 3672, Cathode Ray Picture Tubes.

The Rubber and Miscellaneous Plastic Products Industry created employment for 869 persons. The plants were relatively large in employee size. Of the twenty-one plants, 66.67 per cent employed ten and more persons, and 3 establishments employed approximately 600 individuals.

Apparently there is a relationship between the employee size of the plant and the market area. The extremely small employee size establishments specified their market to be the local geographic area. The larger establishments offered their products on the world-wide market. The plants primarily offered their products for sale on the national or export market.

The plants were basically truck transport oriented. Of the respondents, ninety per cent primarily used truck transportation facilities to acquire raw materials and component parts. The remaining 10 per cent acquired the raw materials by air transport. However, to distribute the finished good, sixty per cent of the respondents used truck transport facilities, and forty per cent used rail facilities. In general, the industry was primarily truck transport oriented, although rail transport facilities played an important role in this industry. The establishments producing rubber products primarily used truck transport facilities both to acquire raw materials and distribute the finished product.

Of the twenty-one establishments located in the area, 91.5 per cent survived. Only two establishments were out-of-business by November, 1969. Both establishments engaged in the manufacture of plastics products. One operation was a multi-industry plant, employing ten persons. The other a single product plant, employing 3 persons.

The following location factors were cited by seventy per cent of the respondents as of great influence on their Tulsa Area location decision, (Table 25):

(1) availability of labor force,

(2) availability and adequacy of highway facilities,

(3) attainment of a favorable competitive position in the industry,

(4) community environment,

(a) community leadership and attitudes, and

(b) availability and cost of housing.

The above factors were consistent with the characteristics of the plants in the industry. Since the majority of the establishments employed ten or more persons, and three of the plants employed approximately 600 individuals, consideration of availability of labor, naturally, was of prime

TABLE 25

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 30, RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS, 1958-1969.

Factor	Influence[a] Little	Great
I. Location of Production Materials:	90.00	10.00
Nearness to raw materials	80.00	20.00
Nearness to component parts	80.00	20.00
II. Labor Force:	30.00	70.00
Availability of skilled labor	50.00	50.00
Availability of unskilled labor	50.00	50.00
Potential for managerial labor	60.00	40.00
Attitudes and activities of labor unions	70.00	30.00
Wage Rates	70.00	30.00
III. Industrial Sites:	60.00	40.00
Accessibility and cost of:		
Industrial land	60.00	40.00
Developed industrial parks	90.00	10.00
IV. Transportation Facilities:	40.00	60.00
Availability and adequacy of:		
Airway facilities	80.00	20.00
Highway facilities	30.00	70.00
Railroad facilities	70.00	30.00
Pipeline facilities	90.00	10.00
Waterway facilities	90.00	10.00
Shipping costs of raw materials	70.00	30.00
Shipping costs of finished goods	50.00	50.00
V. Distributional Facilities:	100.00	0.00
Warehousing and storage facilities	100.00	0.00
Availability of wholesale outlets	100.00	0.00
VI. Market:	40.00	60.00
Existing consumer market	40.00	60.00
Potential consumer market	40.00	60.00

(See footnote at end of table.)

TABLE 25, (Continued)

Factor	Influence[a] Little	Great
Nearness to related industries	40.00	60.00
Attainment of favorable competitive position	30.00	70.00
VII. Water Supply and Waste Disposal Facilities:	90.00	10.00
Availability of water supply	90.00	10.00
Quality and dependability of water	80.00	20.00
Cost of water	80.00	20.00
Disposal facilities for industrial waste	90.00	10.00
VIII. Governmental Structure and Attitudes:	60.00	40.00
Nuisance and stream pollution laws	80.00	20.00
Building ordinances	70.00	30.00
Zoning codes	70.00	30.00
Compensation laws	60.00	40.00
Insurance laws and regulations	60.00	40.00
IX. Tax Structure:	70.00	30.00
Industrial property tax rates	70.00	30.00
State corporate tax structure	70.00	30.00
Local tax assessment basis	80.00	20.00
X. Capital Structure:	70.00	30.00
Availability of capital funds	60.00	40.00
Attitudes of lending institutions	50.00	50.00
Community industrial development projects	60.00	40.00
Insurance rates	70.00	30.00
XI. Industrial Fuels:	70.00	30.00
Availability of coal, oil, gas, electricity	70.00	30.00
Cost of industrial fuels	70.00	30.00
XII. Community Environment:	30.00	70.00
Community leadership and attitudes	30.00	70.00
Availability and quality of schools	50.00	50.00
Nearness to universities and colleges	40.00	60.00
Recreation and cultural facilities	40.00	60.00
Availability and cost of housing	30.00	70.00
Real estate tax	40.00	60.00
Effectiveness of protection facilities	50.00	50.00
Climatic conditions	60.00	40.00

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

concern to the entrepreneurs of these establishments. Availability of skilled and unskilled labor was specified as of secondary importance in the location decision. In general, the attitude of management in this industry was, "we have to train our own labor in this industry. The necessary skills are not found in the area."[1]

The relatively large employee size of the plants in this industry, as compared to the employee size of establishments in other industries in the area, intensified the importance of the factor, availability and cost of housing, as an element of prime consideration in the site-selection of these plants.

Since the majority of the establishments were nationwide market oriented, the central location of the Tulsa Area in the nation, in all probability, was a cost advantage. However, the industry was primarily truck transport oriented, thus, if the central location was to be an advantage, consideration of highway transportation facilities were also of importance in the location judgment of the entrepreneurs. Apparently, the combination of Tulsa's national central location and adequate highway facilities resulted in the concurrence of seventy per cent of the respondents that by locating in the Tulsa Area they attained a favorable competitive position in the industry.

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[1]Interview with the President of Appollo Rubber Company, March, 1970.

Complementing and supporting the obvious cost factors, seventy per cent of the respondents, (Table 25) cited the non-pecuniary factors: (a) community environment, and (b) community leadership and attitudes were also of great influence in their location judgment.

Measured by employment growth, this industry was characterized as a rapid growth industry nationally. Obviously, the Tulsa Area shared in the national growth. Expansion of this industry is explained, in part, on the basis of relatively low cost materials and ability to tailor the material to specific needs. The capital required to set up a processing operation is relatively small. Although technology and skills are necessary, they are not formidable obstacles. The relative ease of entry into this industry, in all probability, contributed to its growth.

In view of the nation-wide market orientation of the plants in this industry, apparently, during the decade plants in the Tulsa Area realized a location advantage relative to other regions in the form of: available labor force; adequate highway facilities; housing costs; and, in all probability the most important advantage, the central national location fostering the attainment of a favorable competitive position in the industry.

Stone, Clay, Glass, and Concrete Products, SIC 32

In this industry, between 1958 and 1969, twenty-nine establishments located in the Tulsa Area. Establishments in this industry manufactured plate 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.

The twenty-nine establishments produced nine products, as classified by the Standard Industrial Classification 4-digit Code. They were:

SIC 3229, Pressed and Blown Glass and Glassware;

SIC 3231, Glass Products, Made of Purchased Glass;

SIC 3241, Cement, Hydraulic;

SIC 3264, Porcelain Electrical Supplies;

SIC 3269, Pottery Products;

SIC 3272, Concrete Products, Except Block and Brick;

SIC 3273, Ready-Mixed Concrete;

SIC 3281, Cut Stone and Stone Products; and

SIC 3295, Minerals and Earths, Ground or Otherwise Treated.

Forty-four per cent of the plants manufactured concrete products, except block and brick, and Portland cement concrete, manufactured and delivered to a purchaser in a plastic and unhardened state. This industry included production and sale of central-mixed concrete, shrink-mixed concrete and transit-mixed concrete, SIC 2372 and 2373. The majority of the plants manufacturing these products offered their goods for sale within the local geographic market area.

The plants were primarily single product operations. Of the twenty-nine plants, 82.6 per cent manufactured one product. Five plants were multi-industry establishments. In addition to primarily engaging in stone, clay, glass, and concrete products, the five plants also manufactured:

SIC 2499, Wood Products;

SIC 2514, Metal Household Furniture;

SIC 3079, Plastic Products;

SIC 3433, Heating Equipment, Except Electric;

SIC 3499, Fabricated Metal Products; and

SIC 3679, Electronic Components.

The twenty-nine plants created employment for 414 persons. The establishments were of relatively small employee size: 58.6 per cent employed less than ten persons; 41.4 per cent employed ten or more individuals.

The plants were primarily local market oriented. Only two plants offered their product on a nation-wide basis. These plants manufactured pressed and blown glass, SIC 3229, and cement, hydraulic, SIC 3241.

The questionnaire elicited a 24.1 per cent response rate. The relatively low response rate, in all probability, was the consequence of the relatively small employee size of the establishments combined with the local market orientation.

The industry was highly truck transport facilities oriented. All of the respondents indicated they primarily used truck facilities to acquire their raw materials. With the exception of one plant, the respondents also indicated truck transport facilities were the primary means by which they distributed the finished goods. This one exception manufactured SIC 3241, Cement, hydraulic, and used rail facilities as the primary means of distributing its finished product throughout the nation-wide market.

Of the twenty-nine establishments, three were out-of-business by November, 1969. Thus, the survival rate was 89.5 per cent.

The following location factors were cited by entrepreneurs in this industry as greatly influencing their location judgment, (Table 26):

(1) Attainment of Favorable Competitive Position

(2) Potential Consumer Market

(3) Nearness to Related Industries

One-hundred per cent of the respondents cited the factor, attainment of a favorable competitive position in the

TABLE 26

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 32, STONE, CLAY, GLASS, AND CONCRETE PRODUCTS, 1958-1969.

Factor	Influence[a] Little	Great
I. Location of Production Materials:	85.72	14.28
Nearness to raw materials	71.43	28.57
Nearness to component parts	100.00	0.00
II. Labor Force:	85.72	14.28
Availability of skilled labor	85.72	14.28
Availability of unskilled labor	57.14	42.86
Potential for managerial labor	71.43	28.57
Attitudes and activities of labor unions	71.43	28.57
Wage Rates	71.43	28.57
III. Industrial Sites:	85.72	14.28
Accessibility and cost of:		
Industrial land	57.14	42.86
Developed industrial parks	100.00	0.00
IV. Transportation Facilities:	71.43	28.57
Availability and adequacy of:		
Airway facilities	85.72	14.28
Highway facilities	57.14	42.86
Railraod facilities	42.86	57.14
Pipeline facilities	85.72	14.28
Waterway facilities	85.72	14.28
Shipping costs of raw materials	71.43	28.57
Shipping costs of finished goods	42.86	57.14
V. Distributional Facilities:	71.43	28.57
Warehousing and storage facilities	57.14	42.86
Availability of wholesale outlets	71.43	28.57
VI. Market:	28.57	71.43
Existing consumer market	28.57	71.43
Potential consumer market	14.30	85.70

(See footnote at end of table.)

TABLE 26, (Continued)

Factor	Influence[a] Little	Great
Nearness to related industries	14.30	85.70
Attainment of favorable competitive position	0.00	100.00
VII. Water Supply and Waste Disposal Facilities:	85.72	14.28
Availability of water supply	85.72	14.28
Quality and dependability of water	85.72	14.28
Cost of water	100.00	0.00
Disposal facilities for industrial waste	100.00	0.00
VIII. Governmental Structure and Attitudes:	57.14	42.86
Nuisance and stream pollution laws	57.14	42.86
Building ordinances	57.14	42.86
Zoning codes	57.14	42.86
Compensation laws	71.43	28.57
Insurance laws and regulations	71.43	28.57
IX. Tax Structure:	57.14	42.86
Industrial property tax rates	42.86	57.14
State corporate tax structure	57.14	42.86
Local tax assessment basis	57.14	42.86
X. Capital Structure:	42.86	57.14
Availability of capital funds	28.57	71.43
Attitudes of lending institutions	42.86	57.14
Community industrial development projects	85.72	14.28
Insurance rates	71.43	28.57
XI. Industrial Fuels:	57.14	42.86
Availability of coal, oil, gas, electricity	57.14	42.86
Cost of industrial fuels	57.14	42.86
XII. Community Environment:	57.14	42.86
Community leadership and attitudes	42.86	57.14
Availability and quality of schools	71.43	28.57
Nearness to universities and colleges	71.43	28.57
Recreation and cultural facilities	71.43	28.57
Availability and cost of housing	71.43	28.57
Real estate tax	57.14	42.86
Effectiveness of protection facilities	57.14	42.86
Climatic conditions	28.57	71.43

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

industry was of great influence in their plant location decision. The factors, potential consumer market and nearness to related industries, were cited as of great influence in the location decision by 85.72 per cent of the respondents, (Table 26).

The strong local market orientation of the establishments supports the importance of these factors, and was intensified by the response of the establishments with less than ten employees. Of the respondents with ten or less employees, 100 per cent cited the factor, existing consumer market, was of prime consideration in their plant location decision.

The entrepreneurs of plants with ten or more employees in addition to the above factors considered the factors: (a) availability of capital funds, and (b) attitudes of lending institutions of great influence in their Tulsa Area site-selection.

The entrepreneurs locating the smaller size employee plants may have been individuals established in the community. Typically, plants of relative small employee size often are started by the entrepreneurs "own-funds"; or established reputations of businessmen in the community ameliorates the problem of capital funding, thus apparently among the small employee plant entrepreneurs, capital was not a factor in the location decision.

Measured by employment growth, this industry was characterized as a slow growth industry both nationally and state-wide. However, of the total increase in state employment, 201.5 per cent of the increase was attributed to the new plants located in the Tulsa Area. Although raw materials essential to this industry such as sand, gravel, gypsum, lime stone, and clay are deposited in the Tulsa Area and are easily accessible, this factor was cited by only 14.2 per cent of the entrepreneurs as of influence in their location decision, (Table 26).

Obviously, the expanding local economy and simultaneous expansion of the construction industry, in all probability, stimulated the development of this industry in the Tulsa Area. The significent local market orientation of the plants supports this premise.

Primary Metal Industries, SIC 33

Between 1958 and 1969, in this industry eight establishments located in the Tulsa Area. This industry included plants engaged in smelting and refining ferrous and nonferrous metals from ore, pig, or scrap; in rolling, drawing, and alloying ferrous and nonferrous metals; in manufacturing castings, forgings, and other basic products of ferrous and nonferrous metals; and in manufacturing nails, spikes, and insulated wire and cable. The eight plants produced six products, as classified by the Standard Industrial Classification 4-digit Code. The plants were primarily single product operations.

The eight plants created employment for 179 persons. Fifty per cent of the plants employed less than ten persons; fifty per cent employed ten or more individuals.

No dominant market orientation is apparent. One plant offered its products for sale in the world-wide market. As might be anticipated this particular firm was the largest employer in the industry and engaged in rolling, drawing and extruding of nonferrous metals, except copper and aluminum. The other plants sold their products over a wide geographic market range without a dominant trend revealed relevant to market area.

The questionnaire elicited a fifty per cent response rate. Seventy-five per cent of the larger employee size plants responded to the questionnaire. Twenty per cent of the smaller employee size plants responded, thus the study basically reflects the attitudes of entreprenuers of the larger operations.

The industry was definitely truck transport oriented. One hundred per cent of the respondents primarily used truck transport facilities to acquire the raw materials and component parts, and fifty per cent primarily used truck facilities to distribute the products to market. Rail transport facilities primarily were used by the other plants to distribute their finished product. Of the plants using rail facilities one offered its products in the nation-wide market, the other within the regional area.

Of the eight establishments located in the Tulsa Area between 1958 and 1969, all of the establishments were "doing-business" by November, 1969, Thus, a 100 per cent survival rate.

Seventy-five per cent of the respondents considered the following factors to be of great influence in their plant location decision, (Table 27):

(1) Availability and Cost of Industrial Land

(2) Market Situation

(a) Nearness to Related Industries

(b) Attainment of a Favorable Competitive Position

(3) Community Leadership and Attitudes

The availability and cost of industrial land, as a prime factor in the location decision, was accentuated by

TABLE 27

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 33, PRIMARY METAL INDUSTRIES, 1958-1969.

Factor	Influence[a] Little	Influence[a] Great
I. Location of Production Materials:	75.00	25.00
Nearness to raw materials	75.00	25.00
Nearness to component parts	75.00	25.00
II. Labor Force:	75.00	25.00
Availability of skilled labor	75.00	25.00
Availability of unskilled labor	75.00	25.00
Potential for managerial labor	75.00	25.00
Attitudes and activities of labor unions	75.00	25.00
Wage Rates	75.00	25.00
III. Industrial Sites:	25.00	75.00
Accessibility and cost of:		
Industrial land	25.00	75.00
Developed industrial parks	50.00	50.00
IV. Transportation Facilities:	50.00	50.00
Availability and adequacy of:		
Airway facilities	100.00	0.00
Highway facilities	50.00	50.00
Railroad facilities	50.00	50.00
Pipeline facilities	100.00	0.00
Waterway facilities	100.00	0.00
Shipping costs of raw materials	50.00	50.00
Shipping costs of finished goods	50.00	50.00
V. Distributional Facilities:	100.00	0.00
Warehousing and storage facilities	100.00	0.00
Availability of wholesale outlets	100.00	0.00
VI. Market:	25.00	75.00
Existing consumer market	50.00	50.00
Potential consumer market	50.00	50.00

(See footnote at end of table.)

TABLE 27, (Continued)

Factor	Influence[a] Little	Great
Nearness to related industries	25.00	75.00
Attainment of favorable competitive position	25.00	75.00
VII. Water Supply and Waste Disposal Facilities:	100.00	0.00
Availability of water supply	100.00	0.00
Quality and dependability of water	100.00	0.00
Cost of water	100.00	0.00
Disposal facilities for industrial waste	75.00	25.00
VIII. Governmental Structure and Attitudes:	50.00	50.00
Nuisance and stream pollution laws	50.00	50.00
Building ordinances	50.00	50.00
Zoning codes	50.00	50.00
Compensation laws	75.00	25.00
Insurance laws and regulations	100.00	0.00
IX. Tax Structure:	100.00	0.00
Industrial property tax rates	100.00	0.00
State corporate tax structure	75.00	25.00
Local tax assessment basis	100.00	0.00
X. Capital Structure:	50.00	50.00
Availability of capital funds	50.00	50.00
Attitudes of lending institutions	50.00	50.00
Community industrial development projects	50.00	50.00
Insurance rates	50.00	50.00
XI. Industrial Fuels:	50.00	50.00
Availability of coal, oil, gas, electricity	50.00	50.00
Cost of industrial fuels	50.00	50.00
XII. Community Environment:	75.00	25.00
Community leadership and attitudes	25.00	75.00
Availability and quality of schools	50.00	50.00
Nearness to universities and colleges	75.00	25.00
Recreation and cultural facilities	75.00	25.00
Availability and cost of housing	75.00	25.00
Real estate tax	75.00	25.00
Effectiveness of protection facilities	75.00	25.00
Climatic conditions	50.00	50.00

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

one-hundred per cent of the larger employee size respondents citing availability of industrial sites was of great influence on their site-selection. Obviously, the above factors were basically economic factors in the location decision. Availability and cost of industrial lands was a cost-reducing factor, influencing the fixed costs of the establishment. Nearness to related industries and attainment of a favorable competitive position in the industry were revenue-increasing factors. However, the factor, community leadership and attitudes, usually considered a non-pecuniary factor, in all probability, in this particular industry also was an economic factor. Expansion or contraction of related industries, strongly influence the production of the primary metal industries plants. Thus, the activities, actions, and attitudes of the community leaders, as they affect the growth of related industries, was a prime consideration on the location judgment of entrepreneurs seeking a plant site.

Measured by employment growth, this industry was characterized as a slow growth industry, nationally. However, state employment during the decade increased 44.8 per cent. Of the state employment increase, 13.7 per cent (Table 13) is attributed to the new Tulsa Area plants.

Obviously, in this industry the state realized a location advantage relative to other regions. In all probability, the entrepreneurs realized a location advantage in the Tulsa Area in the form of available, relatively low cost industrial land; expansion of the local and state economy which stimulates growth of industries related to primary metal users; and a general community attitude and leadership which sought to promote continued orderly expansion of the state and local economy, thus creating a favorable competitive position in the industry for the plants located in the Tulsa Area. This premise is supported by the wide market area of the plants and the 100 per cent survival rate.

Fabricated Metal Products, Except Ordnance, Machinery, and Transportation Equipment, SIC 34

Explosive growth took place in the Fabricated Metal Industries between 1958 and 1969 with ninety-five establishments located in the Tulsa Area.

The Fabricated Metals Products Industry includes establishments engaged in fabricating ferrous and nonferrous metal products such as metal cans, tinware, hand tools, cutlery, general hardware, nonelectric heating apparatus, fabricated structural metal products, metal stampings and a variety of metal and wire products not elsewhere classified. The 95 establishments produced 18 products, by Standard Industrial Classification 4-digit Code, as the data in Table 28 indicates.

TABLE 28

FABRICATED METAL PRODUCTS INDUSTRY BY: 4-DIGIT CLASSIFICATION, PRODUCT PRODUCED, NUMBER OF PLANTS, AND EMPLOYEE SIZE.

SIC	Product	Number	Employee Size
3424	Hand and Edge Tools, Except Machine Tools and Hand Saws	1	10
3429	Hardware Not Elsewhere Classified	2	2 - 4
3433	Heating Equipment, Except Electric	3	4 - 30
3441	Fabricated Structural Steel	17	2 - 462
3442	Metal Doors, Sash, Frames, Molding, and Trim	6	4 - 15
3443	Fabricated Plate Work (Boiler Shops)	11	4 - 400
3444	Sheet Metal Work	8	1 - 15
3446	Architectural and Ornamental Metal Work	2	2 - 24
3449	Miscellaneous Metal Work	8	2 - 60
3452	Bolts, Nuts, Screws, Rivets and Washers	1	96
3461	Metal Stampings	10	3 - 55
3471	Electroplating, Plating, Polishing, Anodizing and Coloring	6	2 - 24
3479	Coating, Engraving, and Allied Services, Not Elsewhere Classified	1	32
3481	Miscellaneous Fabricated Wire Products	2	4 - 25
3491	Metal Shipping Barrels, Drums, Kegs, and Pails	3	15 - 117
3494	Valves and Pipe Fittings, Except Plumbers' Brass Goods	3	5 - 45
3498	Fabricated Pipe and Fabricated Pipe Fitting	5	4 - 160
3499	Fabricated Metal Products, Not Elsewhere Classified	4	2 - 70

Source: Appendix Table 1.

Marked expansion took place among the establishments manufacturing fabricated structural metal products, SIC 344. Fifty-nine per cent of the plants manufactured products in this industrial group. These establishments manufactured primarily capital goods such as fabricated iron, steel, or other metal for structural purposes, such as bridges, and buildings, SIC 3441; metal and metal covered doors and sash, window and door frames, screens, molding, and trim, SIC 3442; power and marine boilers, pressure and nonpressure tanks, processing and storage vessels, heat exchangers, weldments and similar products by the process of cutting, forming and joining metal plates, shapes, bars, sheet, pipe mill products and tubing to custom or standard design for factory or field assemble, SIC 3443; sheet metal work for buildings and manufacturing sheet metal stovepipes, light tanks, etc., SIC 3444; architectural and ornamental metal work of ferrous and nonferrous metals, such as stairs and staircases, open steel flooring (grating), fire escapes, grilles, railings, and fences and gates, SIC 3446; and miscellaneous ferrous and nonferrous metal work, such as prefabricated and portable metal buildings and parts, metal plaster bases, fabricated bar joists and concrete reinforcing bars, and prefabricated exterior metal panels, SIC 3449.

The plants were primarily single product operations. Of the plants, 63.2 per cent confined their activities to the manufacture of one of the products listed in Table 28. Ten of the ninety-five establishments were multi-product operations but confined their activities to the manufacture of products classified within the major industry group. Twenty-six of the establishments are multi-industry plants. A tendency for establishments to consistently combine the manufacture of any two associated products was not apparent.

The plants were national and export market oriented. Of the ninety-five establishments, forty-six, or 48.4 per cent, distributed their product in the nation-wide or export geographic market area; 16.8 per cent of the establishments confined their market to the local area. The larger plants, as measured by employee size, distributed their products throughout the national and world markets; the smaller establishments confined their market region primarily to the state or local area.

The ninety-five establishments created employment for 2,883 persons. The industry was characterized by many plants of small employee size and a few plants of relatively large employee size. The four largest plants employed a total of 1,139 of the workers, thus four establishments employed

39.4 per cent of the workers; 91 establishments employed the remaining 61.6 per cent.

The explosive growth of the structural metal products group, SIC 344, was accentuated by the great share of total employees engaged in the manufacture of these products. Although only six plants were classified in this group, these plants employed 1,949 workers. In all probability, economies of scale were experienced in this industry. As compared to other industries, apparently there was a tendency for a larger number of the plants to be of relatively large employee size. Five plants employed one hundred persons or more; nine, employed between fifty and ninety-nine individuals.

The industry was highly truck transport facilities oriented. Of the respondents, eighty per cent used truck transport facilities to both acquire raw materials and component parts and to distribute the finished product. Seven establishments primarily used rail transport facilities to distribute their finished product. All of these plants sold their products in the national or export geographic market area.

Most plants in this industry were successful. Of the ninety-five establishments, only nine were out-of-business by November 1969. Thus, a survival rate of 91.6 per cent. The plants which ceased operation were primarily of small employee size, although they distributed their products over a wide market area. The highest rate of egress was among the plants manufacturing fabricated structural metal products. However, this was consistent with the characteristics of the industry as the highest rate of ingress took place in this group.

The following location factors were cited as greatly influencing their site selection by entrepreneurs locating plants in the Tulsa Area, (Table 29):

(1) Community Environment

(a) Community Leadership and Attitudes

(b) Nearness to Universities and Colleges

(c) Recreation and Cultural Facilities

(d) Real Estate Tax

(2) Availability of Skilled Labor

(3) Market Situation.

Obviously, the factor, local community environment, was influential. As the data in Table 29 indicate, of the respondents, 67.5 per cent cited the factors, community leadership and attitudes and the real estate tax were of great influence in their location judgment. Sixty per cent indicated the factor nearness to universities and colleges and availability of recreation and cultural facilities were of great influence.

The above responses primarily reflect factors influencing the location decision of establishments with ten or less employees, as seventy-five per cent of the respondents were in this employee size group. Establishments with ten or

TABLE 29

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 34, FABRICATED METAL PRODUCTS, EXCEPT ORDNANCE, MACHINERY, AND TRANSPORTATION EQUIPMENT, 1958-1969.

Factor	Influence[a] Little	Great
I. Location of Production Materials:	75.00	25.00
Nearness to raw materials	77.50	22.50
Nearness to component parts	80.00	20.00
II. Labor Force:	42.50	57.50
Availability of skilled labor	42.50	57.50
Availability of unskilled labor	57.50	42.50
Potential for managerial labor	65.00	35.00
Attitudes and activities of labor unions	67.50	32.50
Wage Rates	62.50	37.50
III. Industrial Sites:	72.50	27.50
Accessibility and cost of:		
Industrial land	67.50	32.50
Developed industrial parks	90.00	10.00
IV. Transportation Facilities:	60.00	40.00
Availability and adequacy of:		
Airway facilities	75.00	25.00
Highway facilities	47.50	52.50
Railroad facilities	62.50	37.50
Pipeline facilities	100.00	0.00
Waterway facilities	85.00	15.00
Shipping costs of raw materials	72.50	27.50
Shipping costs of finished goods	70.00	30.00
V. Distributional Facilities:	90.00	10.00
Warehousing and storage facilities	92.50	7.50
Availability of wholesale outlets	85.00	15.00
VI. Market:	50.00	50.00
Existing consumer market	60.00	40.00
Potential consumer market	52.50	47.50

(See footnote at end of table.)

TABLE 29, (Continued)

	Factor	Influence[a] Little	Great
	Nearness to related industries	60.00	40.00
	Attainment of favorable competitive position	47.50	52.50
VII.	Water Supply and Waste Disposal Facilities:	87.50	12.50
	Availability of water sypply	87.50	12.50
	Quality and dependability of water	85.00	15.00
	Cost of water	90.00	10.00
	Disposal facilities for industrial waste	92.50	7.50
VIII.	Governmental Structure and Attitudes:	82.50	17.50
	Nuisance and stream pollution laws	90.00	10.00
	Building ordinances	75.00	25.00
	Zoning codes	80.00	20.00
	Compensation laws	87.50	12.50
	Insurance laws and regulations	85.00	15.00
IX.	Tax Structure:	80.00	20.00
	Industrial property tax rates	77.50	22.50
	State corporate tax structure	85.00	15.00
	Local tax assessment basis	77.50	22.50
X.	Capital Structure:	65.00	35.00
	Availability of capital funds	57.50	42.50
	Attitudes of lending institutions	57.50	42.50
	Community industrial development projects	85.00	15.00
	Insurance rates	77.50	22.50
XI.	Industrial Fuels:	75.00	25.00
	Availability of coal, oil, gas, electricity	72.50	27.50
	Cost of industrial fuels	77.50	22.50
XII.	Community Environment:	40.00	60.00
	Community leadership and attitudes	32.50	67.50
	Availability and quality of schools	42.50	57.50
	Nearness to universities and colleges	40.00	60.00
	Recreation and cultural facilities	40.00	60.00
	Availability and cost of housing	50.00	50.00
	Real estate tax	32.50	67.50
	Effectiveness of protection facilities	40.00	60.00
	Climatic conditions	42.50	57.50

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

more employees, in addition to the above factors, cited availability of skilled labor also was of great influence in their site-selection.

Although the above location factors appear to be basically non-pecuniary, when viewed in conjunction with the factor, availability of skilled labor, as an important element in the location decision, the factors become primarily economic. For example, real estate tax directly influences the cost of living of employees and their real income. This factor thus influences wage rates and willingness of workers to move into an area. In today's society, which constantly places increasing stress on the achievement of higher education, the factors nearness to universities and colleges and availability of recreational and cultural facilities, psychologically, directly influence workers' attitudes, mobility of labor and labor productivity which, in turn, affects the costs of plant operation. As previously stated, this industry was characterized by relatively large employee size when compared to other industries in the Area, thus the above factors primarily were the cost-reducing factors in the entrepreneurs location judgment.

Sixty per cent of the smaller employee size respondents, in addition to the above factors, cited the factor, the market situation, as of great influence in their location decision. The primary market area of the smaller plants was the local or state-wide geographic region. The expanding local and state economy during the decade in all probability, swayed their location decision.

As measured by employment growth, employment in this industry increased rapidly both state-wide and nationally. Apparently the expanding economy of the decade stimulated development of this industry. State employment rose 64.5 per cent in this industry during the decade. Of the state employment increase, 55.9 per cent of the increase is attributed to the plants located in the Tulsa Area, (Table 13).

In all probability, the area realized a location advantage relative to other state locations in the form of favorable community leadership and attitudes; educational, cultural and recreational facilities; available skilled labor; and an expanding local economy. This premise is supported by the high survival rate of the plants, the industry's market employment increase in the area, and the accord of the entrepreneurs that these location factors were of foremost consideration in their site selection.

Machinery, Except Electrical, SIC 35

Between 1958 and 1969, sixty-eight plants in the Machinery Industry were established in the Tulsa Area. This industry includes establishments manufacturing machinery and equipment, other than electrical equipment and transportation equipment. Machines powered by built-in or detachable motors ordinarily are included in this group, with the exception of electrical household appliances. The sixty-eight establishments produced twenty-four products, by the Standard Industrial Classification 4-digit Code. The plants were primarily single product establishments. Of the sixty-eight plants, nineteen were multi-industry operations.

The multi-industry plants manufactured a variety of products. Simultaneously, with the production of machinery products, the multi-industry plants manufactured products classified in the following industries: Food and Kindred Products; Primary Metals; Fabricated Metal Products; Electrical Machinery, Equipment, and Supplies; Transportation Equipment; Professional, Scientific, and Controlling Instruments; and Miscellaneous Manufactures. A marked relationship between plants in this industry, SIC 35, and the Fabricated Metal Products Industry, SIC 34, was apparent. Of the nineteen multi-industry establishments, 47.4 per cent also manufactured fabricated metal products. However, no relationship between the manufacture of a particular product in the fabricated metal products industry and the machinery industry is apparent.

The sixty-eight plants created employment for 2,560 persons. Of the sixty-eight establishments, 55.8 per cent employed less than ten persons; 44.2 per cent employed ten or more individuals. Thus, the plants primarily were of relatively small employee size. However, three establishments employed 400, 500, and 550 workers respectively. Two of the three major employee size plants manufactured Miscellaneous Machinery, Except Electrical, SIC 3599, and Pumps, Air and Gas Compressors, and Pumping Equipment, SIC 3561. The remaining major employer manufactured Industrial Process Furnaces and Ovens, SIC 3567, and Fabricated Plate Work, SIC 3443. All major employers indicated they marketed their products in a nation-wide geographic market area.

The establishments in this industry primarily were nation-wide market oriented. Eighty-eight per cent distributed their product on a nation-wide geographic market area. Only 14 plants, or 20.6 per cent, indicated they limited their market area to the local geographic region. A relationship between market area and employee size of the plant is apparent. Plants operating within the local market area were extremely small employee size operations.

The industry was definitely truck transport facilities oriented. Seventy-four per cent of the respondents primarily used truck transport facilities to acquire raw materials, component parts; ninety-two per cent of the plants primarily used truck transport facilities to distribute their finished product.

Of the sixty-eight establishments located in the area between 1958 and 1969, only eight had ceased operation by November, 1969. This was a survival rate of 88.9 per cent. The establishments which failed to continue operation manufactured a variety of products.

The questionnaire elicited a 45.0 per cent response rate, however, respondents were of relatively large employee size, thus, the responses primarily reflect the judgments of the larger employers. The following location factors were cited by entrepreneurs as of great influence in their Tulsa Area site selection, (Table 30):

(1) Community Environment

(a) Community Leadership and Attitudes

(b) Availability and quality of schools

(c) Recreation and Cultural Facilities

TABLE 30

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 35, MACHINERY, EXCEPT ELECTRICAL, 1958-1969.

	Factor	Influence[a] Little	Great
I.	Location of Production Materials:	92.60	7.40
	Nearness to raw materials	92.60	7.40
	Nearness to component parts	85.20	14.80
II.	Labor Force:	70.37	29.63
	Availability of skilled labor	70.37	29.63
	Availability of unskilled labor	81.48	18.52
	Potential for managerial labor	81.48	18.52
	Attitudes and activities of labor unions	85.20	14.80
	Wage Rates	81.48	18.52
III.	Industrial Sites:	77.78	22.22
	Accessibility and cost of:		
	Industrial land	66.67	33.33
	Developed industrial parks	88.90	11.10
IV.	Transportation Facilities:	66.67	33.33
	Availability and adequacy of:		
	Airway facilities	74.07	25.93
	Highway facilities	55.56	44.44
	Railroad facilities	77.78	22.22
	Pipeline facilities	100.00	0.00
	Waterway facilities	88.90	11.10
	Shipping costs of raw materials	74.08	25.92
	Shipping costs of finished goods	66.67	33.33
V.	Distributional Facilities:	96.30	3.70
	Warehousing and storage facilities	96.30	3.70
	Availability of wholesale outlets	88.90	11.10
VI.	Market:	37.04	62.96
	Existing consumer market	48.15	51.85
	Potential consumer market	44.45	55.55

(See footnote at end of table.)

TABLE 30, (Continued)

	Factor	Influence[a] Little	Great
	Nearness to related industries	40.75	59.25
	Attainment of favorable competitive position	33.34	66.66
VII.	Water Supply and Waste Disposal Facilities:	96.30	3.70
	Availability of water supply	96.30	3.70
	Quality and dependability of water	96.30	3.70
	Cost of water	96.30	3.70
	Disposal facilities for industrial waste	96.30	3.70
VIII.	Governmental Structure and Attitudes:	85.20	14.80
	Nuisance and stream pollution laws	92.60	7.40
	Building ordinances	88.90	11.10
	Zoning codes	81.48	18.52
	Compensation laws	85.20	14.80
	Insurance laws and regulations	88.90	11.10
IX.	Tax Structure:	77.78	22.22
	Industrial property tax rates	81.48	18.52
	State corporate tax structure	77.78	22.22
	Local tax assessment basis	85.20	14.80
X.	Capital Structure:	85.20	14.80
	Availability of capital funds	77.78	22.22
	Attitudes of lending institutions	85.20	14.80
	Community industrial development projects	92.60	7.40
	Insurance rates	88.90	11.10
XI.	Industrial Fuels:	85.20	14.80
	Availability of coal, oil, gas, electricity	85.20	14.80
	Cost of industrial fuels	85.20	14.80
XII.	Community Environment:	25.93	74.07
	Community leadership and attitudes	18.52	81.48
	Availability and quality of schools	22.23	77.77
	Nearness to universities and colleges	40.75	59.25
	Recreation and cultural facilities	29.63	70.37
	Availability and cost of housing	33.33	66.67
	Real estate tax	48.15	51.85
	Effectiveness of protection facilities	40.75	59.25
	Climatic conditions	33.34	66.66

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

(2) Market Situation:

(b) Attainment of a Favorable Competitive Position in the Industry

Community environment was considered by 74.08 per cent of the respondents as being of great influence in the location decision. The importance of this factor was intensified by 81.49 per cent of the respondents citing the factor, community leadership and attitudes, and 77.78 per cent, indicating availability and quality of schools were also of great influence in their decision to locate in the area.

In the composite response of entrepreneurs in this industry, the factor, the market situation, ranked second in degree of influence in the site-selection. As the data in Table 30 indicate, 62.97 per cent cited the market situation was an influential location force, however, of the larger employee size establishments 66.67 per cent cited the factor, attainment of a favorable competitive position in the industry, was of prime consideration in their location decision. A marked decrease in the relative influence of the market situation is apparent among the larger employee size respondents. Only fifty per cent of these employers cited the market situation was of great influence in their location decision. Since the larger firms, as measured by employee size, primarily distributed their products in the national or international market, the decrease in the influence of the market situation on their location decision is consistent with the characteristics of the industry.

The smaller employee size establishments were primarily local market oriented. Thus, the market situation was considered as an influential location force by 88.89 per cent of these entrepreneurs. The influence of the market situation on the smaller plants is intensified by 77.78 per cent of these respondents citing the factors, existing and potential market situation also were great influential forces in their location judgment.

Measured by employment growth, employment in this industry expanded rapidly nationally and state-wide. State employment increased 61.3 per cent during the decade. Of the state employment increase, 44.2 per cent is attributed to the plants located in the Tulsa Area.

Apparently in this industry the state and the Tulsa Area realized a location advantage relative to other locations. In all probability, the area realized an advantage in the form of community leadership and attitudes, and educational, recreational and cultural facilities which promoted an environment favorable to the profitable operations of plants in this industry. Also the expanding local, state, and national economy created a favorable market situation which fostered attainment of a favorable competitive position in the industry relative to other locations. In all probability, the simultaneous expansion of the fabricated metals industry contributed to the growth of the machinery industry.

The above premise is supported by the 88.9 per cent survival rate of the plants, the concurrence among the entrepreneurs who located plants in the area that the above mentioned factors were of great influence on their location decision, and the apparent joint production of fabricated metal and machinery product.

Electrical Machinery, Equipment, and Supplies, SIC 36

In this industry, between 1958 and 1969, twenty-four establishments located in the Tulsa Area. The plants primarily manufactured pocket, portable, panelboard, and graphic recording instruments for measuring electricity, such as voltmeters, ameters, watt meters, watt-hour meters, demand meters, and other meters and indicating instruments. This industry also includes establishments primarily manufacturing analyzers for testing the electrical characteristics of internal combustion engines, radio appartus, etc. The twenty-four plants produced thirteen products, by the Standard Industrial Classification 4-digit Code. Forty-four per cent of the plants primarily manufactured electronic components and accessories, SIC 3679.

The plants were primarily single product oriented. However, relationship between the products produced by the multi-industry establishments and the Professional, Scientific, and Controlling Instruments Industry, SIC 38 is apparent. Fifty per cent of the plants manufacturing Electronic Components and Accessories, SIC 3679, also manufactured professional, scientific and controlling instruments products, SIC 38.

The twenty-four plants created employment for 660 persons. The establishments were relatively small in employee size. Seventy-one per cent of the workers were employed by the 3 largest establishments; 21 plants employed 28.8% of the workers in this industry. Thus, employment was highly concentrated in a few firms.

The plants were national market oriented. Seventy-nine per cent of the plants offered their products nation-wide; and 29.1 per cent offered their products on the international market. Only one establishment limited its market to the local geographic region. Apparently there is a relationship between employee size of the plant and market area. The five largest plants, as measured by employee size, offered their products on the world market.

The plants primarily used truck transport facilities, both to acquire raw materials and to distribute the finished product. One respondent indicated their establishment primarily used air transport facilities to acquire raw materials and distribute the finished product, and one respondent primarily used rail facilities to distribute the finished goods. With these exceptions, the respondents cited truck transport facilities as their foremost means of transportation.

Of the twenty-four establishments located in the area between 1958 and 1969, five were out-of-business by November, 1969. This is a 79.2 per cent survival rate. The plants, which ceased operation, essentially were of small employee size. Eighty per cent of these plants manufactured Electronic Components and Accessories, SIC 3679. However, in view of the concentration of firms manufacturing these products the attrition rate among this group naturally would be high.

The questionnaire elicited a 70 per cent response rate. The respondents cited the following location factors as of great influence on their location decision, (Table 31):

TABLE 31

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 36, ELECTRICAL MACHINERY, EQUIPMENT, AND SUPPLIES, 1958-1969.

Factor	Influence[a] Little	Great
I. Location of Production Materials:	91.67	8.33
Nearness to raw materials	91.67	8.33
Nearness to component parts	100.00	0.00
II. Labor Force:	50.00	50.00
Availability of skilled labor	50.00	50.00
Availability of unskilled labor	66.67	33.33
Potential for managerial labor	66.67	33.33
Attitudes and activities of labor unions	100.00	0.00
Wage Rates	100.00	0.00
III. Industrial Sites:	100.00	0.00
Accessibility and cost of:		
Industrial land	100.00	0.00
Developed industrial parks	100.00	0.00
IV. Transportation Facilities:	66.67	33.33
Availability and adequacy of:		
Airway facilities	75.00	25.00
Highway facilities	75.00	25.00
Railroad facilities	91.67	8.33
Pipeline facilities	100.00	0.00
Waterway facilities	100.00	0.00
Shipping costs of raw materials	91.67	8.33
Shipping costs of finished goods	91.67	8.33
V. Distributional Facilities:	100.00	0.00
Warehousing and storage facilities	100.00	0.00
Availability of wholesale outlets	100.00	0.00
VI. Market:	41.67	58.33
Existing consumer market	41.67	58.33
Potential consumer market	41.67	58.33

(See footnote at end of table.)

TABLE 31, (Continued)

Factor	Influence[a] Little	Great
Nearness to related industries	41.67	58.33
Attainment of favorable competitive position	50.00	50.00
VII. Water Supply and Waste Disposal Facilities:	100.00	0.00
Availability of water supply	100.00	0.00
Quality and dependability of water	100.00	0.00
Cost of water	100.00	0.00
Disposal facilities for industrial waste	100.00	0.00
VIII. Governmental Structure and Attitudes:	91.67	8.33
Nuisance and stream pollution laws	91.67	8.33
Building ordinances	91.67	8.33
Zoning codes	91.67	8.33
Compensation laws	100.00	0.00
Insurance laws and regulations	100.00	0.00
IX. Tax Structure:	100.00	0.00
Industrial property tax rates	100.00	0.00
State corporate tax structure	100.00	0.00
Local tax assessment basis	100.00	0.00
X. Capital Structure:	91.67	8.33
Availability of capital funds	83.34	16.66
Attitudes of lending institutions	83.34	16.66
Community industrial development projects	91.67	8.33
Insurance rates	100.00	0.00
XI. Industrial Fuels:	100.00	0.00
Availability of coal, oil, gas, electricity	100.00	0.00
Cost of industrial fuels	100.00	0.00
XII. Community Environment:	33.34	66.66
Community leadership and attitudes	41.67	58.33
Availability and quality of schools	33.34	66.66
Nearness to universities and colleges	50.00	50.00
Recreation and cultural facilities	50.00	50.00
Availability and cost of housing	50.00	50.00
Real estate tax	66.67	33.33
Effectiveness of protection facilities	66.67	33.33
Climatic conditions	50.00	50.00

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

(1) Market Situation

(a) Existing Consumer Market

(b) Potential Consumer Market

(c) Nearness to Related Industries

(2) Community Environment

(a) Community Leadership and Attitudes

(b) Availability and quality of schools

Of the respondents, 58.34 per cent cited the factors, existing consumer market, potential consumer market, and nearness to related industries were of great influence in their location decision. As the data in Table 31 indicate, sixty-six per cent of the respondents cited the factors, community environment and the availability and quality of schools were influential forces in their site selection. The factor, community leadership and attitudes was cited by 58.34 per cent of the entrepreneurs.

Apparently in this industry a relationship exists between employee size of the plants and the relative influence of the location factors. Entrepreneurs of the smaller employee size plants were greatly influenced by a different set of location forces than the larger employee size plants. The establishments, employing less than 10 persons, were highly market oriented. One hundred per cent of the respondents, in this group, cited the factors existing and potential consumer market, greatly influenced their location decision. Also, the influence of the market situation was accentuated as a prime factor in the locational decision of the smaller firms, by 80 per cent of these entrepreneurs citing the factors nearness to related industries, and attainment of a favorable competitive position in the industry were of great influence. Community leadership and attitudes were also cited by 80 per cent of these businessmen.

Less emphasis was placed on the market situation by entrepreneurs of the larger employee plants. Only 28.58 per cent of the larger employee group indicated the market situation, both potential and existing, was a factor in their location decision. However, these entrepreneurs stressed the importance of the community environment as a location factor swaying their site selection. The factors: community leadership and attitudes; availability and quality of schools; nearness to universities and colleges; availability of recreational and cultural facilities; and availability and cost of housing were cited by 57.15 per cent of the larger employee size groups as influential location forces. The larger employee size plant entrepreneurs apparently considered the labor market as influencing location factors:

57.15 per cent cited availability of skilled labor and the potential for managerial labor greatly influenced their Tulsa Area site selection.

All these factors were either cost-decreasing or revenue-increasing in the operation of the plants. Obviously, the market situation is a revenue-increasing factor. Consideration of the factors, availability of skilled labor and potential for managerial labor was consistent with the needs of the larger employee plants since three establishments employed approximately 440 workers. Given the level of technological development of this industry, the non-pecuniary factors such as availability to educational and recreational facilities affects the plants costs of operation. Labor costs were dependent upon the availability of skilled labor, many of whom were trained by community supported institutions. In addition, access to recreational facilities psychologically greatly sways the workers' decision to live in a particular geographic area, thus affecting the labor supply and labor costs.

Measured by employment growth, during the decade this industry expanded rapidly both nationally and state-wide. Employment increased nationally 61.3 per cent. State employment increased 259.0 per cent. The outstanding growth of this industry essentially can be explained by the technological development which occurred over the decade, coupled with an expanding consumer market as a consequence of rising consumer incomes. Most of the products, which experienced exceptional growth, were unknown fifty years ago and only twenty years ago, with the advent of television, was the potential scope of the industry becoming apparent.

Of the increase in state employment, 10.9 per cent was attributed to the new plants located in the Tulsa Area, (Table 13). In all probability, the area realized a location advantage relative to other regions in the form of community environment and leadership which fostered development of recreational facilities and vocational training programs. Contributing to the growth of this industry, both nationally and locally, related industries such as fabricated metal products, aerospace, machinery, and professional, scientific and controlling instruments concomitantly expanded, creating a favorable market for the products of the plants. This premise is supported by the concurrence of the respondents as to the influence of the location factors on their site selection and evidence of the rapid expansion of related industries.

Transportation Equipment Industry, SIC 37

Between 1958 and 1969, twenty plants in the Transportation Equipment Industry located in the Tulsa Area. Establishments in this industry manufactured equipment for transportation of passengers and cargo by land, air, and water. The twenty establishments produced seven products, by the Standard Industrial Classification 4-digit Code. No concentration of plants engaged in the production of a particular product occurred.

The plants were primarily single product oriented. Seventy-five per cent manufactured one product. Three plants were multi-industry operations. Apparently a relationship exists between plants manufacturing transportation equipment, SIC 37, and machinery products, SIC 35. Of the multi-industry establishments, two-thirds simultaneously produced metalworking machinery and equipment, SIC 354.

The twenty plants created employment for 373 persons. The establishments were relatively small in employee size. Of the twenty plants, the four largest establishments, employed 65 per cent of the workers; 16 establishments employed 20 per cent of the employees.

The plants were national market oriented: fifty per cent indicated their geographic market area was nation-wide

20 per cent offered their products on the regional geographic market. On plant cited their market area as world-wide. This particular establishment manufactured Aircraft Parts and Auxiliary Equipment, SIC 3729. As anticipated, it is among the larger establishments, when measured by employee size. With the exception of establishments manufacturing Aircraft Parts and Auxiliary Equipment, apparently no relationship exists between the employee size of the establishment, market area, or product produced. Some of the very smallest establishments as well as the largest plants, when measured by employee size, indicate they offered their products on the national market.

The plants were 100 per cent truck transport oriented. Truck transport facilities were the means primarily used by all respondents to acquire raw materials, component parts, and to distribute the finished product.

Of the twenty establishments located in the area, four were out-of-business in November 1969, thus, an eighty per cent survival rate. Three establishments ceasing operation were relatively small, employing 4 to 12 persons. One plant manufacturing of aircraft parts and auxiliary equipment, SIC 3729, was relatively large, employing 50 individuals. These establishments were primarily nation-wide market oriented.

The questionnaire elicited a twenty-five per cent response rate. The low response rate, in all probability, is explained by the relatively small employee size of the majority of the establishments. Thus, the response primarily reflects the attitudes of entrepreneurs of the larger employee size operations. The respondents cited the following factors as of great influence on their Tulsa Area site selection, (Table 32):

(1) Industrial Sites:

(a) Developed Industrial Parks

(2) Market Situation:

(a) Existing and Potential Market

(b) Attainment of a favorable competitive position

(c) Nearness to related industries

(3) Industrial Fuels: (Electricity)

(a) Avialability and cost of industrial fuels

The respondents are almost in complete agreement as to the factors which greatly influenced their location decision. The factor, availability of industrial sites and availability of developed industrial parks in the Greater Metropolitan Tulsa Area was cited by 100 per cent of the respondents as of great influence in the location decision. The factor, avail-

TABLE 32

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 37, TRANSPORTATION EQUIPMENT INDUSTRY, 1958-1969.

Factor	Influence[a] Little	Great
I. <u>Location of Production Materials</u>:	50.00	50.00
Nearness to raw materials	50.00	50.00
Nearness to component parts	25.00	75.00
II. <u>Labor Force</u>:	50.00	50.00
Availability of skilled labor	50.00	50.00
Availability of unskilled labor	50.00	50.00
Potential for managerial labor	50.00	50.00
Attitudes and activities of labor unions	75.00	25.00
Wage Rates	25.00	75.00
III. <u>Industrial Sites</u>:	0.00	100.00
Accessibility and cost of:		
Industrial land	0.00	100.00
Developed industrial parks	50.00	50.00
IV. <u>Transportation Facilities</u>:	75.00	25.00
Availability and adequacy of:		
Airway facilities	75.00	25.00
Highway facilities	50.00	50.00
Railroad facilities	100.00	0.00
Pipeline facilities	100.00	0.00
Waterway facilities	100.00	0.00
Shipping costs of raw materials	75.00	25.00
Shipping costs of finished goods	50.00	50.00
V. <u>Distributional Facilities</u>:	75.00	25.00
Warehousing and storage facilities	75.00	25.00
Availability of wholesale outlets	75.00	25.00
VI. <u>Market</u>:	25.00	75.00
Existing consumer market	25.00	75.00
Potential consumer market	25.00	75.00

(See footnote at end of table.)

TABLE 32, (Continued)

Factor	Influence[a] Little	Great
Nearness to related industries	25.00	75.00
Attainment of favorable competitive position	25.00	75.00
VII. Water Supply and Waste Disposal Facilities:	25.00	75.00
Availability of water supply	25.00	75.00
Quality and dependability of water	25.00	75.00
Cost of water	50.00	50.00
Disposal facilities for industrial waste	25.00	75.00
VIII. Governmental Structure and Attitudes:	75.00	25.00
Nuisance and stream pollution laws	75.00	25.00
Building ordinances	50.00	50.00
Zoning codes	50.00	50.00
Compensation laws	50.00	50.00
Insurance laws and regulations	50.00	50.00
IX. Tax Structure:	50.00	50.00
Industrial property tax rates	50.00	50.00
State corporate tax structure	50.00	50.00
Local tax assessment basis	50.00	50.00
X. Capital Structure:	100.00	0.00
Availability of capital funds	100.00	0.00
Attitudes of lending institutions	75.00	25.00
Community industrial development projects	75.00	25.00
Insurance rates	100.00	0.00
XI. Industrial Fuels:	25.00	75.00
Availability of coal, oil, gas, electricity	25.00	75.00
Cost of industrial fuels	50.00	50.00
XII. Community Environment:	50.00	50.00
Community leadership and attitudes	50.00	50.00
Availability and quality of schools	50.00	50.00
Nearness to universities and colleges	50.00	50.00
Recreation and cultural facilities	50.00	50.00
Availability and cost of housing	75.00	25.00
Real estate tax	50.00	50.00
Effectiveness of protection facilities	50.00	50.00
Climatic conditions	50.00	50.00

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

ability and cost of industrial fuels was cited by seventy-five per cent of the respondents as being of high or of highest importance in their location decision. Most of the respondents voluntarily indicated they used electricity as their foremost source of energy.

In view of the nation-wide market orientation of establishments in this industry, the central geographic location of Tulsa in the nation, in all probability, influenced the location decision of many of the establishments since seventy-five per cent of the entrepreneurs cited the factors, the existing and potential market situation, nearness to related industries, and attainment of a favorable competitive position in the industry greatly influenced their location decision.

In sharp contrast to the relative importance of factors cited by establishments in some of the other industries, capital structure and availability of capital funds was indicated by 100 per cent of the respondents as of little influence in the site-selection.

All factors cited by the plants in this industry, as influencing their location decision, directly were cost-decreasing or revenue-increasing elements. Availability and cost of industrial fuels affects the variable costs of the establishments, and availability to developed industrial parks affects the fixed costs. The market situation affects the current and potential revenues of the establishments. Obviously entrepreneurs in this industry sought to maximize profits by the foremost consideration of revenue-increasing and cost-reducing plant location factors.

Measured by employment growth, this industry is characterized as a slow growth industry nationally. State employment, however, increased 36.3 per cent during the decade. Of the state employment increase, 9.7 per cent of the increase is attributed to the Tulsa area plants, (Table 13). Locally employment growth was concentrated in plants manufacturing, SIC 3791, trailer coaches. Five plants, employing 156 of the industry's 373 workers engaged in this activity.

The U. S. Department of Commerce[2] identifies this activity as expanding more rapidly than the average growth of all manufacturing industries.

The Tulsa Area apparently shared in the national expansion of this industrial activity . Much of the growth is

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[2]U.S. Department of Commerce, Business and Defense Services Administration, Growth Pace Setters In American Industry, 1958-68, U.S. Government Printing Office, Washington, D.C., (1968).

explained by the increases in personal income and leisure time during the past decade, coupled with a desire on the part of travelers to see their country, and the changing concept of "trailer" homes. The trailer has provided a relatively inexpensive means to travel. Also, the need for low price housing by retired and young married couples, the ease of maintenance, and the convenience of mobile homes has greatly stimulated the market for these products.

Apparently, the Tulsa area realized a location advantage relative to other locations in the form of available industrial sites; the location of related industries, such as machinery, and primary and fabricated metal plants; available energy; and a favorable market situation. Again, in view of the plants' national market orientation and reliance upon truck facilities, the central location of Tulsa in the nation apparently is an innate location advantage in this industry. This premise is supported by the complete accord of the respondents as to the influence of the location factors in the site-selection judgment, the expanding local and nation economy, and the characteristics of the plants as mentioned above.

Professional, Scientific, and Controlling Instruments: Photographic and Optical Goods: Watches and Clocks, SIC 38

Between 1958 and 1969, seventeen plants in this industry located in the area. The establishments primarily manufactured mechanical measuring, engineering, laboratory, and scientific research instruments; optical instruments and lenses; surgical, medical, and dental instruments, equipment and supplies; ophtalmic goods; photographic equipment and supplies; and watches and clocks.

The seventeen plants manufactured eight products, by the Standard Industrial Classification 4-digit Code. Of the seventeen establishments, 29.4 per cent manufactured SIC 3811, Engineering, Laboratory, and Scientific and Research Instruments and Associated Equipment, such as nautical, navigational, aeronautical, surveying, drafting, and instruments for laboratory work and scientific research. The plants were primarily single product oriented: 64.7 per cent of the establishments manufactured one product. Six establishments were multi-industry operations.

A relationship between establishments manufacturing products in this industry, SIC 38, and the electrical machinery, equipment, and supplies industry, SIC 36, industry is apparent. Of the six multi-industry establishments, fifty per cent simultaneously manufactured electronic components and accessories, SIC 3679.

The seventeen establishments created employment for 632 persons. The establishments were predominately of small employee size. The three largest plants employed 555 persons, or 87.8 per cent of the workers in the industry; the remaining 14 plants employed 12.2 per cent of the workers. Thus, the industry was characterized not only by many plants of predominately small employee size but also by a few plants of relatively large employee size.

A general trend was not apparent relative to the market area of the establishments in this industry. However, a sharp relationship between the market area, employee size of the establishments, and products produced was noticed. The three largest establishments, as measured by employee size, manufactured SIC 3811, Engineering, Laboratory, and Scientific and Research Instruments and Associated Equipment; SIC 3821, Mechanical Measuring and Controlling Instruments, Except Automatic Temperature Controls; and SIC 3822 Automatic Temperature Controls offer their products in the nation-wide or international market. Plants manufacturing products such as surgical appliances; dental equipment; and ophthalmic goods limited their market to either the local or state-wide area. As measured by employee size, they also were the smaller establishments.

The industry used both air and truck transport facilities to acquire raw materials, component parts, and to distribute their finished goods. Of the respondents, fifty per cent used truck and fifty per cent used air facilities as the primary means of transportation by which to acquire raw materials and component parts, however, seventy-five per cent used truck facilities as the primary means of transportating the finished product, with air transportation used by the remaining 25 per cent.

Of the seventeen establishments located in the area, two were out-of-business by November, 1969. Both establishments were relatively small, employing 2 and 5 persons, respectively.

The respondents cited the following location factors as greatly influencing their site selection, (Table 33):

(1) Community Environment

- (a) Community Leadership and Attitudes
- (b) Availability and Quality of Schools
- (c) Nearness to Universities and Colleges
- (d) Availability to Recreational and Cultural Facilities

TABLE 33

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 38, PROFESSIONAL, SCIENTIFIC, AND CONTROLLING INSTRUMENTS: PHOTOGRAPHIC AND OPTICAL GOODS: WATCHES AND CLOCKS, 1958-1969.

Factor	Influence[a] Little	Great
I. Location of Production Materials:	87.50	12.50
Nearness to raw materials	87.50	12.50
Nearness to component parts	87.50	12.50
II. Labor Force:	62.50	37.50
Availability of skilled labor	62.50	37.50
Availability of unskilled labor	62.50	37.50
Potential for managerial labor	75.00	25.00
Attitudes and activities of labor unions	100.00	0.00
Wage Rates	87.50	12.50
III. Industrial Sites:	75.00	25.00
Accessibility and cost of:		
Industrial land	87.50	12.50
Developed industrial parks	87.50	12.50
IV. Transportation Facilities:	50.00	50.00
Availability and adequacy of:		
Airway facilities	37.50	62.50
Highway facilities	50.00	50.00
Railroad facilities	87.50	12.50
Pipeline facilities	87.50	12.50
Waterway facilities	87.50	12.50
Shipping costs of raw materials	75.00	25.00
Shipping costs of finished goods	75.00	25.00
V. Distributional Facilities:	100.00	0.00
Warehousing and storage facilities	100.00	0.00
Availability of wholesale outlets	87.50	12.50
VI. Market:	75.00	25.00
Existing consumer market	62.50	37.50
Potential consumer market	75.00	25.00

(See footnote at end of table.)

TABLE 33, (Continued)

	Factor	Influence[a] Little	Great
	Nearness to related industries	75.00	25.00
	Attainment of favorable competitive position	37.50	62.50
VII.	Water Supply and Waste Disposal Facilities:	100.00	0.00
	Availability of water supply	100.00	0.00
	Quality and dependability of water	100.00	0.00
	Cost of water	100.00	0.00
	Disposal facilities for industrial waste	100.00	0.00
VIII.	Governmental Structure and Attitudes:	87.50	12.50
	Nuisance and stream pollution laws	87.50	12.50
	Building ordinances	87.50	12.50
	Zoning codes	75.00	25.00
	Compensation laws	100.00	0.00
	Insurance laws and regulations	100.00	0.00
IX.	Tax-Structure:	100.00	0.00
	Industrial property tax rates	100.00	0.00
	State corporate tax structure	87.50	12.50
	Local tax assessment basis	87.50	12.50
X.	Capital Structure:	75.00	25.00
	Availability of capital funds	75.00	25.00
	Attitudes of lending institutions	62.50	37.50
	Community industrial development projects	75.00	25.00
	Insurance rates	87.50	12.50
XI.	Industrial Fuels:	100.00	0.00
	Availability of coal, oil, gas, electricity	75.00	25.00
	Cost of industrial fuels	100.00	0.00
XII.	Community Environment:	37.50	62.50
	Community leadership and attitudes	25.00	75.00
	Availability and quality of schools	37.50	62.50
	Nearness to universities and colleges	37.50	62.50
	Recreation and cultural facilities	37.50	62.50
	Availability and cost of housing	50.00	50.00
	Real estate tax	62.50	37.50
	Effectiveness of protection facilities	50.00	50.00
	Climatic conditions	50.00	50.00

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

(2) Availability of Airway facilities

(3) Attainment of a Favorable Competitive Position in the Industry.

The questionnaire elicited a 53.5 per cent response rate. The composite response of the entrepreneurs indicated the factor, attainment of a favorable competitive position in the industry, was considered by 75 per cent of the respondents as greatly influencing their Tulsa Area location decision, (Table 33). However, the smaller employee size establishments were predominately community environment oriented. Of the respondents employing less than 10 workers, seventy-five per cent cited the factors the community environment: (a) community leadership and attitudes; (b) availability and quality of schools; (c) nearness to universities and colleges; and (d) recreation and cultural facilities as influential location forces in their location decision. In all probability, in this industry as in others, plants with few employees were established by entrepreneurs, previously residing in the community, willing to take the risk of starting a new venture. Thus, the community environment was foremost in their location decision.

Of the establishments with ten or more employees, in addition to citing the factors, the community leadership and attitudes were influential location forces, 75% also cited;

(a) availability of skilled labor; (b) availability of airway facilities; (c) attainment of a competitive position in the industry; and (d) the attitudes of lending institutions greatly influenced their area location decision. Failure to cite the market situation was consistent with the nationwide and international market orientation of the larger establishments. The central location of Tulsa, in the nation, in all probability, was an asset to the community. This premise is supported by 75 per cent of the larger employee size establishments citing the factor, attainment of a favorable competitive position in the industry as of great influence in their location decision. The high degree of air transport facilities used by establishments in this industry also was consistent with the factor, availability of airway transportation facilities being cited as greatly influencing their location decision of the larger establishments.

The U. S. Department of Commerce[3] identified five industrial groupings in this industry as experiencing growth greater than the average growth of all manufacturing industries, 1958-1968. Obviously, the Tulsa Area shared in the

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[3]U.S. Department of Commerce, Business and Defense Services Administration, Growth Pace Setters In American Industry, 1958-68, U.S. Government Printing Office, Washington, D.C., (1968).

national expansion. Of the seventeen establishments located in the Tulsa Area, 10, or 58.8 per cent, were in the industrial groupings identified by the U.S. Department of Commerce as U.S. Growth Pace Setters, 1958-1968.[4] They were:

SIC 3821, Mechanical Measuring and Controlling Instruments;

SIC 3831, Optical Instruments and Lenses;

SIC 3842, Orthopedic, Prosthetic, and Surgical Appliances and Supplies;

SIC 3843, Dental Equipment and Supplies; and

SIC 3861, Photographic Equipment.

The increase in the number of establishments manufactur- dental equipment and supplies is explained primarily on the basis of population increase; changing attitudes toward dental care; rising levels of education and income; improved dental care technology; increased participation in dental insurance plans; and growing and new government programs designed to extend dental care.

The growth in the measuring and research instrument groupings in the industry was primarily a result of development of new and better products. Indeed, approximately half of the measuring and controlling devices on the market today did not exist 10 years ago, and many of the old line instru-

[4] Ibid, p. 185.

ments have been improved. Changing techniques have been applied to new measuring and controlling principles. These have extended the range, reliability, precision, and applicability of instrumentation. With the advent of computer technology and emphasis on automation, industrial process instrument manufacturers have been prompted to provide complete integrated instrument systems. Requirements for instrumentation are particularly heavy in the capital intensive petroleum, chemical, pulp and paper, food processing, power generation, and primary metal industries.[5]

Apparently the Tulsa Area realized a location advantage relative to other locations in the form of a community environment conducive to the expansion of this industry. In all probability, expansion of the electrical machinery industry, both nationally and locally, contributed to the growth of this industry and fostered a location advantage for plants located in the Tulsa Area in the form of attainment of a favorable competitive position in the industry. This premise is supported by the high degree of joint product relationship of plants in the industries.

Finally, the availability of air transport facilities in the area also is apparent as a location advantage in

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[5] *Ibid*, p. 74.

view of the air transport orientation of plants in this industry.

Ordnance and Accessories, SIC 19; and Miscellaneous Manufacturing Industries, SIC 39.

To avoid disclosing data reported by individual companies, establishments classified in the Ordnance and Accessories Industry, SIC 19, are included with the Miscellaneous Manufacturing Industry, SIC 39.

In these industries, between 1958 and 1969, thirty-eight establishments located in the Tulsa Area. Ordnance and accessories industry plants, SIC 19, primarily manufactured artillery, small arms, and related equipment; ammunition; tanks and specialized tank parts; sighting and fire control equipment; aerospace parts; and miscellaneous ordnance and accessories. Miscellaneous manufacturing industry plants, SIC 39, primarily manufactured products not classified in any other major manufacturing group. Plants in this group manufactured jewelry, silverware and plated ware; musical instruments; toys, sporting and athletic goods; pens, pencils, and other office and artists' materials; buttons, costume novelties, miscellaneous notions, brooms and brushes; morticians' goods; and other miscellaneous products.

The thirty-eight plants produced nine products, by the Standard Industrial Classification 4-digit Code. Fifty-two per cent of the plants primarily manufactured electrical, mechanical, cutout, or plate signs, and advertising displays, including neon signs and advertising novelties, SIC 3993. Two plants manufactured guided missiles and space vehicles, completely assembled, SIC 1925.

The plants were primarily single product oriented.

The thirty-eight plants created employment for 5,124 persons. The number of persons employed per plant ranges from 1 to 4,683, however, the median number of employees per plant was six.

Obviously, the establishments were of relatively small employee size. The three largest employed 98.5 per cent of the workers.

The plants were national market oriented. Forty-five per cent offered their products in the national market; 22.7 per cent limited their market area to the local area. A relationship between employee size of the plant and market area is apparent. The two largest establishments, as measured by employee size, offered their products on the world market, and the larger establishments sell throughout the nation-wide market.

The industry primarily used truck transport facilities, both as a means to acquire raw materials and to distribute the finished product. Only one respondent used air transport facilities to acquire raw materials; two respondents primarily used rail facilities.

Of the thirty-eight establishments located in the area between 1958 and 1969, eighty-seven per cent survived. The plants which ceased operation were essentially small employee sized operations, employing from 2 to 15 individuals per plant. However, most of the plants were nation-wide market oriented.

The respondents cited the following location factors as of great influence in their location judgment, (Table 34):

(1) Community Environment

(a) Community leadership and attitudes

(b) Effectiveness of protection facilities.

The questionnaire elicited a 39.3 per cent response rate. As the data in Table 34 indicate, the factors, community leadership and attitudes were cited by 76.9 per cent of the entrepreneurs as greatly influencing their Tulsa Area plant location decision; 69.24 per cent cited the factor, effectiveness of protection facilities, was an influential force. The influence of the factor, community environment, as a major

TABLE 34

PER CENT OF RESPONDENTS EVALUATING FACTORS AS OF LITTLE OR GREAT INFLUENCE ON THEIR LOCATION DECISION, SIC 19, ORDNANCE AND ACCESSORIES; AND SIC 39, MISCELLANEOUS MANUFACTURING INDUSTRIES, 1958-1969.

Factor	Influence[a] Little	Great
I. Location of Production Materials:	84.63	15.37
Nearness to raw materials	84.63	15.37
Nearness to component parts	92.30	7.70
II. Labor Force:	53.85	46.15
Availability of skilled labor	61.54	38.46
Availability of unskilled labor	76.92	23.08
Potential for managerial labor	69.23	30.77
Attitudes and activities of labor unions	100.00	0.00
Wage Rates	92.30	7.70
III. Industrial Sites:	76.92	23.08
Accessibility and cost of:		
Industrial land	61.54	38.46
Developed industrial parks	84.62	15.38
IV. Transportation Facilities:	61.54	38.46
Availability and adequacy of:		
Airway facilities	53.85	46.15
Highway facilities	61.54	38.46
Railroad facilities	84.62	15.38
Pipeline facilities	100.00	0.00
Waterway facilities	100.00	0.00
Shipping costs of raw materials	92.30	7.70
Shipping costs of finished goods	76.92	23.08
V. Distributional Facilities:	92.30	7.70
Warehousing and storage facilities	100.00	0.00
Availability of wholesale outlets	84.62	15.38
VI. Market:	46.16	53.84
Existing consumer market	53.85	46.15
Potential consumer market	46.16	53.84

(See footnote at end of table.)

TABLE 34, (Continued)

	Factor	Influence[a] Little	Great
	Nearness to related industries	76.92	23.08
	Attainment of favorable competitive position	53.85	46.15
VII.	Water Supply and Waste Disposal Facilities:	92.30	7.70
	Availability of water supply	92.30	7.70
	Quality and dependability of water	76.92	23.08
	Cost of water	92.30	7.70
	Disposal facilities for industrial waste	92.30	7.70
VIII.	Governmental Structure and Attitudes:	92.30	7.70
	Nuisance and stream pollution laws	92.30	7.70
	Building ordinances	69.23	30.77
	Zoning codes	69.23	30.77
	Compensation laws	84.62	15.38
	Insurance laws and regulations	84.62	15.38
IX.	Tax Structure:	84.62	15.38
	Industrial property tax rates	76.92	23.08
	State corporate tax structure	84.62	15.38
	Local tax assessment basis	76.92	23.08
X.	Capital Structure:	84.62	15.38
	Availability of capital funds	76.92	23.08
	Attitudes of lending institutions	84.62	15.38
	Community industrial development projects	84.62	15.38
	Insurance rates	84.62	15.38
XI.	Industrial Fuels:	76.93	23.07
	Availability of coal, oil, gas, electricity	69.23	30.77
	Cost of industrial fuels	69.23	30.77
XII.	Community Environment:	30.77	69.23
	Community leadership and attitudes	23.08	76.92
	Availability and quality of schools	38.46	61.54
	Nearness to universities and colleges	38.46	61.54
	Recreation and cultural facilities	38.46	61.54
	Availability and cost of housing	46.16	53.84
	Real estate tax	38.46	61.54
	Effectiveness of protection facilities	30.77	69.23
	Climatic conditions	46.16	53.84

[a]The method by which the degree of influence was determined is explained, in detail, in Chapter 4.

location force reflects the judgment of the larger employee size entrepreneurs, as thirty-eight per cent of the respondents employed ten or more persons. Of the larger employee sized establishments, 80 per cent cited the following factors as influential location factors in their site-selection:

(1) Community Environment

(a) Community leadership and attitudes

(b) Availability and quality of schools

(c) Nearness to Universities and Colleges

(d) Effectiveness of protection facilities.

Measured by employee size, the ordnance and accessories (aerospace) industry experienced outstanding growth nationally. Employment during the period increased 111.6 per cent. The factors cited by the entrepreneurs as of great influence on their site selection are consistent with and supported by developments within the community during the decade. Location of the largest employee sized plant occurred after active competitive woeing by city fathers and civic minded businessmen. Since this industry was science and technology oriented, the factors, quality of schools and nearness to universities and colleges, were selling points which swayed the entrepreneurs location decision. This premise is supported by the high degree to which employees subsequently made use of the educational institutions at the expense of their employer.

The factor, effectiveness of protection, is reflected as a fixed cost in the operation of a plant and in the case of a large operation is an influential location force. Consideration of this factor also was consistent with and supported by the community environment. The Tulsa Fire Department was rated by the American Insurance Association as one of the most efficient in the nation, thus, the insurance rates, accordingly, were lower than in other locations. In addition, the establishments of fire fighting facilities relatively close to the largest plant enhanced the importance of this factor as a location force. The influence of this factor was intensified by the fact that the Tulsa crime rate, according to the F.B.I. index, was below the national average, thus, burglary and vandalism insurance rates in this area also reflected the favorable community environment as a cost-decreasing element in the plant operation.

Apparently, in these industries, the Tulsa Area realized a location advantage relative to other locations in the form of its community environment. Since plants in these industries created many new jobs, thus stimulating the local economy, in all probability expansion of these industries were the cause rather than the consequence of the area's industrial growth during the decade.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The relative influence of location factors on the judgment of entrepreneurs seeking plant sites varied with product produced, employee size of plant, and geographic market area. In general, the factors, market situation, and community environment were major influences in the location decision-making process. With few exceptions, the market situation was the factor of foremost consideration. Since most plants were functioning in mature industries, the high degree of market orientation is consistent with the findings of Hoover[1] in his location studies.

The entrepreneurs' decisions were consistent with the maximum profit location assumption of location theoreticians in that each sought the site from which he was able to either maximize revenues and/or minimize costs. The factor, community environment, played a significant role in the entre-

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[1]Edgar M. Hoover, The Location of Economic Activity (New York: McGraw-Hill, 1963), p. 46.

preneurs' Tulsa Area site-selection by both contributing to and complementing the market situation.

The data in Figure 14 summarizes the composite response of the entrepreneurs and presents the location factors considered by at least 62.5 per cent of the respondents as greatly influencing their Greater Metropolitan Tulsa Area location decision.

Location of Production Materials

In general, given today's level of technology and transportation facilities, raw materials have become ubiquitous materials. The factor, location of production materials, apparently was of little influence in the location decision, with the exception of the transportation equipment industry, SIC 37. In this special case, the factor, nearness to component parts, was considered by the entrepreneurs as a location advantage.

The relatively slight influence of raw material deposit locations and the high degree of market orientation of the plants is consistent with and supported by the Weberian[2] location theory. Weber observed when raw materials are

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[2]Carl J. Friedrich, Alfred Weber's Theory of the Location of Industries. (Chicago: The University of Chicago Press, 1929).

FIGURE 14

LOCATION FACTORS CITED BY AT LEAST 62.5 PER CENT OF THE RESPONDENTS AS OF GREAT INFLUENCE IN THEIR TULSA AREA LOCATION DECISION, BY MAJOR INDUSTRY, 1958-1969

Location Factor	Major Industry Group by 2-digit SIC Code[a]															
	20	23	24	25	26	27	28	30	32	33	34	35	36	37	38	19, 39
I. Location of Production Materials																
Nearness to raw materials																
Nearness to component parts														●		
II. Labor Force								●								
Availability of skilled labor																
Availability of unskilled labor																
Potential for managerial labor																
Attitudes and activities of unions																
Wage rates														●		
III. Industrial Sites					●					●				●		
Accessibility and cost of: Industrial land	●				●					●				●		
Developed Industrial Parks	●				●											

● Denotes factor was of influence.

[a]Industry classification titles are listed at the end of the figure.

Figure 14, (Continued)

Location Factor	Major Industry Group by 2-digit SIC Code[a]															
	20	23	24	25	26	27	28	30	32	33	34	35	36	37	38	19, 39
IV. <u>Transportation Facilities</u>	●						●	●								
Availability and adequacy of:																
Airway facilities								●							●	
Highway facilities	●				●		●									
Railraod facilities	●				●											
Pipeline facilities																
Waterway facilities																
Shipping costs of raw materials	●															
Shipping costs, finished goods	●															
V. <u>Distributional Facilities</u>																
Warehousing and storage																
Availability, wholesale outlets																
VI. <u>Market</u>	●				●	●		●	●	●				●		
Existing consumer market	●		●	●	●	●		●	●					●		
Potential consumer market	●		●	●	●	●		●	●					●		
Nearness to related industries								●	●	●				●		
Attainment of favorable competitive position	●	●			●	●		●	●	●		●		●	●	
VII. <u>Water Supply and Waste Disposal</u>																
Availability of water supply	●													●		
Quality and dependability	●															
Cost of water	●													●		
Disposal for industrial waste	●									●						

[a]Industry classifications are listed at the end of the figure.

● Denotes factor of influence.

Figure 14, (Continued)

Location Factor	Major Industry Group by 2-digit SIC Code[a]															
	20	23	24	25	26	27	28	30	32	33	34	35	36	37	38	19, 39
VIII. Governmental Structure and Attitudes																
Nuisance and pollution laws																
Building ordinances																
Zoning codes																
Compensation laws																
Insurance laws and regulations																
IX. Tax Structure																
Industrial property tax rates																
State corporate tax structure																
Local tax assessment basis																
X. Capital Structure																
Availability of capital funds					●		●		●							
Attitudes of lending institutions																
Industrial Development Projects																
Insurance rates																
XI. Industrial Fuels														●		
Availability of fuels														●		
Cost of industrial fuels																

[a]Industry classifications are listed at the end of the figure.

● Denotes factor of influence.

Figure 14, (Continued)

Location Factor	Major Industry Group by 2-digit SIC Code[a]															
	20	23	24	25	26	27	28	30	32	33	34	35	36	37	38	19, 39
XII. Community Environment	●				●			●				●	●		●	●
Community leadership and attitudes	●		●		●		●	●		●	●	●			●	●
Availability, quality of schools	●				●		●					●			●	
Nearness to universities	●		●		●		●	●							●	
Recreation and cultural facilities	●				●			●				●				
Availability and cost of housing	●				●			●				●				
Real estate tax	●							●			●					
Effective protection facilities	●		●				●	●								●
Climatic conditions	●				●		●		●			●				

● Denotes factor of influence.

[a]The titles of the Industry Groups are:

SIC	Products
19	Ordnance and Accessories, (Aerospace),
20	Food and Kindred Products,
23	Apparel and Other Finished Products made from Fabrics and Similar Materials,
24	Lumber and Wood Products, except furniture,
25	Furniture and Fixtures,
26	Paper and Allied Products,
27	Printing, Publishing, and Allied Industries,
28	Chemicals and Allied Products,
30	Rubber and Miscellaneous Plastic Products,
32	Stone, Clay, Glass, and Concrete Products,
33	Primary Metal Industries,
34	Fabricated Metal Products, except ordnance, machinery, and transportation equipment,
35	Machinery, except electrical,
36	Electrical Machinery, Equipment, and Supplies,
37	Transportation Equipment,
38	Professional, Scientific, and Controlling Instruments; Photographic and Optical Goods; Watches and Clocks, and
39	Miscellaneous Manufacturing Industries.

ubiquitous, the least-cost location of the plant is at either the market site or an intermediary point at which transportation costs will be minimized. Hoover[3] and other theoreticians support Weber in this observation.

Labor Force

Similarly, Tulsa's labor force was of slight influence in the location decision, with the exception of entrepreneurs locating rubber and miscellaneous plastic product plants, SIC 30. The plants in this particular industry, however, were of relatively large employee size. In general, the factor, labor force, was of little influence since most manufacturing plants were primarily of small employee size.

The plants manufacturing rubber products were of relatively large employee size, and thus factors influencing labor costs were of prime consideration as influential location forces. The finding that availability of labor was of little influence by the small employee size plants and a location force by entrepreneurs of the larger employee size plants is also consistent with the observations of Weber,[4] who observed that when a plant experiences high labor costs,

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[3]Hoover, The Location of Economic Activity, Ibid.

[4]Friedrich, Ibid.

then that firm becomes labor oriented, if the savings in labor costs exceed the additional costs incurred.

Industrial Sites

In general, industrial land was of moderate influence on the entrepreneurs' location decision. The factor, accessibility and cost of industrial land, was considered an influential location force by entrepreneurs locating plants in the primary metal, SIC 33; transportation equipment, SIC 37; food and kindred products, SIC 20; and paper and allied products, SIC 26 industries. In addition, businessmen in the latter two industries were swayed by the availability of developed industrial parks. The finding that developed industrial parks was a positive location force supports the empirical evidence that the factors community environment, leadership, and attitudes contributed to the industrial development of the area. Developed industrial parks are the outgrowth of farsighted community leaders and city fathers in that someone must plan industrial development; usually the responsibility of the city fathers, and incur the risks involved in developing an industrial park.

Transportation Facilities

In general, availability and adequacy of transportation facilities, primarily highway and air, were of moderate influence on the entrepreneurs location decision. According to Von Thuenen,[5] Alfred Weber,[6] Hoover,[7] and other theoreticians, the entrepreneur will seek the site at which he minimizes transportation costs. In view of the high degree of local market orientation of the plants, the relatively moderate influence of transportation facilities on the location decision is consistent with location theory.

The factor, transportation facilities, was considered by entrepreneurs in four industries as an influential force in their location judgment. The industries were: food and kindred products, SIC 20; chemical and allied products, SIC 28; rubber and miscellaneous plastic products, SIC 30; and professional, scientific and controlling instrument products, SIC 38. With the exception of the food and kindred products industry, plants in these industries were primarily national market oriented, thus cost and availability of transportation

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[5]Melvin L. Greenhut, Plant Location in Theory and in Practice. (Chapel Hill: The University of North Carolina Press, 1956).

[6]Friedrich, Ibid.

[7]Hoover, The Location of Economic Activity, Ibid.

facilities were a prime cost consideration to the entrepreneurs in their site selection. Although plants in the food and kindred products industry were primarily locally market oriented, nevertheless, they were dependent upon truck facilities as a means by which to acquire their raw materials, thus cost of transportation also played an important role in the location decision of entrepreneurs in this industry.

In general, plants selling in the world and national markets, in all probability, realized a location advantage in the form of lower transportation costs by locating in the Tulsa Area in view of its central location in the nation. However, this advantage was only realized since adequate transportation facilities were available. Access to air transport facilities was of prime consideration by entrepreneurs in the rubber and plastic products industry and the professional, scientific, and controlling instrument industry. The finding that transportation facilities were a positive location force supports the empirical evidence that the community environment contributed to the industrialization of the area. Availability to and adequacy of transportation facilities in a community are the outgrowth of active community leadership and the willingness of a community to assume the responsibility for providing these services.

Distributional Facilities

Tulsa's distributional facilities, such as warehousing and wholesale outlets, apparently had no influence on the location of new industrial establishments. None of the factors in this category were cited by entrepreneurs as a force in their location decision.

Market Situation

The sharp market orientation of plants located in the area is dramatically illustrated by the data in Figure 14. The overall market situation was cited by entrepreneurs in seven industries as an influential location force. The factors, existing and potential consumer market, were indicated by entrepreneurs in eight industry classifications. The factor, the attainment of a favorable competitive position, was cited by entrepreneurs in ten industry classifications.

The high degree of market orientation of the plants is consistent with the Loschian Theory of Location[8] that firms will locate where they monopolize a spatial area. The size of the area is a function of consumer demand. Subsequently, industrial centers emerge and metropolitan areas develop.

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[8]Stefan Valavanis, "Losch on Location," The American Economic Review, Vol. 45 (September, 1955), p. 642.

Obviously, the market situation was fostered by the expanding economy of the decade, both locally and nationally, creating an environment which nourished industrial growth in the area. Expansion of the capital goods industries in the area created job opportunities, rising consumer incomes, stimulated ingress of people, and concomitant rising consumer demand, which in turn fostered expansion of local market oriented consumer good industries. In all probability, the market situation of the area, both existing and potential, was the most influential location force in the entrepreneurs' location judgment. The market situation not only was the consequence of but also contributed to the area's industrial growth.

Water Supply and Waste Disposal

In general, water apparently is an ubiquitous element and thus of little influence in the location decision-making process. The factors, availability, quality, and dependability of water, were cited as location forces by entrepreneurs locating plants in the food and kindred products industry, SIC 20, and transportation equipment industry, SIC 37. Only entrepreneurs locating plants in the primary metal products industry, SIC 33, cited the factor, disposal facilities for industrial waste, was a consideration in their location judgment.

Apparently water and waste disposal facilities are assumed by entrepreneurs to be available at all places and thus today are not considered as location forces. In all probability, this attitude is an outgrowth of today's level of technology and man's ability to efficiently overcome these two elements as deterents to industrial development.

Governmental and Tax Structure

In general, although governmental structure and attitudes, the city, county, and state tax structure are considered by economists[9] as location forces, these two categories of location factors apparently had no positive influence in the location decision of manufacturing establishments locating in the area. None of the entrepreneurs cited the factors as forces on their location judgment. A personal follow-up interview revealed, in all probability, an opinion most aptly descriptive of the entrepreneurs attitudes, "We've got them, wherever we locate!"[10]

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[9] Greenhut, Plant Location in Theory and Practice, Ibid.

[10] Interview with the President of Waner Corporation, February, 1970.

Capital Structure

The availability of capital funds as a location force, in general, was of moderate influence on the entrepreneurs location decision. Failure of capital to be a positive location force is consistent with the characteristics of the plants located in the area. The plants, primarily, were of small employee size. Typically, small operations are funded by the entrepreneurs own funds or by personal bank contacts. Entrepreneurs locating plants in the following three industries cited this factor as an influential location force: paper and allied products, SIC 26; chemicals and allied products, SIC 28; and stone, clay, glass and concrete products, SIC 32.

Industrial Fuels

Given today's level of technology, industrial fuels apparently have become ubiquitous materials and, thus, are of less importance in the location decision than fifty years ago. In general, the factor, availability of industrial fuels was of slight influence on the location decision-making process of the entrepreneurs, with the exception of the transportation equipment industry, SIC 37. Electricity was the primary source of energy used by these plants, and due to the characteristics of the industry, in all probability, was a major variable cost consideration. Since this factor was a cost element in the operation of the plant, naturally it was of prime consideration in the location decision. Consideration of fuel, in this special case, is consistent with and supported by the least-cost site location of theoreticians.

Community Environment

The data in Figure 14 clearly illustrates the dominance of the factor, community environment, as an influential force in the location-decision process. Obviously, entrepreneurs were greatly influenced by this factor and sub-items within this classification.

The factor, community leadership and attitudes, was influential in the location decision of entrepreneurs locating plants in eleven of the seventeen industries. As mentioned previously, this factor also enhanced the positive influence of the factors: market situation, transportation facilities, industrial sites, and capital structure.

In general, community environment was the most influential location factor in the location decision of the entrepreneurs. This premise is supported by the evidence that with the exception of raw material deposits, the other location factors, as set forth by location theoreticians are, in part, a function of the community environment. For example, the degree of development of skilled labor, industrial sites, transportation facilities, local market, water and waste disposal facilities, governmental and tax structure, capital availability, and industrial fuels is dependent upon the local community's leadership and willingness to provide institutions to develop these elements which foster industrialization. The local community environment contributed to and was a consequence of the expanding local economy.

Conclusions

The outstanding feature of this study is the entrepreneurs' accord that the factors market situation and community environment were influential location forces.

The expanding national and local economy of the decade, in all probability, was the prime stimulant which encouraged entrepreneurs to take the risk of a new venture. Apparently, expansion of the capital goods industries, such as the aerospace, primary metal, fabricated metal products, electrical machinery, and professional, scientific and controlling instruments nourished the growth of the smaller employee size consumer goods industries. In other words, expansion of the capital goods industries was the cause of industrialization which in turn was the stimuli for further industrial development in the local area. Thus, the market situation was, in general, a foremost factor in the location decision.

The larger employee size plants primarily produced capital goods. They were national market oriented and had a higher survival rate than the smaller employee size plants. The location decision of entrepreneurs of capital goods plants was greatly influenced not only by the market situation and the community environment but also by availability and adequacy of highway facilities.

The smaller employee size plants were primarily local market oriented. They essentially produced consumer goods and suffered a lower survival rate. These plants sold their products in a monopolistically competitive market. Thus, the relatively low survival rate is probably the result of easy entry and exit into the industries.

The findings of this study is consistent with and supported by location theory. In each instance, the location decision was swayed by the entrepreneurs consideration of revenue-increasing and cost-decreasing elements. Thus, in his judgment, he made the most profitable site selection choice.

APPENDIX A

Tables

TABLE 1 - APPENDIX

MANUFACTURING ESTABLISHMENTS LOCATED IN THE GREATER METROPOLITAN TULSA AREA[a], 1958 - 1969, BY YEAR ESTABLISHED, EMPLOYEE SIZE, MARKET AREA, AND 4-DIGIT STANDARD INDUSTRIAL CLASSIFICATION CODE

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
A-1 Pest Control and Concrete Products	1963	1	R	Tulsa	3361
A-1 Signs	1964	2	N	Tulsa	3993
A & B Oil Well Cementing, Inc.	1962	6	L	Sapulpa	3533
A. E. A. Plastic, Inc.	1963	10	S	Tulsa	3079
Aaron Guttering Service	1962	1	L	Tulsa	3444
Abbott Heat Exchanger	1964	130	N	Tulsa	3443
ABCO Air Conditioning Company[c]	1963	4	S	Tulsa	3444
Accents De'cor	1963	4	S	Tulsa	2514
Subsidiary of Metalart, Inc.					3429
Accro Machine, Inc.	1965	3	L	Tulsa	3591
Accurate Forms & Type Composition Service	1964	1	L	Tulsa	2732
					2751
Ace Hi Signs	1962	4	L	Tulsa	3993
					3461
Acme Machine, Inc.	1968	22	S	Tulsa	3541
					3441
Adamsco, Inc.	1963	5	N	Tulsa	3449
AdArt Printing Company	1968	2	L	Tulsa	2752
Adgraph-Screenfab	1965	3	N	Tulsa	2751
Advertising Service of Tulsa	1964	1	L	Tulsa	2752
					2751
Aerial Data Service	1964	3	R	Tulsa	2741
					2751
Aeromotor Division of Braden-Aeromotor Corp.	1964	462	E	Broken Arrow	3441
Air Cooled Exchangers, Inc.	1964	13	N	Tulsa	3443
Air Power Systems Company	1968	6	N	Tulsa	3613

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
Ajax Plastics Corporation	1959	20	R	Broken Arrow	3079
					3461
Aldor Manufacturing Corporation	1963	24	N	Tulsa	3441
All American Trophy Center	1965	2	S	Tulsa	2753
					2499
					3499
Allen Metal Products Company	1962	3	L	Tulsa	3264
Allied Limb & Brace Company	1966	3	R	Tulsa	3842
Allied Oklahoma Corporation	1959	80	N	Sand Springs	2753
Subsidiary of Allied Graphic Arts, Inc.					
New York, New York					
Aluminum Hardcoat Company	1959	24	E	Tulsa	3479
					3471
Aluminum Manufacturing Corporation	1963	6	N	Tulsa	3449
Amax Aluminum Mill Products, Inc.	1959	30	R	Tulsa	3361
Subsidiary of American Metal Climax, Inc.					3441
New York, New York					
American Casting Company	1966	9	S	Tulsa	3565
					3559
Anchor Paint Manufacturing Company	1962	60	N	Tulsa	2851
Anchor Slaugthering Company	1964	3	L	Tulsa	2011
Anderson, Andy, Sheet Metal Works	1967	2	S	Sand Springs	3449
					3441
Apco Oil Corporation (Solvents Division)	1965	6	R	Tulsa	2911
Apollo Rubber Company	1966	27	N	Tulsa	3544
					3069
Arrow Oil Tools	1960	6	N	Tulsa	3533
Artistic Quotes	1965	2	R	Tulsa	2499

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET AREA[b]	LOCATION	PRODUCT BY SIC
Art Studio of Tulsa, Inc.[c]	1965	15	R	Tulsa	3231
Asphalt Plant Engineering Services	1964	4	E	Tulsa	3433
Associate Industries	1959	5	E	Tulsa	3821
					3569
					3494
Atlas Air, Incorporated[c]	1965	3	L	Tulsa	3444
Auburn Cord Duesenberg Company	1960	15	N	Broken Arrow	3711
Automatic Systems Division of Fruehauf Corp.[c]	1966	25	E	Tulsa	3535
Avco Electronics Division, Tulsa Operation Subsidiary of Avco Corporation, New York, New York	1962	150	E	Tulsa	3621
					3662
B & M Trucking & Sand Company	1964	8	L	Jenks	3295
B & W Manufacturing Company	1964	2	L	Tulsa	3429
					3449
Bagby-Harris Concrete Company	1966	43	L	Jenks	3273
Bartolina Manufacturing Company	1961	41	E	Tulsa	3494
					3452
					3533
					3443
					3498
Bash, Ted, Machine Shop	1960	2	N	Tulsa	3566
Bendco Pipe & Tubing Bending	1962	4	N	Tulsa	3498
Betche, Incorporated	1966	16	R	Tulsa	2512
Biles Concrete Products	1962	8	S	Tulsa	3272
Bixby Machine & Engineering Company	1962	2	L	Bixby	3599
Black, Sivalls & Bryson, Inc., Automation Division, Subsidiary of Black, Sivalls & Bryson, Inc., Kansas City	1960	95	E	Tulsa	3533
					3821

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
Blue Chip Chemical Company	1963	2	N	Tulsa	2842
Borden Milk & Ice Cream Company	1965	25	L	Tulsa	2021
Bourne's Ed., Aluminum Products Company	1960	4	L	Sapulpa	3444
					3442
Brainerd Chemical Company	1960	7	R	Tulsa	2879
					2851
					2842
Brandt Equipment & Supply Company	1967	14	R	Tulsa	3559
Broach, G. C., Company, The	1960	26	E	Tulsa	3567
Broken Arrow Mobilhome Manufacturing, Inc.	1959	60	N	Broken Arrow	3713
					3791
Broken Arrow Monument Company[c]	1963	8	L	Broken Arrow	3272
Bronzcraft-Awards, Incorporated	1968	25	N	Tulsa	2431
					2499
Bruno's Corn Tortillas	1965	2	L	Tulsa	2099
Bryant Incinerator Construction, Inc.	1968	11	R	Tulsa	3272
					3433
Builders Steel Company, The	1962	15	S	Tulsa	3441
Bush Manufacturing Company	1959	12	R	Tulsa	3613
					3561
Business Builders, Incorporated	1966	27	N	Tulsa	3993
Business Printing, Incorporated	1966	6	S	Tulsa	2721
					2751
Byron Jackson Pumps, Incorporated Subsidiary of Division of Borg-Warner Corporation - Chicago, Illinois	1959	550	E	Tulsa	3561
C & P Printing & Stationery Company	1960	2	L	Tulsa	2751
Cabinets by Coppage	1960	1	L	Tulsa	2541
					2341
					3079

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
Cameron Corporation	1963	10	N	Tulsa	2394
					1925
					3861
					2531
Carr Industrial Tooling & Manufacturing Company	1963	5	S	Tulsa	3362
					3541
					3369
Carter, O.N., Trucking & Sand Company	1965	5	L	Sand Springs	3295
Central Process & Sales Company, Incorporated	1962	15	N	Tulsa	3993
					3953
Central Victorian Marble, Incorporated	1965	6	S	Tulsa	3913
Champion, Incorporated	1963	90	N	Sand Springs	3522
Charley's Chuckle Cards, Incorporated	1961	3	N	Tulsa	2771
Charlie's Upholstery	1962	4	S	Tulsa	2512
Cheairs Company	1966	2	N	Tulsa	2514
					2511
Chemical Equipment Corporation	1960	5	N	Tulsa	3811
Chittom Equipment Company	1964	25	E	Tulsa	3564
					3599
City Sheet Metal Company	1963	9	L	Tulsa	3444
Clark's Auto Trim	1964	1	L	Tulsa	3714
Clay Arts Ceramics	1964	3	L	Kiefer	3269
Cleora's Pastry Shop & Catering Service[c]	1962	8	L	Tulsa	2051
Coleman Metal Treating Laboratory Incorporated	1963	27	R	Tulsa	3399
Comet Signs Company	1965	3	L	Tulsa	3461
					3993
Commander Finishing Company	1964	210	N	Sand Springs	2392
Commercial Hard Chrome Company	1964	2	N	Tulsa	3471
Component Structures Corporation	1965	15	L	Tulsa	2431

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET AREA[b]	LOCATION	PRODUCT BY SIC
Conley, Ed., Plastic Corporation	1966	50	E	Jenks	3079
Con-Rad Corporation	1963	260	E	Tulsa	3672
Subsidiary of U.S. Industries, Inc. New York, New York					3079
Constant Quality Printing	1966	3	L	Broken Arrow	2731
					2741
Continental Research Company	1960	7	N	Tulsa	3662
Cook Gold & Porcelain Laboratory	1959	4	R	Tulsa	3843
Cooling Products Company, Incorporated	1961	45	E	Broken Arrow	3443
Costume Shop, The	1962	2	S	Tulsa	3999
					2389
Cozart Custom Cabinets	1959	4	L	Tulsa	3079
					2431
Crescent Precision Products	1961	500	N	Tulsa	3599
Crest, Incorporated	1961	111	E	Tulsa	3949
Currell Components	1964	4	L	Broken Arrow	2433
Subsidiary of Currell Lumber Company, Lawton					
Custom Chrome Plating Company	1966	2	R	Tulsa	3471
Custom Cutter Company	1960	51	N	Tulsa	3545
Custom Engineering and Manufacturing Corporation	1964	45	N	Tulsa	3561
					3494
Custom Machine Works, Incorporated	1966	3	L	Broken Arrow	3471
Custom Moulding & Millwork, Incorporated	1962	8	N	Tulsa	2499
					2431
Danuser Machine Works	1964	104	N	Claremore	3522
Subsidiary of Patterson Steel					
Davis, Eddie, Upholstery Company[c]	1965	1	L	Tulsa	2512
Design Engineering Company	1963	2	L	Broken Arrow	3362
					3323

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
Detection Products[c]	1967	5	N	Tulsa	3679
Subsidiary of R. A. F. Corporation, Chicago					
Dewey Portland Cement Company	1961	145	R	Tulsa	3241
Subsidiary of Martin Marietta Corporation New York, New York					
Donut Shop, The[c]	1963	8	L	Sand Springs	2051
Dorsett Electronics, Incorporated	1963	400	E	Tulsa	3811
Downing Manufacturing Company	1963	5	N	Tulsa	3993
					3591
Drum Service Company	1960	15	S	Tulsa	3491
Dugger Manufacturing Company	1960	1	N	Tulsa	3699
Dynaplex Corporation	1963	12	R	Sand Springs	3079
Earl's Upholstering Company	1960	1	L	Tulsa	2512
Econ-O-Matic, Incorporated	1964	4	R	Tulsa	3679
Econo-Therm Corporation	1962	120	N	Tulsa	3567
E. I. Dupont De Nemours & Company, Incorporated	1962	95	E	Tulsa	3079
El Dorado Window Company[c]	1965	10	R	Claremore	3442
Electro Platers	1963	3	S	Tulsa	3479
					3471
Electronic Manufacturing & Engineering[c] Corp.	1966	9	N	Tulsa	3572
					3999
					3679
El Taquito, Incorporated	1965	8	N	Tulsa	2099
					2033
Empire Optical	1965	6	L	Tulsa	3831
Empire Press	1965	3	R	Owasso	2731
					2741

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
Essex, Incorporated	1962	62	E	Tulsa	3443
Evans Box Manufacturing Corporation	1962	30	R	Tulsa	2653
Executive Suites, Incorporated[c]	1963	8	R	Tulsa	2751
Fashion Eyewear, Incorporated	1964	3	L	Tulsa	3851
Fiberglass Pools, Incorporated	1968	4	S	Tulsa	3079
Fibre-Mold Company	1964	4	N	Tulsa	3079
Fields Manufacturing Company	1961	16	R	Tulsa	3713
Flour Products Company	1968	23	E	Tulsa	3443
Subsidiary of Flour Corporation, L. A. California					
Food Pak, Incorporated	1964	3	R	Tulsa	2087
Foreman Printing Company	1959	1	S	Tulsa	2751
					2752
Foremost Dairies, Incorporated	1962	7	L	Tulsa	2026
Fuller, A. L. & Sons[c]	1965	6	L	Tulsa	2541
G & E Mold-A-Glass Company[c]	1967	3	N	Tulsa	3079
G & S Manufacturing Company	1959	5	N	Tulsa	3591
Galvo Steel Fabricators, Incorporated	1968	12	N	Tulsa	3441
Garnett Corporation	1963	4	L	Tulsa	3591
Garrett Signs	1962	1	S	Tulsa	3993
Gasser Construction Company	1964	5	R	Tulsa	3272
Gemco, Incorporated	1964	85	E	Tulsa	3729
					3993
General Pattern Company	1963	4	R	Tulsa	3565
					3999
General Steel Fabricating, Incorporated	1960	30	L	Tulsa	3441
					3433

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
General Wire & Supply Company	1963	8	R	Tulsa	3449
Gentry Job Shop	1959	10	L	Tulsa	2431
Giles Printing Company	1961	4	L	Tulsa	2752
					2751
Goodlet's Auto Trim Shop	1966	1	L	Tulsa	3714
Good-All Corrosion Control Company[c]	1963	15	R	Tulsa	3679
					3629
Goulds Pumps, Incorporated	1962	30	R	Tulsa	3561
Graphic Engineering, Incorporated	1962	25	E	Tulsa	3679
Subsidiary of Indel Supply					
Graphic Typesetting & Negative Service[c]	1965	15	N	Tulsa	2751
					2752
					2791
Greenhill Memorial Gardens	1961	12	S	Sapulpa	3272
					2499
					3499
Guy's Foods, Incorporated	1965	40	R	Tulsa	2032
Subsidiary of Guy's Foods, Incorporated,					2035
Kansas City, Missouri					2099
					2087
H & H Manufacturing Company	1965	5	R	Tulsa	3591
Hesco Manufacturing Company	1960	8	N	Sapulpa	3533
Henry's Septic Tanks	1966	3	L	Collinsville	3272
Honey Glazed Donut Shop, Incorporated[c]	1964	11	L	Tulsa	2051
House of Craftsman	1963	8	L	Tulsa	2512
Hunter Aero Instruments Company	1960	4	E	Jenks	3811
Hudgins Supply Company	1963	6	L	Sapulpa	3542
Hurricane Sales Inc. & D. O. T., Inc.	1965	3	N	Tulsa	3811

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
Hypar Corporation	1968	12	N	Tulsa	3441
I C Film Production[c]	1966	15	N	Tulsa	3993
Ideal Crane Division of Bert Parkhurst & Company	1965	5	E	Tulsa	3531
Indrepco, Incorporated	1964	4	E	Tulsa	3679
Industrial Commercial Photography[c]	1965	15	N	Tulsa	3993
Industrial Design Specialists, Incorporated	1962	5	R	Tulsa	3545
International Metal Company	1963	29	N	Sapulpa	3356
J & M Foods[c]	1968	4	L	Tulsa	2099
Jeannie Music Publishing, Incorporated	1959	8	N	Tulsa	2741
Jem Manufacturing, Incorporated	1964	15	N	Tulsa	3449
Jenks Ready Mix	1960	4	L	Jenks	3273
Jetflo Manufacturing Corporation	1959	4	N	Tulsa	3635
Johnny's Slot Car Products[c]	1965	2	N	Tulsa	3941
John's E-Z Spuds	1966	3	L	Tulsa	2099
Johnson Plastics, Incorporated	1965	6	N	Tulsa	3079
Jones, R. D., Upholstering Company	1960	2	L	Tulsa	2512
K M Corporation	1962	10	N	Tulsa	3241
Kamac Manufacturing Company	1965	6	N	Tulsa	3559
Kamp, Frank, Upholsterer	1963	1	L	Tulsa	2512
Kay's Custom Upholstering Company	1964	1	L	Tulsa	2512
Keller's Furniture Refinishing & Upholstering	1965	1	L	Tulsa	2512
Kelly Dental Studio, Incorporated	1961	13	L	Tulsa	3843
Kelly's Home & Office Decorating Center	1964	8	L	Tulsa	2542 2541
Kelly, W. R., and Son	1968	2	S	Tulsa	2426
Kentube Company	1961	80	E	Tulsa	3356

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
Kuharski Mold	1959	8	N	Tulsa	3079
La Maison	1967	4	N	Tulsa	3449
					3642
Latimer's, Incorporated	1965	8	S	Tulsa	2035
Lawyer Graphic Screen Process	1962	4	N	Tulsa	3961
					2752
LeBar, Albert[c]	1965	1	L	Tulsa	2512
Lite-A-Vent Corporation	1959	2	R	Tulsa	3444
Subsidiary of Federal Construction Company					
Lith-A-Print	1964	3	L	Tulsa	2752
Litho-Graphic Company	1963	2	L	Tulsa	2731
Litho Negative Service, Incorporated	1959	7	S	Tulsa	2752
					2751
Looney's of Texas Manufacturing Company	1963	8	R	Sand Springs	3441
Lockard's Upholstery	1964	4	L	Tulsa	2512
Love Sheet Metal	1959	4	R	Claremore	3444
Lowrance Electronics Manufacturing Corporation	1966	60	E	Tulsa	3679
					3822
Lu Celia's Designs, Incorporated	1966	25	N	Tulsa	3229
M D Associates	1965	3	L	Tulsa	3679
Magic Circle Manufacturing Company	1961	15	S	Tulsa	3442
Magnalectric Corporation, The	1965	7	N	Tulsa	3679
Magnetic Switches, Incorporated	1959	9	E	Tulsa	3694
Mart Trophy & Hobby Company	1960	1	S	Tulsa	2499
					3993
Mary's Pie Shop	1965	2	L	Tulsa	2051

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
McClure Pattern Shop	1963	4	L	Tulsa	3461
					3565
McMichael Asphalt Sales Company	1961	5	S	Tulsa	2951
McNabb Engraving & Trophy Company	1963	4	R	Tulsa	3499
					3914
					2499
Meek's Duplicating-Lithographing	1961	5	L	Tulsa	2752
Metalart, Incorporated	1963	4	S	Tulsa	2514
					2599
					3446
Micro Manufacturing Company	1961	8	N	Tulsa	3711
					3751
Microphoto Division	1967	8	S	Tulsa	2751
Subsidiary of Oklahoma Data Service Company					
Tulsa					
Mid-Continent Concrete Company	1963	18	L	Tulsa	3273
Midwest Sign & Engineering Company	1963	70	N	Tulsa	3499
Midwestern Metals, Incorporated[c]	1961	6	E	Tulsa	3441
Mobile Engineering Company	1960	47	N	Tulsa	3791
Subsidiary of Redman Industries,					
Incorporated Dallas					
Mobile Manufacturing	1965	3	L	Tulsa	3591
Modern Plating	1966	10	S	Tulsa	3471
Modern Sign & Neon Company	1959	8	R	Tulsa	3993
Mohawk Ornamental Iron	1961	2	L	Tulsa	3446
Montello, Incorporated	1960	6	N	Sand Springs	2899
Mooney, Bill, Signs	1960	1	L	Mounds	3993

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET AREA[b]	LOCATION	PRODUCT BY SIC
Moreland-Hulse Dental Laboratory	1959	8	S	Tulsa	3843
Morgan Wood Turning	1959	3	L	Broken Arrow	2499
Morris, Sidney, Goldsmith Corporation[c]	1962	4	L	Tulsa	3913
Morton Foods, Incorporated	1963	50	S	Tulsa	2099
Subsidiary of Morton Foods, Incorporated Dallas					
Mott, Benny, Roofing & Sheet Metal Company	1960	15	R	Tulsa	3444
Mr. Exec' Products	1966	117	N	Tulsa	3491
Subsidiary of Business Builders, Incorporated Tulsa					
Mr. Jackson Interiors, Incorporated	1964	3	L	Tulsa	2512
Multifab Manufacturing Corporation	1968	6	R	Tulsa	3449 3441
Neece Steel Corporation	1962	80	N	Tulsa	3441
Nicholson Products, Incorporated	1966	9	S	Tulsa	3544 3461
Nordam, Incorporated[c]	1966	50	N	Tulsa	3729
Nordam	1968	20	N	Tulsa	3079
Division of R. H. Siegfried, Incorporated					
North American Rockwell Corporation, Tulsa Division	1962	4,683	E	Tulsa	1925
Nourse Precision Machining	1965	2	L	Broken Arrow	3591
NuLine Awards	1960	8	N	Tulsa	3499 3914 2499
Nupar Manufacturing Company, Incorporated	1962	35	R	Tulsa	3461
O K Products Machine Shop, Incorporated	1964	3	S	Tulsa	3591

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
Oil Capitol Neon Company	1963	2	L	Tulsa	3993
Oildex Corporation[c]	1961	4	N	Tulsa	3714
Oil Originals by LuCelia, Incorporated	1959	25	N	Tulsa	3993
Oklahoma Big Pattern, Incorporated[c]	1960	4	R	Tulsa	3553
					3423
Oklahoma Neon Company	1960	10	S	Tulsa	3993
Oklahoma Spring Company	1965	25	R	Tulsa	2515
					3481
Old Village Products	1966	27	N	Tulsa	3491
Subsidiary of Business Builders, Incorporated - Tulsa					
Owen Tool & Cutter Grinding	1965	2	L	Tulsa	3545
Ozark, Incorporated	1965	9	S	Claremore	3561
P-F Business Forms Company	1965	30	N	Tulsa	2751
					2761
Paco, Incorporated	1966	2	N	Tulsa	3494
Par-Buster Golf Practice Net Company	1963	2	N	Tulsa	3949
Subsidiary of Maker Products - Tulsa					
Parker Brothers, Incorporated	1959	9	N	Tulsa	3599
Patty Precision Products Company	1962	55	N	Sapulpa	3461
Pearson Signs	1966	1	L	Tulsa	3993
Peerless Printing Company	1959	2	R	Tulsa	2751
Pennington Tool & Manufacturing Company	1961	3	N	Tulsa	3949
					3461
Petroleum Electronics Manufacturing Incorporated	1963	28	E	Tulsa	3679
					3612

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
P. G. & H., Incorporated	1968	16	L	Tulsa	3591
Subsidiary of Tulsa Machine Works					
Pioneer Body Works[c]	1960	3	S	Catoosa	3713
Pioneer Fence	1961	4	S	Broken Arrow	2499
					3481
Pittenger Sintered Products, Incorporated	1967	8	R	Tulsa	3714
Plastic Products, Incorporated	1965	7	N	Tulsa	3551
					2023
Poly-Version, Incorporated	1966	26	N	Tulsa	2381
Powers, R. A. Company	1966	2	L	Tulsa	2752
Precision Machine & Manufacturing Company[c]	1964	6	N	Tulsa	3591
Precision Welding Company	1962	15	N	Tulsa	3498
Precision Wood Products, Incorporated	1963	17	N	Tulsa	2541
Printers, Incorporated	1965	3	S	Tulsa	2752
Subsidiary of Frank Andrews Advertising Tulsa					
Process Foods, Incorporated	1965	6	L	Tulsa	2099
Production Wood Products Company	1966	27	E	Tulsa	2499
Subsidiary of Business Builders Incorporated Tulsa					
Pryer Machine & Tool Company	1966	9	R	Tulsa	3591
Quality Machine & Manufacturing Company[c]	1967	9	L	Tulsa	3599
Rainey Corporation, The	1964	57	N	Tulsa	3443
Rauner Printing Company	1960	8	L	Tulsa	2751
Regal Concrete Company	1965	6	L	Tulsa	3273
Republic Glass Company, Incorporated	1964	4	R	Tulsa	3229

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
Republic Instrument Company, Incorporated[c]	1960	5	N	Tulsa	3811
Subsidiary of Republic Exploration Company					3679
Tulsa					
Research & Manufacturing Corporation	1964	15	R	Tulsa	3079
Richardson Upholstery Shop	1961	1	L	Tulsa	2512
Richcraft Manufacturing Company, Incorporated	1960	12	N	Broken Arrow	2521
Riverside Concrete Products	1964	3	L	Tulsa	3272
Riverside Sand Company	1965	7	L	Tulsa	3295
Roto Hammer Company	1959	4	N	Tulsa	3569
Ro Way Door Company of Tulsa[c]	1966	7	R	Tulsa	3442
Royal Coach Manufacturing Company	1966	1	L	Tulsa	3713
Russell-Wade Electronic, Incorporated	1966	6	N	Tulsa	3949
Sanders, B. E., Company	1960	8	N	Tulsa	2423
Sandi Manufacturing Company[c]	1962	4	N	Tulsa	3635
Sand Springs Weaving[c]	1965	85-100	N	Sand Springs	2211
Subsidiary of Bibb Manufacturing Company					
Macon, Georgia					
Sapulpa Red-E-Mix Company, Incorporated	1959	13	L	Sapulpa	3273
Sapulpa Refining Company	1964	2	R	Sapulpa	2992
Subsidiary of Kithen Oil Company, Incorporated - Stroud					
Scotsman Corporation[c]	1965	20	N	Tulsa	3537
Scott Rich Homes	1966	26	R	Claremore	3791
Scott Typeco	1966	2	L	Tulsa	2791
Scotty's Donut Shops, Incorporated[c]	1959	3	L	Tulsa	2051
Self's Custom Butchering	1960	3	L	Collinsville	2011

(See footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
Service, Incorporated	1964	16	L	Tulsa	3993
Service Paint Company	1964	35	N	Tulsa	2851
Shamrock Manufacturing & Sales Company, Inc.	1964	2	S	Tulsa	2821
Signet Controls, Incorporated	1966	28	E	Tulsa	3622
Sims Upholstery	1966	5	L	Tulsa	2512
Skiatook News	1959	5	L	Skiatook	2711
Smith Sheet Metal Company	1964	3	L	Tulsa	3444
Snow's Upholstering[c]	1963	1	L	Tulsa	2512
Solaray Signs, Incorporated	1964	3	L	Tulsa	3993
Sommer, W. L., Company of Oklahoma, Incorporated	1966	4	R	Tulsa	3561
Southern Engineering & Sales, Incorporated	1964	6	R	Tulsa	3651 3861
Southern Maid Donut Shops of Tulsa, Incorporated	1965	10	L	Tulsa	2051
Southern Mill Fabricators, Incorporated Subsidiary of Tandy Industries, Incorporated Tulsa	1963	250	N	Tulsa	2433
Southside Cabinet Company Subsidiary of Beck Homes, Company, Incorporated - Tulsa	1960	15	L	Jenks	2431
Southtown Sand, Incorporated	1964	11	L	Bixby	3295
Southwest Plastics Subsidiary of Division of Southwest Metal Finishing Company - Tulsa	1965	10	N	Tulsa	3079
Southwest Steel Corporation[c]	1965	60	N	Tulsa	3449
Space Tek Manufacturing Company	1966	6	N	Tulsa	3591 3461
Spraycoat, Incorporated[c]	1960	10	R	Tulsa	3281 3079

(See Footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
Stan-Fields Manufacturing Company	1968	2	N	Tulsa	2841
Star Forms, Incorporated	1962	3	L	Tulsa	2752
Stormco Windows, Incorporated	1966	17	S	Tulsa	3442
Subsidiary of Americano, Incorporated Tulsa					2431
Studer's Printing, Incorporated	1967	4	L	Tulsa	2752
					2751
					2761
Superior Body Works	1959	4	D	Sapulpa	3713
T & L Brass & Aluminum Foundry	1960	8	L	Tulsa	3591
Taylor, Incorporated[c]	1961	5	N	Sapulpa	3498
Taylor & Oxford Ceramic	1962	2	R	Tulsa	3269
Tear-Eaze Company, The	1961	3	N	Tulsa	2761
Teach-Tron Laboratories	1965	4	S	Tulsa	3264
					3679
Tefco Lithographers, Incorporated	1961	4	R	Tulsa	2751
					2752
Temco Manufacturing Company	1962	11	L	Tulsa	3999
Texas Pipe Bending Company	1966	160	E	Tulsa	3498
Thunderbird Engineering, Incorporated[c]	1960	10	N	Tulsa	3531
Toddlin' Time, Incorporated	1965	30	R	Tulsa	2361
Tri-Ex, Incorporated	1965	67	E	Tulsa	3443
Tube Fab Incorporated	1959	43	N	Tulsa	3498
					3443
					3441
Tube Honing Service	1963	8	S	Tulsa	3442

(See Footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
Tulsa Armature Works, Incorporated	1961	14	R	Tulsa	3536
Tulsa Automotive Supply	1961	8	L	Tulsa	3548
Subsidiary of Brook Brother, Oklahoma City					3791
Tulsa Centerless Grinding Company	1965	1	R	Tulsa	3591
Tulsa County News	1965	12	L	Tulsa	2711
					2731
Tulsa Dental Laboratory[c]	1965	2	S	Tulsa	3843
Tulsa Door Assembly[c]	1966	5	L	Tulsa	2431
Tulsa Engineered Products Company	1965	20	N	Tulsa	3561
Tulsa Fabricating Company	1966	2	L	Sand Springs	3441
Tulsa Foam, Incorporated	1964	12	S	Tulsa	3079
Subsidiary of King Metal Products, Incorporated - Tulsa					
Tulsa Galvanizing Corporation	1966	32	R	Sand Springs	3479
Tulsa Graphic Press, Incorporated	1967	2	L	Tulsa	2752
Tulsa Jetco, Incorporated	1964	26	R	Claremore	3531
Tulsa Matchplate Company	1963	5	N	Tulsa	3369
Tulsa Matrix Company	1963	1	R	Tulsa	3555
Tulsa Precision Manufacturing Company	1964	25	N	Tulsa	3589
					3569
Tulsa Rock Company	1961	20	L	Tulsa	3295
Tulsa Rotary Broom Company	1962	2	R	Tulsa	3711
Tulsa Rubber Company	1959	45	S	Tulsa	3069
Tulsa Trailer Manufacturing Company[c]	1965	12	N	Tulsa	3799
Tulsa Tube Bending Company	1959	24	E	Tulsa	3498
					3446

(See Footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
Tulsa Welding & Fabrication, Incorporated	1966	30	N	Tulsa	3498
Subsidiary of O. R. Burden Construction Corporation - Tulsa					
Tulsa Wilbert Vaults, Incorporated	1963	6	L	Tulsa	3272
Tumelson's Construction & Sand Company	1959	2	S	Jenks	3295
United Printing & Business Forms	1966	2	L	Tulsa	2752
United Steel Fab, Incorporated	1965	18	L	Tulsa	3449
Universal Advertising, Incorporated	1961	5	L	Tulsa	2731
Universal Joint Specialists, Incorporated	1959	6	R	Tulsa	3566
Universal Welding & Fabricating[c]	1962	4	R	Tulsa	3443
Valley Engineering Company	1963	8	N	Tulsa	3799 3542
V B Products, Incorporated	1961	96	N	Tulsa	3452
Van Donge's Bowling Supply	1964	6	S	Tulsa	3914 3499
Venetian Marble of Tulsa	1964	6	N	Tulsa	2511
Virginia "B" Packing Company[c]	1964	4	L	Tulsa	2011
Wagoner Frame Shop[c]	1965	1	L	Tulsa	2499
Waner Corporation	1968	80	E	Tulsa	3443
Ward Tool & Manufacturing Company	1965	6	L	Broken Arrow	3461
Webco, Incorporated	1966	10	N	Sapulpa	3441
Wheeler Industries, Incorporated	1968	15	R	Sapulpa	3791
Wies Welding Works	1962	3	N	Tulsa	3441
Wiggins, V. H., Company	1964	3	L	Tulsa	3441
Williamson Manufacturing Company[c]	1960	250	E	Tulsa	3079
Subsidiary of T. D. Williamson, Incorporated					
Wolf's Manufacturing Company, Incorporated	1965	12	L	Jenks	3591

(See Footnotes at end of Table)

TABLE 1 - APPENDIX, (Continued)

NAME	YEAR EST.	NO. of EMPLOYEES	MARKET[b] AREA	LOCATION	PRODUCT BY SIC
Zone Packers & Manufacturing Company	1960	7	S	Tulsa	3533
Willmaco Corporation	1961	30	N	Tulsa	3599
Subsidiary of T. D. Williamson, Incorporated					
Yuba Heat Transfer Corporation	1960	400	N	Tulsa	3567
Subsidiary of Yuba Industries, Incorporated					3443

[a]The Greater Metropolitan Tulsa Area by definition includes the following municipalities and towns: The City of Tulsa, Claremore, Sand Springs, Broken Arrow, Bixby, Sapulpa, Jenks, Kiefer, Owasso, Collinsville, Mounds, Catoosa, and Skiatook.

[b]The Geographic market area is denoted by: L for Local, S for State, R for Regional, N for National, and E for Export.

[c]Establishments locating in The Greater Metropolitan Tulsa Area, 1958 - 1969, doing-business in November, 1966, but out-of-business or "address unknown" by November, 1969.

Sources: Oklahoma Industrial Development & Park Department. Oklahoma Directory of Manufacturers and Products. 1967 Edition. Tulsa Chamber of Commerce. Tulsa Area Manufacturers Directory, 1967-68. Tulsa: 1967. Tulsa Chamber of Commerce. Tulsa Area Manufacturers Directory, 1969-70. Tulsa: 1969. Claremore Chamber of Commerce. Industrial Sheet of Claremore, Claremore: 1969.

TABLE 2 - APPENDIX

ESTABLISHMENTS RESPONSE TO QUESTIONNAIRE BY SIC, NUMBER AND RESPONSE RATE

SIC	MAJOR INDUSTRY GROUP	NUMBER OF PLANTS	NUMBER OF RESPONSES	RESPONSE RATE (PER CENT)
20	Food and Kindred Products.	21	3	14.3%
22	Textile Mill Products.	1	--	--
23	Apparel and Other Finished Products from . . Fabrics and Similar Materials	6	2	33.3%
24	Lumber and Wood Products, Except Furniture .	22	8	36.3%
25	Furniture and Fixtures	27	5	21.7%
26	Paper and Allied Products.	1	1	100.0%
27	Printing, Publishing and Allied Industries .	38	14	38.8%
28	Chemicals and Allied Products.	7	7	100.0%
29	Petroleum Refining and Related Industries. .	3	0	--
30	Rubber and Miscellaneous Plastics Products .	21	10	52.6%
32	Stone, Clay and Glass Products	29	7	26.9%
33	Primary Metal Industries	8	4	50.0%
34	Fabricated Metal Products, Except Ordnance . Machinery, and Transportation Equipment .	105	40	41.2%
35	Machinery, Except Electrical	68	27	45.0%
36	Electrical Machinery, Equipment and. . . . . Supplies.	24	13	70.0%
37	Transportation Equipment	20	4	25.0%
38	Professional, Scientific and Controlling . . Instruments	17	8	53.5%
39	Miscellaneous Manufactures (Includes Group . 19 Ordnance and Accessories).	36	13	39.3%

TABLE 3 - APPENDIX

MANUFACTURING ESTABLISHMENTS[a] LOCATED IN THE GREATER METROPOLITAN TULSA AREA[b], 1958-1969, BY: 4-DIGIT SIC, PRODUCT PRODUCED, AND NUMBER OF PLANTS

SIC	PRODUCT	NUMBER OF PLANTS
19	ORDNANCE AND ACCESSORIES	
192	Ammunition, except for small arms	
1925	Guided missiles and space vehicles, completely assembled	2
20	FOOD AND KINDRED PRODUCTS	
201	Meat Products	
2011	Meat packing plants	3
202	Dairies	
2021	Creamery butter	1
2023	Condensed and evaporated milk	1
2026	Fluid milk	1
203	Canned and frozen foods	
2032	Canned specialties	1
2033	Canned fruits and vegetables	1
2035	Pickled fruits and vegetables	2
205	Bakery products	
2051	Bread and related products	6
208	Beverages	
2087	Flavoring extract and flavoring sirups	2
209	Miscellaneous foods and kindred products	
2099	Food preparations, n.e.c.	7
22	TEXTILE MILL PRODUCTS	
221	Broad woven fabric mills, cotton	
2211	Weaving mill, cotton	1
23	APPAREL AND RELATED PRODUCTS	
234	Women's and children's underwear	
2341	Women's and children's underwear	1

(See footnotes at end of Table)

TABLE 3 - APPENDIX, (Continued)

SIC	PRODUCT	NUMBER OF PLANTS
236	Children's outerwear	
2361	Girls, children's and infants' dresses, etc.	1
238	Miscellaneous apparel	
2381	Fabric dress and work gloves	1
2389	Apparel, n.e.c.	1
239	Fabricated textiles, n.e.c.	
2392	House furnishings, n.e.c.	1
2394	Canvas products	1
24	LUMBER AND WOOD PRODUCTS	
242	Sawmills and planing mills	
2423	Shingle mills	1
2426	Hardwood dimension and flooring	1
243	Millwork and related products	
2431	Millwork plants	8
2433	Prefabricated wood products	2
249	Miscellaneous wood products	
2499	Wood products, n.e.c.	12
25	FURNITURE AND FIXTURES	
251	Household furniture	
2511	Wood furniture, not upholstered	2
2512	Wood furniture, upholstered	15
2514	Metal household furniture	4
2515	Mattresses and bedsprings	1
252	Office furniture	
2521	Wood office furniture	2
253	Public-building and related furniture	
2531	Public-building furniture	1
254	Partitions and fixtures	
2541	Wood partitions and fixtures	4
2542	Metal partitions and fixtures	1
259	Furniture and fixtures, n.e.c.	
2599	Furniture and fixtures, n.e.c.	1
26	PAPER AND ALLIED PRODUCTS	
265	Paperboard containers and boxes	
2653	Corrugated shipping containers	1

TABLE 3 - APPENDIX, (Continued)

SIC	PRODUCT	NUMBER OF PLANTS
27	PRINTING AND PUBLISHING	
271	Newspapers	
2711	Newspapers	2
272	Periodicals	
2721	Periodicals	1
273	Books	
2731	Books, publishing and printing	5
2732	Books printing	1
274	Miscellaneous publishing	
2741	Miscellaneous publishing	4
275	Commercial printing	
2751	Printing, except lithographic	17
2752	Printing, lithographic	16
2753	Engraving and plate printing	2
276	Manifold Business Forms	
2761	Manifold Business Forms	3
277	Greeting cards	
2771	Greeting cards	1
279	Printing trades services	
2791	Typesetting	1
28	CHEMICALS AND ALLIED PRODUCTS	
282	Fibers, plastics, rubbers	
2821	Plastics materials, synthetic, resins, and nonvulcanizable elastomers	1
284	Cleaning and toilet goods	
2841	Soap and other detergents	1
2842	Polishes and sanitation goods	3
285	Paints and allied products	
2851	Paints and allied products	3
287	Agricultural chemicals	
2879	Agricultural chemicals, n.e.c.	1
289	Miscellaneous chemical products	
2899	Chemical preparations, n.e.c.	1
29	PETROLEUM AND COAL PRODUCTS	
291	Petroleum Refining	
2911	Petroleum Refining	1

TABLE 3 - APPENDIX, (Continued)

SIC	PRODUCT	NUMBER OF PLANTS
295	Paving and roofing materials	
2951	Paving mixtures and blocks	1
299	Petroleum and coal products, n.e.c.	
2992	Lubricating oils and greases	1
30	RUBBER AND PLASTICS PRODUCTS, N.E.C.	
306	Rubber products, n.e.c.	
3069	Rubber products, n.e.c.	2
307	Plastics products, n.e.c.	
3079	Plastics products, n.e.c.	19
32	STONE, CLAY, AND GLASS PRODUCTS	
322	Pressed and blown glassware	
3229	Pressed and blown glass, n.e.c.	2
323	Products of purchased glass	
3231	Products of purchased glass	1
324	Cement, hydraulic	
3241	Cement, hydraulic	2
326	Pottery and related products	
3264	Porcelain electrical supplies	2
3269	Pottery products, n.e.c.	2
327	Concrete and plaster products	
3272	Other concrete products	8
3273	Ready mixed concrete	5
328	Cut stone and stone products	
3281	Cut stone and stone products	1
329	Nonmetallic mineral products	
3295	Minerals, ground or treated	6
33	PRIMARY METAL INDUSTRIES	
332	Iron and steel foundries	
3323	Steel foundries	1
335	Nonferrous rolling and drawing	
3356	Rolling and drawing n.e.c.	2
336	Nonferrous foundries	
3361	Aluminum castings	2
3362	Brass, bronze, copper castings	2
3369	Nonferrous castings, n.e.c.	2

TABLE 3 - APPENDIX, (Continued)

SIC	PRODUCT	NUMBER OF PLANTS
339	Primary metal industries, n.e.c.	
3399	Primary metal industries, n.e.c.	1
34	FABRICATED METAL PRODUCTS	
342	Cutlery, handtools, hardware	
3423	Hand and edge tools	1
3429	Hardware, n.e.c.	2
343	Plumbing and heating, except electric	
3433	Heating equipment, except electric	3
344	Structural metal products	
3441	Fabricated structural steel	17
3442	Metal doors, sash, and trim	6
3443	Boiler shop products	11
3444	Sheet metal work	8
3446	Architectural metalwork	12
3449	Miscellaneous metalwork, n.e.c.	8
345	Screw machine products, bolts, etc.	
3452	Bolts, nuts, rivets, and washers	1
346	Metal stampings	
3461	Metal stampings	10
347	Metal services, n.e.c.	
3471	Plating and Polishing	6
3479	Metal coating, engraving, etc.	1
348	Miscellaneous fabricated wire products	
3481	Fabricated wire products, n.e.c.	2
349	Fabricated metal products, n.e.c.	
3491	Metal barrels, drums, and pails	3
3494	Valves and pipe fittings	3
3498	Fabricated pipe and fittings	5
3499	Fabricated metal products, n.e.c.	6
35	MACHINERY, EXCEPT ELECTRICAL	
352	Farm machinery and equipment	
3522	Farm machinery and equipment	3
353	Construction and like equipment	
3531	Construction machinery	4
3533	Oilfield machinery	6
3535	Conveyers	1
3536	Hoists, cranes, and monorails	1
3537	Industrial trucks and tractors	2

TABLE 3 - APPENDIX, (Continued)

SIC	PRODUCT	NUMBER OF PLANTS
354	Metalworking machinery and equipment	
3541	Metal-cutting machine tools	2
3542	Metal-forming machine tools	2
3544	Special dies and tools	2
3545	Machine tool accessories	3
3548	Metalworking machinery, n.e.c.	1
355	Special industry machinery	
3551	Food products machinery	2
3553	Woodworking machinery	1
3555	Printing trades machinery	1
3559	Special industry machines, n.e.c.	3
356	General industrial machinery	
3561	Pumps and compressors	8
3564	Blowers and fans	1
3565	Industrial patterns	3
3566	Power transmission equipment	1
3567	Industrial furnaces and ovens	3
3569	General industry machines, n.e.c.	3
357	Office machines, n.e.c.	
3572	Typewriters	1
358	Service-industry machines	
3589	Service-industry machines, n.e.c.	2
359	Miscellaneous machinery	
3599	Miscellaneous machinery	21
36	ELECTRICAL MACHINERY	
361	Electric distribution products	
3612	Transformers	1
3613	Switchgear and switchboards	2
362	Electric industrial apparatus	
3621	Motors and generators	1
3622	Industrial controls	1
3629	Electric industrial goods, n.e.c.	1
363	Household appliances	
3635	Household vacuum cleaners	2
364	Lighting and wiring devices	
3642	Lighting fixtures	1
365	Radio and TV receiving equipment	
3651	Radio and TV receiving sets	1

TABLE 3 - APPENDIX, (Continued)

SIC	PRODUCT	NUMBER OF PLANTS
366	Communication equipment	
3662	Radio, TV communications equipment.	2
367	Electronic components	
3672	Cathode ray picture tubes	1
3679	Electronic components, n.e.c.	12
369	Electrical products, n.e.c.	
3694	Engine electrical equipment	1
3699	Electrical products, n.e.c.	1
37	TRANSPORTATION EQUIPMENT	
371	Motor vehicles and equipment	
3711	Motor vehicles.	3
3713	Truck and bus bodies.	5
3714	Motor-vehicle parts and accessories	4
372	Aircraft and parts	
3729	Aircraft equipment, n.e.c.	2
375	Motorcycles, bicycles, and parts	
3751	Motorcycles, bicycles, and parts.	1
379	Transportation equipment, n.e.c.	
3791	Trailer coaches	5
3799	Transportation equipment, n.e.c.	2
38	INSTRUMENTS AND RELATED PRODUCTS	
381	Scientific instruments	
3811	Scientific instruments	5
382	Mechanical measuring devices	
3821	Mechanical measuring devices.	2
3822	Automatic temperature controls.	1
383	Optical instruments and lenses	
3831	Optical instruments and lenses.	1
384	Medical instruments and supplies	
3842	Surgical appliances and supplies.	1
3843	Dental equipment and supplies	4
385	Ophthalmic goods	
3851	Ophthalmic goods.	1
386	Photographic equipment	
3861	Photographic equipment.	2

TABLE 3 - APPENDIX, (Continued)

SIC	PRODUCT	NUMBER OF PLANTS
39	MISCELLANEOUS MANUFACTURING	
391	Jewelry and silverware	
3913	Lapidary work.	2
3914	Silverware and plated ware	3
394	Toys and sporting goods	
3941	Games and toys	1
3949	Sporting and athletic goods.	4
395	Pens, pencils, and office supplies	
3953	Marking devices.	1
396	Costume jewelry and notions	
3961	Costume jewelry.	1
399	Miscellaneous manufactures, part two	
3993	Signs and advertising displays	20
3999	Miscellaneous products, n.e.c.	1

[a]Plants located between the years of 1958-1969, identified as doing business in November, 1966, or later.

[b]The Greater Metropolitan Tulsa Area, by definition, includes the following municipalities: The City of Tulsa, Claremore, Sand Springs, Broken Arrow, Bixby, Sapulpa, Jenks, Kiefer, Owasso, Collinsville, Mounds, Catoosa, and Skiatook.

Source: Compiled from the Oklahoma Industrial Development and Park Department, Oklahoma Directory of Manufacturers and Products, 1967 Edition. Tulsa Chamber of Commerce, Tulsa Area Manufacturers Directory, 1967-1968, and 1969-70. The Claremore Chamber of Commerce, Industrial Sheet of Claremore, Claremore, 1969.

TABLE 4 - APPENDIX

ESTABLISHMENTS LOCATED IN THE GREATER METROPOLITAN TULSA AREA[a], 1958-1969, DOING-BUSINESS, NOVEMBER 1966, and OUT-OF-BUSINESS, NOVEMBER 1969 BY ESTABLISHMENT, EMPLOYEE SIZE, MARKET AREA, and 4-DIGIT STANDARD INDUSTRIAL CLASSIFICATION CODE

Establishment	Employee Size	Market Area	SIC Code
ABCO Air Conditioning Company.	4	S	3444
Art Studio of Tulsa, Inc.	15	R	3231
Atlas Air, Inc.	3	L	3444
Automatic Systems Division of Fruehauf Corp., Detroit, Michigan	25	E	3535
Broken Arrow Monument Company.	8	L	3272
Cleora's Pastry Shop & Catering Service. . . .	8	L	2051
Davis, Eddie, Upholstery Company	1	L	2512
Detection Products Subsidiary of R.A.F. Corp., Chicago, Illinois	5	N	3679
Donut Shop, The.	8	L	2051
El Dorado Window Company	10	R	3442
Electronic Mfg. & Eng. Corporation	9	N	3679
			3999
Executive Suites, Inc.	8	R	2751
Fuller, A. L. & Sons	6	L	2541
G & E Mold-A-Glass Company	3	N	3079
Good-All Corrosion Control Company	15	R	3629
			3679
Graphic Typesetting & Negative Service	15	N	2751
			2752
			2791
Honey Glazed Donut Shop, Inc.	11	L	2051
I C Film Production.	15	N	3993
Industrial Commercial Photography.	15	N	3993
J and M Foods.	4	L	2099
Johnny's Slot Car Products	2	N	3941
LeBar, Albert.	1	L	2512
Midwestern Metals, Inc.	6	E	3441
Morris, Sidney, Goldsmith Corp..	4	L	3913
Nordam, Inc.	50	N	3729
Oildex Corp.	4	N	3714
Oklahoma Big Pattern, Inc.	4	R	3423
			3553
Pioneer Body Works	4	S	3713
Precision Machine & Mfg. Co.	6	N	3591
Quality Machine and Mfg. Company (NR).	9	L	3599

[a]See footnote at the end of the Table.

TABLE 4 - APPENDIX
(Continued)

Establishment	Employee Size	Market Area	SIC Code
Republic Instrument Company, Inc.			
Subsidiary of Republic Exploration Company.	5	N	3679
Tulsa			3811
Ro Way Door Company of Tulsa	7	R	3442
Sandi Manufacturing Company.	4	N	3635
Sand Springs Weaving			
Subsidiary of Bibb Mfg. Co., Macon, Georgia	85	N	2211
Scotsman Corporation	20	N	3537
Scotty's Donut Shops, Inc.	3	L	3051
Snow's Upholstering.	1	L	2512
Southwest Steel Corporation.	60	N	3449
Spraycoat, Inc.	10	R	3079
			3281
Taylor, Inc.	5	N	3498
Thunderbird Engineering, Inc.	10	N	3531
Tulsa Dental Laboratory.	2	S	3843
Tulsa Door Assembly.	5	L	2431
Tulsa Trailer Mfg. Company	12	N	3799
Universal Welding and Fabricating.	4	R	3443
Virginia "B" Packing Company	4	L	2011
Wagoner Frame Shop	1	L	2499
Willmaco Corporation			
Subsidiary of T. D. Williamson, Inc.	30	N	3599
TOTAL	1,086		

[a]The following letters are used to denote the different market areas: L for local; S for state; R for regional; N for national; and E for export.

APPENDIX B

Questionnaire

The University of Tulsa

INDUSTRIAL PLANT LOCATION STUDY

Please complete and return this confidential questionnaire promptly in the attached envelope. If you are interested in the results of this study, please give your name in the space provided below.

If you have any questions regarding this confidential questionnaire, please contact Professor L. H. Scheer, Dept. of Economics, WE 9-6351, Ext. 218.

Name and Title ______________________________
(only if you are interested in the results of this study)

Address ______________________________

Briefly describe your product: ______________________________

____

HOW IMPORTANT WERE THE FOLLOWING FACTORS IN YOUR DECISION TO LOCATE IN THE GREATER METROPOLITAN TULSA AREA?

Please check the appropriate box to signify the <u>relative importance</u> of the factor in your location decision.

FACTOR	IMPORTANCE OF FACTOR: (CHECK ONE)				
	HIGHEST	HIGH	MEDIUM	LOW	LOWEST
I. <u>Location of Production Materials</u>	☐	☐	☐	☐	☐
Nearness to raw materials.	☐	☐	☐	☐	☐
Nearness to component parts.	☐	☐	☐	☐	☐
II. <u>Labor Force</u>.	☐	☐	☐	☐	☐
Availability of skilled labor.	☐	☐	☐	☐	☐
Availability of unskilled labor.	☐	☐	☐	☐	☐
Potential for managerial labor	☐	☐	☐	☐	☐
Attitudes and activities of labor unions . .	☐	☐	☐	☐	☐
Wage Rates	☐	☐	☐	☐	☐
III. <u>Industrial Sites</u>	☐	☐	☐	☐	☐
Accessibility and cost of:					
Industrial land.	☐	☐	☐	☐	☐
Developed industrial parks	☐	☐	☐	☐	☐

600 South College, Tulsa, Oklahoma, 74104

FACTOR	IMPORTANCE OF FACTOR: HIGHEST	HIGH	MEDIUM	(CHECK ONE) LOW	LOWEST
IV. Transportation Facilities					
Availability and adequacy of:					
Airway facilities					
Highway facilities					
Railroad facilities					
Pipeline facilities					
Waterway facilities					
Shipping costs of raw materials					
Shipping costs of finished goods					
V. Distributional Facilities					
Warehousing and storage facilities					
Availability of wholesale outlets					
VI. Market					
Existing consumer market					
Potential consumer market					
Nearness to related industries					
Attainment of favorable competitive position					
VII. Water Supply and Waste Disposal Facilities					
Availability of water supply					
Quality and dependability of water					
Cost of water					
Disposal facilities for industrial waste					
VIII. Governmental Structure and Attitudes					
Nuisance and stream pollution laws					
Building ordinances					
Zoning codes					
Compensation laws					
Insurance laws and regulations					
IX. Tax Structure					
Industrial property tax rates					
State corporate tax structure					
Local tax assessment basis					
X. Capital Structure					
Availability of capital funds					
Attitudes of lending institutions					
Community industrial development projects					
Insurance rates					
XI. Industrial Fuels					
Availability of coal, oil, gas, electric					
Cost of industrial fuels					

FACTOR	IMPORTANCE OF FACTOR: (CHECK ONE) HIGHEST	HIGH	MEDIUM	LOW	LOWEST
XII. Community Environment.	☐	☐	☐	☐	☐
Community leadership and attitudes	☐	☐	☐	☐	☐
Availability and quality of schools.	☐	☐	☐	☐	☐
Nearness to universities and colleges. . . .	☐	☐	☐	☐	☐
Recreation and cultural facilities	☐	☐	☐	☐	☐
Availability and cost of housing	☐	☐	☐	☐	☐
Real estate tax.	☐	☐	☐	☐	☐
Effectiveness of protection facilities . . .	☐	☐	☐	☐	☐
Climatic conditions.	☐	☐	☐	☐	☐

Pleast list four factors, from the preceding, which you believe to be the most crucial NOW in locating a plant such as yours:

1. ______________________ 2. ______________________

3. ______________________ 4. ______________________

What factors do you believe limit or hinder the operation of your Tulsa located plant?

____

____

A. FORM OF ORGANIZATION, 1968 (check one): ☐ Proprietorship; ☐ Partnership;

☐ Corporation; ☐ Cooperative; ☐ Other (Specify) ______________

B. PLANT: Did the formation of your presently existing firm result in (check one):

☐ Building of new plant facilities; ☐ Acquisition of operating facilities;

☐ Merger of operating plant facilities

If operating facilities were acquired, briefly describe the product previously

fabricated: ______________________________

C. EMPLOYEES: (Average number in 1968; exclude proprietors and partners)

Average number of production workers: ________

Average number of non-production workers: ________

D. PAYROLL: (Total wages, salaries, and other payments before deductions, 1968)

Production workers' wages: ________

All other employees' wages and salaries: ________

E. PLANT MAN-HOURS OF PRODUCTION WORKERS IN 1968:
(Do not include hours for paid vacations, etc.) __________

F. MARKET: Please approximate the percent of your:

Product purchased by: _____ industry; _____ consumers; _____ government

_____ other (specify) ______________________________

Raw materials obtained: ___ locally; ___ regionally; ___ nationally; ___ foreign

Component parts obtained: ___ locally; ___ regionally; ___ nationally; ___ foreign

Product distributed by: ___ direct sales; ___ jobbers; ___ retailers; ___ agents;

___ manufacturers; ___ other (specify) ______________________________

G. TRANSPORTATION (check one): What was the primary form of transportation used in 1968 to:

Ship your product: ☐ air; ☐ pipeline; ☐ truck; ☐ railroad; ☐ water

Acquire materials, parts: ☐ air; ☐ pipeline; ☐ railroad; ☐ truck; ☐ water

H. WATER AND WASTE (check one): What is the:

Nature of your industrial waste? ☐ solid; ☐ gaseous; ☐ liquid

Means used to dispose of your industrial waste? (explain) ______________________________

____

Quantity of water intake: ☐ under 1 million gals.; ☐ 1 to 19.9 million gals.;

20.0 to 99.9 million gals.; ☐ 100 million gals. or over

I. COST OF MATERIALS, FUELS, ELECTRICITY, AND CONTRACT WORK IN 1968: (The cost of all items actually consumed or put into production in 1968; include all operating costs except wages and salaries.)

____

J. INVENTORIES: (The dollar value of all inventories, either processed or in the form of materials and fuels at the end of 1968.)

____

K. CAPITAL EXPENDITURES IN 1968: (All expenditures on new structures, additions to plant, machinery, equipment, and all expenditures on used plant and equipment from others.)

____

L. VALUE OF ALL PRODUCTS SOLD OR SHIPPED AND OTHER RECEIPTS: (Net selling values, f.o.b. plant)

____

APPENDIX C

Supporting Letters

August 10, 1969

Copy

Mr. J. Livingston, President
P. O. Box 1797
Tulsa, Oklahoma 74105

Dear Mr. Livingston:

The University of Tulsa and the Economic Development Commission of Tulsa are presently involved in a study of: (1) factors which influenced manufacturing firms to locate in the Greater Metropolitan Tulsa Area, and (2) the economic impact of manufacturing firms, established in the last decade, on the economy of the Area.

The firms which have located in the Area have contributed to our economic growth but some are also a consequence of the economic development which has taken place. We ask your help in aiding us to better understand the factors which influenced you to locate in the Tulsa Area, and the economic impact of your decision. The enclosed questionnaire plays an important role in this study.

In order to expedite the study, we would appreciate your return of the questionnaire (using the enclosed addressed envelope) as soon as possible. Your answer will be treated as confidential material. If you need any further information concerning the questionnaire, contact Mrs. L. H. Scheer at the University of Tulsa, WE 9-6351, Ext. 218.

We shall be grateful for your early attention to completing the questionnaire.

Sincerely,

Kermit E. Brown

Kermit E. Brown
Vice President For Research
The University of Tulsa

Fred Setser

Fred Setser
Chairman, The Economic Development Commission of Tulsa

THE UNIVERSITY OF TULSA

Dear Sir:

Recently you received an "Industrial Plant Location Study" questionnaire.

Your participation in this study is of utmost importance to the economic growth of the Tulsa Area. Your response provides t e data crucial to promoting the sustained and diversified growth of t e Area.

Please complete and mail your questionnaire today. If you have any questions call Professor L. H. Scheer WE 9-6351, Ext. 218.

Thank you

The University of Tulsa

Department of Economics

September 19, 1969

Cleora's Pastry Shop & Catering Service
Mrs. Cleora Butler
440 East Pine
Tulsa, Oklahoma

Dear Mrs. Butler:

Surely you agree the profitability of your company is influenced by local economic conditions. When our local economy spurts forward, markets expand, profits rise, and job opportunities increase.

We are asking a select number of businesses to indicate the reasons they chose the Tulsa Area. From this information, definite programs will be developed to assist our local industries to enhance their economic situation and the local economy.

Please cooperate with us by completing and mailing the enclosed confidential questionnaire. If you have any questions, call me at WE 9-6351, Ext. 218.

Thank you,

Lorraine H. Scheer

Lorraine H. Scheer, Assist. Prof.
Research Study Director

600 South College, Tulsa, Oklahoma, 74104

CHAMBER of COMMERCE

The Metropolitan Tulsa Chamber of Commerce is interested in the results of a study being conducted by the University of Tulsa on industrial plant location.

Professor L. H. Scheer of the Department of Economics mailed to you a form requesting information concerning why you located your plant in Tulsa. We would sincerely appreciate your completing this form and returning it to the University of Tulsa as soon as possible.

Should you have any questions, please feel free to contact Mrs. Scheer at 939-6351, extension 218, or me at the Chamber office, 585-1201.

Sincerely,

Paul J. Lehman

Paul J. Lehman, Manager
Local Industry Department

PJL:dw

616 SOUTH BOSTON AVENUE • TULSA, OKLAHOMA 74119 • 918 / 585-1201

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