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An Analytical Study of Industrial Location as Applied to the United Arab Republic.

Abdel Hady Koraitim

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AN ANALYTICAL STUDY OF INDUSTRIAL LOCATION
AS APPLIED TO THE UNITED ARAB REPUBLIC

A Dissertation

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Louisiana State University and
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in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Management and Marketing

by

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ABSTRACT

The major purpose of this study is to make a functional analysis of location factors, showing how they are applied to industries in the United Arab Republic. Through the evaluation of these factors and with comparison to what is used in the United States, restrictions imposed on the industrial development of Egypt can be depicted and subsequently overcome. Such an analysis emphasizes the need for more suitable positions for manufacturing to implement a procedure of geographical distribution of industry in the United Arab Republic. This policy was recognized as a means of elevating the standard of living.

The study begins with a consideration of the historical factors of location which gave little or even no regard to sound economic bases in the site selection process. However, efficient allocation of resources and competitive production accentuated recognition of the importance of economic principles as guidelines in determining the place of processing. Theories of location developed by Von Thunen; Weber; Fetter, Hotelling, Lerner, Singer, Smithies, and Chamberlin; Losch; Greenhut; Hoover; and Isard were presented. Although industrialists are generally unaware of the existence of locational theories, they do conform in practice to the principles advocated by these theories. Furthermore, there is no one theory that has been generally accepted. Numerous locational decisions are made according to other considerations rather than those supported by the theoretical principles.

Locational factors such as raw materials, markets, transfer cost, labor, capital, managerial ability, energy sources, industrial concentration

and dispersal, and climate; as well as factors working on the local level are discussed. The site selection is not determined by one or some of these factors considered individually. Rather, it is dependent upon the complex interactions of many of them.

The procedure of finding a suitable locale can be simplified by the growing use of quantitative techniques of analysis such as comparative cost, input-output, linear programming, industrial complex, and position of the market. These measures may suggest more places to industries and more manufacturing to certain areas. Consequently, they could be more applicable than the conventional methods for economic planning, especially in less developed countries.

The role performed by inability of production factors in extending the industrial activity to larger areas is emphasized. Recent tendencies in industrial location which took place in the United States are also investigated and supported by empirical studies. The developed changes deprived some regions of their traditional importance in certain kinds of production and gave a promising future to other areas as industrial centers.

As applied to the Egyptian industries, factors of location are treated in three categories: historical, topographical, and economic. Several elements are considered under each of these three divisions, with examples cited of industries most influenced by every factor in their locational decision. However, the undeveloped natural resources, the lack of venture capital, and the shortage of managerial ability were real handicaps in the way of industrial development of the country.

The inescapable results was great concentration of the manufacturing activities in large cities such as Cairo and Alexandria. Previous industrialization plans suffered many setbacks.

The analysis outlines the steps taken by the New Regime in launching a large-scale program of economic development. To spread out the industrial activity over most regions of the country, efforts have been made to increase resource exploration, raise sufficient capital, provide technical ability and managerial talents, extend the market, and establish the required facilities.

The research ends with a criticism of certain industrial locations and suggestions of new ones in Egypt. Differences are cited between the United Arab Republic and the United States with regard to places available for processing activities and general recommendations are given.

INTRODUCTION

This study is the culmination of six years of graduate work done in the United States. It is prepared under the auspices of the Government of the United Arab Republic. The writer was granted a scholarship, along with other members of the universities and government staff, to specialize in the industrial field of business administration. Egypt has been experiencing a large-scale program of economic planning and industrial development. Studying and training abroad have been sponsored by the State as one of several steps taken to meet the growing needs of the country for technical ability and managerial talents.

PURPOSE

It was believed, until recently, that land is the only source of wealth in Egypt. A rapid growth of industrial activity, however, has taken place in the last decade. A study of the location of industries could serve several needs. Therefore, the objectives of this study are:

To determine and evaluate the factors which have influenced the placement of manufacturing in the United Arab Republic in light of what has been applied in the United States;

To infer the degree of conformity of the site selection process to certain economic theories of location;

To depict the elements that hinder the regional distribution of Egyptian industries and to evaluate the measures implemented to overcome such obstacles; and

To investigate the possibilities of finding more places which can be recognized as suitable for processing in the United Arab Republic.

METHOD OF COLLECTING DATA

The problem of industrial location has captured the interest of various concerned persons. Economists as well as managers and engineers have been occupied over the years with the exploration of this area.

Factors influencing the placement of industry are many and diverse. Not only do they act and react upon each other, but also they change in significance over time. Consequently, several theories on the location of economic activity were developed. Books and periodical articles have been advanced in dealing with the determination of the optimum point of manufacturing.

As a comparative study, the analysis had to investigate the problem in both the United States and the United Arab Republic. A search of existing literature was made to provide a source of supply of background material. Valuable information was obtained from empirical studies performed in the United States. By written communication, data were collected from government agencies, research and teaching institutions, training centers, planning organizations, private research departments, and interested personnel in the United Arab Republic.

Papers presented at the United Nations Conference on the Application of Science and Technology for the Benefit of Less Developed Areas have been of specific importance in providing information about the recent developments in the United Arab Republic. This conference was held in Geneva, February 4-20, 1963.

EXTENT AND LIMITATIONS

All conceived factors of location, influencing most of the industries, are analyzed in this study. Shortcomings are consequently

expected. Although the research is not limited to specific factors, some of these are given certain stress and detailed discussion according to their importance. An inclusive treatment, however, cannot be made possible in this short treatise.

Since numerous books, periodicals, publications, and personal correspondence in Arabic were used, difficulties in translation were often encountered. Moreover, because of the long distance that separates the United Arab Republic from the United States, where the research was done, empirical study in the field (in Egypt) could not be performed.

METHOD OF PRESENTATION

This dissertation is presented in eight chapters. The first chapter deals with background factors which put the bases of the problem under study. It is divided into three sections showing the growing importance of the locational decision to any economic activity, the historical factors which governed the business enterprise in selecting its site, and the development of the theory of industrial location. Modern accomplishments of Greenhut and Isard as well as earlier endeavors of Von Thunen, Weber, Losch, and others have been briefly discussed.

The second chapter treats the factors of location in some detail. The compound effect exerted by them on the site selection process is represented by a location factor wheel. Although these factors are interdependent, an arrangement according to degree of significance has been tried. Each element is examined, when applicable, under several related items.

The third chapter evaluates the quantitative methodological techniques recently used to determine the most profitable place of manufacturing. Advantages and general applications of such measures in the future are also recognized.

The fourth chapter analyzes the effect of the mobility of factors of production in extending the area available for processing. Barriers as well as inducements to such mobility have been investigated.

The fifth chapter evaluates the recent tendencies in the location of industries in the United States. Extent and direction of the change of industrial placement shows areas that emerged as new manufacturing centers of certain industries. Loss incurred in other regions and the reasons behind these developments have been determined also.

The last two chapters investigate the situation in the United Arab Republic, as it pertains to location of industry. One chapter is devoted to factors of location as applied to the Egyptian industries. These factors are sorted into three groups: historical, topographical, and economic. Following the discussion of each factor, examples of industries influenced by that factor are given.

The next chapter is concerned with the recent industrial developments in the United Arab Republic. The treatment includes two major sections: industrial concentration and regional distribution of industries. The former part determines the reasons for which the Egyptian industries tended to centralize in a limited number of large cities. The latter part evaluates the measures taken to overcome the industrial concentration trend and to extend the manufacturing activities to many regions of the country.

The closing chapter summarizes the influence of the factors of location on various industries. Conclusions are drawn concerning the past developments and the potential growth of the industrial activity in the United Arab Republic. Differences between the United States and Egypt with regard to industrial location are outlined and some general recommendations are given.

CHAPTER I

BACKGROUND FACTORS

The scope of management spans not only people and their organizational relationships but also the coordination of human with non-human or physical resources. Under the term physical resources are usually included physical facilities such as the following components: plant, equipment, and working conditions. At the risk of slighting the behavioral aspects of management, it might be said that the determination and co-ordination of these non-human resources is at least as challenging (if not more so) than the management of people, in terms of decision making. While people can be motivated and to some extent controlled, the plant, equipment, and working conditions are in many instances not affected by the power of human manipulation.

The problems arising in the planning and organizing of physical facilities, as pertaining to production, are both many and diverse. In the process of planning and determining a plant, or building, two factors must be given primary consideration; one is location and the other is suitability for production. Three problems are raised when the subject of equipment or machinery is discussed in planning sessions: the first area of decision concerns selection; the second deals with the layout and arrangement; and the third treats their maintenance and repair. Finally the factors of light, color, noise, and atmospheric control all play a part in the evaluation of working conditions.

The selection of a suitable plant location is a basic preliminary step taken towards the preparation and arrangement for production. After a plant has once been located on a particular site, the firm is usually committed to a continuation of the facility activities on that site for an extensive period of time, or the entire investment, except for removable equipment, may be written off as a loss. Buildings once erected and equipment once installed can be changed or abandoned only at considerable expense.

Unfortunately, it is possible for a plant to be so poorly located as to continually handicap its operation. Sometimes, the original location is at fault, and at other times the surrounding conditions undergo such a drastic change that a good location later becomes economically inefficient. At times, regardless of the efficiencies of production, the cost factors of raw material procurement and finished product delivery can be so out of proportion relative to similar costs of competitors that profitable future operations cannot be foreseen at the established site. If this is so, plant relocation has to be given serious consideration.

Many administrators are actually faced with a relocation problem which they do not recognize or which they ignore for lack of courage to undertake its solution. Such refusal to face the problems sometimes allows a bad situation to become even worse, because operations become so uneconomical that losses result, making it more difficult than ever to carry out a move.

A decision as to location is critical, and is of considerable importance to firms of all sizes.

These physical resources, their ramifications, and the difficulties in both planning and controlling them will be the subject of

this treatise. This presentation will endeavor to give both a theoretical framework from which guidelines for action can be drawn, and a practical application of these guidelines to the development of industry in the United Arab Republic.

HISTORICAL FACTORS

Before competition was as keen as it is today and when price was not an important factor in selling, it made relatively little difference where a plant was located. Manufacturing, if properly managed, was profitable almost anywhere. Historically, manufacturers have located plants with little thought given to economic and engineering consequences. Operations were situated in a given community because of one or more of the following factors:

The plant founder, promoter, or executive had lived there during his life, or the place was close to his residence;

The lure of a free plant site or attractive building had been tempting;

Similar industries had become popular around the area; and

The availability of an established transportation route had been recognized.

A new business is always faced with the problem of where to locate, and too often, the decision is reached with scant regard for sound economic principles. This is probably because of the more pressing problems involved in establishing a new business, e. g., financing.

In the early stages of the industrial age, the lack of rapid transportation acted very strongly upon the location of industrial

enterprises. Inland travel and shipping were slow and highly expensive. Consequently, coastal towns and towns on navigable rivers were favored for commercial activities. In the United States the communities which located themselves along the main inland routes were later to develop into important industrial cities.

From this has arisen the common fallacy that all sites adjacent to highways and railroads have adequate transportation service. Only after operations have begun does the misinformed organizer learn of his problems in obtaining shipments of raw materials and servicing his customers.

While enormous progress has been made in utilization of raw materials, methods of production, and in new processes and techniques of every description, no such scientific advances can be claimed in the determination of plant installations.

However, as any country develops industrially, as the transportation systems of that country improve and materials and labor are dispersed to a variety of new locales, and as an abundant labor supply becomes more widespread, the location of plants must be increasingly influenced by the economic factors and conditions created by alternative sites, and less by traditional influences or the personal whims of the financier.

Proper plant site selection requires a scientific determination of the location factors involved for the particular installation, and the scientific analysis of those factors, in order to ensure a site which will provide optimum production and business atmospheres. The importance of the application of scientific principles is apparent when

it is realized what tremendous quantities of money have been expended for new plants and equipment in this generation.

In comparison with a new business, plant location in an established industry also demands much managerial attention because of a number of conditions which can be summarized as expansion, decentralization, and relocation.

Expansion is probably the most frequent cause for considering the problem of plant location. Established industries often expand when their facilities become obsolete, market demand grows beyond the capacity of the plant site and facilities, or adequate services are not available to the customer.

Decentralization, on the other hand, is influenced by the availability of new sources of labor supply, the improved labor relations associated with a smaller plant, a lower absentee rate, and the greater interest in the work by citizens of small communities. The worker in turn, benefits from the lower cost of living, the elimination of expensive and annoying commuting, increased opportunities for advancement, and better opportunities to utilize his spare time. A decentralized market is cause for a decentralization of the industry servicing it. Safety from atomic attack has also been advanced as a reason for decentralization of certain industries. In fact, since the beginning of World War II, many companies have located new plants with reference to possible bombing by the enemy.

Relocation generally is dictated by a shift of the market, a need for a new labor reservoir, a desire to operate in the least-cost combination location, a necessity to compact a steadily mounting freight cost, or the

requirement for new straight-line production facilities. All of these factors pervade decisions on relocation.

In terms of geography, it is not generally realized that all cost factors are regionally variable, including those affecting raw materials, freight, wage rates, utilities, local and state taxes, insurance rates, and even rental or other carrying charges. It is an inescapable fact, therefore, that geographic placement becomes as important to manufacturers as sound management, modern plant structure, and astute merchandising policies. In many industries a differential of as much as 10 per cent of total manufacturing and distribution costs can be affected simply by virtue of a geographical site.¹

This fact leads to the conclusion that plants can no longer be located by intuition or on the basis of insufficient data; nor can the manufacturer automatically expand in his present location simply because that tract of land was chosen, perhaps accidentally, many years ago.

THE DEVELOPMENT OF A THEORY OF INDUSTRIAL LOCATION

Before entering into a treatment of the factors of location, it might be profitable to trace the historical development of location theories and their basic postulates. From brief articles to complete textbooks, serious attention has been given by economists to the subject of industrial placement. Other writers, ranging from engineers to industrial executives have also presented discussions on this topic.

Most of these writers place their emphasis on the social groupings and movements of people, the growth of industrial centers, the shifting and relocation of industry, and the degree of industrial

¹Leonard C. Yaseen, Plant Location (Roslyn, New York: Business Reports, Inc., 1952), p. 2.

dispersion and concentration. Others give specific emphasis to location factors as they pertain to a particular industry. Even those who deal with the factors of location applicable to industry in general, take a narrative viewpoint and treat the problem from an historical, sociological, or geographical form. Though these endeavors contribute to a special theory of placement of a business, they do not apply a general theory to locational patterns.

Only a few writers like Weber and Losch were concerned with deriving a general theory of industrial situation.² Furthermore, only Losch involved himself primarily with a general capitalistic-like theory of location. However, his interest was more towards ascertaining a rational system than for describing actuality.

Theoreticians of today are chiefly preoccupied with introducing the time element into their analyses of the location theory in the form of dynamic models. But while stressing time, the spatial aspects of industrial placement cannot be denied, for both time and space must be vital considerations in any economic theory. These factors are focal points in the writings of Walter Isard who has established a broad general theory of location which incorporates and refines many earlier concepts.³

For a general background, certain location theories should be summarized. These include the least cost, locational interdependence, maximum profit, and Isard's general theory.

²Melvin L. Greenhut, Plant Location in Theory and in Practice (Chapel Hill: The University of North Carolina Press, 1956), p. 253.

³Walter Isard, Location and Space Economy (New York: The Technology Press of M.I.T. and John Wiley and Sons, Inc., 1956).

The Least Cost Location Theory

Under the least cost approach there is a traditional dualism in location theory: a Von Thunen type of analysis for the agricultural sphere and a Weberian scheme for the industrial sphere.

Von Thünen⁴ was concerned primarily with agricultural locations due to the fact that agriculture held the position of primary importance in the economy at the time and place of his writing. He based his decision for selecting the agricultural tracts upon alternative costs in different sites of production.

Von Thünen was concerned with only one consuming center, and his theory was designed to explain the type of crops that would be grown at places of varying distances from that market.

For simplification, Von Thünen assumed that capital and labor were everywhere equal in cost and productivity. Furthermore, he assumed that all land was equal in fertility and that the cost of production was the same in all locations.

So, the placement decision was concerned with minimizing two kinds of costs: (1) land rent, and (2) transportation expense.

Alfred Weber, like Von Thünen, was a German economist. In 1909 he followed Von Thunen's least-cost approach with a book discussing a general theory of industrial location.⁵

In Von Thunen's scheme, the location was given and the type of production was to be determined. The treatment is reversed in Weber's theory, where the type of industry was given and the place of establishment

⁴Johann Heinrich von Thünen, Der Isolierte Sraat in Beziehung auf Landwirtschaft und Nationalökonomie (3rd ed.; Berlin: Schumacher-Zarchlin, 1875).

⁵Alfred Weber's Theory of the Location of Industries, Translated by Carl Joachim Friedrich (Chicago: University of Chicago Press, 1929).

was sought. Unlike Von Thünen, Weber assumed uneven deposits of fuel and raw materials, labor of varying quality and costs, and several consuming centers. These assumptions gave Weber's theory more realistic bases than those of Von Thünen's system. However, in the agricultural enterprise, the rent differential plays the same role as the labor cost differential in an industrial enterprise where there is an intensive concentration of labor.⁶ Weber ignored the demand problem, assuming that the market for any product would always be greater than the aggregate output of all suppliers.⁷ He also overlooked any influence of taxes and interest.

In making a location decision under the Weberian analysis, three determinants have to be considered: labor, transportation, and agglomerating or degglomerating forces. The agglomerating forces include marketing advantages, proximity to auxiliary industries, and economies of scale. An example of a degglomerating force is land rent. It is hypothesized that industries are drawn to the site where the transferral expense is minimized, but the cost of labor may cause displacement from that site to a place where the savings in labor cost are larger than the additional transportation costs. Furthermore, as industries concentrate together, the land rent rises, causing some industries to move to cheaper tracts of land. These agglomerating forces may work in either one direction or another. In other words, decentralizing tendencies are contracted or intensified by the power of the agglomerating or degglomerating forces.

⁶Walter Isard, op. cit., p. 189.

⁷Malvin L. Greenhut, op. cit., p. 256.

The Locational Interdependence Theory

The interdependence theory of location has a more market-oriented approach than that of the least-cost theory. Because of the shortcomings of the Von Thunen-Weber purely competitive framework, the interdependence theory was developed under the influence of Fetter,⁸ Hotelling,⁹ Lerner and Singer,¹⁰ Smithies,¹¹ Chamberlin,¹² and others.¹³

The interdependence analysis is based on the assumptions that the cost of production is equal at all sites and that the objective of situating in a specific place is to control the largest market area. Delivered price is assumed to vary with location for buyers are assumed to be scattered over a wide area, and each producer is a spatial monopolist in his relations with a certain group of consumers. Under this framework, the size of the market area which belongs to a firm is determined by the locational interdependence of the firms. The tendencies of sellers toward dispersion vary with the amount of freight costs, the elasticity of demand, and the characteristics of marginal costs.

⁸Frank A. Fetter, "The Economic Law of Market Areas," Quarterly Journal of Economics, XXXVIII, 1924, pp. 520-529.

⁹Harold Hotelling, "Stability in Competition," Economic Journal, XXXIX, 1929, pp. 41-57.

¹⁰Abba P. Lerner and H. W. Singer, "Some Notes on Duopoly and Spatial Competition," Journal of Political Economy, XLV, 1937, pp. 445-486.

¹¹Arthur F. Smithies, "Optimum Location in Spatial Competition," Journal of Political Economy, XLIX, 1941, pp. 423-439.

¹²Edward H. Chamberlin, The Theory of Monopolistic Competition (5th ed.; Cambridge: Harvard University Press, 1946).

¹³Greenhut, op. cit., p. 258.

The major shortcoming of the locational interdependence theory is that it neglects the fact that production costs vary at different industrial sites.

The Maximum-Profit Theory

The theory of the maximum-profit location avoids the disadvantages of the locational interdependence and the least-cost location theories, and takes into consideration the varying cost and demand factors which were limitations of the previous theories.

The maximum-profit theory was presented by a German economist, August Lösch, in 1939 (translated into English in 1954).¹⁴ In analyzing the theories of location, Lösch stated that neither the least-cost nor the largest market should be the determinant of the industrial location. Lösch's analysis is based on a free economy where the optimum placement of the individual enterprise in different sites can be determined from the cost and demand curves. The correct locational point lies where the net profit is greatest.¹⁵

In 1956, a general theory of plant location was presented by Greenhut who attacked Lösch's theory in the following manner:

While Losch's theory is highly informative, (1) his failure to include cost differentials, other than those attributable to agglomerating and transportation advantages, (2) his failure to carry to its capitalistic end the full impact of agglomerating cost advantages on the locations of firms belonging to a given industry, (3) his consequent failure to combine an analysis of cost and demand factors in one model, and thus (4) his

¹⁴August Losch, The Economics of Location, Translated by William H. Waglom (New Haven: Yale University Press, 1954).

¹⁵Ibid., p. 29.

disregard of the forces that cause extraordinary concentrations of homogeneous business units render his conclusion (that attempts to maximize effective demand lead to an hexagonal type of intra-industry dispersion of firms) clearly inadequate as a general explanation of plant location in a private capitalistic economy.¹⁶

Greenhut found that the inclusion of cost and demand factors in one model requires a broader statement of the determinants of plant location than that which includes only the least cost or the largest market area. Here, he introduced the maximum-profit location as the needed missing link. Greenhut refers to the best location as that site from which a given number of buyers can be served at the lowest total cost.¹⁷

There seems to be some overlapping in the approaches of Lösch and Greenhut regarding the maximum-profit location. This may be due to the fact that Lösch's book was written in Germany during World War II and was not translated into English until 1954, at which time much of Greenhut's analytical work had been completed. The next rung on the historical ladder of industrial location theory is that of Isard's concepts.

Isard's General Theory

Walter Isard is probably the most outstanding authority currently writing in the field of locational economics. His general location theory encompasses a wide range of economic activities, giving attention to spatial variations in costs and prices and to the distribution of inputs and outputs.

¹⁶Greenhut, op. cit., pp. 263-264.

¹⁷Ibid., p. 262.

Isard uses the substitution effect and the concept of transportation inputs as tools of his analysis. The concept of transportation inputs is defined as the movement of a unit weight over a unit distance, and the shipping rate is the price of a transportation input. The determination of this price may be accounted for by a conventional demand and supply analysis for conveyance inputs. A fall in the price of a shipping cost input induces a spatial lengthening of production and may be associated with both a scale and substitution effect.¹⁸ The problem of determining the transportation optimal point resolves itself into a determination of the proper substitution points between pairs of transportation inputs.

However, the selected site may not always be at the point of minimum shipping costs. For example, points of suitable wages, cheap power, less rent, or low taxes could be the causes of a movement from the point of a minimum transportation outlay. Thus, the plant location may be shifted from the optimal transportation location to any other site where sufficient savings can be obtained on any type of production outlay to justify the move.¹⁹

Isard's method has been used to reformulate the Weberian transportation orientation doctrine. Weber emphasized three basic forces in his location analysis: the transport cost differentials, the labor cost differentials, and the effects of agglomerating or degglomerating factors.²⁰

¹⁸Isard, op. cit., p. 255.

¹⁹Ibid., p. 259.

²⁰See p. 9, above.

Isard followed Edgar M. Hoover's classification of the agglomeration or deglomeration factors, namely:

Large-scale economies -- realized by the enlargement of the firm's scale of production at one location;

Localization economies -- accomplished through the enlargement of the total output of one industry at a certain location; and

Urbanization economies -- gained by all firms in all industries at a particular location because of the enlargement of the total economic size (population, income, output, or wealth) of that location.²¹

Economies of scale can be realized through the substitution of transportation outlay for various production outlays as the production factors become cheaper with the growth of the individual firm.²²

Localization economies, on the other hand, are external to the firm in comparison to economies of scale which are realized within the firm. Localization economies result in lower-cost service inputs. Some firms may move to places where they would be able to substitute shipping cost outlays for production outlays if localization economies existed in the new sites.²³

Finally, urbanization economies are associated with the growth of the total economic size of a multi-product location. Such growth may result in the reduction in cost of certain services and facilities as power, insurance, fire protection, repair and maintenance, market research

²¹Isard, op. cit., p. 172.

²²Ibid., p. 173.

²³Ibid., p. 267.

and information, et cetera. When this happens there could be substitution of transportation outlay for these various production outlays which then become cheaper.

To assure an all-encompassing theory, Isard discussed the agricultural phase in Chapter 8 of his book, and the interrelations of location theory and trade theory in Chapter 9.

To be sure, this short treatise has not given an inclusive treatment of the location theorist's work. Extensive use of graphical and mathematical presentations have been made in their analyses, but these have been omitted here for the sake of brevity and pertinency.

CHAPTER II

FACTORS OF LOCATION

Holmes defined the problem of plant location as:

the problem of determining that location which, in consideration of all factors affecting delivered-to-customers cost of the product(s) to be manufactured, will afford the enterprise the greatest advantage to be obtained by virtue of location.¹

Consequently, that industrial location is best which results in the lowest unit cost in producing and distributing the product to the consumer. Determination of such site is seldom controlled by one factor alone but is usually the result of many economic forces. Generally, one, if not more, of these factors is based on the ability to manage efficiently and effectively.

There is no single course of action which can be followed by all enterprises at all times in choosing a plant site. Each industry has its own peculiar situation and every time has its own specific considerations. The specific list of factors to be used in any locational study and the detailed analysis relative to cost of those factors are dependent upon the conditions being faced by the individual firm at the time of the decision. Personnel available, money for investment, and the critical effect of improper location may all be determining factors in the selection of the factor list.² Those factors which are not analyzed on a cost basis should be analyzed on a non-cost basis.

¹W. Gerald Holmes, Plant Location (New York: McGraw-Hill Book Company, Inc., 1930), p. 3.

²See Appendix A for comprehensive list of locational factors.

To facilitate a comprehension of the hypotheses proposed in following chapters in this section, problems pertaining to locational factors and the levels of selection will be treated. These include: materials, markets, transfer costs, labor supply and cost, availability of capital, managerial ability, energy sources, industrial concentration or dispersal, climatic conditions, and local factors. Figure 1 shows the relationship between these factors.

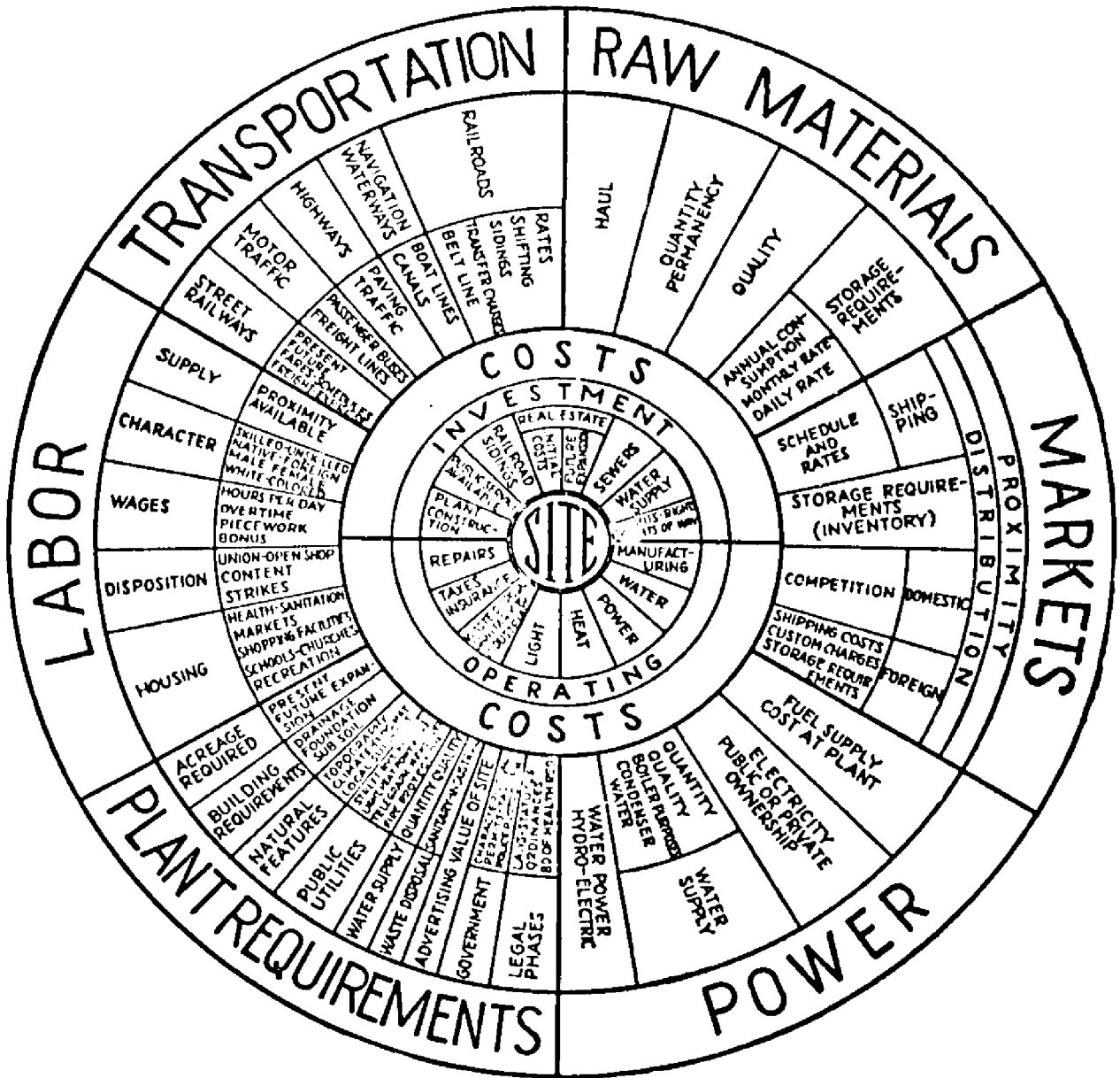
RAW MATERIALS

The source of raw materials is pertinent to the location problem since each industry in some way relies on a supply of raw materials for its operations. All industrial establishments will, therefore, be concerned, although in varying degrees, with their sites relative to needed materials and to the costs of procuring them. For example, the steel industries of Pittsburg and of Birmingham, Alabama, have been profitably aided by the nearby location of iron ore, coal, and limestone.³ The canning industry is flourishing in the United States because of reliable and adequate food surpluses above local need. Industries using outputs of other manufacturers for their own products usually consider the advantages of a location close to their supplies.

The role of adequate materials supply in locational decisions varies according to the nature of the materials themselves, the processes that use them, and the techniques available in their distribution and utilization.

³Edwin Scott Roscoe, Organization for Production (Homewood, Illinois: Richard D. Irwin, Inc., 1959), p. 132.

FIGURE 1
LOCATION FACTOR WHEEL



Source: Frank C. Vilbrandt, Chemical Engineering Plant Design (New York: McGraw-Hill Book Company, Inc., 1942), p. 366.

Materials and Processes

Materials can be set into many classifications: heavy, bulky, perishable, or of different value. The manufacturing process may be adjusted to substitute materials in its operations and it may use some or many materials and in different proportions.

The industry using material that considerably diminishes in weight or bulk during the manufacturing process will be attracted to a location near raw material production. In this way, shipping costs on useless waste matter are avoided. This is the case of manufacturers utilizing the produce of extractive industries (agriculture, forestry, and mining). For example, the weight of the raw sugar extracted in a sugar-beet factory is only one-eighth of the weight of the beet, coal, and lime used; paper weighs only about two-fifths of the pulpwood used in its production.⁴

A special problem in industrial location is brought about by perishable products like foods. A perishable material, or one which is not suitable for travel will attract to itself the processes using it. Vegetable and fruit canning and preserving are often found near the sources of supply.

The value of raw material per unit weight is also significant in determining plant sites, for transportation costs will add less, proportionately, to the cost of a higher value material than to one of lower value. Moreover, freight carriers usually charge higher rates on more expensive than on less expensive commodities.

⁴R. C. Estall and R. Ogilvie Buchanan, Industrial Activity and Economic Geography (London: Hutchinson & Co., Ltd., 1961), p. 26.

The possibility of using substitute materials can also affect the location decision. Where materials are substitutable, the pull of any one of them is reduced.

The industries' attraction to material sources depends on the number of materials involved in the manufacturing process and their relative importance. As the number of materials used increases, the influence of any one will decline. The attraction of one material in one direction may be countered by the pull of another in a different direction; e.g., the radio and electrical industries use numerous materials, and most of them are purchased in small quantities. In such industries, materials exert little, if any, influence on the location decision.

Techniques of Distribution and Utilization

Technical advances in processing have decreased the cost pull of materials in many industries. For example, the preliminary treatment of primary raw materials, such as the beneficiation of iron and copper ores, reduces the quantity of waste and increases their transportability.

However, material procurement costs do remain significant as a locating factor in some industrial processes. There are certain industries engaged in processing the produce of extractive industries, where impediments of bulk, waste content, or perishability are still to be faced. For example, saw-mills are situated with regard for timber supplies, and consequently the distribution of the industry shows shifts over time. This reflects the exhaustion of supplies in depleted areas such as in Michigan, Wisconsin and Mississippi, and the attraction of virgin forest resources elsewhere as in the Pacific Northwest.⁵

⁵Ibid., p. 29.

On the other hand there are exceptions. Petroleum refining operations utilize a primary raw material directly, but the industry is not completely situated at the oil-producing location. In this case, the loss of weight in processing is relatively small and the fluid raw material can be transported readily.

THE MARKET

The market as a locational factor is a significant one to be considered in the decision as to where to locate. Every new industry is based upon an immediate or potential market, and markets may be concentrated or widely dispersed, depending upon the product. The span of the market may be local, regional, national or international, and in serving market areas of differing size, industries face completely different placement problems.⁶

When a market is concentrated and specialized, the industrial location tends to be close to it. For example, manufacturers of automobile parts and accessories would be apt to locate near Detroit,⁷ while manufacturers of textile machinery are usually found near important textile centers. Similarly the farm machinery industry is located largely in the Middle West, while cotton-picking machines are manufactured chiefly in the South.⁸

If a market is nationwide, it is possible to determine the focal point which will provide the lowest cost for distribution.⁹ Then,

⁶Glenn E. McLaughlin and Stefan Robock, Why Industry Moves South (National Planning Association, 1949), p. 31.

⁷James M. Moore, Plant Layout and Design (New York: The Macmillan Co., 1962), p. 35.

⁸Estall and Buchanan, op. cit., p. 33.

⁹See Chapter III, "Techniques of Analysis."

production may be centralized in one or several plants depending on the market size. An example of the first case is the national market for electrical machinery which is mainly served by an industrial concentration in the Northeast.¹⁰ Examples of the second case are found in the bottled beverages and ice industries and in construction and furniture manufacturing. Also, automobile assembly plants are widely distributed to be nearer to the various population centers.¹¹

For industries with an international market, production should likewise be decentralized in many plants including overseas sites. In this case, the availability of a port possesses many attractions, as exemplified by the Ford assembly plant and the Coca-Cola bottling factory in Alexandria, United Arab Republic.

Some modern industries with large-scale production tend to select their location where the market capacity can absorb their output. Lack of market capacity is a grave handicap to the development of such large industries as iron and steel, chemicals and automobile manufacturing in non-industrialized or underdeveloped countries. The regional or local market cannot absorb the full output of a modern plant; to serve a wider market, extra transportation costs would be incurred. Even if losses would not occur, economies of scale would be neutralized.

Several of the considerations that determine a plant's location near the market are naturally the converse of the forces attracting industry to its major materials. Some of these considerations are as

¹⁰Estall and Buchanan, op. cit., p. 33.

¹¹Roscoe, op. cit., p. 132.

follows: An increase in weight, bulk, or fragility through manufacturing tends to cause the producer to seek a site near his market. For example, many populous cities have soft drink bottling plants; bakeries and similar shops are strongly market-oriented; makers of boxes, barrels, and containers also have establishments close to their main customers.

A high degree of perishability in the product makes a market location essential. Makers of bread, cakes, and ice cream, for example, are situated near the customer. Perishability may be used in a different sense for local newspapers are of little value outside their own localities.

When personal contact between producer and customer is necessary, a nearby plant might be desirable. Industries which produce goods in accordance with the specifications of users may profit by locating near the market, e.g., custom-made clothing.¹² Many manufacturing concerns which specialize in the production of small tailor-made parts for other enterprises or for private customers also have to be close to their market. Most maintenance services are positioned near a central market, since after-sales service can be considered as part of the productive process. Without such service many prospective purchasers will not buy the product. A large manufacturer of heavy electrical equipment which requires periodical factory reconditioning built a new plant in the Southwest of the United States, in order to secure a larger share of the business in that area.¹³ This personal contact between the makers

¹²Richard N. Owens, Management of Industrial Enterprises (Homewood, Illinois: Richard D. Irwin, Inc., 1957), p. 127.

¹³McLaughlin and Robock, op. cit., p. 24.

and the users of the products may have the added advantage of giving impulse to inventions and improvements.¹⁴

The relatively cheap commodity whose transfer costs can add substantially to its price usually positions itself where it is used. This is true, for example, in the case of cement manufacturers.

TRANSFER COSTS AND TECHNIQUES

All industrial operations require inbound movement of raw materials and outbound movement of the finished product. Since these movements can consume a very high percentage of the final cost to the customer, the wise selection of a plant site requires the attainment of low transfer costs and satisfactory service.

The importance of transportation as a locational factor sometimes depends upon how much of the manufacturing process is done in a particular plant. In a highly centralized operation where raw materials are moved through several stages to completion, transfer costs may be much less significant than in an assembly operation where the several components are brought from other sources and merely put together.

There are several important elements that affect the transfer costs incurred in any given location. These are:¹⁵ the media available; the relative cost for the various media; the distance to be covered and type of terrain; the urgency of shipment and the dependability of transportation; the physical shipping facilities; and the demand for special services.

¹⁴Gunnar Alexandersson, The Industrial Structure of American Cities (Lincoln, Nebraska: University of Nebraska Press, 1956), p. 45.

¹⁵Yaseen, op. cit., p. 19; James Moore, op. cit., p. 42; and McLaughlin and Robock, op. cit., pp. 85, 91.

Transportation Media

When different forms of transportation are available, competition may cause special rates to be quoted. For example, the New York State Erie Canal has affected the railway rates from the Great Lakes to New York.¹⁶ Also, the opening of the St. Lawrence Seaway brought an immediate reduction in railway rates on several commodities moving between Atlantic and Lakeside ports.¹⁷ Therefore, it is vital for the industry contemplating a new location to consider the intricacies of the complex transportation system at its disposal.

Depending on the nature of the commodity, each transportation medium has its own advantages.¹⁸ Railroads, water carriers, and highway vehicles are suitable for almost all classes of traffic; pipelines are practical for bulk liquid and gases; airlines are best where speed is essential and where access by surface agencies is especially difficult; pack animals are advantageous in difficult terrain; belt, cable, or rail conveyors serve best for short distances; self-delivery suffices for livestock and self-propelled vehicles; electric cables transport electric energy; and telecommunications media serve for information and commercial negotiations.

Media Cost

It has been said that ". . . freight rates are to regions and to cities what tariffs are to nations."¹⁹ As freight charges are part of

¹⁶J. Russell Smith and M. Ogden Phillips, North America (New York: Harcourt, Brace and Company, 1942), p. 167.

¹⁷Estall and Buchanan, op. cit., p. 37.

¹⁸Edgar M. Hoover, The Location of Economic Activity (New York: McGraw-Hill Book Company, Inc., 1948), p. 15.

¹⁹John W. Alexander, S. Earl Brown, and Richard E. Dahlberg, "Freight Rates: Selected Aspects of Uniform and Nodal Regions," Economic Geography, January, 1958, 34:1, p. 1.

the delivered-to-customer cost, the relative cost of the service may determine the type of carrier which will be used. However, the choice is not that easily made since freight rates are quite complex. They vary from hauler to hauler for the same load, from customer to customer for the same hauler, from one kind of load to another, and from one distance to another.

Charges, in the first place, vary according to the commodity to be carried. Bulky raw materials are often carried for less per ton/mile than semi-finished or finished products. The latter, being of higher value, can bear a higher shipping charge which will add less, proportionately, to the delivered price. Freight rates also vary according to distance and it is a general rule that the cost per ton/mile tapers off as the length of haul increases.

Distance and Topography

The type of terrain has an important influence on the transportation routes in any particular area. It affects, indirectly, the competitive position of industries that may develop in certain locales.

Water carriers are normally restricted to river valleys, lakes, bays and canals, while railroads and highways follow valleys and passes, seeking to circumvent natural barriers.

Those sections of the country which are geographically removed from the major economic activity of the nation do not, usually, enjoy good transportation service. New England, for instance, is separated from the interior of the United States by the mountainous terrain of its western border. New England had the most advantageous position for industrial development in America's infancy since sea transportation held primary importance at that time in freight movement. However, when

population and markets grew in the interior of the United States because of the enormous wealth of raw materials, the peripheral position of New England placed it at a distinct disadvantage against the competition of the newer industrial regions farther west.

Urgency and Dependability

The quality of transportation service is sometimes of greater importance in the industrial location than the achievement of the lowest possible shipping costs. The establishment of plants may be conditioned upon the availability of regular shipments within certain time limits. For instance, several of the textile industries have positioned themselves to be within a short delivery time of the New York City market. To the St. Louis shoe companies, time was important for raw materials and supplies sent to branch plants, as well as for finished shoes brought back to St. Louis.²⁰ In such cases, good roads and reasonable state trucking regulations are major elements in determining a favorable location zone around the home plant.

The objectives of those who are responsible for industrial purchasing are to get materials of the right quality, in the right quantity, at the right time, at the right price, from the right source, with delivery at the right place.²¹ The efficiency of the transportation medium can contribute greatly toward the realization of time and place objectives. If the commodity is delivered at the wrong time or the wrong place, results may amount to production interruption if it is a

²⁰McLaughlin and Robock, op. cit., p. 85.

²¹J. H. Westing and I. V. Fine, Industrial Purchasing (New York: John Wiley and Sons, Inc., 1955), p. 6.

raw material brought to the plant, or to loss of customers if it is a finished good sent to the market.

Shipping Facilities

If the transfer process depends on the utilization of special facilities, their existence in the contemplated location must be carefully checked.

Bulk commodities, liquids, gases, machinery, and refrigerated products all are examples of goods needing special handling and transfer facilities. Heaters to prevent freezing, box cars with ends that open, covered hopper cars, and a large variety of other equipment are designed for conveying specific commodities.

Trucks, too, have become increasingly specialized since an increasing number of manufacturers have become dependent on them for shipping their products. Accordingly, good highways assume an added importance as a factor in the location of industries.

Special Services

Frequency of service may be an important factor in the location of certain industries such as the garment and shoe industries. Location in cities on switching or spur tracks is often desired in order to get ready access to train movements on a number of lines. Producers establishing plants in smaller towns may depend on the advantages of trucks in providing frequent service both from sources of supply and to markets. Where the finished product is to be moved from the plant to a number of customers at different and nearby points, delivery by trucks is also convenient and economical.

If the objective is to keep to a minimum the working capital invested in materials and goods in transit, speedy transportation is used. Where time is not a major factor, plant location may be affected by savings that can be realized by using a lower cost method of shipping.

In certain cases, access to headquarters and to other plants of the industrial concern could be a significant element in location. This is desirable to permit inspection trips of central office executives, to facilitate conferences among managers of operating plants, and to speed the process of decision making.

The manufacturer must also consider the growing tendency of his workers and employees to come to work by private cars, especially if his plant site is not easily accessible by existing public transportation service. This would involve him in greater land requirements for parking. In the United States, the need for parking space is cited more often than the need for additional productive floor space as a reason for industrial concerns wishing to leave their existing sites.

INTERRELATIONSHIPS AMONG RAW MATERIALS, MARKETS, AND TRANSFER COSTS

Transfer costs as a locational factor perform a modifying role between raw materials and markets. When they favor nearness to raw materials as a determining factor in location, they deprive the market, at the same time, of some of its importance.

It is generally known that proximity to a source of raw materials is a significant factor in location when these materials are perishable, heavy, bulky and cheap, or when they are greatly reduced in bulk during processing. On the other hand, proximity to the market is an important factor if quick supply to customers is necessary, after-service is

required, the bulk of the finished product is increased during manufacturing, or if transferring the product long distances causes breakage or spoilage.

However, the influence of raw materials and/or markets may be reduced or enhanced by the transportation situation, transfer costs, and processing techniques. It is the cost or difficulty of movement that hinders the free flow of materials to where they might be required. For instance, the difference in railway rates between livestock and meat products has been an important factor in the struggle between rival centers of the packing industry. Packing was favored in the eastern part of the United States by a freight rate on livestock of about one-third of the rate for processed meat. Then, pressure from Chicago packers brought the rate on the finished product down, enabling its packing industry to compete more effectively in the eastern market. Subsequently, the meat packing industry began to grow in centers farther west. Chicago packers then demanded lower rates on livestock to enable them to compete with those who were nearer the cattle ranges. Finally, percentage increases on all rates has further favored the movement of livestock and this has stimulated the packing industry in the extreme east again.²²

With advances in transportation techniques have come equally significant technical advances in manufacturing which have decreased the pull of materials on many industries.²³ Among these are the techniques of preliminary treatment of primary raw materials, reducing the quantity

²²D. Philip Locklin, Economics of Transportation (Homewood, Illinois: Richard D. Irwin, Inc., 1960), p. 46.

²³See Shipping Facilities, above, p. 26.

of waste and increasing their transportability. The beneficiation of iron and copper ores is an example.

Even where the attraction of raw materials is strong, remoteness from markets, lack of labor and poor transportation facilities may offset such attraction and make utilization at the point of origin uneconomical. Furthermore, a material-oriented industry may be located at a considerable distance from its materials when a country feels a need to possess an industry but cannot provide all its resources. Such an industry is best located at the point of minimum procurement cost. This could be near a port when the material is being imported by sea, or at a nodal point, if the material is to be moved overland from its source to its destination. Materials will still play a role in location, but transportation facilities have the important part.

Generally speaking, the pull of the market is considered now as the norm for modern industry. Sites, other than market locations, would have to be justified by cost advantages that outweigh the attractions of the market and the cost of moving the finished product to its consumer. A raw-material resource may possess such advantages. However, the influence of the market as a location factor has been augmented by the general practice of charging higher freight rates on finished products than on raw materials.

Finally, it should be noticed that a market is often more a derived than an original feature. A concentration of industry at any point creates a market at that point and a raw materials location can become a market place, too. Similarly, a market place can be a materials location for those who use the products of industry situated there.

LABOR SUPPLY AND COST

An adequate supply of labor is fundamental to all manufacturing processes although the influence of labor considerations on location decisions varies widely from industry to industry. Where production techniques are not highly mechanized and the product has a high labor component, geographical differences in labor cost are significant in determining the industrial location. This situation may eventually bring the automation problem into the forefront. Rather than replacing human labor, automation will make it possible to render new, more comprehensive, and more economical services.²⁴ Automatic factories cannot be completely workerless factories. Maintenance, disassembly, and repair work will still depend largely on human labor. Even in the most automatic office it will be necessary to have people on the job to tape the machines.

Although the effect automation will have on labor supply as a location factor may be undetermined, it is apparent that it will result in a change of emphasis. Labor which is satisfactory in today's assembly plants will not necessarily qualify for work in tomorrow's automated plant, for substantial retraining would be required. Unskilled labor may be eliminated with skilled and semi-skilled labor occupying all strata of positions. To summarize, it can be said that the specialized automatic machinery is capable of doing only those operations for which it has been designed. Labor, by contrast, is adaptable and, therefore, is likely to retain some influence as a locating factor.

²⁴John Diebold, "Automation--The New Technology," Harvard Business Review, Nov./Dec. 1953, 31:6, p. 63.

The labor input is usually high in the textile, clothing, and shoe industries, some engineering processes, and in manufacturing concerns which require manual skill for production. Establishments in these industries are often small and tend to employ a high percentage of female labor. In such industries, labor requirements strongly influence location decisions. This may explain the tendency for light industries to settle in areas where heavy industries are located. Women workers, whose husbands are employed in these heavy industries, constitute a large supply of labor for the light industries. One illustration is the position of the silk and rayon industries in the east Pennsylvanian coal mining region.²⁵

The influence of labor on sites is determined principally by variations in labor cost, variations in labor supply, and the need for special skill.

Labor Cost

Variations in labor cost are not merely a question of differing wage levels, since high wage rates are not in themselves disadvantageous. Of more importance is labor productivity, because more money may be an effective means of spurring employees to work harder; on the other hand, it may not.²⁶ Apart from industrial organization, management techniques, and technological methods, productivity is clearly affected by labor attitudes, turnover, and absenteeism.

²⁵Estall and Buchanan, op. cit., p. 90.

²⁶Harold F. Rothe, "Does Higher Pay Bring Higher Productivity," Personnel, July/August 1960, Vol. 37, p. 20.

An antagonistic and hostile attitude on the part of workers may nullify the attraction of a favorable wage rate. When militant labor unions become well established in older industrial areas, their activities sometimes cause worker-management relations to become very strained. Such an environment is not attractive to industries seeking a new plant site, and existing firms may consider the possibility and desirability of relocation or opening branch plants in areas where labor attitudes are more favorable. Therefore, a discouraging labor history may cause an otherwise favorable location to be rejected.

Labor cost is also affected by the size of the site area, and not only by the wage differential which is usually found between large and small industrial centers. Because of fewer alternative jobs available, small centers are characterized by a lower rate of labor turnover, lower rate of absenteeism and generally favorable labor attitudes. Moreover, the favorable wage level may be induced by low living cost and population pressure.

Fringe benefits have their own implications on the cost of labor. Contributions by the enterprise to welfare schemes, insurance plans, recreational facilities, hospitalization expenses, and the like add substantially to total labor costs.

Finally, state labor laws are another factor influencing plant location. Workers' compensation laws, unemployment compensation laws, and statutes regulating hours of work are especially predominant in their effect on the cost of labor. Therefore, industries are attracted to states providing less restrictions and relaxed regulations of employment.²⁷

²⁷Greenhut, op. cit., p. 133.

Labor Supply

The size of the labor force affects industrial location in varying degrees. Large labor concentrations are very attractive to industry, especially those concerns which have large seasonal requirements and are compelled to tap areas satisfactory in this respect. For example, the displacement of farm labor by mechanization of agriculture in the southern part of the United States has been a favorable factor for inducing industries to move there.

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In a large population, it is usually not a difficult task to find the particular types of workers that suit different needs. Labor supply is more flexible, and specialized organizations exist through which placement can be quickly achieved. Workers' layoff is not such a difficult problem as it is in a small community or one-industry town where alternative opportunities open to workers are limited.

However, the physical existence of labor is not the only requirement. The type of labor is also important, its age and sex structure, and the level of industrial capability. Male and female labor are usually in joint supply; where there is one, the other will often be available. The case of industrial capability is another thing for technical know-how is often a common possession of the worker in most advanced industrial areas. After a short training period, the worker can operate new machines and adopt new processes. The situation is completely different in the under-developed areas where efficiency of labor is generally low and labor costs high even though wage rates are low. Moreover, to achieve a significant level of industrial development,

²⁸McLaughlin and Robock, op. cit., p. 69.

physical needs must be adequately satisfied. This may not be a problem in advanced economies, or where there are connections with areas of food surplus, provided that there is the ability to pay. In underdeveloped countries, however, the supply of labor is restricted by food supply conditions, and industrial advance will depend primarily upon increased production in agriculture.

Special Skills

The need for special skills is another factor of importance in influencing the location of industry since certain industries still call for a high degree of manual skill. The small metal product trades, the furniture industry, the tailoring trades, and pottery production, are some activities which still depend on specialized skills.

Seemingly, less and less of modern manufacturing industries are dependent on craftsmen's ability, for methods of production are being perfected that can substitute the machine for the worker's skill. However, there is still a need for much highly skilled labor in mechanized production as well as in the automatic age. There is a demand for super-skilled men, both for the maintenance of expensive and intricate plants and for such occupations as tool making. Although the role of the super-skilled man may affect a decreasing number of the industrial employees, it is becoming more vital than ever in the operation of industrial processes. On the other hand, a rapidly increasing proportion of the total work force will be employed in operations calling for some skill. A fair proportion of industrial workers will be classified in the "skilled" category, and most of the remainder will be semi-skilled.²⁹

²⁹See p. 32 above.

THE AVAILABILITY OF CAPITAL

The need for capital affects the type and costs of production in various locations, and the pressure of this problem is felt by different industries in varying degrees. Large organizations have available funds in reserve, or can obtain funds through the money market on good terms and low cost. Also, the money market is usually concentrated in one, or a few, center(s) of trade in each country, e.g., London, New York, Cairo and Alexandria, and so forth. Small businesses must borrow money, if they can, on strict terms and high interest costs. The effect of capital on the locational choice of big businesses, therefore, is indirect. It is the availability of capital to customers and suppliers rather than to the firm itself that matters. On the other hand, capital availability may be the determining location factor to the small enterprise.

Capital availability depends on a variety of considerations: capital price, security of investment, and certainty of returns.³⁰ In advanced economies, there is a highly developed money and credit system fostering institutions for savings, cooperative credit associations, stock markets, industrial development corporations, and banking and insurance services. Such organizations enable many capital needs to be met and thus assist in the establishment of industry. Moreover, risk capital is usually available for the promotion of new enterprises or for the development of promising new areas.

In most underdeveloped countries, capital must either be saved out of current income or be borrowed from abroad and if national income is low, there can be no high level of saving. Borrowing from abroad

³⁰B. Graham, D. L. Dood, and S. Cottle, Security Analysis (New York: McGraw-Hill Book Company, Inc., 1962), p. 49.

depends on a different set of circumstances. If it is a government loan or grant, it is affected more by political than by economic considerations, but if it is a private investment, it is influenced by strictly economic motives. The private investor needs to feel security in his investment, an expectation of acceptable returns, and freedom from the fear of governmental instability which might lead to the expropriation of his assets without adequate compensation.

MANAGERIAL ABILITY

Managerial talent has not always been recognized as an economic resource. But recognizing management talent as a source of wealth is not enough; developing nations must take action to generate and accumulate this important economic resource, just as positive steps are taken to generate and accumulate capital.³¹ Moreover, the efficient application of capital and labor in industry depends on the degree of management development. Even a richly endowed country needs organizational and executive skills if it is to develop an industrial economy. Poor management may fail to capitalize on good resources. A modern industrial economy demands an adequate supply of men with skills and experience in technical knowledge, administrative ability, capacity to control others and marketing know how. The skilled entrepreneur must be capable of setting objectives and standards, policy formation and planning, interpreting of data, forecasting, supervising, evaluating, and making decisions. The need for managerial ability is greater where resources are scarce. Here, skill, ingenuity and innovation must offset the lack of good resource base.

³¹ Leon C. Megginson, "Applicability of Management Principles in Underdeveloped Economies." A paper presented at the Tenth International Meeting of the Institute of Management Sciences at Tokyo, August, 1963.

Established industrial centers usually possess a good supply of men in the managerial class. The availability of trainees and experienced workers plays a prominent part in locational decisions. In seeking new plant sites firms ascertain whether the prospective area has men of executive ability, or whether the area is or could become attractive to such men.

ENERGY SOURCES

The energy requirement is essential to all modern industries; in some it is a controlling factor. The carborundum plant at Niagara Falls, and the aluminum plants at various places with cheap hydraulic power are examples.³²

Technological advance has altered the conditions of demand for energy, permitting the growth of new industries, and the substitution of one energy source for another where economies were to be gained by such substitution. For example, oil has supplanted coal in some cases, and natural gas has increased in importance. Both oil and gas have advantages in cleanliness and labor cost, and if a close control over heat is required, oil and gas have additional advantages. These differences have sometimes caused plants to be located in areas that are served by natural gas in preference to other locations, although the extension of gas transmission lines is causing this factor to decrease in importance.

The unequal distribution of energy resources over different areas, and the variations in quality, accessibility and general costs of exploitation, cause great inequalities between locations in the

³²Roscoe, op. cit., p. 133.

cost of energy. Because of these inequalities, the economics of the transportation of energy assume great significance in deciding which of possible sources of energy will be used in any given location.

Energy costs may also be affected by the development of atomic power. Although this development is presently not a factor in plant location, it is apparent that it will have some effect in certain industries.

INDUSTRIAL CONCENTRATION AND DISPERSAL

One industrial phenomenon is that firms tend to be attracted to the same location, and the process tends to be cumulative, i.e., industry attracts industry. Some of these industries may want to use the product of an established enterprise as their raw material. This is shown by many steel users who are located in steel-making centers. Others may desire to use a by-product of those industries; for example, waste sulphur recovered from gas scrubbers at gas and coking plants has been used for fertilizer processing. Industries using waste sulphur as a raw material wish to situate themselves fairly close to a gas or coking station.

Furthermore, technological advance has brought about an increased concentration of industrial activity to enable individual industries to share the benefits recurring from using well advanced and expensive machinery, equipment, and installations. These cannot be owned or economically operated by one firm or a few small firms.

Conversely, new organizations may be established either to supply located firms with certain parts, accessories, machinery, or containers, or to provide them with required services such as banking, insurance,

transportation facilities, repair and maintenance, trade information, and business research.

As the concentration continues, it becomes a center of increased earning power; it provides an available market for consumer good industries which will be attracted to the growing center. The next step in this process is that labor supply grows, giving a geographical division of labor, enhancing further the attractions of the location for other processes. External economies, resulting from such expansion, will be gained by all industries.

However, a stage will be reached where maximum economies of scale have been achieved and any further expansion would result in diseconomies which offset or even overcome the realized economies. Among these diseconomies are: competition among various industries may bid up the prices of materials, labor of all kinds, capital, and land; labor in areas of industrial concentration is strongly unionized and militant union activities may affect labor attitudes as well as wages. Strikes may be more common and their effects more widespread; and as a region grows above a certain size, the provision of public services becomes more costly and taxes must be increased to pay for them.

Such disadvantages cause some industries to disperse and seek a location elsewhere. This tendency is enhanced further by different state laws. Firms may wish to avoid having all their facilities in one state to insure against the possibility of adverse changes in the state laws.³³

³³Alexandersson, op. cit., p. 49.

In their dispersal procedure, firms vary in their requirements for a new location. Frequently they prefer small centers affording lower taxes, cheaper sites, lower wages and good attitude, lower power cost, and so on. Some firms look for a region that already has some industrial potential, hoping for suitable labor and possible sources of supply for component parts or services. Others may wish to locate in towns with little or no existing industry to gain from the lack of competition and from a favorable community attitude.

CLIMATIC CONDITIONS

The factor of climate may either play a direct or indirect role in determining plant location. Its direct effect can be shown in industries having specific internal climatic requirements such as humidity in textile mills, temperature in candy factories, and dust removal in precision manufacturing. Such requisite conditions can be provided artificially through the use of modern equipment like humidifiers and air conditioners, but total coverage by this equipment may be limited by its expense in installation and operation.

Since climate affects the type and productivity of agriculture, it will naturally affect the location of industries processing the produce of agriculture, such as the preserving and canning industries.

As to its indirect effect on location decisions, climate should be considered in cases similar to the following: Research experiments have revealed that climatic conditions influence human efficiency and productivity. This can either be accepted, and output lost, or be combatted by using the required air-conditioning apparatus with its extra costs. This situation is prominent in outdoor operations such as shipbuilding. A stable climate is most favorable to such industrial

activity, since operations can be carried on continuously throughout the year, thus permitting, among other things, the spreading of fixed costs over a greater number of units of output.

Manufacturers utilizing large amounts of floor space, where maintenance is a factor, will prefer areas where there is no frost line problem and no freezing, thus eliminating continuous pointing up of brick work, removal of ice and snow, elimination of enclosed loading platforms, and the winterizing of trucks and other plant equipment.

The velocity and direction of prevailing winds may have a detrimental effect on the ventilating problems of large plants. This is especially true if any phase of the operation, or neighboring plants, produce noxious odors, fumes or heat.

It is recognized that areas highly favored climatically are attractive to people. Thus, as their populations grow, such areas become attractive to industry.

Finally, climate is reflected in the habits and requirements of consumers, and thus affects the prospects for consumer goods industries of various types. Even marketing policies are dictated by climatic factors.

LOCAL FACTORS

So far, only those forces that are of major importance in relation to the broader aspects of the location decision, that is, to the choice of region in which to establish a plant, have been discussed. But within the satisfactory region, a satisfactory community and a satisfactory plant site have to be determined. This means that

there are two levels of classification in the location decision: the broader regional level and the narrower local level. For many industries, the choice will indeed be made in these two stages. For others, the line of division between the two levels is not clear cut.

In this section the topic of significant local features will be treated.

Land and Building

The cost of land is an important factor in choosing between an urban location and one in a smaller town or suburb. A lack of adequate space may force the firm to choose a multistory building when other considerations indicate that a single story layout would be more desirable. Most companies require space for parking facilities, adequate light and air, and protection against undesirable neighbors. An industry may also want ample space for later expansion, thus making its land requirements more difficult to satisfy. Some industrial buildings, with their equipment, impose heavy loads upon their foundations; and so the geological conditions may limit the choice of sites.

The availability of suitable buildings may also affect site selection. This problem was particularly significant in the post-war years when a producers' market stimulated many industries to immediate expansion. At that time, either the building industry was fully occupied with other urgent work, or building materials and labor were in short supply. Glenn and McLaughlin cited many examples where the existence of even approximately suitable premises was a strong attraction for industry to move south.³⁴ However, ordinarily a site

³⁴Why Industry Moves South, p. 98.

should not be chosen merely because land or a building is available. Location is not easily changed, and a poor location may burden an industry permanently with heavy fixed charges.

Availability of Services

A prospective manufacturer will be encouraged by the suitable provision of required services. Waste disposal is not an easy problem to many industries such as ore-processing plants, steel mills, and chemical plants, which must dispose of large quantities of useless extract.³⁵ They may be prevented by local authorities from dumping waste into streams or piling it on land within the city, and if this is the case public facilities for waste disposal should be provided.

Since road requirements are important to many modern industries, good highway maintenance and satisfactory transportation services are further inducements for site selection.

Civic values contribute to the desirability of the city or town as a place for workers and employees to live. Public health services, educational and recreational facilities, and police and fire protection make one area more attractive than the others.

Water Supply

Water is an essential requirement of all industries, being used variously in processing, in the production of steam, and in cooling. In assessing the importance of water in location decisions, quantity and quality of available resources have to be considered in the light of demand requirements.

³⁵Owens, op. cit., p. 132.

The quantity of water available varies from area to area and seasonally within a given area. Possible locations for industrial enterprises in a given region may be restricted by overall or seasonal water shortage. This is specifically true for those industries with large water requirements, and such industries are often the fundamental ones in an industrial economy.

Water sources may be either on the earth's surface or underground. Surface water is generally inferior, containing dissolved oxygen, organic matter, and other impurities. But it is widely obtainable in the quantities required and thus most industrial demands are met from surface sources. However, underground water is preferred for some uses, despite the higher fixed and operating costs incurred in exploiting it. Although poor quality water can be upgraded by various treatments, this might add to total development and operating costs that could be avoided in a different location. Even good water may be spoiled locally by the introduction of contaminants into it by industry and municipalities. Industries requiring pure water should examine the methods of waste disposal in the vicinity of a prospective location.

Although there is a tremendous increase in water requirements by industry year after year, only a small fraction of all water used is actually consumed. The amount of water incorporated into the product or lost to evaporation and other ways is very small relative to the vast quantity used for cooling, steam raising, washing, and so forth where the water can be repeatedly used. Where supplies are really abundant, cooling water may be used only once, and the industry saves the cost of land, buildings, equipment, and staff which would be required for cooling

installations. In many cases, however, water is not in such lavish supply, and various devices are used to cool the water and to reduce evaporation and other losses, permitting the more effective utilization of available water. If water pollution cannot be controlled, salt water may be converted into water suitable for industrial use. This last possibility could be economically reasonable for industries located near the seacoast.

The proportion of water costs to total costs will vary among industries according to particular requirements and conditions of supply. A cost for water that is permissible in one industry may be far in excess of what another industry can afford. A plant such as a petroleum refinery or a steel mill, using large quantities of water per unit of production, must have a low-cost water supply. Industries using only small quantities of water per unit of high-priced product, on the other hand, can stand relatively high-cost water for selective uses.³⁶

Promotional Activities

Convinced of the beneficial consequences of industrialization to their economic and social life, different localities compete with each other to attract promising industries to their area. Promotional activities and inducements by local bodies may take one of two broad forms.

Financial assistance: Such financial inducements are of various types, for example, outright money gifts, the offering of sites or

³⁶Water for Industrial Use (New York: United Nations, Department of Economic and Social Affairs, 1958), p. 11.

buildings at nominal prices or rent free, favorable utility rates and tax concessions or exemptions which would pay the cost of moving the industry to the sponsoring community. The reaction of industrial men to such inducement varies. Some accept money donations as an expression of community feeling. Others fear that acceptance carries a risk that a body making a substantial financial contribution might want to interfere with management. On the other hand, the community itself may run a risk if the moving industry puts pressure for greater demands in the future. In this case, the community either realizes the further demands or faces the problem of unemployment.

Providing information: Local community organizations often advertise the advantages of locating a plant in their area. The information given is usually gathered from research planned to assess the size and quality of the market, the availability of good workers, the adequacy of transportation media, and the facilities of industrial research. The availability of such information saves industrialists from expending time and money on their own private research into a prospective location. Some large firms may prefer to assess the prospects of alternative locations in a supplementary study. Smaller firms may, however, be influenced and led to inquire more closely into the possibilities of the site.

Promotional activities are performed by governmental units, business groups, and/or private bodies. In the United States almost every region possesses promotional organizations which cooperate with, and coordinate the activities of, state associations of manufacturers, development commissions, local chambers of commerce, and other associations.

THE ILLUSION OF THE IDEAL LOCATION

The ideal location would have every advantage and no disadvantages. It is the site where a certain industry would have every cost of operation at the lowest level, and be as close to the market as it is to the source of raw material so that freight costs would be at a minimum. In such a locale workers would be in perfect supply with the required skill; community and labor attitudes would be favorable. Here, land should be available for any need and land prices and building costs would be at a minimum and tax rates would be comparably low. All services and facilities would be provided for low expense with freedom from any restrictions or regulations that would hamper the industrial operations. But no location exists where every cost, taken separately, is the least possible one. Moreover, time will change the relative importance of all factors and it is impossible to be sure that the site chosen will continue to be the best.

Therefore, the ideal location for any given industry probably does not exist, but the intelligent entrepreneur will seek, to the extent feasible, the particular combination of favorable features that most nearly meets his individual needs. If several possible locations appear equally attractive, the final decision may be affected by a feature of little intrinsic value.

CHAPTER III

TECHNIQUES OF ANALYSIS

In spite of the fact that most industrial location studies entail investigation of the same basic factors, industry has developed a variety of techniques for evaluating and comparing the ability of alternative sites to supply these basic needs. But, while the methods of study differ in terms of approach, organization, and sources of information employed, a fairly general pattern of procedures has been developed. Most new site studies involve the following steps:

- setting up the organization to deal with the problem;
- listing the requirements for the new plant;
- selecting the general area where the plant is to be located;
- screening communities within that area;
- comparing candidate communities and making a final choice; and
- selecting the specific plant site within the chosen community.

Methods of Studies

Several methods have been developed to study the location problem. In this chapter, some of the more modern approaches are briefly discussed.

The comparative cost analysis: Such an analysis is based, for each industry studied, on an established or anticipated pattern of markets and a given geographic distribution of raw materials and other productive factors used. The analyst attempts to determine in what region the industry could achieve the lowest total cost of production and distribution.

Through such analysis those industries for which each region tends to have positive locational advantages can be identified.

Isard and Schooler used the comparative cost approach in their study of the Arkansas, White, and Red River basins,¹ whereby production costs and freight expenses were analyzed for plants of different size as a base for comparison among various locations. Two sites in the Arkansas, White, and Red River basins, and one site, Houston, on the Gulf Coast were considered. Their analysis centered on natural gas as the principal raw material in the area studied.

Joseph Airov used the same method of analysis in his study of the synthetic fiber industry, when he made an interregional comparative cost analysis among three types of regions: raw material areas, market areas, and a low labor-cost area.² Airov was interested in plant locations for enterprises producing nylon, orlon, dacron, and other fibers made from petrochemical ingredients.

The comparative cost analysis has the limitation of being applicable only to individual industry location studies with respect to a given region. Positive conclusions would be reached if interindustry relations were considered. Such relations often lead to external economies stemming from a larger and more diversified labor force; larger requirements of fuel, power, transport, and various facilities; and the localization in one district of diverse activities which feed by-products into each other. The need to evaluate these relations requires an inter-industry approach.

¹Walter Isard and Eugene W. Schooler, Location Factors in the Petrochemical Industry (Washington: U.S. Department of Commerce, 1955).

²Joseph Airov, The Location of the Synthetic Fiber Industry (New York: The Technology Press of M.I.T. and John Wiley & Sons, Inc., 1959).

The input-output analysis: In its simplified version, this approach amounts to the calculation of the quantities of various inputs required per unit of output of a given commodity, for the regions under consideration. The region in which the total input cost would be lowest per unit value of output is the most desirable.

The sophisticated version of the input-output analysis can be adopted if interindustry relations are to be considered. A set of regions is chosen and the most appropriate group of industries for each region is selected. The output of these industries along with the inputs from the same types, constitute the total supply which is consumed through two channels: the first is an intermediate use by the industries for further processing; and the second is a final use by consumers, investors, government, and exporters.³ The inputs of each of several factors such as raw materials, power, transportation, labor, equipment, and other services, required to produce a unit of output should also be determined.

If the output of an industry is increased to respond to an increase in the demand for its product, this industry has to increase its inputs proportionately. Since the inputs of any industry are supposed to be final outputs of other industries, these industries must also increase the amounts of their own inputs used, and so on.

The shortcomings of this method arise because, in reality, most industries produce several commodities, and computational difficulties

³Hollis B. Chenery and Paul G. Clark, Interindustry Economics (New York: John Wiley & Sons, Inc., 1959), p. 16.

limit the boundaries of any industrial classification that can be employed. There is also the question of stability of input coefficients, for as the output of an industrial activity expands, new combinations of the various inputs and new technical processes may become feasible. These new combinations and processes would probably require different percentage increases in the various inputs. Furthermore, where there are fixed limits to a given resource, or factor of production, entirely new production techniques and/or locations may be indicated in order to realize increments of output.

Linear programming: ". . . is a method of planning whereby some objective function is minimized or maximized while at the same time satisfying the various restrictions placed on the potential solutions."⁴ It is a mathematical technique, recently developed for solving problems concerned with decision making.

The quantitative aspects of problems connected with product mix, job assignment, capacity allocation, production scheduling, transportation, pricing policies, business expansion, and sales efforts are subject to analysis by linear programming.

Essentially, it is a systematic method for having an optimum solution from a number of alternatives, the objective of which may be profit maximization or cost minimization. An example of the first case is where the manufacturer plans to use the available factors of production in a way that realizes his maximum profit. An example of the second case would be an industrialist who is confronted with a

⁴Edward H. Bowman and Robert B. Fetter, Analysis for Production Management (Homewood, Illinois: Richard D. Irwin, Inc., 1957), p. 77.

situation of using different means of transportation in shipping his raw materials or distributing his finished goods. The objective here is to incur the lowest possible cost, and in all the decisions he makes, the manufacturer is influenced by the location of his activity.

Limitations of the linear programming technique arise due to the necessity of quantifying all the factors and stating their relationships in a linear pattern. The qualitative aspects of the problems studied cannot be handled unless they can be expressed in quantitative terms.

The industrial complex analysis: This method was used by Isard, Schooler, and Victorisz in their study of a proposed industrial complex, composed of oil refining, petrochemical, synthetic fiber, and fertilizer industries in Puerto Rico.⁵ The data and results were considered to be valuable not only to the involved industries, but also to enterprises in various fields who sought diversification and new profitable channels for expansion. The approach was used in order to give maximum consideration to economies achieved through the action of forces of agglomeration. The purpose of the research was to identify types of industrial activities that might profitably locate in Puerto Rico and to find out the possibilities of its economic development as an underdeveloped region.

The market position techniques: It is possible to determine the center of a market, which is a statistical device helpful in approximating that point which will provide the lowest cost for distribution. An overlay

⁵Walter Isard, Eugene W. Schooler, and Thomas Victorisz, Industrial Complex Analysis and Regional Development (New York: The Technology Press of M.I.T., and John Wiley & Sons, Inc., 1959).

of the map of the market area is made on graph paper, and customer locations are plotted according to their geographic position. A uniform scale is laid out along the horizontal and vertical axes, and the number of distance units, along both axes, of each destination are found. An average is determined along the horizontal axis by adding together all of the distance units and then dividing by the number of points plotted. In a similar manner, the average is also determined for the vertical axis. Then, the point determined by plotting the two averages on the graph is the geographic center of the market. (See Figure 2 for an example.)

The analysis would be more accurate if the weighted center of the market were to be determined. This could be accomplished by multiplying the number of distance units along each axis for each entry by the volume of quantity moved to that destination during a representative period. The weighted average along each axis could be determined by dividing the sum of individual multiplications by the total quantity moving to all points considered. Then, the point determined by plotting the two weighted averages on the graph would be the weighted center of the market.⁶

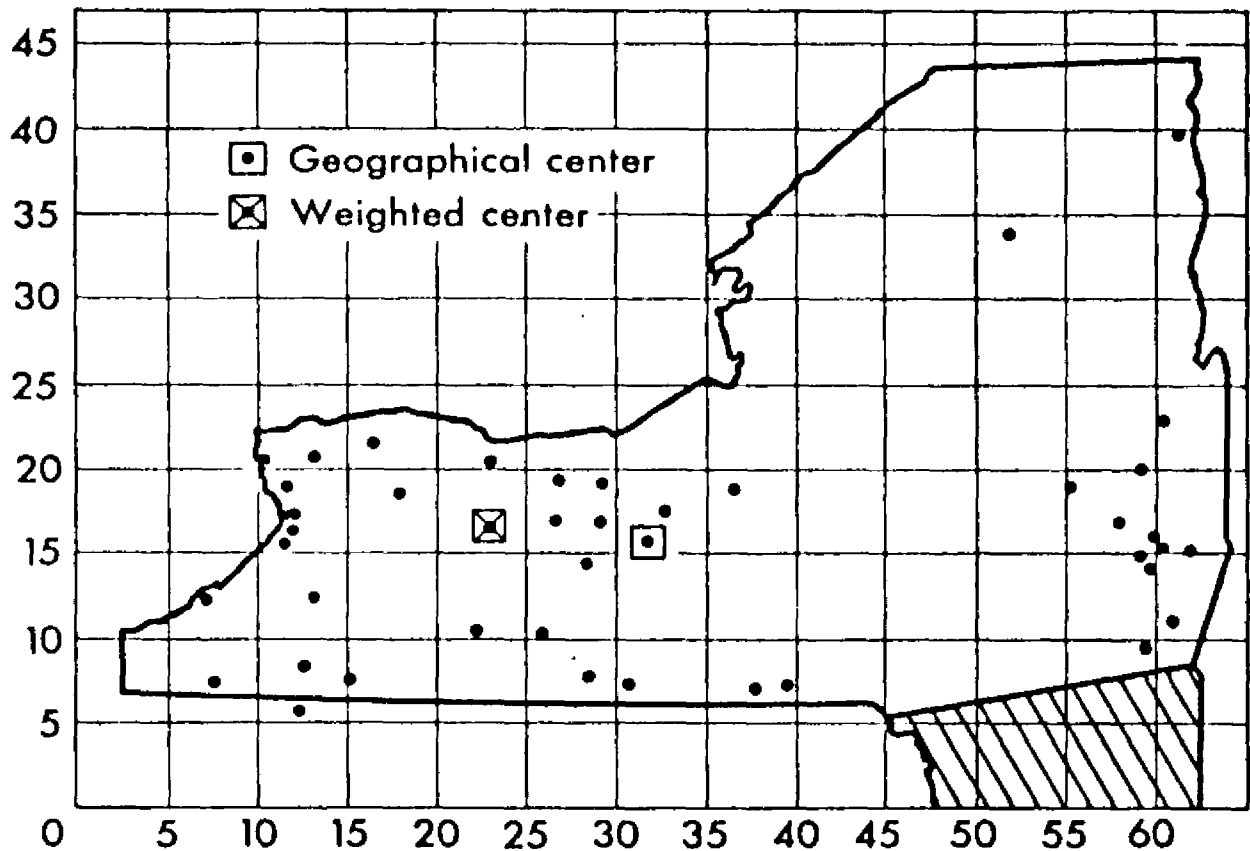
Caution should be used in the application of this technique. The center of the market can be used only as a guide for plant location.

Another technique, following the same line, was developed by Harris⁷ who advocated that the position of the market is the major

⁶Yaseen, op. cit., p. 29.

⁷Chauncy D. Harris, "Mathematics of Plant Location," The University of Chicago Reports, IV, 1954.

FIGURE 2
THE CENTER OF MARKET TECHNIQUE



The center of a market for a territory serving all of upper New York State and border areas in Vermont and Pennsylvania. The geographical center is near Auburn, New York, while the weighted center, which takes into consideration the volume of goods handled at each location, is south of Rochester.

Source: James M. Moore, Plant Layout and Design (New York: The Macmillan Co., 1962), p. 40.

determinant in plant location. He presented a mathematical formula for sales potential (P) in terms of the markets accessible to a site (M) and the distance of the markets from that site (d). The formula then reads:

$$P = \sum \left(\frac{M}{d} \right)$$

Then, the best industrial location would be at the site where (P) is at a maximum.

Recognizing the importance of minimizing total transportation costs (T), Harris developed his second formula:

$$T = \sum (Md)$$

where (M) represents the markets within reach of a city and (d) the distance in freight costs to each unit.

Consequently, the best location would be where (T) is at a minimum.

The use of computers: Operations research analysts have given considerable attention to the problem of industrial location, but their investigations have been limited primarily to the transportation problem. Brink and deCani have presented a model using an analogue computer to determine an optimum location.⁸

The study described a firm which wants to serve (n) markets from (m) industrial locations, where the demand at each market is known, and the industrial locations are determined so as to minimize total transportation costs. An analogue computer, utilizing electrical potentials on points in a plane which is moved so that iso-cost curves can be

⁸James Moore, op. cit., p. 63.

traced through the measurement of electrical current, was used. A general mathematical solution was developed, but it was iterative and expensive to compute.

The Rayco Company, automobile seat cover manufacturer, used a digital computer to determine the locations of new stores.⁹ Variables affecting sales were put in quantitative terms and analyzed by the computer to determine which were significant influences on sales on a net basis, after considering the effect of all the others taken at the same time. The calculations involved 888 relationships, and it would have been impossible to do them by manual methods.

Finally, there was a study which explains how the transportation model of Koopmans was used to assist in planning the location, timing, and number of additional production units required by Maxwell House Division of General Foods Corporation in a next decade.¹⁰

⁹M. E. Salvesson, "Electronic Computers in Business," Journal of Industrial Engineering, Vol. IX, No. 2, March-April, 1958, p. 110.

¹⁰H. P. Berry, "Applications of Linear Programming and Electronic Computers to the Planning of Expansion of Plant Facilities," Proceedings of Conference of Electronics in Action, American Management Association, 1957.

CHAPTER IV

MOBILITY OF PRODUCTION FACTORS

Influenced by production economies in seeking an industrial location, the manufacturer looks for the site where the combination of productive services can be had at minimum cost per unit of output. Therefore, the prices of production factors will help to determine the relative advantage of alternative locations.

Differentials in the prices of productive services arise primarily from the difficulty, or expense, of moving factors from one place to another. To the extent that any factor of production is mobile, it moves to places where it is better rewarded. This tends, in turn, to reduce geographic differentials in its price.

Land Immobility

Land, or natural resources, is the only element absolutely fixed in position. Consequently, the economics of location is usually concerned with the spatial adjustment of the other more mobile production factors to land, which is immobile, in a way determined by human wants and capacities.¹ In terms of price differentials, land shows the largest differences, partly because it is immobile and partly because there is such wide variation in the natural endowments of sites.

¹Edgar M. Hoover, Jr., Location Theory and the Shoe and Leather Industries (Cambridge: Harvard University Press, 1937), p. 3.

Capital Mobility

Two kinds of capital can be distinguished, capital goods or equipment on the one hand and money capital on the other. There is a significant difference between them in the degree of mobility. Some forms of capital equipment, such as tools and light machinery, can be moved; but most kinds of equipment which are important to many industrial processes are quite heavy. They are considered relatively immobile and regarded as sunk in a particular location. Their value lies in their output, or as scrap. The capital involved can be shifted only gradually and indirectly by a diversion of replacement and new investment.

By contrast, money capital is much more mobile, though its degree of mobility depends on several considerations. These are the price (the interest rate) offered, the security of the investment, and the certainty of return. Since there are many possible outlets for investment capital, the quantity available for any particular use depends, other things being equal, on the price given by the borrower. However, the mobility of money capital itself tends to equalize the differences in price and any proposed use of that capital must compete for it at, or near, the prevailing rate of interest.

Labor Mobility

Labor mobility is affected by wage rate differentials, living costs, stability of employment, working and living conditions, and opportunities for advancement. Labor mobility has two forms, geographical mobility and occupational mobility.²

²Hoover, The Location of Economic Activity, op. cit., p. 104.

Geographical mobility of labor may occur among different places in the same region or among different regions. The development of suburban train and bus services and the use of private cars have greatly increased local mobility which takes place within the region. Industrialists can regard a wide area as a possible labor market. Regional mobility is much more important. It is vital to the growth of new centers of production, but it is normally a slow process, because mobility among regions requires the uprooting of homes and the severing of local connections in the permanent movement to another region. Great migrations of population do not usually occur unless there is some social, economic or political change.

Occupational mobility of labor is that which develops between industries. It is an important feature of an industrial society which undergoes continuous change in the process of its progress. The mechanization of agriculture released many farmers who were transferred to industry. The standardization of machinery carried with it the more complete standardization of operations and increased the mobility of skilled labor from plant to plant. The declining industries release labor which should be absorbed by the expanding sectors. Skilled and semi-skilled labor will be concentrated in the automated factory, while unskilled labor is going to move to less developed plants.

Managerial Mobility

Managerial ability is fairly mobile, and an area with good prospects can usually attract men of ability. The attraction is naturally augmented if the location is also physically desirable. However, mobile executive personnel are not always sufficient. Local participation

in management may be immediately desirable and in the long run essential.

One of the great obstacles to industrial growth in underdeveloped countries is the lack of trained and experienced men of high executive and managerial ability. The only alternative is to attempt to attract foreign managers. The mobility of managerial and entrepreneurial skill across international borders depends on the salary rates and other incentives offered.

Barriers to Mobility of Production Factors

Land is naturally immobile. However, land products which are used as raw materials can be moved to places where the concerned industries are located. This possibility depends upon the efficiency of transportation and the absence of the relevant barriers which hinder the movement of the other factors of production.

Boundaries hinder the migration of labor, capital, and enterprise. Some of the obstacles to crossing the frontier are erected as a part of national, state, or local policy; others merely reflect the inevitable difficulties of passing from the jurisdiction of one set of laws and customs to that of another.

Labor is considered, in the short run at least, to be relatively immobile. With deep-set economic and social roots in its community, labor may not move for many years in response to a differential in wages or employment opportunities. Furthermore, interindustry mobility can be restricted by union activity such as the adoption of the closed shop practice.

On the international level, money capital is not always mobile because of the risks involved. Much depends on the type of economy, the prospects and the governmental stability in the area of projected investment. The international flow of capital and enterprise may also be retarded by special laws or taxes in both the lending and the borrowing countries. As far as labor is concerned, the control or outright prohibition of international human immigration has become increasingly prevalent even in some countries formerly regarded as underpopulated.³ With regard to managerial ability, the foreign executive formerly considered himself as being lured from a developed area, with its many attractions and amenities. Some sacrifice was called for, and this has to be compensated by higher financial rewards. On the other hand, foreign management is often regarded with suspicion, distrust, and dislike. Such an attitude is not conducive to the essential mobility of higher executive skills.

Inducements to Mobility of Production Factors

Mobility of factors of production is of great importance to economically depressed areas and underdeveloped regions. The industrial progress and economic growth of these regions may be dependent upon obtaining the needed capital or having certain skills. Increased mobility of capital and labor may result in prompt discovery and exploitation of new uses for the unused or inefficiently used resources of problem areas.

On the other hand, low living standards in an area mark it as an uneconomic location for the number of people it has. The fact that

³Ibid., p. 227.

better employment is available elsewhere shows that some of those people would be not only better off but more useful elsewhere and should move. Emigration then is a sound way to take advantage of the superior productive possibilities of other regions.

Consequently, it is logical in both the United States of America and the United Arab Republic, for example, to inform Southern farmers about Northern job opportunities and at the same time to inform industrialists about new uses for Southern native materials and desirable Southern industrial sites.

The significance of the mobility of production factors has been looked upon seriously by both governmental and private bodies. Several types of inducements have been offered to encourage mobility of such factors.

Capital inducements: Coordination and support of a national credit system and standardization and control of corporate financing procedures remove some of the obstacles to investment in previously underdeveloped and remote areas. Regional and local differences in interest rates have diminished in the United States by the Federal Reserve Banking system and the national systems of insurance of bank deposits and real estate mortgages.

A somewhat similar effect can be ascribed to the publication of a wide variety of marketing and business statistics. The availability of such data makes it possible for private investors to locate less blindly and reduces the locational disadvantage of areas that are relatively unfamiliar.

Promotional activity is practiced by all levels of government and professional organizations and groups to attract private investment.

Tangible assistance to incoming industry usually involves either the provision of relevant information or some sort of subsidy.

Labor inducements: Government's unemployment policies normally aim at establishing an adequate minimum of spending power and at increasing labor mobility between jobs and between areas. For the latter purpose, special organizations have been set up in many countries to bring vacancies to the notice of the unemployed labor; training schemes are developed to promote greater mobility between jobs of different types. Public support of education, particularly vocational education, is an important means of subsidizing labor mobility. When stress is laid on acquainting all persons with a broad range of basic knowledge and useful skills, the barriers of ignorance, inertia, and unadaptability are reduced and more rapid migration responses occur.

Regional mobility can be assisted by financial grants, by the provision of accommodation and cheap land, and by advantageous concessions in the receiving areas. Governments have on many occasions taken a hand in transferring populations to specific locations. Re-settlement projects, in which public authorities assume responsibility for the initial selection and the continued success of a new location, are occasionally maintained.

International inducements: Capital shortage is one of the principal impediments to industrialization in most underdeveloped countries. The inflow of foreign capital serves two purposes: i. e., it provides the means for acquiring local factors for investment in secondary industry, and it provides the exchange for acquiring necessary foreign factors of production, especially the plant and equipment.

Foreign capital is most likely to be attracted by industries in which the underdeveloped country can support at least one factory of a size and efficiency likely to yield a profit not less than that which the foreign manufacturer can earn by exporting to the market in question. Local production is also more advantageous if the end product is bulkier than the materials it is made of. Thus, foreign manufacturing concerns prefer to set up local subsidiaries to assemble such items as automobiles, sewing machines, and tractors. Local manufacturing facilities may be set up merely to come within a tariff wall or to avoid the effects of import controls which bar the finished product but not the necessary machinery and raw materials.

Recognizing the deterrent effect of foreign exchange restrictions, import countries have relaxed the restrictions confined to specific industries deemed to be of particular significance. The free transfer of interest and dividends, even in convertible currencies, is now permitted. Several less developed countries allow the repatriation of capital that has been invested in approved projects. In this connection, great encouragement came through the Mutual Security Act guarantee program, under which the United States as a capital exporter operates a system of government insurance.⁴ Foreign investors can purchase protection against the risks of confiscation, expropriation, and currency inconvertibility. Furthermore, several countries have enacted laws guaranteeing that specific industries will not be nationalized or that in the event of expropriation, just and equitable compensation will be paid.

⁴Processes and Problems of Industrialization in Under-Developed Countries (New York: United Nations Department of Economic and Social Affairs, 1955), p. 87.

Many underdeveloped countries have taken more positive steps to encourage a greater inflow of capital by granting exemption from customs duties on plant and equipment and raw materials or components required by a new foreign industry. Also, by granting exclusive rights for specified periods, or by the remission of certain local taxes, the countries have encouraged the inflow of capital.

Attempts have also been made to encourage foreign investment in secondary industries by publicizing the opportunities available.

Bilateral treaties, such as those of "friendship, commerce and navigation" negotiated by the United States are often designed to accord reciprocal treatment for the investments of either country in the other and thus to stimulate the transfer of capital.⁵

Finally, where basic facilities are particularly inadequate, the government may encourage foreign enterprises by laying out industrial estates serviced by highway and railway, water and power networks, and containing factory buildings which may be leased to overseas manufacturers.

As far as labor mobility is concerned, the degree of warmth with which any foreign enterprise will be welcomed will depend on the arrangements proposed for training and promotion of the native labor. This training function is not confined to in-plant facilities offered by foreign-owned factories with their qualified immigrant staff. Industrial countries have provided similar facilities in many domestic establishments to which trainees from less developed areas have been invited. This could be expanded, both on the private level by industrial

⁵Ibid., p. 88.

firms with branches in less developed countries and on the government level by scholarships or similar grants to selected workers for courses in technical schools and apprenticeship in suitable factories.

Most of the less developed countries have encouraged immigrants to bring with them at least their professional tools and equipment, by remitting custom duties on their entry. Even without tools, it should not be overlooked that each emigrant represents the investment of a substantial amount of capital, equivalent to what it would have cost to bring up and educate a worker of comparable ability and skill in the country of destination.

Emigration laws have been relaxed in some countries to facilitate the entry or naturalization of workers with special qualifications. Employment codes have been amended in other countries to give a larger share in employing the specially qualified foreigners who could not be replaced by local employees.

In many cases, lack of finance is not the basic impediment to the establishment of new industries. More important is the lack of technical knowledge. Consequently, the independent movement of "know-how" which in recent years has become known as "technical assistance," assumes greater importance as the relative magnitude of labor and capital movements declines.

Special organizations have been established in the industrial nations to provide the less developed countries with different types of technical assistance especially in the industrial sphere. An example for these organizations is the U.S. Technical Cooperation Administration which came into being in 1950.⁶ In addition to the official programs,

⁶Ibid., p. 90.

a large number of non-governmental agencies organize, or participate in, technical assistance.

Moreover, there are several organizations which have been operated under the United Nations administration to help the less developed countries financially and technically. Among these organizations are the International Bank for Reconstruction and Development, the International Labor Organization, the United Nations Educational, Scientific and Cultural Organization, and the productivity centers established in some countries.

CHAPTER V

RECENT TENDENCIES IN THE LOCATION OF INDUSTRIES IN THE UNITED STATES

American industry has been on the move; there have been marked changes in the location of particular industries, as well as a significant redistribution of manufacturing as a whole. The rapid technological developments and the fundamental political and social changes of recent decades have had a far reaching influence on the geographical distribution of industry.

Among the important developments that have affected the industrial location are the phenomenal growth of aircraft manufacturing and air transportation, the productivity revolution in agriculture, the shift from coal to oil and natural gas, the increased importance of labor unions, the tremendous growth of government expenditures, the rise of real per capita income, and the decline in emigration.

Table I presents some selected statistics of the economic and social changes which took place during the period from 1929 to 1954.

Extent and Direction of Change of Industrial Location

The extent and direction of redistribution of manufacturing in the United States are discussed in a comprehensive study conducted by Fuchs, and prepared under the auspices of the Committee on Analysis of Economic Census Data which was appointed by the Social Science Research Council in 1956.¹

¹Victor R. Fuchs, Changes in the Location of Manufacturing in the United States Since 1929 (New Haven and London: Yale University Press, 1962).

TABLE I
 SELECTED INDICATORS OF ECONOMIC AND SOCIAL CHANGE: 1929,
 1947, AND 1954

	1929	1947	1954	1954 as index number	
				(1947 = 100)	(1929 = 100)
Population (millions)	122	144	162	112	133
Civilian employment (millions)	47.6	58.0	61.2	106	129
Manufacturing employ- ment (millions)	9.7	14.3	15.7	110	162
Agricultural employ- ment (millions)	10.4	8.3	6.5	78	62
Foreign-born popula- tion, 21 years of age or more (millions)	(1930) 13.3	(1950) 10.1			76
Union membership (millions)	3.4	14.5	16.6	114	488
Population, 55 years and over (millions)	14.8	23.7	28.0	118	189
Price index (1954 = 100)	57.4	83.0	100.0	120	174
Gross national product (\$ billions)	\$104.4	\$234.3	\$363.1	155	348
Federal Government budget expendi- tures (\$ billions)	\$3.1	\$39.0	\$67.8	174	2,187
Value added by manufacture (\$ billions)	\$30.6	\$74.3	\$116.9	157	382

TABLE I (Continued)

	1929	1947	1954	1954 as index number	
				(1947 = 100)	(1929 = 100)
Aircraft and parts (except engines), value added by manufacture (\$ millions)	\$44	\$703	\$4,852	690	11,027
Disposable personal income per capita (\$)	\$682	\$1,180	\$1,582	134	232
Motor vehicle registration (millions)	26.5	37.4	57.9	155	218
Coal production (millions of short tons)	612	689	420	61	69
Petroleum and natural gas production (millions of barrels)	1,062	1,990	2,568	129	242

Source: Victor R. Fuchs, Changes in the Location of Manufacturing in the United States Since 1929, (New Haven: Yale University Press, 1962), p. 3.

From this study it can be seen that the South and the West of the United States grew much more rapidly than the nation as a whole; the North Central region just held its share, and the Northeast showed a comparatively large loss. In 1929, the South and the West together accounted for less than one out of every four manufacturing jobs and for only one-fifth of value added by manufacture. By 1958, their share had increased to one-third, as measured by either variable. The direction of change, since 1947 was substantially the same as in the longer period, but the comparative gains of the West were greater than those of the South. Within the South, most of the gains were in the western part of the region, especially Texas. In the West, the southernmost states grew faster than did the northern, in both the shorter and longer periods.²

Tables II and III show the extent of redistribution of manufacturing by Census division between 1929 and 1954 and between 1947 and 1954.

Factors Influencing Change in the Location of Industry

As the centers of American industry and population continue to move westward, it is increasingly hard to determine whether the growth of industry is drawing the people or whether the westward migration of people is bringing industry in its wake. Certainly the millions of people who have settled in the Southwest and beyond the western ranges have created vast new markets for industry. At times the needs of these areas have so greatly exceeded local supply that they have been heavily dependent upon the industrial East, particularly for manufactured

²Ibid., p. 9.

TABLE II
 VALUE ADDED BY MANUFACTURE, BY DIVISION AND STATE,
 CENSUS BUREAU CLASSIFICATION AND MONOGRAPH INDUSTRIES:
 1929, 1947, AND 1954 (IN MILLIONS OF DOLLARS)*

	Census Bureau classification			Monograph industries		
	1929	1947	1954	1929	1947	1954
U.S. Total	\$31,885	\$74,340	\$116,914	\$30,620	\$72,819	\$112,045
New England	3,239	6,798	9,128	3,152	6,729	8,807
Middle Atlantic	10,175	20,767	30,402	9,825	20,427	29,135
East North Central	9,983	23,474	36,500	9,698	23,014	35,287
West North Central	1,869	4,115	7,113	1,760	3,993	6,566
South Atlantic	2,458	6,941	10,657	2,340	6,812	10,345
East South Central	924	2,884	4,701	866	2,641	4,415
West South Central	950	3,030	5,721	897	2,995	5,470
Mountain	370	783	1,505	334	819	1,423
Pacific	1,922	5,544	11,183	1,743	5,386	10,593
Maine	174	429	565	171	431	554
New Hampshire	147	306	408	145	306	403
Vermont	77	149	222	75	149	201
Massachusetts	1,710	3,356	4,356	1,668	3,339	4,231
Rhode Island	324	658	697	318	653	671
Connecticut	806	1,896	2,877	774	1,847	2,744
New York	4,973	9,655	14,140	4,809	9,529	13,384
New Jersey	1,771	4,186	6,331	1,721	4,088	6,148
Pennsylvania	3,430	6,926	9,930	3,294	6,809	9,602
Ohio	2,889	6,357	10,165	2,830	6,287	9,871
Indiana	1,136	2,969	4,625	1,095	2,887	4,462
Illinois	2,930	6,683	9,668	2,822	6,542	9,396
Michigan	2,067	5,200	8,707	2,026	5,158	8,461
Wisconsin	949	2,263	3,333	923	2,138	3,094
Minnesota	404	1,021	1,594	379	990	1,439
Iowa	323	671	1,235	330	667	1,161
Missouri	777	1,620	2,727	748	1,541	2,491
North Dakota	15	29	34	12	29	33
South Dakota	22	51	77	20	51	74
Nebraska	119	260	394	109	251	342
Kansas	205	461	1,094	189	460	1,023

TABLE II (Continued)

	Census Bureau classification			Monograph industries		
	1929	1947	1954	1929	1947	1954
Delaware	\$ 69	\$ 183	\$ 353	\$ 64	\$ 180	\$ 331
Maryland	422	1,139	1,888	395	1,082	1,791
District of Columbia	52	99	157	47	97	140
Virginia	380	1,050	1,629	353	1,035	1,595
West Virginia	251	663	988	233	662	972
North Carolina	693	1,646	2,210	683	1,600	2,147
South Carolina	159	793	1,040	155	793	1,032
Georgia	294	1,016	1,592	279	1,014	1,574
Florida	135	349	797	126	344	760
Kentucky	236	743	1,236	213	513	1,031
Tennessee	322	961	1,678	304	953	1,626
Alabama	258	877	1,319	245	872	1,297
Mississippi	107	302	465	102	300	460
Arkansas	94	267	457	87	264	429
Louisiana	246	694	1,181	233	680	1,111
Oklahoma	149	341	580	144	339	563
Texas	460	1,727	3,501	432	1,710	3,365
Montana	61	90	141	54	89	133
Idaho	44	109	182	42	108	176
Wyoming	33	34	51	29	34	49
Colorado	122	286	472	112	279	439
New Mexico	11	32	126	8	55	116
Arizona	32	83	192	28	99	178
Utah	56	128	276	52	125	271
Nevada	8	17	62	5	27	58
Washington	367	874	1,549	354	855	1,475
Oregon	206	675	1,037	197	670	1,011
California	1,349	3,994	8,597	1,191	3,860	8,105

* As a result of rapid technological change, there have been numerous revisions of Census industry classifications since 1929. In order to achieve comparability over time, therefore, it has been necessary to create a new industry code, referred to as "monograph industries." The major differences between Census Bureau and Monograph values are attributable to industries excluded from the monograph.

Source: Victor R. Fuchs, Changes in the Location of Manufacturing in the United States Since 1929, (New Haven: Yale University Press, 1962), pp. 5-6.

TABLE III
 TOTAL EMPLOYMENT IN MANUFACTURING, BY DIVISION AND STATE,
 CENSUS BUREAU CLASSIFICATION AND MONOGRAPH INDUSTRIES:
 1929, 1947, AND 1954 (IN HUNDREDS OF EMPLOYEES)

	Census Bureau classification			Monograph industries		
	1929	1947	1954	1929	1947	1954
U.S. Total	101,975	143,022	156,512	96,560	141,188	150,990
New England	12,458	14,751	14,313	12,154	14,587	13,873
Middle Atlantic	30,028	39,538	41,052	28,698	39,111	39,680
East North Central	29,493	43,228	44,598	28,267	42,755	43,363
West North Central	5,671	7,861	9,393	5,072	7,728	8,736
South Atlantic	9,999	15,238	17,453	9,388	14,956	16,943
East South Central	4,169	6,354	7,147	3,813	6,170	6,846
West South Central	3,410	5,507	7,133	3,091	5,469	6,815
Mountain	1,187	1,404	1,874	990	1,394	1,783
Pacific	5,555	9,137	13,544	5,083	9,014	12,948
Maine	767	1,001	1,040	752	1,001	1,023
New Hampshire	712	747	770	703	746	760
Vermont	305	348	358	295	348	332
Massachusetts	6,391	7,180	6,771	6,249	7,129	6,605
Rhode Island	1,401	1,473	1,239	1,384	1,461	1,206
Connecticut	2,880	3,999	4,139	2,770	3,898	3,945
New York	13,313	17,731	18,959	12,763	17,581	18,145
New Jersey	5,165	7,390	7,875	5,043	7,281	7,708
Pennsylvania	11,549	14,416	14,216	10,891	14,248	13,826
Ohio	8,533	11,942	12,675	8,220	11,865	12,329
Indiana	3,598	5,482	5,828	3,405	5,413	5,630
Illinois	8,275	11,861	11,779	7,822	11,714	11,532
Michigan	5,991	9,754	10,016	5,851	9,694	9,781
Wisconsin	3,093	4,186	4,299	2,968	4,068	4,089
Minnesota	1,242	1,815	2,030	1,098	1,764	1,825
Iowa	974	1,403	1,627	853	1,398	1,554
Missouri	2,406	3,271	3,684	2,245	3,202	3,427
North Dakota	50	52	56	35	52	53
South Dakota	78	102	115	68	102	108
Nebraska	347	470	569	295	461	495
Kansas	573	746	1,310	477	746	1,270

TABLE III (Continued)

	Census Bureau classification			Monograph industries		
	1929	1947	1954	1929	1947	1954
Delaware	\$ 265	\$ 347	\$ 394	\$ 242	\$ 343	\$ 365
Maryland	1,509	2,286	2,531	1,409	2,232	2,406
District of Columbia	140	178	203	123	175	182
Virginia	1,315	2,165	2,397	1,164	2,101	2,319
West Virginia	935	1,273	1,185	826	1,272	1,161
North Carolina	2,264	3,814	4,300	2,209	3,673	4,163
South Carolina	1,138	1,887	2,194	1,116	1,881	2,180
Georgia	1,717	2,499	3,012	1,625	2,495	2,980
Florida	713	786	1,233	670	779	1,182
Kentucky	885	1,295	1,464	747	1,138	1,296
Tennessee	1,420	2,223	2,605	1,313	2,207	2,514
Alabama	1,300	2,062	2,170	1,215	2,057	2,138
Mississippi	562	773	906	536	766	895
Arkansas	487	658	783	440	652	738
Louisiana	975	1,324	1,447	915	1,309	1,366
Oklahoma	386	554	798	358	552	773
Texas	1,561	2,970	4,103	1,376	2,953	3,936
Montana	171	185	183	133	157	175
Idaho	170	169	237	158	168	229
Wyoming	71	56	62	47	54	58
Colorado	391	540	630	338	531	595
New Mexico	50	66	149	33	75	136
Arizona	122	141	260	104	138	247
Utah	185	245	293	162	241	286
Nevada	25	26	57	12	26	53
Washington	1,287	1,442	1,923	1,222	1,425	1,841
Oregon	738	1,055	1,343	700	1,052	1,309
California	3,529	6,638	10,277	3,160	6,536	9,797

Source: Victor R. Fuchs, Changes in the Location of Manufacturing in the United States Since 1929, (New Haven: Yale University Press, 1962), pp. 7-8.

goods. Yet at other times, the growth of western industry has outstripped the population and created labor shortages, thus stimulating further migration.³

The most important factors influencing the recent locational trends appear to have been climate, labor, availability of raw materials, developed transportation, national security, and decentralization.

Climate: Climate, to be sure, has not changed. What has changed is the technology and importance of aircraft manufacturing, average life expectancy, average income, and the importance of military payrolls as a source of personal income. Climate has been very important in the growth of aircraft manufacturing and subsidiary industries in California and the Southwest. It also has played a role in the location of military establishments and the shifts in population. These developments have encouraged the growth of local market-oriented industries in several southern and western states, especially Florida and Colorado.

Labor: Regional differentials in supplies of unskilled labor have been important for the low-wage, labor-intensive industries such as textiles and apparel, which have tended to shift from the Northeast and East North Central to the South Atlantic and East South Central. Furniture, footwear, and some high-wage industries such as tires and tubes also have shown a pattern of locational change oriented to labor.⁴

Among the reasons that have been given for locating new plants in rural areas are the availability of a ready supply of untrained labor.

³Malcolm C. Neuhoff, Trends in Industrial Location, Studies in Business Policy, No. 59, National Industrial Conference Board, Inc., New York, 1952, p. 3.

⁴Fuchs, op. cit., p. 28.

It is advantageous to take untrained workers and teach them the required skills from the beginning. Moreover, the overconcentration of plants in large industrial areas results in great hardships to the workers in times of depression and curtailment.

In general, the state differences in extent of unionization are more significant than are differentials in wage levels in drawing industry to certain regions. This is especially true where minimum wage laws and the rise in wages in formerly low-wage areas tend to equalize rates throughout the country.⁵ It is felt by some managers that more cooperative and productive labor-management relationships will prevail when workers are less organized.

Raw materials: The attraction of raw materials has been evident in the growth of the chemical industry on the Gulf Coast, the shift of lumbering to Oregon and northern California, the redistribution of pulp and paper mills from the Northeast to the South Atlantic. Industries whose redistributions were partly influenced by natural resources include furniture, cigarettes and cigars, and some of the paper industries such as paper bags.⁶

However, the pull of raw materials has continually diminished relative to the locational attractions of labor and markets. The number of manufacturers who directly process basic raw materials is decreasing. Most industrial firms purchase partially processed materials. In other industries, technical improvements, and substitute

⁵Neuhoff, op. cit., p. 9.

⁶Fuchs, op. cit., p. 258.

or synthetic materials reduce the former locational pulls of raw material sources. An example of this is the steel industry which has traditionally located close to the coal fields, since it uses coal in large quantities. As new processes have been developed for basic steel refining which eliminate the need for coal, this change in raw material demand could lead to a complete relocation of the steel industry.⁷ Furthermore, the vast nationwide transportation network, the decentralization process of all industry, and competitive sales equalization practices have made it more feasible for manufacturers to widen the gap between their own producing plants and the actual raw material source.⁸

Transportation: Modern techniques of transportation are significant in removing some of the previously important limitations upon the selection of industrial sites.

Water transportation has been the least costly form of transportation. Thus the St. Lawrence Seaway, which has produced major changes in the pattern of industrial location by strengthening the competitive position of the metropolitan areas on and near the Great Lakes, is an extension into the interior of the continent of the North Atlantic water route. The trend toward inland penetration of waterborne commerce has been augmented by the increase in the barge traffic of the Mississippi River system, the development of new ports, connected with the sea by artificial channels or canalized rivers, such as Houston, Albany, and Stockton.⁹ All of this has been accompanied by important

⁷James Moore, op. cit., p. 40.

⁸Yaseen, op. cit., p. 22.

⁹Harold M. Mayer, "Some Current Trends Affecting the Value of Industrial Property," The Appraisal Journal, Vol. XXVI, No. 1, January, 1958, p. 89.

new concentrations of industries which otherwise would have located closer to the seacoasts. Improved techniques of water transportation are further lowering the costs, and hence widening the accessibility of interior as well as of coastal locations and creating new values for industrial locations.

With regard to railways, many innovations have been introduced to help create new industrial locations and facilitate accessibility to both sources of raw materials and markets. Diesels and roller-bearing freight equipment have placed through freight trains on passenger schedules. Special equipment is being provided to reduce damage and to speed the handling of freight. Shipper loading rules have been liberalized to permit greater flexibility.

Despite efforts of the railroads to attract new traffic, an increasing number of plants are being constructed without access to rail lines, because truck service has been growing and improving, thus extending the number of places which can qualify as plant locations and increasing the choice open to manufacturers. Furthermore, as decentralization continues, more industries will rely on highway transportation. Highways have followed the shift of freight business.

As new air routes are extended and as the feeder lines gain in number and importance, locations which were once thought to be relatively remote because of the time involved in surface transportation have been seriously considered for plant sites. Companies will use air freight not just for rush shipments but as a regular and normal method of shipping goods.

National security: National security considerations first brought the matter of industrial location and dispersal to the fore in

1946.¹⁰ Since then, complete programs have been worked out on industrial and community bases with various incentives offered. But production and cost factors have been almost always given precedence over national security considerations, with the exception of defense production plants which have considered national security and dispersion as an important factor in much of their expansion programs.

Although national security has had little effect upon the location of industry in the past, it will be of major influence in the future, for new installations more so than for expansions of old establishments.

Decentralization: Decentralized industries are primarily responsible for current plant location trends. These industries have decentralized for a variety of reasons. Some have followed deliberate policies of locating their activities in various parts of the country because of a desire to improve certain aspects of the business. For example, many companies decentralize to take advantage of improved transportation or labor situations in certain localities.

Other companies decentralize because of the nature of their products. In this category would come producers of items that must be manufactured near the market because of service considerations, or that must be made at the source of raw materials because of the cost of moving such items as wood, iron ore, and other heavy resources.

A third group of companies decentralize because of a lack of suitable manufacturing facilities at existing plant sites. To overcome this shortage, and to acquire such intangibles as "good will" and "know

¹⁰Maurice Fulton, "Plant Location--1965," Harvard Business Review Vol. 33, No. 2, March-April, 1955, p. 49.

how," many companies purchase the facilities, and often the names, of other industrial organizations.

In recent years, a new motive for decentralizing plants has resulted from a recognition of the clumsiness of the gigantic plants so characteristic of the mass-production industries. A large plant frequently becomes difficult to manage and a victim of inertia. There are also the difficulties of providing the tremendous supply of personnel necessary, as well as the internal material handling, servicing, and maintenance problems of a large plant. Scattered small plants are easier to manage than one extremely large plant. Moreover, advantages can be realized through emphasizing the general principle of diversification of risks. Production would not be completely tied up by a fire or other contingencies at any one point.

Still other factors are behind the recent increase in the number of decentralized companies. The rise in freight rates has led to the building of plants closer to markets, and the desire for improved labor relations has drawn industry to areas where better labor conditions may prevail.

Other factors: The attraction of fuel and power as factors of industrial location has been decreasing. Natural gas and oil are gaining in popularity over coal. As their distribution is being extended to many areas, other factors are becoming more important considerations in selecting a site. Moreover, as new atomic power plants are developed, free of reliance on local fuel or water resources, they are capable of location anywhere.

However, atomic energy development is unlikely to produce radical locational changes. It can lower electricity costs in areas where they are high but probably cannot compete economically with the best hydroelectric sites. The lowest cost atomic power is likely to be available only in areas of fairly concentrated demand, and its location and development may be primarily dictated by strategic and political considerations.¹¹

In contrast to the future of fuel and power development, which promises greater freedom of location, water problems threaten increasing restrictions. The causes of the growing water shortage may be the growth of population, the increasing living standards, the continued industrial expansion, and the popular use of air conditioning. When other locational criteria dictate a site in which the water condition is not attractive, the concerned industry may be forced to reach out across the miles for water or to apply unusual techniques such as the use of distilled sea water. These solutions are very costly and they would hamper the competitive position of such industry.

Since one of the most compelling water problems is that of pollution, an increasing number of states has enacted laws for waste control. These laws have tended to give a preference to states where the law is enforced more laxly by industries whose waste control is not an easy problem.

Local Tendencies in the Location of Industries

On the local level, the current and prospective trends in industrial location seem to be leading to an increased concentration on the

¹¹Hoover, The Location of Economic Activity, p. 185.

fringes of the medium sized metropolitan areas. Many of these areas are coalescing to form continuous urban agglomerations with a continued growth of industrialization. A more rapid growth of service establishments and occupations has been taking place in the largest metropolitan areas.

The nature of the community, its amenities, its local government, and its planning and zoning, have become more critical factors than ever before in dictating the location of industries. Planned industrial centers and growing competition for industry have been other features of recent tendencies in plant location.

The community: Many industries are giving serious consideration to smaller communities as they are locating their plants away from the cities and in the suburbs or small towns instead. These areas now offer practically all the advantages, facilities, and services supplied by cities, at much lower cost and tax rates. Larger land areas are available for parking, off-street loading and unloading facilities, and future expansion. Employers are finding that in a moderate-size community, with less big city distractions and with less time and effort spent traveling to and from work, the employees are likely to be happier in their work and therefore more productive.

Community character is a new factor to consider since today's management is taking a deeper interest in the social and cultural background of the people who may be employed in the plant and whether they possess the ability to grow in terms of added responsibility. This is especially important since job requirements are becoming more complex. For example, today a good supervisor not only must be a good mechanic but must comprehend shop budgets, cost accounting systems, material control

systems, computer procedures, job evaluation procedures, and many other skills.¹²

Industrial centers: There is a swing toward planned industrial centers known as industrial parks.¹³ Each center accommodates a group of manufacturing and distributing plants in a given area. These centers have been growing rapidly because of the cost sharing, construction, and financing advantages provided by their developers.

Competition for industry: There is a growing competition among states, municipalities, and community organizations for attracting industry to their areas. Many varieties of inducements are being extended to attain business volume and jobs brought by industry to the area in which it locates. While many plant relocations have been based primarily on the attractiveness of such offers, there is increasing recognition among management to consider well all factors pertaining to a new site before being attracted by features of only temporary significance or less real value.

¹²Fulton, op. cit., p. 41.

¹³Lawrence L. Bethel, Franklin S. Atwater, George H. E. Smith, and Harvey A. Stackman, Jr., Essentials of Industrial Management (New York: McGraw-Hill Book Company, Inc., 1959), p. 103.

CHAPTER VI

FACTORS OF LOCATION AS APPLIED TO THE EGYPTIAN INDUSTRIES

The placement of industries of the United Arab Republic have been influenced by many factors. Some industries have changed their sites while others are still in their old positions, although the original reasons of attraction no longer exist. At the same time, it is difficult to determine a specific factor or a group of factors that have affected the geographical distribution of these industries. Although economic principles are considered to have had a major influence on the locational decision, other factors have also exerted some power in directing the industrial plants to certain areas. Factors which have been important in the locational distribution of industries in the United Arab Republic are treated in this chapter in three sections. These include historical factors, topographical factors, and economic factors.

HISTORICAL FACTORS

The recent developments in site selection have been based, to a certain extent, on principles used in the past. Consequently, the analysis of the forces behind such selection should consider the historical factors which affected most of the industrial enterprises, especially the small ones, in their locational decisions.¹

¹ Gamal M. Said, "Newer Aspects of Location in Egypt," Egypte Contemporaine, XLIV, No. 271 (Jan., 1953), p. 9.

Old Industrial Centers

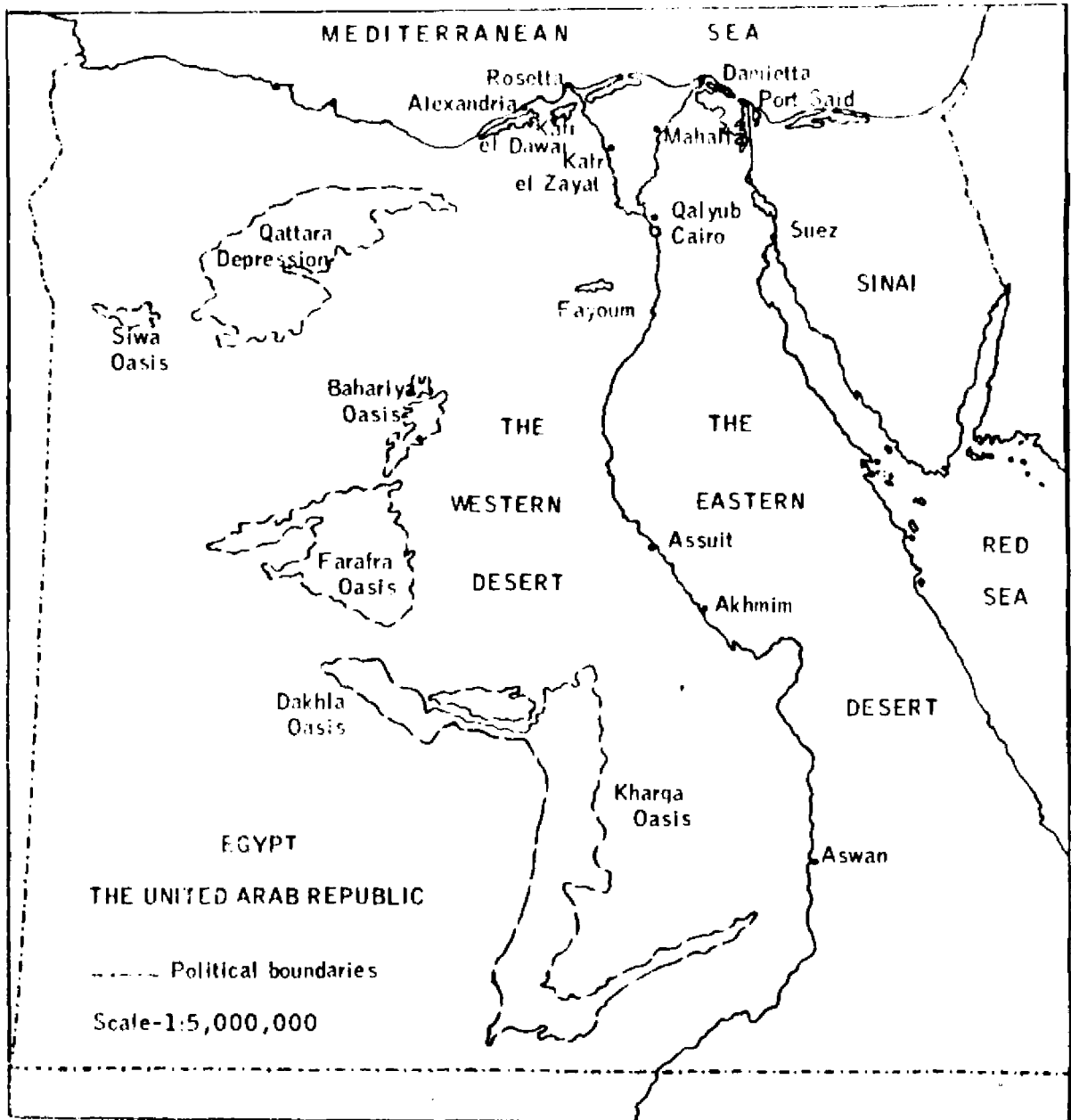
The percentage of persons engaged in manufacturing to the total population was higher in the ancient cities than in the modern ones.² This relationship, which has continued to exist over the years, shows that new production activities are drawn toward the old industrial centers of the country and emphasizes the importance of the historical factors in determining the selection of the production site. It should be recognized that what is called an historical factor today was not historic at the time when industry started, and that some other factors were the real forces pulling manufacturing where it was originally established. Those factors could either be working until now, or their importance may have ceased to exist, but the advantages gained by the industry in a certain locale may have kept it from moving to another place. The location of some of the old industrial centers is shown in Figure 3, and the factors that led to their establishment are briefly discussed in the following section.

Damietta: Damietta possessed the most important sea port in the United Arab Republic until the end of the last century. During that time, the largest volume of the country's foreign trade was passing through it.³ Wood and silk fibers were imported from Turkey, Syria, and Lebanon, and processed leather was exported to many different nations abroad. These goods were used as raw materials for furniture, boat

²Aida Bechara, Industrial Location in the Egyptian Region (Cairo: Dar el Nahda el Arabia, 1962), p. 38.

³Gamal E. El Shayal, Political and Economic History of Damietta (Cairo: Dar el Fikr el Araby, 1949), p. 66.

FIGURE 3
 OLD INDUSTRIAL CENTERS IN EGYPT



Source: Based on map in: Eva Garzouzi, Old Ills and New Remedies in Egypt (Cairo: Dar el Maaref, 1958), p. 9.

building, weaving, and leather industries which were established in Damietta. Although these products are today brought from several areas inside the country, such as Cairo and Alexandria, Damietta's manufacturing is still flourishing and new enterprises are drawn to the city because of its skilled labor supply, its industrial atmosphere, and its well deserved reputation as a good market.

Mahalla el Kubra: Because of its central position in the Nile Delta, a large supply of labor, and a high degree of humidity, Mahalla el Kubra has the advantages of being the largest center of spinning and weaving industries in the nation. It provides textile factories around the country with their material requirements, and exports its products to many of the world markets. Complementary manufacturing and utilities enterprises which were established to serve the main industry added another impetus to various business concerns locating in the same area.

Qalyub: Another important industrial center is Qalyub. Most of its industries such as cotton weaving, candy processing, and copper hardware works are operated manually. The city has enjoyed several eras of industrial success, especially during the era when imports were interrupted during World War II. Because of its nearness to Cairo, Qalyub is not only a source of raw materials but also an extended market. Moreover, the availability of good river, road, and rail transportation is an advantageous factor for manufacturing. However, Qalyub's production started to decline by the end of the Second World War because of the increased mechanization of industry in other parts of the country.

Assuit: Another center of industry was located at Assuit, which is located on the old highway connecting the United Arab Republic and the Sudan. It was through here that the goods traded between the two

countries moved. Many of the imported raw materials were processed in Assuit and sent back as finished goods to the Sudan. Among these were furniture; woolen carpets, blankets, and textiles; swords; ceramics; cosmetics; and wooden manufactures ornamented with ivory.

The construction of railways has facilitated the availability of raw materials in several places in the country, depriving Assuit of one of its important advantages. Consequently, some industries have migrated from the city to other centers. For example, the making of ivory products is concentrated today in Khan el Khalili and it is the most visited place by tourists who used to buy these commodities. Other activities like the manufacturing of wooden and woolen goods are still developing in Assuit not because of the availability of raw materials, but due to the skill and experience gained by its workers.

Akhmim: Two factors initiated the industrial endeavor in the city of Akhmim. These were its position on the River Nile, the most important waterway in the country, and its high degree of humidity, which suits the weaving industry. Since manufacturing in Akhmim is of the manual type, its future is not certain.

Founders' Residence

Most of Egypt's industrial enterprises, especially those located outside Cairo and Alexandria, are small-size establishments organized by individual entrepreneurs near their place of residence. The reasons for locating these include the convenience of the locations and the importance of the personal relations between the businessman and customers in the success of his business. This latter factor is not felt greatly by bigger establishments such as the corporations which are not affected by the founders' residence in their location.

Since small businesses are usually inherited by successors, they tend to remain in the same location longer than the life span of their founders. This is the reason that many manual industries and crafts are still scattered in the rural areas until today.

Urban Attraction

Many industries, especially those financed by foreign businessmen, were influenced by the attraction of urban areas in their locational decisions. In addition to the availability of public utilities, service establishments, entertainment houses, and social organizations, the foreign investor prefers the atmosphere of large cities such as Cairo, Alexandria, and Port Said.⁴

Today, Egyptian industrialists are trying to overcome the urban pull by situating their plants in rural areas. They then provide their workers and employees with modern life requirements through the construction of private houses, schools, and entertainment facilities. One of the factors motivating them is the belief that rural areas can be converted into successful industrial centers and that industrial development is not dependent upon the foreigners who previously inhabited the cities.

TOPOGRAPHICAL FACTORS

Land surface and soil, humidity and climate, water supply, and drainage facilities are significant topographical factors in directing industrialists in their site selection.

⁴Abdel G. Younis, Industrial Location--Comparative Study (Alexandria: Alexandria University Press, 1961), p. 7.

Land Surface

According to topographical bases, the United Arab Republic can be divided into two broad regions: the Nile Valley and Delta, and the desert. Fertile soil is limited to the first region, which constitutes only 3 per cent of the total area; the remaining majority of 97 per cent of Egypt's surface is desert.⁵ Consequently, the nation's people have been concentrated in the Nile Valley and Delta, supported by an intensive type of agriculture which constituted the main economic activity in the country, while industry was considered as a subsidiary endeavor. Furthermore, manufacturing was restricted to the Nile Basin since it is easier to construct roads, railways, and water arteries required for industry on a flat surface rather than in a mountainous area or in a remote desert.

The desert region contains three areas: the Western Desert, the Eastern Desert, and the Sinai Peninsula. It is inhabited by a scattered population which depends on sheep herding and cultivation in the oases and strips of arable land. Also, some few people are engaged in mining in the Sinai Peninsula and along the Red Sea coast.⁶

Climatic Conditions

The importance of climate in the locational decision is derived from its effect on certain industrial processes and its influence on human efficiency and behavior.⁷ For example, humidity is higher in the

⁵Information Department, Aswan--Then and Now, Cairo, UAR, 1963, p. 7.

⁶See Figure 3 above, p. 89.

⁷James Moore, op. cit., p. 44.

central part of the Nile Delta than in both the North Coast and Upper Egypt. Consequently, the weaving industry, which is one of the biggest industrial activities, has been greatly influenced by this factor in the selection of its sites. Also, most of the manufacturing establishments are largely restricted to the northern part of the country where the weather is relatively good throughout the year. Although these difficulties can be overcome, especially in the newly-constructed plants, by the use of modern equipment such as humidifiers and air conditioners, the cost may be burdensome.

Water Supply

Since most of the industrial activity is placed in the Nile Basin where water is sufficiently available, the influence of this factor has not been decisive in site selection. However, water supply and kind would be seriously considered with the planned industrialization of many areas of the country.

According to their need of water, industries can be divided into two categories: those which consume little or no water, such as furniture manufacturing, cotton ginning, and repair and maintenance establishments; and those which use large amounts of water, especially for cooling processes. The second group can be divided, in turn, into two classifications: big-size businesses and medium- or small-size enterprises. The first group depends on underground water economically raised by privately owned stations. Included in this classification are spinning and weaving; textile bleaching, dyeing, and printing; soap manufacturing; cement; and food industries. Some of the industrial plants which

are located near the Nile, or close to its canals, depend on it for their water supply, after purification, if necessary.

The medium- or small-size enterprises often find it more economical to use water supplied by the regular public utilities, otherwise, they have to pump their own water from underground sources.

Drainage Facilities

Although waste disposal is a growing problem in every industrial country, it has not yet been seriously felt by Egyptian manufacturers, because there are many drainage facilities available for most industries. For example, leather tanning is mainly found in the El-Mex area in Alexandria where it makes use of the Mediterranean Sea for this purpose; the fertilizer industry located in Kafr el Zayat dumps its waste, after the application of neutralizing processes, into the River Nile; and some other production activities utilize the public sewage system, when possible. But when the country reaches a higher stage of industrial development, waste disposal in the streams, or piling on the land within the cities, would be prevented by the authorities, and this factor could be more effective in determining the place of manufacturing.

ECONOMIC FACTORS

Economic factors are the most significant ones affecting the position of the Egyptian industries. They are so many and diverse that it is not easy to say which individual factor, or group of factors, has the main influence in directing the manufacturing activity toward its site. Moreover, the economic factors are so interrelated that they exert a compound effect and it is almost impossible to determine the

relative importance of each of them in the locational decision. However, it can be seen in the following pages that many of the industrial plants are raw materials oriented in their placement. Economical factors are discussed here under the subheadings: raw materials, the market, transportation facilities, the labor force, the availability of capital, managerial ability, energy sources, and industrial concentration.

Raw Materials

The value of raw materials used in manufacturing in the United Arab Republic constitutes the highest percentage in total cost of production relative to the other elements, such as labor, power and fuel, and overhead cost.⁸ Although detailed figures may not be available since transportation expenses are included in the value of raw materials, this would not change the real situation because most factories are situated near the sources of raw materials. However, transfer costs affect industries differently, depending on the number of items used in production in each of them. The larger the number of these materials, the less is the importance of the transportation factor. On the other hand, the more sources of raw materials there are, the lower is the significance of each of them in determining the industrial location. In addition to transfer cost, several other elements have to be considered in evaluating the available source of raw material. These are the continuity, certainty, and accuracy of delivery; and the efficiency and security of the transportation media. Also, purchase price does not have to be gradually increased with the increase in the demand for the

⁸Bechara, op. cit., p. 83.

raw material, otherwise, the advantage of proximity to its source would be nullified. Furthermore, one of the known practices is for the industrialist to overlook a nearby source of material and instead procure the goods from another place because of his personal relationship with the supplier or the transportation agents.

Industrial locations influenced by raw materials: Materials supply performs varied roles in identifying the site of processing according to the type of manufacturing; its pull may be strong for some industries, while it can be overlooked by others.

Extractive industries, for example, are tied up to the area of cultivation, forestry, mining, and petroleum wells. While agriculture is the major activity in the Nile Valley and Delta due to their soil fertility and irrigation facilities, forestry does not take place in Egypt because of the lack of woods. Mining and crude petroleum production for the years 1952, 1955, 1958, 1961, and 1962 are shown in Table IV. Phosphates are extracted, concentrated and filtered near Safaga at Um El-Howatat, Al-Higab, and Al-Gasos.⁹ Large quantities are exported either in the form of rocks or crushed ore. Manganese is exploited at Gabal Um Bagma, 90 miles southeast of Suez, and exported from Abou Zeneima, a port on the Red Sea.¹⁰ The extraction of zinc and lead is taking place in three mines at Um Gheig, Abu Anaz, and Sawg El Bohar; the exploitation of iron oxides occurs at Um Greifat; all are located near El-Kosseir.¹¹ Black sands are collected from the Delta

⁹The Economic Development Organization, Dar el Hana Press, Cairo, UAR, 1960, p. 40.

¹⁰Ibid., p. 39.

¹¹Ibid., p. 42.

TABLE IV
 MINING AND CRUDE PETROLEUM PRODUCTION IN THE
 UNITED ARAB REPUBLIC, IN TONS

Item	1962	1955	1958	1961	1962
Phosphate	478000	626000	558000	627000	562000
Manganese	209000	220000	112000	278000	151000
Iron Ore	--	--	178000	422000	459000
Salt, "Common"	498000	402000	403000	517000	337000
Zinc	4057	1798	1579	200	35
Lead	55	479	394	129	130
Natron	--	2640	5570	3190	5272
Kaolin	--	2694	9111	27180	13777
Black Sand	7130	7190	12381	45227	83916
Iron Oxides	173	585	1096	690	183
Sulphur	--	--	7241	2700	2072
Talc	4903	6002	6580	5956	6779
Clay (diatom)	700	200	360	301	--
Bayarit	10	61	2070	1573	1025
Asbestos	60	--	440	230	398
Mayca and Fermacolite	--	--	274	77	234
Chromium	--	--	--	1390	--
Lead and Zinc Alloys	--	--	--	1467	1944
Almanite and Titanium	--	--	--	--	24409
Gold*	15375	6526	1812	931	--
Crude Petroleum**	2613000	2006000	3473000	3814000	5138000

*In ounces

**Cubic meters

Source: Administration of Public Mobilization, Statistical Pocket Book--1952-1962, Cairo, UAR, April, 1963, pp. 33, 34.

shores and their various alloys are separated in a factory at Alexandria.¹² These are vital products in the production of steel, chemicals, and atomic power. Almanite has been extracted only since 1962 from its mines at Aby Ghalka at a distance of about 440 miles south of Suez.¹³ Other minerals have been discovered in scattered areas in the Eastern and Western deserts, as well as at Sinai. Petroleum wells have been dug and pumping operations are taking place at Asal, Sudre, Matamer, Firan, Balaim Barri, Abu-Redis, Sudry, and Akma in Sinai Peninsula; Ras-Gharib, Bakr, Karim, and Ghardaka on the Red Sea Coast; and Balaim Bahari on the Suez Gulf. Crude oil is transferred by tankers to refineries in Suez and Alexandria where a system of pipelines was built to transport the refined products to several industrial regions.¹⁴

Chemical industries also are greatly affected in their location by the source of raw material. The manufacture of fertilizers is carried on near the Suez petroleum refineries which supply the acids and gases required for this industry,¹⁵ and in Aswan to use the phosphate deposits of this area.¹⁶ The cement produced in Helwan depends on the blast furnace slag from the iron and steel industry found there,¹⁷ and paper

¹²Ibid., p. 44.

¹³Ibid., p. 42.

¹⁴Information Department, Industry in the United Arab Republic, Cairo, UAR, 1963, p. 5.

¹⁵The General Organization for the Industrial Five-Year Plan, Annual Report-1958/1959 (Cairo: Government Printing Office, 1960), p. 523.

¹⁶Information Department, Industry in the United Arab Republic, p. 8.

¹⁷The Economic Development Organization, p. 46.

and cardboard mills were established in Suez, Edfu, and Alexandria where seven different raw materials are used in their production. These are rice husks, bagasse (sugar cane waste), wheat and barley husks, papyrus reeds, maize stalks, cotton, wood, and rags.¹⁸ Insecticides, such as D.D.T., benzene hexachloride, and toxaphene are produced in Kafr el Zayat and Alexandria to utilize the chlorine resulting from the caustic soda industry which was originally located there because of the availability of large supplies of salt.¹⁹

Food industries are distributed in several places according to the presence of raw materials. Sugar cane cultivation is concentrated in Upper Egypt owing to the suitability of its warm climate. Consequently, production of sugar and related products such as alcohol, vinegar, carbon-dioxide gas, and perfumes is localized at Edfu, Armant, Kom Umbo, Nagga Hamadi, and Abu-Korkes.²⁰ The abundant supply of all varieties of fresh fruits and vegetables provides the essentials for the processed food industry situated in Qaha and Edfina.²¹ Sardine and shrimp preserving and freezing factories are positioned at El-Burg in Damietta, and in Port Said and Alexandria as coastal cities,²² dairy industries are found in Mansoura and Tanta which are considered to be

¹⁸Information Department, Industry in the United Arab Republic, pp. 9, 10.

¹⁹Industry after the Revolution and the Five Year Plan, Middle East Publications, Cairo, UAR, 1960, p. 209.

²⁰The Economic Development Organization, p. 70.

²¹Information Department, Industry in the United Arab Republic, p. 11.

²²The General Organization for the Industrial Five-Year Plan, op. cit., pp. 388, 400.

accumulation centers of milk,²³ onion is dehydrated in Souhag which has the largest cultivated area of this crop,²⁴ and oil is extracted from cotton seeds in Kafr el-Zayat where the cotton ginning industry was placed close to large cotton cultivated areas.²⁵

Industries depending on imported materials such as specific kinds of lumber, paper, fibers, and chemicals are sited in Alexandria, which possesses the largest seaport in the country.

The Market

Proximity to markets is one of the important factors affecting the placing of manufacturing establishments in Egypt. It has been a usual practice for the industry to be stationed near its market in the absence of any other factor having a direct influence on the selection of its site. Moreover, consumer goods production is affected more than the production of other commodities by the market as a factor of location. Usually, the unit price is highly competitive and the profit is so low that it cannot support any additional cost to cover transfer expenses. At the same time, trade in small consumer goods frequently requires the rapid delivery of relatively small consignments, which is most economically carried out by motor vehicles direct from manufacturer to retailer. While the market for some products is localized to a certain extent (for example, the printing industry and trade in high-class clothing are highly concentrated in large cities especially Cairo

²³Ibid., pp. 372, 374.

²⁴Ibid., p. 379.

²⁵Ibid., p. 505.

and Alexandria) the majority of the products of manufacturing are sold all over the country. A factory cannot, therefore, be placed near all its markets, and could either find the point of minimum transportation costs for its particular group of markets, or could go to the place where the most significant market was situated. In the first case, it might not in practice be conveniently located near any one of its markets, and would thus lose such advantages as ready access for service. In the second case, it would have these advantages, in connection with its main market, at the risk of perhaps slightly increased transfer expenses to its others. The consumer may be another manufacturer, for instance, the plastic moulding industry is the user of moulding compounds, and quick deliveries are required, while in many cases a certain degree of technical cooperation is also necessary between user and producer.

Furthermore, members of the public have grown to expect guarantees and free service after purchase; and if a manufacturer is to satisfy the buyer and at the same time operate economically, he must either place his works close to the principal market, or establish a service store there. The cost of these after-sale services and, indeed, of the whole sales organization including money spent on advertising, constitutes a large proportion of the processor's total expenses, with the result that the importance of the market as a locating factor has been correspondingly increased.

In all such cases, the significant consideration is to reduce to a minimum the combined cost of production and marketing. This is evidence that the existing public transportation facilities must play a large part in deciding the location in respect of markets. Accurate,

direct services from the plant to all the principal markets are obviously an advantage, and it is quite likely that the possession of a direct railway route to almost everywhere in the country is one of the reasons for the industrial development of Cairo in addition to its extended market.

Large cities are considered to be centers of the main markets in Egypt owing to the great number of their population who enjoy a high purchasing power relative to those who live in other parts of the country. Studies revealed a high degree of correlation between cities as purchasing centers and the establishment of different industries.²⁶ This may go back to the preliminary stage of industrial development when the construction of most of these industries was financed by the accumulated profits of merchants who normally select large cities as the place for their business and their residence.

Another reason for the significance of the market in attracting industries to its area is the personal relations between the manufacturer and his customers. These relations are looked upon as a dominant factor in locating small- and medium-size industries which cannot support the operations of an efficient marketing organization or a well planned advertising strategy. Moreover, the personal element is gaining preference with the passage of time, in the locational decision of small businesses who try to meet the increased competition of big businesses by direct and good relations with customers. The success of small weaving establishments in Cairo until today, for example, has

²⁶Bechara, op. cit., p. 141.

depended upon their personal relations with wholesalers in the textile market of the ancient district of Al-Azhar.

Industrial locations influenced by the market: The consumer market is the most critical factor in the locational decision of the market-oriented food processors who have to maintain quick and frequent distribution of their products to consumers. Pasteurized milk production plants, bakeries, soft drink bottlers, candy factories, and ice plants are situated in almost every city. Tanta and Mansoura, for example, were selected for the establishment of the new dairy industry since both are regarded as distribution centers to many parts of the country.²⁷ Tobacco and cigarette manufacturing is concentrated mainly in Giza, Alexandria, and Tanta, which represent the largest centers for marketing these products.²⁸ The factory that was built at El Hawamdiya for sugar refining was more affected by proximity to markets in the northern part of the country than by nearness to raw materials in Upper Egypt.²⁹

Among the pharmaceutical and chemical industries, there are those who were directed by the market in the selection of their sites, such as the pharmaceutical plants in Abu Zaabal and Cairo; cosmetics and printing ink factories in Cairo; paints, varnishes, and lacquers factories in Materia and Kubbeh; stationary, printing paper, and

²⁷The General Organization for the Industrial Five-Year Plan, op. cit., pp. 372, 374.

²⁸U.A.R. Government, 12 Years of Industrial Development (Cairo: Government Printing Office, 1964), p. 283.

²⁹Gamal M. Said, Economies of Egypt (Cairo, 1950), pp. 14, 15.

corrugated cardboard mills in Alexandria; and chinaware and stoneware plants in Mostorod.³⁰

Since olden days, small textile factories have been scattered in many districts in Cairo, Helwan, Alexandria, Mahalla el Kubra, and Qalyub, producing various kinds of fabrics to satisfy local markets. Making of fishing nets and heavy fabrics from linen and cotton has taken place in Port Said where fishermen and sailors are mostly found.³¹

Many of the metallic and engineering industries take into consideration the position of the markets which they have to serve before erecting their plants. These include the electronic industry, which produces radio and television sets, dispatching and receiving apparatus, record players, air-conditioners, and refrigerators, in Amiria, Almaza, Giza, and El Nuzha;³² the manufacturing of automobiles, car accessories, spare parts, and batteries in Giza, Helwan, and Cairo;³³ and building materials processing in Mostorod.³⁴

Although the founding of ship yards and floating docks in Alexandria and Port Said may be justified on the ground of their natural factors as they possess seaports, it can also be looked upon as market oriented since they perform repair and maintenance services

³⁰U.A.R. Government, 12 Years of Industrial Development, pp. 335, 336.

³¹Ibid., p. 333.

³²Ibid., pp. 329, 330.

³³Ibid., p. 328.

³⁴The General Organization for the Industrial Five-Year Plan, op. cit., p. 753.

to passing ships and tankers.³⁵ Also, export industries such as cotton pressing and packing, and rice beating are mainly located in Alexandria to save inland transportation in the way to their markets abroad.³⁶

Transportation Facilities

Transportation facilities have had an undeniable role in locating the Egyptian industries since the beginning of industrial activity, because the accessibility of the site for rail, road, or water ways has obviously increased its suitability for manufacturing. This can be seen not only from the emergence of Assuit, in the past, as a production center due to its position on the old road between Egypt and the Sudan,³⁷ but also from the industrial progress that has taken place in Cairo and Alexandria more than in any other city in the country. The first is considered to be a river port on the Nile; and the second possesses a large seaport on the Mediterranean Sea, and it is also connected with the Nile by El Mahmoudia Canal, which is suitable for navigation. Moreover, both Cairo and Alexandria have direct access by railways and roads to most areas of the country.

The pressure exerted by transfer media in directing the industrial location is felt differently by various businesses according to their size. As far as the handicraft works and semi-mechanical processing are concerned, the effect of the transportation factor might be negligible. They need small quantities of raw materials and

³⁵Ibid., p. 614.

³⁶Younis, op. cit., p. 9.

³⁷See p. 90 above.

serve local contracted markets, which can be reached by using animal or human means of transfer. On the other side, there are the modern and big businesses which use great quantities of raw materials and distribute their products over a wide area to national and/or international markets. This kind of manufacturing was started a long time ago in Cairo and Alexandria to use their transportation facilities to satisfy its need of raw materials and to reach its markets. Also, imported coal has been delivered at Alexandria port to be used as a source of power for most industries.

The crucial thing about the transportation factor is the cost involved. This is determined by several elements such as the distance between the industrial center and the source of raw material, the place of the market, the size and value of the product, the location of the energy source, the available means of transfer and their certainty and accuracy.

Means of transportation: The Egyptian producer has at his disposal all means of transferring goods, by water, land, and air. Sea, or river, transportation is the oldest established method and it still represents the most economical method of all. It continues to be of major importance since the country is serviced by the River Nile and with many canals. Several industries have been located in cities having good maritime connections, such as Rosetta, Mahalla el Kubra, Samanoud, Fowa, Talkha, Zifta, Dessouk, Sherbin, Meit Gamr, Manzala, Mansoura, Meinia el Kamh, Belbies, Zagazig, Menouf, Ashmoun, Shebin el Kom, Benha, and Fayoum.³⁸ Wooden barges are used for carrying heavy and

³⁸Bechara, op. cit., p. 195.

bulky materials which are non-perishable and of low value such as sands, stones, clay, and timber, as barges are slow, operate with sails, and depend on the wind for their power. Other products, such as cotton and fuel oil, are transferred from Upper Egypt to Alexandria and from Suez to Cairo and other internal ports by boats and tankers. Imports and exports as well as goods in transit are handled through Alexandria, Suez, and Port Said seaports and the Suez Canal.

The role of the Suez Canal in the field of maritime transport requires no elucidation. By virtue of its geographical location, the strategic value of the Suez Canal surpasses in importance that of any other maritime passage in the world. The importance of the Canal and of the Suez maritime route with regard to other means of communication becomes more apparent when we study the fields in which the services of the Canal come into play. It links America, Asia, Australia and various parts of Africa. It uses the Mediterranean and the Red Sea. These are internal seas situated in the center of the world. They are, in a manner, the links which connect the enormous masses of land which represent more than half the land area of our planet. Finally, this route is close to Eurasia, and caters for an enormous proportion of the inhabitants of the world.³⁹

Railways are indispensable to ensure the transportation by land of sources of power, ores, and goods of all types, to supply the industrial life of any country. The first railway in Egypt was completed in 1856 between Alexandria and Cairo, and another railway was built, afterwards, from Cairo to Suez, thus allowing shipments to go all the way from Alexandria to Suez by rail and to connect with the regular steamship sailings that were by that time taking place to and from the two

³⁹Galal H. Sadek, "The Problem of Transport in Africa," The Scribe, Vol. VII, No. 5 (January, 1964), p. 39.

ports.⁴⁰ Then, the railways were extended by lines from Benha to Suez via Zagazig and Ismailia, from Qalyub to Mansoura, Tanta to Mansoura, Zifta to Dessouk, Tanta to Shebin el Kom and Cairo, Dessouk to Shebin el Kom, Dessouk to Damanour, et cetera; as well as by branch lines to the Barrage and to Abbassia.⁴¹ The principal towns in the Delta have been thus connected by a network of railways. Much of the economic progress has been undoubtedly due to this development of railways. The railways made possible, for example, the wide extension of cotton cultivation by providing the means of transferring this crop to the market in Alexandria where the railway terminal was directly connected to the docks by a branch line to the quay side. This endeavor gave initiative to the construction of several cotton industries in Alexandria and its suburbs. Moreover, another railway was built, running up the west bank of the Nile from Cairo to Upper Egypt, and encouraging the extension of sugar industry there. Other branch lines of railways were constructed from Assuit to Fayoum, from Alexandria along the Mediterranean shore to the Libyan boundaries, from Ismailia to the Palestinian railways, and from Upper Egypt to the Western Oasis Railway. All of these lines have a role to participate in the establishment of many industries and the marketing of their products.

A factor that gives transportation by road an advantage over other means of transfer is that it allows door-to-door service without requiring anything of auxiliary handling. Roads can penetrate everywhere,

⁴⁰A. E. Crouchley, The Economic Development of Modern Egypt (London: Longmans, Green and Company, Ltd., 1938), p. 112.

⁴¹Ibid., p. 139.

while railways can only be established along definite lines. While only very big enterprises can afford to own a railway line to link them to the general network, many companies can have their own fleet of trucks reaching sources of raw materials as well as markets. However, good roads in Egypt are not as many as they should be to meet the requirements of its agricultural and industrial progress, and to provide producers with safe, fast, and economical means of transportation. Major roads are those from Alexandria to Cairo across the Delta and via Kafr el Dawar, Damanhour, Tanta, and Benha; Alexandria to Cairo across the Western Desert; Cairo to Suez across the Eastern Desert; Tanta to Damietta; Cairo to Ismailia; Port Said to Suez; Cairo to Fayoum; and Cairo to Upper Egypt.⁴² Furthermore, there are many narrow roads connecting between towns and villages, although some of them cannot be used in the rainy season since they are not well paved. Most of the goods transferred by trucks are cotton and cotton products and fuel oil.

Planes, like boats, enjoy the advantage of having natural ways, and there is nothing to be prepared or arranged for their route. Trains and trucks, on the other hand, require the preparation and maintenance of adequate facilities. The distribution of industries, today, all over the country, and the widened distance between the industrial centers, and between them and the sources of raw materials and markets urge the stimulation of a major effort in the field of air traffic.

⁴²Bechara, op. cit., p. 191.

Finally, there is the pipelines system as a means of transferring crude petroleum to its refineries and petroleum products to consumption centers. While tankers are considered to be more economical to operate for long distances, pipelines are required when the petroleum wells or the markets, or both, are situated far from the coast or when the transferring distance is so short to be economically covered by tankers whose loading and unloading costs are relatively high.

Industrial locations influenced by transportation facilities:

As previously stated the transportation factor has an intermediate role between raw materials and the market in the locational decision.⁴³ Consequently, the industrial site is selected as a result of a mixed or complex effect of several forces, and it is difficult to determine that a certain position is completely influenced by transportation facilities. However, the transportation effect could be more apparent in localizing some industries than the effect of any other factor, such as the cases of situating a lead and zinc plant in Suez to use the Red Sea in transferring the required ores from their mines in the Eastern Desert; a barrel-making factory also in Suez served by its railways in carrying raw materials; a cement factory in Kafr el Zayat using the Nile in shipping its raw material of phosphates from Upper Egypt; and a rice beating factory, a plant for the extraction of food oil from cotton seeds, and a ceramic pipes plant on the banks of El Mahmoudia canal at Alexandria to facilitate the movement of raw materials and finished goods.⁴⁴

⁴³See p. 29 above.

⁴⁴The General Organization for the Industrial Five-Year Plan, op. cit., pp. 331-677.

The Labor Force

The labor effect on the locational decision is determined by several elements, such as labor supply, wage level, productivity, turnover and absenteeism, and trade unions and labor laws.

The supply of workers is not a problem to the Egyptian industrialist as labor resources are available, and there are generally no difficulties in recruiting except in the initial stages when a factory is built in an isolated area where living accommodations are not available. This could be one of the reasons why most industries tend to locate within the limits of large cities, in addition to the fact that skilled workers are more available in these cities where education opportunities are favorable, and labor supply is abundant due to the willingness of population to migrate from Upper Egypt and the country to such cities. However, there has been an industrial shift from the urban centers to the suburbs and the rural areas to avoid problems of concentration and overcrowding, and to use the increased number of unemployed or under-employed workers, especially after the mechanization of agriculture. These laborers may lack the industrial traditions, and they have to learn a new concept of time, to work under rigid discipline and to be precise in the performance of tasks. Nevertheless, most employers agree that Egyptians are hard workers; they adjust to industrialization quite well; they are sufficiently intelligent to understand instructions; they are quick to follow examples set by others; and with practice, their manual dexterity becomes good.⁴⁵ This is not

⁴⁵Frederick Harbison and Ibrahim Abdelkader Ibrahim, Human Resources for Egyptian Enterprise (New York: McGraw-Hill Book Company, Inc., 1958), p. 69.

to say that the availability or unavailability of a large supply of workers has a direct effect on the establishment of industries in certain areas. Manufacturing can be started almost anywhere, even in uninhabited places, depending on the availability of other factors of production; and, in this case, labor can be attracted through migration of those who want to improve their standard of living. However, skill and experience impose some restrictions upon the application of this approach, and industries utilizing the services of specific type of labor may not be able to move freely among many sites.

For small shops and family-operated handicraft establishments, wages are paid on uncertain bases, greatly affected by personal factors. In most of the medium-sized and larger establishments, wages are determined, in part at least, by minimum-wage laws. The wage structure consists of the basic wage or salary, the high-cost-of-living allowance, and a special allowance, where applicable, for industries located in the Suez Canal area. The high-cost-of-living allowance was inaugurated during the Second World War, and the principle of extra pay, based on the number of dependents, to meet rising living costs has been continued as a permanent policy.⁴⁶ Members of the labor force are classified as operatives or as administrative, technical, or clerical employees. Among the operatives there are daily-paid workers and piece workers, and the distinction between a skilled and unskilled worker is usually hard to define. Since machinists, patternmakers, carpenters, or loom-fixers are sometimes paid on a monthly basis, some of these may be

⁴⁶Ibid., p. 90.

classified as technical employees rather than as operatives. Furthermore, the high-cost-of-living allowance, which is based upon the number of dependents and the levels of base pay, results in widely differing pay for the same jobs, and it also tends to blur somewhat the differentials between the pay for skilled and unskilled workers. Another factor causing the wide range between minimum and maximum rates for a particular job is the practice of granting an annual wage increase in the form of a year-end bonus. Although it is customary to start workers at the bottom of the range, the unions have pressed for the granting of annual wage increase as a matter of right and not at employer discretion, and the government appears to support their position. Finally, the wage rate is usually less in Upper Egypt and the rural areas than in Lower Egypt and the urban centers. Consequently, it is possible for processing operations that need great numbers of operatives, especially for seasonal or temporary employment, to be placed in the rural areas.

Productivity, the output per man per hour, is a function of labor, equipment, capital and management, and only by efficient combined application of all these factors can high productivity be attained.⁴⁷ But because of the low labor wages, many entrepreneurs think labor is cheap, while it is in fact costly both in actual production and in administration. Lack of skills and stability makes its unit cost high and it is uneconomical to employ such labor just because it is plentiful, instead of using mechanical equipment. The chief reasons behind the low rate of productivity in Egypt were the low standards of health, nutrition, housing and education; the high rate of absenteeism; and the labor

⁴⁷Kurt Grunwald and Joachim O. Ronall, Industrialization in the Middle East (New York: Council for Middle Eastern Affairs, 1960), p. 37.

turnover. Long working hours and low wages offered no incentive to increased efforts; labor control by foremen was deficient; management was poor and overstaffed; technical knowledge and ability were scarce. All these have been improving, and wherever modern equipment and proper training have been introduced, a rate of efficiency greater than that of Great Britain and even of Germany and not inferior to that of the United States has been accomplished.⁴⁸ At Kafr el Dawar, one of the textile centers, one worker operates from 12 to 16 looms, and good housing, subsidized food, and welfare services quickly achieve labor stability.

Labor turnover and absenteeism are always greater during the first few years of the factory's operation. The newly recruited workers have not made the transition from an agricultural or nonindustrial way of life, which results in general instability of the labor force. Consequently, factories located in the rural areas which recruit agricultural labor appear to have more trouble with turnover than those in the urban areas. The major problem is usually the lack of living quarters, since rural communities have insufficient quarters for new industrial workers and the industrial concerns are usually slow in developing company-owned housing for them. A new management is also less able to solve its labor problems than one which has had considerable experience. Turnover is higher among unskilled laborers than among skilled workers and clerical employees. Unskilled laborers of probationary status may see little prospect of becoming permanently

⁴⁸Ibid., pp. 38, 39.

employed; those who have acquired skills may be much more committed to the factory. Also, the differentials in pay and status between skilled and unskilled workers are such as to encourage the former to stay on the job and the latter to quit. Absenteeism is not a serious problem although many laborers from rural areas sometimes fail to report to work because they are needed to help with planting or harvesting, or for a variety of personal reasons. But factory workers are subject to sanctions and to the loss of their jobs for unexcused absences, so that unauthorized absenteeism, at least among permanent workers, is rare in most enterprises. Absences due to illness are a more serious problem since they are increasing in number. This does not mean that the health of Egyptian industrial workers has been deteriorating, but it can be explained by the fact that the reporting of statistics is improving and that more workers are using medical services provided by the companies.⁴⁹

Trade unions were introduced in Egypt in 1899 by French workers imported into the country to operate its nascent industries.⁵⁰ During the first World War, when the country was under British occupation, further contacts were made between Egyptian and foreign workers and their ideas. Initially, trade unions functioned as mutual benefit societies to provide workers with legal assistance in obtaining compensation. These societies were not recognized by employers for collective bargaining. It was not until the beginning of the thirties that the first federation of trade unions was formed, only to be suppressed by the Government shortly afterwards because it was allegedly politically

⁴⁹Harbison and Ibrahim, *op. cit.*, p. 84.

⁵⁰Grunwald and Ronall, *op. cit.*, p. 32.

motivated. The first Trade Union Act was passed in 1942; it gave workers the right to organize under definite conditions and under strict Government supervision. Agricultural workers were excluded from the application of the Act. Following the revolution of 1952, a new Trade Union Act was decreed, and agricultural workers were covered by an amendment of 1954, employees of the Ministry of War and the governmental military plants and installations were excluded.⁵¹ Close government supervision of accounts, meetings, and memberships of all trade unions, more than half of which were in Cairo and Alexandria, was provided. Between the years of 1950 and 1955 union membership rose from 150,000 to about 400,000, organized in 1,154 registered unions and 45 federations which, in 1957, formed the General Federation of Egyptian Workers.⁵² However, the preference of the workers for plant unions rather than occupational organizations accounts for the small average membership. Social legislation had begun as early as 1909 with a law prohibiting the employment of children under nine years of age in the cotton industries, and limiting the working hours of children under thirteen years to nine hours and to daytime.⁵³ Inspection, however, was deficient and ineffective, and the law was not enforced. A Labor Office was established in 1930 and Egypt became a member of the International Labor Organization in 1936. Since 1942, employers have had to be insured against compensation claims resulting from work

⁵¹Information Department, Labor and Workers, Cairo, UAR, 1963, p. 11.

⁵²Grunwald and Ronall, op. cit., p. 203.

⁵³Ibid., p. 33.

disabilities and additional provisions have been made for medical care in industrial plants, sick leave, severance pay, and notice of discharge. Then the socialist acts of July, 1961, gave the right to workers to share in corporate profits and participate in company management.

The total number of persons engaged in Egypt's major industries for the years 1927, 1937, 1947, and 1954 is listed in Table V.

Industrial locations influenced by the labor force: Most industries that have been affected by labor as a locational factor, are specifically interested in skilled workers. Even in this case, large mechanical enterprises which have their own training facilities are less influenced by labor skill and experience than the small- and medium-sized concerns which have to depend upon the labor market in recruiting workers. Small shops and handicraft establishments are still following the apprenticeship system which enables them to remain in their old established positions selected by other factors rather than by labor. Consequently, industries whose processes are simple, such as cotton ginning and pressing, food processing, tobacco, paper, oil extraction and shortening, are not greatly affected by labor since they can satisfy their need of large numbers of unskilled laborers almost anywhere. On the other side, technical and fine processes such as the production of machinery, transportation equipment, furniture, basic metals and fine spinning are more affected by the labor situation as the majority of their workers are from the skilled category. Examples are the fine spinning company founded in Damietta because of its workers'

TABLE V
INDUSTRIAL EMPLOYMENT BY MAJOR GROUPS IN EGYPT, 1927-1954

	1927	1937	1947	1954
Food Processing	14,280	32,500	59,900	50,310
Beverages		1,270	4,900	4,080
Tobacco	9,130	9,070	9,720	9,050
Cotton ginning and textiles	21,320	40,480	134,350	113,620
Clothing and footwear	4,660	9,620	3,320	6,060
Woodworking, furniture, fixtures	9,200	4,170	3,760	6,940
Paper and paper products	590	2,540	4,460	4,490
Printing and publishing	5,230	6,860	5,360	7,700
Leather and leather products	1,480	1,410	2,660	2,700
Rubber products	--	20	880	940
Chemicals	2,930	6,380	15,770	8,470
Petroleum and coal products	--	200	3,610	2,880
Non-metallic mineral products	4,520	7,740	12,960	16,950
Basic metals			1,160	2,810
Metal products	10,510	8,870	12,460	11,530
Machinery	--	--	--	800
Electrical machinery	--	2,650	90	1,790
Transport equipment	10,720	15,600	2,280	11,450
Other manufacturing	<u>410</u>	<u>5,900</u>	<u>1,080</u>	<u>1,910</u>
Total	95,000	155,120	278,730	264,480

Source: Kurt Grunwald and Joachim O. Ronall, Industrialization in the Middle East (New York: Council for Middle Eastern Affairs Press, 1960), p. 188.

experience in this type of work, and the transistor radio factory constructed in Cairo where the needed technicians are available.⁵⁴

Wage differentials between rural and urban areas tend to disappear or, at least, to decrease for two reasons. The first is the tendency of industries which prefer large cities to be located in the suburbs rather than inside the city so that they can obtain workers from the neighboring rural areas. Examples of these industrial suburbs are Belbies, Kubbeh, El Basatin, Shubra el Kheima, and Amiria near Cairo; and El Nuzha, Hagar el Nawatia, and Ras el Sawda near Alexandria. The second reason is that even the laborers who work in factories inside the cities are used to living in the suburbs where the standard of living is quite reasonable. Consequently, it can be said that wage differentials have more effect on the local distribution of industries rather than on their regional or national distribution.

The Availability of Capital

Until the end of the nineteenth century, the early promoters of large-scale manufacturing in Egypt were almost all foreigners. Only gradually did Egyptian capitalists, who had previously invested almost exclusively in real estate and construction, join the existing industrial enterprises and subsequently initiate new ones. They realized the profitability of this new kind of capital employment and the interrelation of political and economic independence. Egyptian holdings of industrial stocks and bonds increased from 9 per cent in 1939 to 39 per cent in 1948, and their participation in the mobilization

⁵⁴The General Organization for the Industrial Five-Year Plan, *op. cit.*, pp. 412, 735.

of new capital rose from 47 per cent during the period between 1934-1937 to 66 per cent during 1940-1945. In 1954, out of 3,748 major industrial undertakings, 3,172--or more than 80 per cent--were owned by Egyptian nationals, 528 were owned by foreigners, and 46 were in mixed ownership.⁵⁵ In addition to resident foreigners, considerable capital of absentee foreigners participated in Egyptian enterprise, first with the resident foreigners and later also in partnership with Egyptians.

The United Arab Republic was the first country in the Middle East to set up a stock market and to enact modern commercial legislation. Fifty-five per cent of all industrial enterprises in 1954 was organized in corporate form. Although there were only about 300 manufacturing corporations which employed more than 10 workers, they employed more than half of the entire industrial labor force. Paid-up capital in productive establishments rose from L.E. 34 million in 1953 to L.E. 66 million in 1956.⁵⁶

Industrial locations influenced by the availability of capital:

The industrial activity was dependent in its first stage on foreign financiers who used to live in port cities. Also, when Egyptian capitalists began to invest in industry, they placed factories in the large cities where they first started their commercial business. Consequently, the construction of most of the industries in Alexandria and Cairo was influenced by the availability of capital. Moreover, basic

⁵⁵Grunwald and Ronall, op. cit., p. 28.

⁵⁶Ibid., p. 186.

facilities such as money markets, commercial banks, transportation, water supply, sanitation and power, increasingly provided in the urban centers, influenced the growth of industry in those centers. Only small numbers of industrial establishments such as those engaged in cotton ginning, oil extraction and soap manufacturing, and rice beating were built in cities like Tanta, Damanhour, Mansoura, Dessouk, Shebin el Kom and Rosetta by rich natives who gained their capital from agricultural production.

The industrial activity found its way to the rural areas only after the Government took the initiative. A maximum limit was put by the law for the ownership of land, and investing in construction was restricted.

Managerial Ability

As an economic resource, management is similar in important respects to capital. If a country wants to industrialize, it must accumulate the human resources required for management, just as it must acquire capital for power installations, transportation and communication systems, and factories.⁵⁷ It must also find the means of channeling these human resources into the most productive activities.

In the late nineteenth and early twentieth centuries, practically all of Egypt's industries were, as it was said before, owned by foreigners and managed by foreign expatriates. The foreign enterprises developed Egyptian supervisors, technicians, and minor administrators, but they

⁵⁷Frederick Harbison and Charles A. Myers, Management in the Industrial World (New York: McGraw-Hill Book Company, Inc., 1959), p. 118.

did not produce many top-level organizational resources. In the thirties the situation began to change as a consequence, primarily, of the inauguration of high tariffs and of other protective measures which resulted in most of the new enterprises being founded, owned, and managed by Egyptians. A large portion of these firms were, however, established by the minorities who were also dominant in trade and commerce. Apparently, as Professor Megginson said,⁵⁸ reticence existed among this aristocratic class to the encouragement of the expansion, training, and elevating the position of managerial classes. The aristocrats reason that the managerial classes may gain political influence at the expense of the aristocracies. Although such a phenomenon could conceivably occur, the fact remains that if a nation is to expand industrially, a managerial class must be developed. Also, there is little reason to believe that the mass of working people have been, or will be, exploited by the emerging professional managerial class. Actually, what was happening in Egypt is that the working classes were exploited by the aristocracies.

Today, the greater part of the country's industry is all Egyptian, and most of the leading industrialists in the larger private and government-owned enterprises are nationals. This is a factor of great significance for future economic development. Managers, along with government personnel and army officers, are now important members of the country's elite. With the gradual lessening of the power of large landowners and aristocracies, this new industrial elite is

⁵⁸ Megginson, op. cit., p. 2.

gaining both status and economic power. Unlike the foreign interests and the minorities who used to control and manage industry, the new business leaders are motivated by more than their personal desire for profits; they want to build Egypt's industries as a matter of national prestige. However, the country is relying heavily on capital-intensive industries which require a relatively high proportion of highly trained professional and managerial resources. Egypt must purchase the know-how to run her industries, either by sending graduates abroad for training, by hiring foreign technicians to come to Egypt, by offering liberal terms to foreign enterprises, or by a combination of all these measures.

Industrial locations influenced by managerial ability: The great connection between capital and management during the foreign industrial domination in Egypt kept most of the industrial establishments within the boundaries of Alexandria, Cairo, and Port Said. Even the factories which were operated outside these large cities, under the influence of other factors of location, were directed by what can be called absent management; managers had to move to the factories' sites only for emergencies and necessities. The Egyptian minorities of industrialists, who came afterwards, selected for their plants positions in the same area where their business enterprises were situated, to facilitate their control over both activities.

Today, management is considered a highly mobile factor which can be made available not only from within the country but also from abroad. The reorganized government oil refinery at Suez, for example, is managed by a team of engineers who had been studying mostly in American universities. Some of them needed additional training in oil

refinery work and were sent on short observation visits to Europe. Also, the board of directors of the integrated iron-and-steel plant, built by the West German Demage Company at Helwan, represents both sides, Egyptians as well as Germans.

Energy Sources

Until a few decades ago, coal was the source most relied upon for the supply of energy. Petroleum deposits were first recognized at Gensah on the Red Sea Coast in 1865 by a company which was looking for sulphur.⁵⁹ It was twenty years later that public attention was drawn to the possibility of extracting oil from regions where it was presumed to be located. First explorations were not successful and there was a temptation to abandon the task altogether; but the oil fields at Ghardaka, then that of Ghareb, were discovered and production exceeded one million tons in 1937. At that time, coal was being imported to serve as fuel for various purposes. However, during the Second World War and in the immediate post-war period, it was necessary to rely on oil. Other oil fields were discovered at Sudre, Asal, Firan and Balaim, and lastly at Abu Redis and Bakr, and production rose gradually until it reached 4.8 million tons in 1962. As for refining and industrialization of crude oil, there are three oil refineries, two at Suez and one at Alexandria. Plants have been set up for oil distillation; production of bitumen, high octane and regular gasoline and kerosene; treatment of gases; and extraction of sulphur.

⁵⁹Galal H. Sadek, "The Oil Industry in the United Arab Republic," The Scribe, Vol. VII, No. 3 (November, 1963), p. 46.

Electricity was generated in Cairo in 1892 and in Alexandria one year later, then in most cities, only for domestic use.⁶⁰ Because of its high expense, it could not be used in industry and it was necessary for the industrial establishments which had to use electricity as source of power, to build their own generators. However, with the development achieved in producing and after the electrification of the old Aswan Dam, public utilities companies started to encourage industrialists to use electricity during daytime, when the rate of consumption for illumination purposes is less, by offering them reduced prices. The role played by electricity in the industrial development of Egypt will be greatly increased by the completion of the High Dam power station and the transmission lines from Aswan to Cairo.

The United Arab Republic has not been one of the countries producing coal until recently when geological surveys led to the discovery of this mineral in the regions of Ein Moussa, Wadi Sawra, Magahara, Araka, Abu Rawach, Edfu and the oases. According to estimates, production of coal will begin in 1965.⁶¹

Industrial locations influenced by energy sources: Egypt was importing coal in large quantities when it was the only source of energy for industries. Consequently, manufacturing was basically located in Alexandria where the imported coal was being shipped to its port from Europe. Also, many establishments were situated in Cairo where coal was being transferred from Alexandria by a direct railway line connecting the two cities.

⁶⁰Bechara, op. cit., p. 221.

⁶¹Galal H. Sadek, "The Problem of Power and the Industrial Launching of the African Continent," The Scribe, Vol. VII, No. 2 (October, 1963), p. 27.

Since the introduction of oil as a source of power, several industrial plants have been established in the Suez area, where the oil refineries are operating. The fuel has been transported to other areas of industrial activity by railroads and motor-truck tankers, and gradually by pipelines. Moreover, the construction of local refineries made possible the initiation of new by-product industries such as the production of nitrogen fertilizers from the gases resulting from the refining operations.

Electricity has had various effects upon the location of industries. Large industrial concerns have not been much influenced since they found it more economical to build their own power stations. But small- and medium-sized factories which have been depending upon the public utilities companies have had to be situated in the large cities, especially Cairo and Alexandria, where these companies have been found. It is expected that the planned transmission lines which will carry the electric current from the High Dam power station to many parts of the country will cause a great change in the location of industries. Many plants would not be restricted in their choice to certain positions with regard to their energy source, but there will be much leeway in site selection.

Industrial Concentration

Table VI shows the locations of industries in the United Arab Republic in 1954. Although Cairo and Alexandria accounted for two-thirds of all the industrial establishments, the structures of the two regions differ. Despite the fact that Cairo had more than twice the number of establishments, both employed almost the same number of

TABLE VI

LOCATION OF INDUSTRIES IN EGYPT, 1954

Nature of Activity	Number of Establishments						Total
	Cairo	Alexandria	Suez and Canal Zone	Frontiers Districts	Lower Egypt	Upper Egypt	
Cotton ginning & pressing	--	3	--	--	58	34	95
Mining & quarrying	7	3	1	13	--	5	29
Manufacturing	1638	699	143	1	756	414	3651
of which:							
Food industry	485	255	61	--	252	316	1369
Spinning & Weaving	219	74	--	--	233	18	544
Manufacture of clothes, footwear, etc.	150	34	1	--	35	--	220
Manufacture of furniture	95	31	10	--	40	7	183
Printing, publishing, etc.	115	36	5	--	3	2	161
Manufacture of non-metallic mineral products (except petroleum & coal products)	98	43	10	--	84	28	263
Manufacture of metal products (except machinery & transport equipment)	170	52	--	--	26	6	254
Electricity, gas & sanitary services	3	3	4	--	1	--	11
Total	1648	708	148	14	815	453	3786
Percent	44	21	2	--	22	11	100

Source: National Bank of Egypt, Economic Bulletin, Vol. X, No. 4 (1957), p. 343.

workers: Cairo, 63,470; Alexandria, 56,880, as shown in Table VII. This indicated that the average size of industrial plants in the port city of Alexandria was larger. Several reasons explain the concentration of the Egyptian industries in a small number of cities. The population increase in the urban areas has been more marked than in the rural. For example, between 1917 and 1957, Egypt's total population grew from 12.7 million to 24 million, or by about 100 per cent. During the same period, Cairo expanded from 791,000 to 2,100,000, or by almost 200 per cent.⁶² Those cities are well provided with rail, river, or sea transportation; and they contain by far the cheapest and most abundant and reliable sources of electric power. The same is true for labor which is willing to migrate from country to town, as a consequence, wages in the countryside are not appreciably lower than in towns; the higher literacy rates also indicate the presence of more skilled labor in the cities. Other favorable factors are the extended markets, which are supported by an increased purchasing power, the availability of banking service, workshops, spare parts, educational and cultural facilities and entertainment houses.

The localization of many industries in these urban centers has encouraged and attracted other ones, to the same areas so that they can share in the realized external economies. However, it has been noticed that the large Egyptian industries have not been greatly affected by the concentration factor in their locational decision. Such industries are in so good a financial position that they can provide themselves with required facilities.

⁶²Grunwald and Ronall, op. cit., p. 43.

TABLE VII
LABOR AND VALUE ADDED DISTRIBUTIONS IN EGYPT, 1954

Governorate	Labor distribution		Value added		Value added per laborer	Per Capita level of wages
	Number	Per cent	L.E.000's	Per cent	L.E.*	L.E.*
Cairo	63,470	26.3	19,957	21.4	314.4	94.7
Guiza	14,572	6.0	7,308	7.8	501.5	103.6
Kaliubia	20,931	8.7	2,639	2.8	126.1	86.8
Alexandria	56,880	23.6	23,182	24.9	407.6	105.8
Beheira	18,626	7.7	8,558	9.2	459.5	102.3
Canal	4,116	1.7	1,783	1.9	433.2	189.0
Suez	3,560	1.5	1,477	1.6	414.9	246.9
Frontiers						
Districts	5,818	2.4	13,488	14.5	2318.3	158.6
Dakahlia	2,592	1.1	748	0.8	288.6	73.7
Sharkia	1,458	0.6	498	0.5	341.6	61.7
Gharbia	26,451	11.0	9,834	10.5	371.8	110.0
Menoufia	1,451	0.6	402	0.4	277.1	53.8
Kafr el Sheikh	1,208	0.5	217	0.2	179.6	49.7
Damietta	1,264	0.5	164	0.2	129.8	68.0
Asswan	2,525	1.0	252	0.3	99.8	65.3
Assuit	1,783	0.7	303	0.3	169.9	54.4
Beni-Suef	1,362	0.6	218	0.2	160.1	55.8
Sohag	1,107	0.5	193	0.2	174.3	56.9
Fayoum	1,350	0.6	134	0.1	99.3	40.0
Kena	5,269	2.2	802	0.9	152.2	56.9
Menia	5,342	2.2	1,164	1.3	217.9	63.5
Total	241,135	100.0	93,321	100.0	387.0	101.0

*L.E. - Egyptian pound = \$2.87.

Source: National Bank of Egypt, Economic Bulletin, Vol. X, No. 4 (1957), p. 341.

Industrial locations influenced by industrial concentration:

Since the major part of the Egyptian manufacturing is concentrated in a limited number of industrial centers, it is hard to determine how far certain industries have been influenced specifically by this factor. However, examples are clear in the case of the industrial complex containing spinning, weaving, textiles, and dyeing industries in Beida, Kafr el Dawar, and Mahalla el Kubra areas. The industrial complex at Helwan, also, has been greatly relying on the benefits of the agglomerating factors in setting up in one place a basic iron and steel mill capable of producing pig iron, steel ingots, and rolled-steel products; along with cars and railway wagons plants; and a planned coke plant to be constructed as soon as coal would be locally extracted.

CHAPTER VII

RECENT INDUSTRIAL DEVELOPMENTS IN THE UNITED ARAB REPUBLIC

The need for industrialization began to be realized in Egypt during the First World War owing to the shortage of imports. At this time several minor industries were brought into being, and the older ones were given a new impetus. After the war there was a desire to increase the country's political and economic independence by industrialization, and the government Commission on Trade and Industry that had been formed in 1917 urged greater government help for manufacturing. Misr Bank, which was founded in 1920, had as one of its objectives the fostering of industrial activity. Its founding was followed by the creation of the Egyptian Federation of Industries in 1922, which represented employees.¹ Little was done, however, in the nineteen-twenties for several reasons: high cotton prices seemed to promise continued prosperity; capitalists preferred to invest in land; and the government, bound by international conventions, could not modify the low custom duties. But the drastic fall in cotton prices during the economic depression of the 1930's, the realization that population was out-running the absorption capacity of agriculture, the tariff increase, and the fact that certain branches of industry promised worthwhile profits combined to renew the urge for industrialization.

¹Charles Issawi, Egypt at Mid-Century, An Economic Survey (London: Oxford University Press, 1954), p. 140.

The Second World War, again, stimulated the industrial production in Egypt, not only because of the severe reduction of imported goods, but also due to the increased demand for such products by the Allied troops stationed in the country. Several industries expanded, especially textiles, preserved foods, chemicals, glass, leather, cement and other building materials, petroleum and mechanical industries. New ones were established, such as the dehydration and canning of vegetables, rubber goods, jute processing, the making of spare parts and tools, and a wide variety of chemicals and pharmaceuticals. By 1949, however, foreign competition began to weigh heavily on all economic activities. Stocks accumulated, working hours were reduced, and some factories had to close down. Although the Korean War gave manufacturing a new stimulus by both raising the price of cotton and with it the internal purchasing power, and diminishing foreign competition, such stimulus had spent its force by 1951. At this time several industries, notably, textiles and construction, once more faced difficulties.²

INDUSTRIAL CONCENTRATION

Up to 1954, the process of industrialization had been very slow in Egypt, and it had not kept its ascending line; rather it lost its impetus in the post-war years. Even at the time of its rapid expansion, industry failed to draw away from the cultivated land the surplus population by providing employment for it.³ Consequently, industrial

²Ibid., p. 142.

³Eva Garzouzi, Old Ills and New Remedies in Egypt (Cairo: Dar el Maaref, 1958), p. 55.

development became the most hopeful sector of the economy in the struggle to raise the standard of living of an increasing number of population; yet there are several elements that restrict the industrial activity to certain parts of the country, as it has been well noticed. Most Egyptian industries are concentrated in Cairo, Alexandria, and some intermediate cities such as Kafr el Zayat, Kafr el Dawar, Mahalla el Kubra and Suez where the main requirements for manufacturing are more readily available than elsewhere. This has resulted in the development of these cities and has helped them to acquire a number of advantages which entitle them to be centers for new industries. But if this centralization will continue, the country will have to face several problems that have already become discernible. Attracted by city amenities, the would-be workers inevitably tend to migrate to industrial centers causing the overcrowding of these cities with the resulting difficulties in housing, communications, public services, and the gradual decline in other regions of the country. Moreover, the attraction presented by these zones to other industrial activities may not be justified either on sound economic bases or by public welfare. If the entrepreneur has to make his locational decision according to sound economic principles, he has to be guided by the availability of factors of location, which are most pertinent in his situation, at the least possible cost; otherwise, the contemplated site should be avoided, and no problem would be encountered. The problem is difficult, however, when the needed requirements for the industry are available in a place which has to be dispensed with for the sake of public welfare. In planning for industrial development, the government was faced by this controversy between economic

welfare and total welfare;⁴ and to adopt the solution which would not contradict either one of them, a recognition of the reasons behind the industrialists' preference of specific areas for their activity is necessary.

Reasons of Industrial Concentration

Since factors of production are scarce and locational requirements are not available everywhere, industry tends to be established in selected positions; and there have been several obstacles in the way of dispersal, some of them are economic while others are social or institutional.

The main economic obstacle is the shortage of capital caused by a low level of savings out of the national income which is, by itself, very low. Moreover, those who have money were wary of investing in what was looked upon as new ventures having an uncertain chance of success and preferred the lower returns but safer investment in agricultural land. At the same time, an access to foreign currency reserves is a determining factor in importing the required machinery and equipment. Since in its first stage of development the country would be still in need of considerable quantities of imported consumable goods, there will be only a minor surplus in its balance of payments. Such a minor surplus is not adequate by any means to meet the relatively heavy requirements of investment goods.

⁴Y. El-Mulla, "Special Factors Affecting Industrial Development in Less Developed Areas with Special Reference to U.A.R.," U.A.R. Standardization Bulletin, Vol. III, No. 1 (October, 1963), p. 7.

Spreading industrial projects over many regions of the country demands a great portion of raw materials, and the dependence on imported materials for production would subject the industry to large difficulties.

Technical know-how is available only in the industrial centers. Of course, a country whose national wealth has been relying, for many years, on the exploitation of land, would not have the opportunity to build up any important group of technicians.

The difficulty in securing managerial capacities and the aid provided by foreign managers is not always accepted. While such abilities are not easily acquired, industrial establishments might prefer, for political and social reasons, to have indigenous managerial personnel.

Production is for distribution, and a country with a surplus of manufactured goods has to find local as well as foreign outlets. Local markets supported by high purchasing power may be found in large cities, while they are unavailable in the rural areas where the standard of living is mostly low. Furthermore, the local consumer in general prefers the imported goods either because he has been accustomed to them for many years, or because he derives a kind of prestige out of their use. As far as foreign markets are concerned, the country would confront many difficulties whether in obtaining the raw materials of the required specifications or in competing with highly developed countries with unknown products to the consumer abroad.

Finally, facilities and services which are confined to certain parts of the country rather than the others, have to be extended over other areas as well. For example, transportation facilities, energy sources, technical education, and other public services should be adjusted in parallel to the conditions imposed by industrial dispersal.

REGIONAL DISTRIBUTION OF INDUSTRIES

For industrial regional distribution to be accomplished according to sound economic reasons, it was necessary to investigate the potentialities of the various zones to determine the possibilities of their industrialization. An enumeration was, therefore, made of the industrial, agricultural and mineral raw materials.⁵ These were geographically classified, and a survey was made of the available laborers who might be fit for work of technical and medium precision, as well as qualified individuals for jobs in the administrative and marketing fields. Transportation facilities, sources of power and fuel, water supply, and means for waste disposal were also studied. A new procedure has been followed for the national and local distribution of the planned industrial establishments. For projects of a national character, the problem of location could be solved from the center. The criteria used are largely of an economic nature related to raw materials, labor availability, marketing facilities, et cetera. In certain important cases, operation research techniques were used to determine the distribution of activities over different locations. The problem of oil refining, for example, was studied by the operation research group in the Institute of National Planning.⁶ For projects of regional character, the needs as well as the availabilities of each zone were considered in a manner

⁵U.A.R. Government, 12 Years of Industrial Development, p. 299.

⁶I. H. Abdel Rahman, "Methodology of Planning for Development in the U.A.R.," Paper presented at the United Nations Conference on the Application of Science and Technology for the Benefit of Less Developed Areas, Geneva, February, 1963.

satisfying these needs and realizing consistent and coordinated programs for the whole country. Furthermore, plans were designed, legislations were enacted, and solutions have been adopted to overcome the previously mentioned obstacles.

The Industrial Capital

With the restriction in land property brought about by the land reform law in 1952 and the general drive for industrialization launched by the Government, capital turned to other outlets, but, still seeking safety, went for the greater part into new buildings. However, regulations putting a maximum limit for the annual investment in the construction industry were conducted. Moreover, to overcome the reluctance of private capital, the Government took several steps to encourage people to save and invest in industry. A method of co-partnership in financing between the State and the individuals was followed, with the Government guaranteeing a minimum rate of profit; imports of goods that could be replaced by local production were cut; custom dues on manufactured goods were put up, while they were reduced on raw materials and on equipment necessary for industrial development; and the lending capacity of the Industrial Bank, a Government sponsored establishment, was increased.

In the foreign sphere, loans and credit facilities have been used on a large scale since the development projects are based on sound economic bases and can be self-financing in a few years. The restrictions which were imposed on importation have been helpful in gradually building a reserve of foreign currency to be used for industrial requirements. Also, priority in execution was given to those projects which would

contribute a large excess of foreign exchange, or which result in a reduction of imported goods.

Raw Materials

Mineral deposits: To locate new deposits of minerals, efforts have been made to improve geological and mineral prospection by providing the required equipment and personnel. Modern criteria of geological exploration have been taken into consideration; they imply using different geological guides including regional, mineralogical, structural, lithological, stratigraphic, and physiographic.⁷ Regional guides have been particularly suited for selecting large regions favorable for mineral deposition; while the others have been used mainly for detailed exploration within these favorable regions. These methods have been necessary to obtain precise information on the extension of mineral deposits laterally and in depth, and the tonnage and grade of the ore under exploration. For deposits exposed at or near the surface trenches and pits have been found to be, in several cases, more useful than drilling. In addition, it has been realized that mining is more convenient than drilling where topographical conditions are not convenient for the latter, recovery by drilling is low, and when large technological samples are required. Otherwise, drilling is normally used, especially in cases where attaining considerable depth is needed and exploration mining will become expensive.

⁷E. M. El Shazly, "Exploration for Mineral Deposits in the U.A.R.," A paper presented at the United National Conference on the Application of Science and Technology for the Benefit of Less Developed Areas at Geneva, February, 1963.

Collecting data, analyzing samples, and carrying out operations, geological parties and prospecting companies have contributed to make basic raw materials available for many industries. Among these are: phosphate ore for the fertilizer industry; iron ore for iron and steel mills; white sand for glass manufacturing; lime-stone for cement; iron and steel, and fertilizer industries; Kaolin for the production of ceramics, porcelain, and paper; talc for insecticides, medicines, and paper making; granite, marble and ornamental stones for building and mosaic; and gypsum for agriculture, construction, and cement industry.

Petroleum products: Marked progress had been achieved in the petroleum industry of the United Arab Republic during the last decade. Intensive geological exploration is being carried out, applying up-to-date methods, and the areas currently under exploitation spread intermittently throughout the Egyptian deserts.

Prospecting and processing of crude oil had earlier been carried out by three foreign companies: the Anglo-Egyptian Oil Well Company (Shell), Socony Vacuum, and Standard of New Jersey. Standard of New Jersey withdrew in 1950, though it had already located an oil well in Sinai. The other two companies had ceased searching for new deposits of oil by the time the output of the existing fields was beginning to slow down.⁸ In 1956, the General Petroleum Organization was established to supervise and plan production at the different stages of prospecting, excavation, exploitation, storage, and marketing.⁹ Also, the Cooperative Society for Petroleum began to flourish and grow more active since it

⁸"Egyptian Oil Booms," Arab Observer, No. 178 (November 18, 1963), p. 13.

⁹Ibid., p. 12.

was awarded an exploration permission from the Government. Moreover, at the time the State was engaging national capital in prospecting, it was encouraging foreign investors to finance the operations. It was thus, for example, that the Eastern Petroleum Company was recently founded with a 50 per cent national capital belonging to the General Organization and the Cooperative Society, and 50 per cent foreign capital belonging to the International Petroleum Company, an Italian subsidiary.¹⁰ As a result, there were 13 rather than 4 oil fields in 1952. Crude oil production increased from about 2.3 million metric tons in 1952 to 4.8 million in 1962, as shown by Table VIII, and to almost 6 million in 1963.¹¹

The capacity of the two old refineries at Suez was raised and a new one was constructed in Alexandria. The major units in standing refineries include atmospheric and vacuum distillation, thermal reforming, asphalt blowing, hydrogen sulphide separation and sulphur production, and conventional treating equipment. Current processing of local crude oil leads to a surplus in gasoline and mazout, while there is a serious shortage in middle distillates. This situation is presently handled by exporting part of the heavy oil and importing crudes rich in middle distillates. For balancing production and consumption rates and attaining self-sufficiency of almost all petroleum products, a new refinery is under erection at Suez for the production of distillate fuels such as

¹⁰Galal H. Sadek, "The Oil Industry in the U.A.R.," p. 48.

¹¹U.A.R. Government, 12 Years of Industrial Development, p. 197.

TABLE VIII

PRODUCTION OF OIL FIELDS IN EGYPT
IN THOUSANDS OF METRIC TONS

Oil Fields	1952	1955	1958	1961	1962
Sinai:					
Asal	797	168	152	154	225
Sudre	341	319	187	159	133
Matamer	-	19	12	15	16
Firan	-	17	16	9	10
Balaïm Barri	-	53	1387	2079	2936
Abo-Redis	-	-	390	172	121
Sudry	-	-	-	70	93
Akma	-	-	-	5	19
Red Sea:					
Ras-Gharib	1200	1201	1008	849	716
Bakr	-	-	-	196	285
Karim	-	-	-	76	75
Ghardaka	40	36	32	30	29
Suez Gulf:					
Balaïm Bahari	-	-	-	-	151
Total	2378	1813	3184	3814	4809

Source: Administration of Public Mobilization, Statistical Pocket Book, 1952-1962, Cairo, UAR, April, 1963, p. 32.

kerosene, gas, oil, and diesel fuels. Under the recent plants, other petroleum products such as propane, butane, light naphtha, gasoline, fuel oil, coke, and fuel gas; and petrochemical products like sulphur, benzene, and toluene will also be processed.¹²

Agricultural resources: The majority of the population in the United Arab Republic depends on agriculture. The cultivated land is densely inhabited, and this is coupled with a continuous increase in population (600,000 annually) which is a rate higher than that of agricultural development. A plan has been in operation since 1960 for increasing productivity of the already cultivated land, diversifying the crops produced, and improving their yields and qualities.¹³ The plan also includes programs for land expansion by reclaiming fallow areas.

Since agricultural raw materials are spread all over the valley, particularly in Lower Egypt, food industries, for example, can be easily distributed in many places.

Manpower Development

It has been increasingly recognized that economic development requires not only the setting up of factories, the accumulation of capital, the mobilization of savings, et cetera, but it also requires manpower development which may prove more difficult to attain than the physical material requirements of development.

¹²A. Mustafa, I. K. Abdo, M. Borhan, and F. M. Ebeid, "Development of the Petroleum Industry in the U.A.R.," A paper presented at the United Nations Conference on the Application of Science and Technology for the Benefit of Less Developed Areas at Geneva, February, 1963.

¹³S. Hagrass, "Agrarian Reform in the U.A.R.," A paper presented at the United Nations Conference on the Application of Science and Technology for the Benefit of Less Developed Areas at Geneva, February, 1963.

A project for manpower survey was designed in July, 1957, by the Central Statistical Committee to be carried out by the Ministry of Labor on a periodic basis.¹⁴ Its objectives are: to measure the volume of manpower and the labor force; to ascertain the geographical, age, and industrial distribution of the labor force; to measure seasonal fluctuations of these variables; and to determine the percentage of employment.

Population structure: Figures for 1960 indicate that the proportion of population which constitutes manpower amounts to about 77 per cent, which is slightly higher than the percentage for 1957-58. However, a fairly consistent decline, both absolutely and proportionately, in the labor force has been noted. Compared with 38.8 per cent of total manpower in 1957-58, the labor force constituted 32.6 per cent of manpower in 1960.¹⁵ The decline in volume, which is of the order of about 900 thousand persons, was explained in the light of two factors. First, a law was decreed in April, 1959, prohibiting the employment of juveniles under the age of 12. Second, since most of the decline was recorded in connection with the rural areas, it is likely that the data collectors had included in the labor force peasant women who helped their husbands by performing light agricultural jobs but, later, gradually excluded these women from the labor force. Consequently one has to be careful when deriving any conclusion regarding the drop in employment.

¹⁴National Bank of Egypt, "Population and Manpower," Economic Bulletin (1963), Vol. XVI, No. 1, p. 9.

¹⁵Ibid., p. 10.

Basic characteristics of the labor force: Considering the educational status of workers, the statistics show that 60 per cent of the total labor force is illiterate, and the second largest group is composed of people with less than middle-level education who form somewhat more than a quarter of the total labor force. In fact, the number of the employed people with a middle-level, university, and graduate education accounts for only about 5 per cent of the total. In 1960, however, the literate and educated laborers accounted for 36.6 percent of the total, as compared with only 30.2 per cent in 1957-58. Although part of this increase is, of course, due to the fact that the total labor force in 1960 was smaller than in 1957-58, this does not account for all the increase. Rapid improvement has also been achieved in the other groups owing to the concentrated efforts and large investments made in the field of education.

About three-quarters of the labor force fall in the 20-64 age bracket, with the rest falling in lower or higher strata, but mainly in the 12-20 category which contains 15 to 18 percent of the labor force. Table IX shows that the bulk of workers is spread fairly evenly over the four age brackets starting with the 20-29 bracket. The 30-39 bracket is the largest single age class; it accounts for slightly over one-fifth of the total. Persons under 12 years of age declined substantially in number as a result of the law prohibiting the employment of juveniles. The decline in the 12-15 and 16-19 age groups may be explained by the increase in the number of people in these groups who go to school.

Labor force distribution by main types of economic activity

TABLE IX
AGE DISTRIBUTION OF LABOR FORCE IN EGYPT
IN THOUSANDS OF PERSONS

Age Group	1957-58	Per Cent	1959	Per Cent	1960	Per Cent
6-11	249	3.5	104	1.6	40	0.7
12-15	653	9.3	574	8.7	418	6.9
16-19	615	8.8	578	8.8	523	8.6
20-29	1390	19.7	1315	19.9	1181	19.5
30-39	1534	21.8	1478	22.4	1388	22.9
40-49	1220	17.4	1206	18.3	1202	19.9
50-64	1145	16.3	1150	17.4	1124	18.6
65 and over	219	3.1	194	2.9	174	2.9
Not stated	4	-	2	-	1	-
Total	7029	100.0	6601	100.0	6051	100.0

Source: National Bank of Egypt, Economic Bulletin (1963), Vol. XVI, No. 1, p. 13.

is often used as one of the indicators of the degree of development of any given economy, and it is certainly a useful guide to the extent of diversification or concentration of economic activities. The largest portion of the laborers in the United Arab Republic is engaged in agriculture, which absorbs over 50 per cent of the total labor force. Then come the civil service and other services, and commerce, which account for approximately 20 per cent and 10 per cent respectively of the total. Manufacturing, building, construction, and transportation engage some 15 per cent with the share of manufacturing alone does not exceed 10 per cent of the labor force. With the implementation of recent economic development plans and industrialization programs, the distribution began to change gradually. There has been an absolute increase in the size of people engaged in almost every type of activities. Relatively speaking, however, agriculture has had a declining share of the labor force, while the manufacturing sector has been increasing its share. With regard to the regional distribution of workers, all the regions have benefited from the expansion of the industrial sector, but not equally. Lower Egypt, where 21 thousand new laborers were employed, was the first area to gain from the increased employment opportunities. Alexandria, Cairo, and Upper Egypt, in each of which about 12 thousand new workers got jobs, were the next to gain. The Canal zone had the least expansion since the newly created jobs did not exceed 2 thousand.¹⁶

Technical training: The lack of technical know-how imposes itself on Egypt in the different stages of its development, whether in planning,

¹⁶National Bank of Egypt, "Economic Conditions in the U.A.R.," Economic Bulletin (1963), Vol. XVI, No. 1, p. 43.

execution, or operation of the industries after their establishment. In all of these stages, personnel of high technical abilities are required. This obstacle has been overcome through the application of two procedures: the first is resorted to as a short-run solution; the other is considered to be a long-run remedy.

The short-run solution was accomplished by mobilizing all the required qualifications available in the country in the first stage of planning. In the stage of execution, it was necessary to employ technicians from abroad who had to come with the imported machinery and equipment to erect and operate them. With the assistance of native technicians who had to help the foreign experts, the country was able to carry out the scheduled programs. In the third stage, operation, it was necessary, too, to have some foreign technicians, especially in new industries in which nationals had no previous experience. Local personnel were attached to foreign experts in order to acquire the experience needed for the operation of such projects.

As a long-run remedy of the lack of technical ability, several steps have been taken to provide various industries with required experts. The State gave special attention to the vocational schools where attendants learn carpentry, wood and metal engraving, smithery, leather work, weaving, et cetera. The Popular Culture Institute was started in 1946 with one center in Cairo and another in Alexandria; in 1956-57 it had over 20 centers distributed over various towns of Egypt.¹⁷ Subjects of studies are divided into theoretical and practical

¹⁷Garzouzi, op. cit., p. 30.

courses, which include arts, industrial training, languages, technical studies of all kinds, courses in hospital work, and even rehabilitation courses for prisoners. Each center has a popular library and uses educational films to complete the study program. Tours, both inside and outside the country, are arranged for the students to widen their outlook and foster relationship with others. In 1953 a preparatory stage of 4 years of study which would come between the primary and the secondary stages was included in the national education program. The objective of this program was to encourage vocational guidance, as the study includes four types: general, industrial, commercial, and agricultural. Only elementary notions of these subjects are taught, for the subjects are better covered in the technical secondary schools where the same divisions have been created.

In 1954, the government, recognizing the need for the introduction of industrial engineering and modern management techniques into Egyptian plants, applied to the International Labor Organization for technical assistance in establishing a Productivity and Vocational Training Center.¹⁸ The functions of the Center were: to undertake productivity studies and surveys of managerial practices to help employers and workers organize manpower-training and management-development programs within industry; to organize practical courses in industrial engineering and management for members of management and workers and follow up the work of the trainees; and to apply modern industrial engineering and management methods with a view to raising productivity and workers' earnings and demonstrating the benefits that

¹⁸Harbison and Ibrahim, op. cit., p. 124.

result from the application of these methods. Thus, foundations were laid for a much-needed and long-overdue effort to promote the idea of management-sponsored vocational training within industry, and it was possible to train 30,000 foremen within a period of four years to meet the needs of local factories. The ultimate success, however, will depend, not upon the number and the extent of programs developed for training foremen and middle management, but rather upon the extent to which it can create a sense of responsibility on the part of top management for the training and upgrading of industrial manpower. In 1957, the Productivity and Vocational Training Center was taken over by the government and called the Department of Productivity and Vocational Guidance of the Ministry of Industry.

Managerial and Administrative Abilities

The United Arab Republic realized that the development of managerial talent must become a part of the national policy if it is to achieve its goal as a developing country. The expansion of this resource can no longer be considered a field of private endeavor, or the responsibility of the industrial organization alone. For a nation even to enter the race to industrialize, it must encourage and facilitate the training and development of managerial personnel to direct efficiently the affairs of its business and governmental organizations. Only through effective management of these organizations will the supply of goods and services increase rapidly enough to raise the standards of living of its people.¹⁹

¹⁹ Megginson, op. cit., p. 2.

University education: In Egypt, there are four large public universities, Cairo, Alexandria, Ein Shams, and Assuit; in addition, there are two under construction, Tanta and Mansoura, and one is still in the planning stage to be situated in the Suez Canal zone. Each one of the four established universities has faculties of all fields of study and specialization. And in judging their capacity to develop the high-level manpower needed for industrialization, the training provided by the faculties of commerce and engineering is of particular interest. On the whole, the programs of study offered possess both the advantages and shortcomings of the British and European universities after which they were modeled. The early faculty members were nearly all foreigners, and the Egyptians who have succeeded them were, with very few exceptions, sent abroad for their graduate study and training.

Until recently, the faculties of commerce were specialized in teaching the routine mechanics of trade and business administration. Most of the graduates end up as administrative clerks, accountants and bookkeepers, and minor functionaries in banking or trading institutions. Very few have risen to high executive or administrative positions, and a program of basic preparation for top-level executive leadership was still lacking. On the other hand, Egyptian-trained engineers are highly valued on the basis of their technical ability, but they lack training in administration and human relations. The New Regime, however, has recognized the necessity for large-scale investment in training both engineers and business administrators, and there is evidence that university administrators have realized these problems. In 1955, for example, the universities started to introduce graduate

work in factory administration, engineering economics, industrial legislation, cost accounting, and industrial hygiene. At the bachelor level, courses in industrial organization, management, and production engineering have been also introduced. Today, most observers would agree that Egyptian universities are being developed quite rapidly into institutions geared to train high-level manpower.

Institute of Public Administration: One of the promising attempts to improve the quality of administrative and managerial personnel, is being carried out by the Institute of Public Administration in Cairo. This institute, established with the help of the United Nations, has the objectives of providing systematic training for public administrators, conducting basic research in the area of public administration, and furnishing teaching materials and publications for educational programs. Its training curriculum includes such subjects as principles of administration, organization and management, personnel administration, financial administration, employee relations, and social and economic problems of contemporary Egypt.

Institute of Personnel Management: The unemployment problem following the Second World War caused a great concern with labor as an important factor in production. The trade-union movement gained strength, and there was a growing number of persons in industry and government who were specializing in labor problems, as a result of various kinds of labor legislation which management personnel were not prepared to handle. The more progressive companies, with the guidance of enthusiastic personnel who had studied management and industrial relations, started to show interest in personnel administration and

employee welfare services. Consequently, the Institute of Personnel Management was formed in 1950 by a group of persons from government and private enterprise to promote the professionalization of personnel management, to organize conferences and courses on personnel and labor problems, and to provide a clearinghouse of information for those interested in the field.²⁰

The National Institute of Management Development: The successor to the Management Development Institute was the National Institute of Management Development. The Institute was established in 1959 upon the recommendations of an American consulting team of Professors Jenck, Graham, and Harbison, for the development of top managers.²¹ The Institute's structure and functions, curriculum design, and training procedures were based upon Western experience, Egyptian needs, and the Egyptian environment as it then existed. Through resident training programs, the top manager was to be made aware of new ideas and attitudes which could enhance the success of the enterprise he controlled with regard to decisions concerning product line, pricing, and financing, in addition to matters of personnel, organization, and production technology. By performing its research function, the Management Development Institute would reveal the dimensions of the Egyptian economy and their significance for managerial decision. Egypt's economy at that time, however, was a mixed one, with a substantial private sector. Today, the private sector is sharply reduced, with most of the important enterprise activity being

²⁰Harbison and Ibrahim, op. cit., p. 128.

²¹Thomas L. Whisler, Consultant to the Ford Foundation, "NIMD, 1963: An Evaluation," A Report to Dr. A. Fouad Sherif, Chairman of the Board, The National Institute of Management Development, Cairo, Egypt, U.A.R., August, 1963.

publicly owned and controlled. This has changed the management development picture in that it directly involves Government interest in supporting and controlling management development activities, and it raises important questions about the meaning of "top management," "middle management," and, in fact, about the whole meaning of management decision making and managerial discretion.

Thus, it was the outcome of the decrees of 1961 nationalizing industry and creating the National Institute of Management Development that both the industrial environment and the formal objectives of the management institute in Egypt have been altered. The concept of the Institute as simply an initiator of change has been replaced by the concept of the Institute as responsible both for stimulating new needs in the manager and for acting as a resource agency for satisfying those needs. In addition to training and research, consulting has been a third function of the Institute.

At the same time that the economic organization has changed, the size of the industrial sector has been growing rapidly with an increased demand for managers and, consequently, an increased importance of the Institute for their development. Top management programs have been continued in the spirit and tradition of earlier programs with the same curriculum mix set up under the old institute. Moreover, for infusion of new knowledge into enterprises, the National Institute is likely to find itself under increasing pressure for lower level training and for consulting services.

The development of a research center in the Institute has been given a high priority since training managers how to function effectively

in their environment requires understanding on the part of both trainer and manager of cultural and economic factors affecting the internal and external operations of the enterprise.

The Government has charged the Institute with providing managerial consulting services to Egyptian enterprise. This function, however, has been administratively separated for the protection of the research and training personnel from the overwhelming flood of consulting demand, and a rationing rule was devised for specifying the kinds of consulting to take and the kinds to forego.

Extending the Market

Many efforts have been made to extend the market for Egyptian goods. These efforts include the negative restrictions on imports as well as positive measures to divert the consumer's preference from foreign to local products, and to ensure a wider acceptance of the Egyptian manufactures in markets abroad. The Egyptian Organization for Standardization was established in July 1960 to consolidate efforts made in the field of manufacturing and to maintain its quality.²² Standardization implies the formulation and application of unified specifications and measures for products, whether they are processed or natural, in order to ensure their quality and efficient and safe use. It provides a link between production and consumption so that one may conform to the other.²³ Moreover, the transition from production to consumption occurs not only at the ultimate point of use

²²U.A.R. Government, 12 Years of Industrial Development, p. 313.

²³Lala C. Verman, "Standardization: A Pre-Requisite for Development," U.A.R. Standardization Bulletin, Vol. 111, No. 1 (October, 1963), p. 17.

but also at a number of intermediary points both in industry and trade. The growth of industry in the country has been marked by a corresponding rise in the interdependence of the different spheres of production on one another. Each has to look to others for the supply of raw materials, machinery, components and at times services; and each, in turn, provides similar facilities to others. The resulting complex relationship cannot be sustained unless adequate understanding is established for the innumerable contacts when products pass from one hand to another, be it within a plant, from one plant to another, from a store to a consumer, or even from one country to the others. One of the main functions of standardization has been to facilitate the flow of products through these transition points.

Furthermore, the country has been adopting the policy of fixing higher standards for its exports than for home production. Quality control techniques have been used to ensure that the exported products do, in fact, comply with such higher standards in order to gain popularity and good reputation in the foreign markets. The results have been encouraging as the Egyptian products have been finding their way to many of the world's markets. Table X shows, in summary form, the area-commodity distribution of the United Arab Republic exports in 1962. As far as the total value of major exports is concerned, the Eastern Bloc provided the most important single outlet. The Western Hemisphere occupied the second position with over half of the exported shipments to this region going to the European Economic Community. The less developed region absorbed about 23 per cent of the total value of the main exports. Transactions with the Arab countries amounted to

TABLE X

MAIN EXPORTS OF THE UNITED ARAB REPUBLIC, 1962

Area	Foodstuffs		Raw Materials		Fuels		Manufactures		Total	
	L.E. '000*	Per Cent	L.E. '000*	Per Cent	L.E. '000*	Per Cent	L.E. '000*	Per Cent	L.E. '000*	Per Cent
Eastern Bloc	3381	17.4	56899	65.1	533	3.6	4230	18.8	65043	45.1
North America	34	0.2	4493	5.1	1785	12.0	1926	8.5	8238	5.7
Other: Western Countries	4532	23.3	3714	4.3	881	5.9	2097	9.3	11224	7.8
European Economic Community	4377	22.6	10751	12.3	9212	61.9	1662	7.4	26002	18.0
Arab Countries	3708	19.1	211	0.3	153	1.0	6973	31.0	11045	7.7
Rest of the World	<u>3377</u>	<u>17.4</u>	<u>11295</u>	<u>12.9</u>	<u>2326</u>	<u>15.6</u>	<u>5640</u>	<u>25.0</u>	<u>22638</u>	<u>15.7</u>
Total	19409	100.0	87363	100.0	14890	100.0	22528	100.0	144190	100.0

*L.E. - Egyptian pound = \$2.87.

Source: National Bank of Egypt, "Foreign Trade in 1962," Economic Bulletin, Vol. XVI, No. 1 (1963), p. 62.

roughly one third of the exports to the less developed region as a whole. This pattern of distribution is in harmony with the general observation that the bulk of the export trade of the less developed countries is transacted with the industrial and advanced regions of the world, and that trade between the less developed countries themselves is relatively small.

Providing the Required Facilities

Attention has been given to the establishment of efficient means of transportation to facilitate the transfer of raw materials, whether imported or locally produced, to manufacturing centers; and the shipment of finished goods to consumption markets and ports of exportation. A railway line was extended from Aswan, for example, to carry iron ores to the iron and steel mill at Helwan.²⁴ Highways were constructed between Cairo and Alexandria; Cairo and Aswan; Abul Matamir, in the west, and Matera, in the east; and the New Valley and the Nile Valley. Roads also connected the mining and industrial areas in the Eastern and Western deserts, and along the Red Sea and Sinai.²⁵ A network of pipelines began in 1956 to penetrate the country from Suez and Alexandria to Cairo and the Delta.²⁶ The building of a new petroleum pipeline network is underway to link Mex and Tanta. This pipeline comprises two auxiliary branches, the first for the transportation of petroleum

²⁴Information Department, Transport and Communications, Cairo U. A. R., 1963, p. 15.

²⁵Ibid., p. 24.

²⁶"Egyptian Oil Booms," op. cit., p. 13.

by-products, and the second, starting from Mex and passing through Kafr el Dawar, for gasoline and kerosene.²⁷ Moreover, old ports were improved and new ones were constructed on the Red Sea coast and the Gulf of Suez for both internal and external movement of minerals and manufactures.

Egyptian industry has been dependent on imported coal for the generation of power. Only recently has coal been discovered in certain parts of the country, and a new plant was erected for the production of coke by the destructive distillation of coal.²⁸ Coke is required to feed the blast furnaces of the iron and steel industry. The augmented quantity of petroleum products and the electrification of the old Aswan Dam also increased the capacity of the local sources of energy to meet the industrial requirements for power. The country's potentialities of electricity will be greatly increased with construction of the Aswan High Dam power station. Four main tunnels with turbines and twelve generating units are planned to be completed in 1970.²⁹ Meanwhile, two main high-tension transmission lines from Aswan to Cairo, transformer stations, and other transmission and distribution lines of both high and medium tension have to be installed by 1968 so that the power generated from each unit can be gradually utilized.

²⁷Galal H. Sadek, "The Oil Industry in the U.A.R.," p. 51.

²⁸U.A.R. Government, 12 Years of Industrial Development, p. 235.

²⁹Information Department, Aswan High Dam, Cairo, U.A.R., May 1964, p. 20.

Great use of underground water has been made for industrial purposes, especially in the desert areas. Branch canals and water pipes were extended to areas adjacent to the Nile Valley. One of the most recent projects is the extension of water pipes from the Nile River to Sinai underneath the Suez Canal. Filtering stations, such as the one built north of Helwan, were positioned in areas where pure water is needed by industry.

Drainage facilities and sewage systems were implemented in towns and rural areas to provide factories with required services for waste disposal. At the same time, these projects have protected water arteries against pollution to preserve an adequate supply of water for industrial use.

Finally, new communities were planned where popular housing, shopping centers, clubs, recreation areas, schools, and hospitals were established to provide living facilities for the new agglomerations of workmen.

CHAPTER VIII

SUMMARY AND CONCLUSIONS

It was the procedure in the past to select the industrial location by the use of intuition, rule of thumb, and trial and error approaches; or according to various historical and social factors without regard to sound economic reasons. However, the process of industrial site selection has been developed so that it can fit into the general description of business administration. Determining a place for manufacturing has become, like any other business decision, a rational decision and is made after an assessment of the relative advantages of different positions for the purposes of the particular industry. Moreover, it is one of the early decisions in the foundation of a business enterprise, and is very important in that it is one of the most difficult to reverse if the choice should prove to be unwise.

BETWEEN THEORY AND PRACTICE

Three general types of the economic theory of location were briefly discussed. These were the least cost theory, the locational interdependence theory, and the maximum profit theory. The contribution of Walter Isard was considered to be within the framework of the least cost theory. Although industrialists are generally unaware of the existence of locational theories, they do conform in practice to the principles advocated by these theories.

The least cost theory seems to be the most generally applicable to industries in the United States. Price determination is the result

of competitive forces, and entrepreneurs, under the pressure of economizing expense, seek the place of least cost of productions for their activity.

The supposition of equal costs of production assumed under the interdependence theory of location eliminates its association with the real world. Although this theory may be more applicable to the producers of consumer goods, it is not recognized as a guide of action in many other situations. However, the agglomeration forces, first noted by Alfred Weber and expanded on by other least cost theorists, have affected the growth of industrial parks and complex whether in the United States or in the United Arab Republic. These forces include internal as well as external economies realized in proximity to complementary or related industries and services.

The least cost locale is usually that of maximum profit also. The maximum profit theory, however, covers situations where a site will be chosen while it is not that of least cost of production. This case is noticed where the industrial activity is situated with the objective of controlling a certain segment of the market.

In spite of the great diversification of the base upon which various types of the locational theory were built, there is no one theory that has been generally accepted by businessmen. This fact can be seen from the numerous locational decisions which are made according to other considerations rather than the least cost, the agglomeration forces, or the maximum profit. The desire to decentralize, the need to expand, or the necessity to relocate may have greater influence on site selection than any of the other determinants.

EXTENT OF FACTORS INFLUENCE AND APPLICATION

The industrial location has significant consequences that can make processing costs in one area different from those in another, though the effects vary considerably in importance from industry to industry, according to kind and scale of operations, and from time to time for the same industry as new techniques are developed. In practice, the influences on location decisions are not independent but act and react on one another. Site selection is not determined by one or some specific factors considered individually, it is the result of a combined effect of many factors. Among these factors of location are raw materials, markets, transfer cost, labor, capital, managerial ability, energy sources, industrial concentration and dispersal, climate, and many other factors working on the local level.

Most material resources are not available to industry at equal cost irrespective of position, because they are distributed in a scattered manner over a wide space area. There are those materials which are used after little preliminary processing, their sources being largely determined by nature. At the other end there are the highly processed materials, the sources of which depend upon the existing places of the factories where they are made. In addition to the available source of material, the kind of materials used, the processes applied in their manufacturing and the techniques used in distribution and utilization determine to a large extent the degree of influence exerted by raw materials on the locational decision. Moreover, if an industry uses several different raw materials the relative importance of each must be considered.

The attractions of a materials situation have to be measured against those of a site elsewhere, and especially of a market position. Markets have become of great significance for many modern industries. This may be justified on several bases such as transportation economies, mass production possibilities, increase in weight, bulk, fragility, or perishability of the product, and the importance of personal relationships between producer and consumer. However, the importance of the market as a locational factor depends upon the extension of area served by the manufacturer. While proximity to certain distributing centers is recommended in the case of an industry serving a nationwide market, it is a necessity to a producer selling in a local or specialized market.

In some industries the incurred transportation expenses are so heavy that the location problem boils down to finding the place where total transfer costs are lowest. Other industries are concerned with the expense and inconvenience of moving materials and products but would not need to give transfer costs the first place in their locational decision. This decision is usually affected by the available means of transportation, their relative cost, hauling distance and topography of land, urgency for the service and dependability of transportation, physical facilities, and required services.

Transfer costs have been playing a modifying role between raw materials and markets and development in transportation media and facilities. Even where the pull of raw materials is strong, production may not be carried on at or near the source of material. Remoteness from markets and/or lack of shipping facilities may offset the importance of the raw material and make utilization at the point of origin uneconomic.

Perhaps labor is the most complicated of all the principal factors of location. In fact, its influence is largely unpredictable. Not only is local labor likely to be materially affected by the advent of industry, but its character may gradually change owing to external and often uncontrollable causes such as the interference of automation and trade union activities. The effect of labor on the site selection process may be considered in terms of cost, quantity, and quality. Labor cost covers such matters as wage levels, productivity, fringe benefits, and compensation laws. Labor quantity is concerned with the supply of workers as well as the relative demand for the three main classes of laborers (male, female, and juvenile) and the degree of competition for labor in the local market. Labor quality deals with the need for special skills, training, and adaptability.

As an economic resource, managerial ability has been exerting a substantial influence in directing the localizing process of manufacturing. The managerial factor has both quantitative and qualitative characteristics; thus successful industrialization is dependent not only upon the generation of sufficient numbers of high-talent personnel but also upon their proper integration into effective organization structure.

The almost universal accessibility to energy supplies in the form of oil and electricity has made many industrial processes more flexible in their location requirements than before when coal was the only major source of power. Rather than clustering around water wheels, factories have been spreading out, taking advantage of a steady succession of developments: the steam boiler, the transmission of electricity for

long distances, oil- and gas-generated steam. The trend will be reinforced, in the future, by the utilization of atomic power.

The attraction of separate undertakings, pursuing the same kind of processes or participating in a sequence of operations, to locate in one position, is a common feature of industrial distribution. Such geographically associated establishments share the benefits realized from the economies of concentration. The linkage among these industries may be vertical, with each of them forming one stage in a series of operations; horizontal or lateral, where separate firms produce many individual parts and accessories to be assembled into a finished product; or diagonal, where a firm furnishes a good or provides a service that is required at various stages in the vertical process. This linkage may also be based on technological considerations with the associates using in common the same equipment or facilities. Above a certain size, however, such significant economies may be partially or even completely offset by the extra costs incurred in various ways, causing the dispersal of the industrial complex.

Climate has been gaining direct influence in selecting the place of manufacturing owing to the development of new industries requiring certain climatic conditions for adequate production. Moreover, climate has an indirect importance stemming from its effect on labor efficiency and productivity. This should be considered not only to maintain good human relations but also to realize business success and effectiveness.

The problem of industrial location cannot be completely solved on regional bases. The advantages of determining a suitable region for the contemplated type of production may be jeopardized, if not completely

forgone, by the selection of an unsatisfactory community within this region. To find a satisfactory site, local factors such as cost of land, suitability of buildings, availability of services, adequate water supply, reasonable financial support, and accurate business information should be investigated.

The optimum location implies that a balance has been achieved among all factors so that they mesh smoothly and each makes its due contribution to provide the most economic conditions for production. It should be noted, however, that even the best position will not be wholly ideal. No place has a complete monopoly of advantages and total absence of disadvantages, so that even the best choice will contain some element of compromise.

With more possible plant sites to choose between, management has been able to compare certain advantages of the new situations with greater speed and accuracy than in the past. Quantitative measures such as the comparative cost analysis, the input-output analysis, linear programming, the industrial complex analysis, the market position techniques are used to solve cost, transportation, and other objective matters.

The elements affecting locational profitability and serviceability are numerous and complexly related. There are usually two phases to such problems. First, the relevant factors (for example, agglomeration economies, transportation facilities, proximity to markets) have to be determined. Once the effect of each of these upon profit and/or service is known, the second step is to compute via a mathematical model the best locale. In both these phases the mathematical question is often so large that a computer solution is required.

Such devices, however, will not either solve the many subtle nontechnical problems or help in assessing the relative importance of a plant location factor. This type of question is peculiarly one for executive judgment. The place for an automatic factory may be determined some day by feeding data into an electronic computer. But the human element in manufacturing activities and the subjective influence in the process of site selection remains very great. Industrial location is still a problem for top management, with its responsibility for the results of such substantial investment decisions.

Industrial activity is usually restricted to areas where production factors are available in the right quantity, quality, and cost. Consequently, immobility or mobility of these factors plays a great part in eliminating manufacturing to certain positions or spreading it out over extending regions.

Although land is naturally fixed, the products of land are mobile and can be transferred to places where other factors of location are favorable. This can be easily accomplished by the ever developing means of transportation.

Labor is considered to be spatially as well as occupationally mobile. Such mobility may be hampered by deep-seated economic and social conditions, and by unions' activities. However, geographical mobility has been encouraged by increased moving facilities, employment opportunities, government policies, and support of the concerned local organizations. Occupational mobility, also, has been greatly induced due to the continuous change experienced by industry and the progressive standardization of machines and operations.

Money capital is usually treated as more mobile than capital goods, although its flow can be hindered by political boundaries and international risk. These obstacles can be overcome by the coordinated effort of the financial organizations, private and governmental, toward a unified rate of interest, security of investment, and certainty of returns.

Managerial mobility depends on good prospects, high salaries, and social inducements. In the absence of boundary restrictions and emigration impediments, managerial ability can be considered highly mobile.

On the international level, several steps were taken to facilitate the movement of foreign capital as a significant factor for the industrialization of developing countries. Government insurance and protection, free transfer of interest and dividends, repatriation of capital, exemption from custom duties, and bilateral treaties are examples of what have been done. On the other hand, the foreign investor has been encouraged by high profit expectations and extending markets overseas.

International mobility of labor and managerial ability depends on their contribution to training and promotion of the native labor, and on their participation in providing tools and equipment to receiving states. The relaxation of immigration laws in some countries and the formation of special agencies resulted in increased financial help and technical assistance given by developed countries to developing nations.

Recent developments have been exerting a drastic change in the geographical distribution of industries in the United States. It was only at the end of the second World War that the South and West found the chance to make a bid for northern industry. Manufacturing had diversified as well as expanded in those regions during and after the

war years. In the late forties, not only were there existing plants to attract northern industrialists, but there were also more skilled workers and more people with higher per capita incomes, suggesting that a significant market existed.

Essentially, it was the prospect of three factors: markets, materials, and labor, all interrelated, that gave the South and the West their post-war opportunity to attract industry. At the same time, a number of northern factories were rapidly becoming obsolete. Confronted with a decision to expand their present facilities or relocate, many chose to move. For not only were land costs lower in the South and the West, and markets appealing, but also several southern and western states began to push offers of long-term tax exemptions and 100 per cent financing of new plants. Furthermore, other forces such as climate, improved transportation, national security, decentralization, developed sources of energy, and relaxed regulations were accentuating the move.

On the local level, the trend has been toward the smaller communities as they possess most of the advantages of large cities with avoidance of many disadvantages of these cities. This makes neighboring communities and states even more bitter competitors than rival regional areas. So by and large the scramble for new industry is a fine thing, but there is a growing evidence that as the competition grows hotter, more and more states and communities are offering financial inducements, sometimes with a disregard of future punitive costs to themselves and their new corporate citizens. What must be determined is whether the promise of jobs and increased prosperity to the community is worth the price.

However, the new tendencies have certainly contributed to many improvements. Industrial parks have sprouted on desolate sandlots with vast super-highways smoothing the path of corporate progress. Universities and colleges have been upgraded, and teachers lured away from rival states in order to attract research and development corporations. And, most important, state programs designed to train the illiterate and the unskilled have got under way as officials have discovered that, for most industrial firms, a community's greatest asset lies in the character, skill, and attitudes of its people.

APPLICATION IN THE UNITED ARAB REPUBLIC

In selecting their place of manufacturing, the Egyptian industries have been governed by the guidelines put forth by the factors of location as analyzed in this study. However, the emphasis given to each factor has been slightly different than what is being applied in the United States. This is to meet the special needs and peculiar situation of the United Arab Republic.

Three types of locational factors influenced the placement of industry in Egypt. These are historical, topographical, and economic factors. Manufacturing used to be directed toward old established centers such as Damietta, Mahalla el Kubra, Qalyb, Assuit, and Akhmim. To be sure, what is known today to be historic, was not so when the industrial activity originally started in these locales. It was affected by economic or topographical elements such as availability of raw materials, transportation facilities, nearness to markets, and climate suitability. Although most of the original reasons of attraction seized to be workable, some of these centers survived because of their industrial

atmosphere and the experience gained by their people; others are still flourishing owing to the continuation of the old factors; still others are even progressing due to the introduction of new forces.

Founders' residence and urban attraction are the other two historic factors affecting the construction of factories in certain positions. Individual entrepreneurs tended to establish their business, usually of the small size, close to their residence for convenience and importance of maintaining personal relationships with customers. On the other side, large establishments were directed by urban amenities in their locational decision. Modern industries, however, are trying to prove that rural areas can be converted into suitable place for manufacturing by situating their plants away from large cities.

Several topographical factors also exerted power in determining Egypt's industrial sites. Land surface has a special influence since the majority of the country's surface is desert. Consequently, the industrial activity has been restricted to the Nile Valley where it is easier and economical to construct facilities and services required for manufacturing. Some major industries such as weaving, spinning, and paper making were affected by the climate in their location because of their requirements of certain degrees of humidity or dryness. Water supply has not been a decisive element in the process of site selection since most manufacturing is confined to the Nile Basin and Delta where water is available in sufficient quantities. Nevertheless, the importance of this factor should not be underestimated as the industrial activity is being extended to other parts of the country. The same situation applies to drainage facilities which constitute no problem for the time being.

Great consideration is given by the Egyptian industries to economic factors in handling the problem of plant location. These factors include raw materials, the market, transportation facilities, the labor force, the availability of capital, managerial ability, energy sources, and industrial concentration. Although they affect the locational decision collectively, the influence exerted by each of them differs according to the type of the contemplated industry. However, since the value of materials constitutes the major part in the total cost of production, most of the manufacturing activity in Egypt is raw materials oriented in its site selection.

Nearness to the market occupies the second position in the preference gradation in determining the place of processing. It is a followed procedure to locate industry within the distribution area of its product in the absence of any specific factor having a direct effect on its placement. This is especially applied in selecting sites for the production of consumer goods. Prices are competitively determined and proximity to markets has a large bearing on profits. Small-sized establishments also have a great concern in locating their industries near the market to maintain personal relationships with customers and to avoid transportation cost and difficulties.

Transportation facilities were realized as a location factor with the start of manufacturing in Egypt. More specifically, Assuit for example emerged as an industrial center in the past owing to its position on the road between Egypt and the Sudan. In last decades, Cairo and Alexandria have been considered to be the most industrially developed areas of the country because of their accessibility for internal as well as external means of transfer. Despite the fact that the United Arab

Republic possesses all kinds of transfer media by rail, road, water, and air, and that the Suez Canal runs in its territory, the progress in transportation does not keep pace with the industrialization move in the country.

To determine the effect of the labor force on the locational decision, several elements such as labor supply, wage level, productivity, turnover and absenteeism, and trade unions and labor laws were discussed. Labor was found to be available in large supply almost anywhere. The real problem is the lack of know-how and technical ability. Wages are determined by law and differences in the way of compensation tend to disappear among all regions. Labor productivity has shown gradual increase with the mechanization of industry and the increased utilization of new machinery and modern equipment. Turnover rate and absenteeism are higher in the country and among the unskilled laborers rather than in the city and among the skilled workers. The rural areas lack living facilities and services, and the industrial laborer there was moved originally from the agricultural activity. He is less disciplined than the laborer in the urban areas who is more acquainted with industrial regulations and sanctions. The skilled worker shows more interest in his work than the unskilled worker who has little prospect in his employment. Although laborers in the United Arab Republic have been organized in unions since 1899, they started to gain power just recently. Labor laws are favoring the worker and protecting his benefits. Certain costly labor-standard-requirements such as paid vacations, sick leaves, and restrictions on dismissals are a burden on investors. They are unusual and extreme for a country whose industry is in an early stage of development. Further

benefits to labor should be measured by productivity and weighed against negative effects that may result such as reduced demand for labor and lower rate of growth of the national output.

In the late nineteenth and early twentieth centuries, practically all of the manufacturing industry in Egypt was controlled by foreign capital. Locations of industries were affected by the foreign investors' residence and places of convenience to them. Restrictive laws were passed in the 1920's to limit the influence of foreign owned enterprises on the national economy, and to encourage the participation of Egyptians in their management. The assistance accorded to local entrepreneurs resulted in the establishment of many national concerns in different parts of the country.

Managerial ability was tied up to capital. Its effect was simply to supplement the influence exerted by capital on the selection of manufacturing sites. When Egyptian capitalists dominated the industrial activity, they played the same role performed by foreign investors. They concentrated business control and management in their hands, showing reticence to the expansion of managerial classes. Only recently and when management and ownership were separated did management development take place.

Coal, oil, and electricity were the three sources of energy to affect the location of Egyptian industries. When coal was the only source of power, Egypt used to import it from European countries. Most factories were stationed in the port city of Alexandria and in other places with good transportation connections where coal could be economically transferred. The extraction of oil increased the number of manufacturing positions especially when it was carried by pipelines to many parts of

the country. While the use of electricity for industrial purposes is not on a large scale, it is expected to be greatly augmented after the construction of the High Dam power station.

GOVERNMENT INTERVENTION

Examples of industrial sites influenced by each factor of location were cited in this study. One of the clear conclusions of the analysis is the tendency of the manufacturing activity in the United Arab Republic to concentrate in specific areas especially in Cairo and Alexandria. This situation cannot be justified only on the bases of agglomeration forces and external economies. More important, it is the outcome of Egypt's particular circumstances. Egypt has unlimited aspirations and capacity to develop the human resources required by any industrialization plan. Her basic shortages are in capital and in natural resources. Lack of venture capital willing to assume the risk of new undertakings is a sharp obstacle to economic development. And because of the prevailing nationalistic movement, no appreciable amount of foreign capital would flow into the country. No great mineral wealth was discovered and the agricultural land is cultivated almost to its maximum intensity. Technical know-how is lacking and managerial ability is needed for any kind of progress. Moreover, distribution possibilities for native products are limited either in the local market or abroad. And manufacturing facilities are required to spread the industrial activity over a large area.

In spite of the fact that the United Arab Republic is overwhelmed by a population-growth rate which continues to outstrip production increase, the development that the nation was experiencing until 1952 was far from being a planned process. Confronted with this situation,

the new regime looked upon a large-scale industrialization program as a means of elevating the low standard of living. For this goal to be accomplished, processing has to be dispersed rather than confined to certain places. And government intervention was required to overcome the previously mentioned obstacles. Such intervention is justified not only as a reflection of the expanding corporations at public expense, but also on the fact that location is a serious matter for the firm itself and for the regional or even the national interest as well. This interest can be served through the application of several measures such as the geographical redistribution of population with regard to the availability of economic resources, the establishment of new industrial centers and the creation of subsidiary industries, the dispersal of vital industries for defense purposes, and provision of the required social services.

Consequently, the definition of the locator's objective must be broader than the simple claim of self interest and maximum profits. The choice of a plant site, by a rational individual, should be explained under the postulates of maximum satisfaction and public welfare. The factors of location may then be extended to include other considerations which are unrelated to maximum profits. These considerations offer psychic benefits and national prosperity and security.

To increase the country's potentialities for wide geographical distribution of industries, the requirements for such expansion had to be fulfilled. Land ownership was regulated and maximum limit was put on investment in new buildings in order to release local funds for manufacturing. The inflow of international capital which first took the form of government loans and later was in the form of private investment

helped to establish the foundation for the large scale industrialization program.

Intensive geological exploration has been carried on by qualified staff using modern equipment to increase mineral and petroleum supplies. Agricultural planning included programs for expanding the cultivated area, increasing yield, and diversifying production.

Great effort and interest were devoted to manpower development. Workers and would-be workers have been provided with practical training and technical knowledge under the guidance of native technicians and foreign experts.

Egypt now has the nucleus of industrial managers and the basic institutions to fulfill this role. The existing managerial elite, though small, is energetic and receptive to modern technology and methods of organization. The country's educational institutions are capable of increasing the supply of high level manpower.

In order to ensure quality and competitive strength for the Egyptian products in both local and foreign markets, standards were put on their processing and distribution. Many commodities found their way to overseas outlets and their future is promising.

Finally, facilities and services have been supplied to every possible area to which manufacturing can be extended.

For the implementation of the new policy, a separate ministry for industry was established in 1957, the Industrial Organization Law, organizing and encouraging the industrial activity, was issued in 1958, research and training centers were constructed, a number of local and national administrations were formed, industrial five-year plans have

been conducted, and a local governmental system and cooperative societies were introduced for the first time. Moreover, several aids and inducements were offered to industrialists. These took the form of subsidies, loans, participation in capital, exemption from taxes and custom duties, tariff protection, priority in exportation and government supply, minimum profit guarantee, providing necessary information and technical assistance, and promotional activities.

CRITICISM

The execution of the industrialization plan resulted in the construction of major projects such as the High Dam, the New Valley, the Quattara Depression, and the Tahrir governorate. New industrial centers such as Aswan and Helwan were founded and a number of new industries have been efficiently operated. Moreover, the industrial activity found its way to the village and rural areas. However, results were not all successful, and good judgment was missed in some cases. The steel and iron mill, for example, is built near Helwan; the ore is found in the area east of Aswan, and the coke has to be imported. Both ore and coke are brought to the plant by means of railways and Nile barges, a fact which sends up the cost of production. This situation may be justified on the bases of economics of concentration or proximity to markets, but the product is at a competitive disadvantage. Also, there is still concentration of the newly established plants in the old industrial areas such as Cairo, Alexandria, and Suez.

SUGGESTED LOCATIONS

The industrial activity can be extended to areas such as the northwestern coast from Alexandria to Sallum, Abis area to the south

and southwest of Alexandria, El-Nubariah canal zone in Beheira governorate and similar zones in the northern governorates, Qoota and Kom Ochim near Fayoum, the desert strip on the Nile banks and on the two sides of the Delta, the desert strip on the Suez Canal banks, Sinai Peninsula, the east coast of the Red Sea, and the oases.

These areas are preferable because of their topographical and economic advantages. Not only that these locations are near to the already developed areas, but also the land surface is plain where water supply, drainage facilities, and industrial services can be economically provided. In some places where the Nile or canals are relatively far, underground water can be easily available. Moreover, climatic conditions are suitable for any kind of manufacturing.

With regard to the economic advantages of the suggested sites, raw materials are available either from the near-by cultivated land or from the surrounding mineral deposits and petroleum supplies. Labor is available in large supply in the country, and workers can be redistributed over the new places after the construction of living quarters and facilities. Furthermore, land is plentiful, costless, and available for any future expansion. Fuel and electricity can be transmitted for power generation, and transportation media by rail, roads, or water are either existant or can be extended. The foreign market is easier to reach by industries situated near the Suez Canal zone and the Red Sea coast. And the local market can be covered through the Nile and other means of transfer.

THE UNITED STATES AND THE UNITED ARAB REPUBLIC COMPARED

The United Arab Republic might be regarded as a single industrial region with the Nile River crossing it from south to north. In some industries, a manufacturer established in any one of the industrial centers might not be uneconomically placed to acquire his materials, to serve the greater part of the national market, and to have ready access to a port for overseas trade. This situation has helped a high concentration of industrial activity.

The survival of the old industrial centers in Egypt rests on other advantages which have grown up to offset the loss of the initial attraction. Among these advantages are the growth of a skilled labor force, the establishment of a product reputation, and the building up of an industrial atmosphere.

Under recent developments, the mobility of Egyptian industry can be urged by social as well as economic factors. Great dependence is put upon the movement of factors of production to make available the missing requirements in certain localities.

The Egyptian locator is guided by national interest as well as by his individual benefits in selecting the industrial site.

Government action affecting the location of industry is not confined to specific countries but is prevalent in all economies today. However, such action may be more effective in the United Arab Republic for the sake of public welfare according to its socialistic system.

In the United States, on the other hand, with its vastly greater size, industrial areas are much bigger and far more widely separated. Location decisions, therefore, are often of a different order of magnitude and importance.

Old established centers continue to flourish because of the high immobility of capital equipment. Heavy investment, not readily written off, is tied up in such equipment. Furthermore, it is often much cheaper to expand industrial capacity at an existing site than to construct a new plant on a new position.

Under recent tendencies, changes in the location of the American industry are influenced by the availability of economic factors and the changing role performed by each of them.

The manufacturer in the United States is completely persuaded by the maximum-profit motive in his locational decision.

Government intervention in the process of site determination is slightly effectual even in the case of national security. This is justified on the basis of the free enterprise system.

GENERAL RECOMMENDATIONS

In this closing section, several common pitfalls are recognized so that they can be avoided, and some recommendations are given so that they may be followed.

Some labor-oriented concerns miscalculate labor costs. They develop wage-rate data for comparative skills and job occupations but neglect to assess the effect of local fringe benefits. They should take into account the relative differences in workweek, overtime patterns, turnover, absenteeism, productivity, and attitudes.

Manufacturing may be interrupted by lack of a suitable labor force. New operations located in resort areas or adjacent to high-paying seasonal industries would be forced to close down.

Smaller communities could offer more favorable conditions than congested metropolitan areas. However, future expansion needs may be jeopardized by encroachment of residential and commercial districts, and by the limited size of available services and facilities.

Selected sites have to be checked against unforeseeable difficulties such as poor subsoil conditions, inefficient utilities, restricting zoning ordinances, roads inadequacy, and uncooperative community.

Lack of distribution know-how and overestimation of market fertility especially for new products may endanger the future of an industry in a certain region.

The local impact of the new plant may introduce complex problems such as those superimposed on an agricultural economy not ready for new type of requirements.

Many non-integrated industries might be faced by the shortage of supporting facilities when they concentrate in one locale. A community may measure up well in availability of primary supplies for manufacturing but be unable to provide a wide enough range of other services, supplies, and supporting industries.

Factors-input costs vary with every industry. For some, labor accounts for a relatively high proportion of final delivered-to-customer product costs. In others, assembly of raw materials, transportation expense, or cheap power and fuel are the determining factors.

Current and anticipated tax rates and regulations, and problems of overseas branches have to be carefully investigated and evaluated.

Finally, national security and public welfare should be given an impressive consideration in the process of site selection.

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APPENDIX A

CHECK LIST OF FACTORS AFFECTING PLANT LOCATION

Reproduced below is a two-part check list of the factors to be considered when seeking the site for a new plant. This summary was developed by Fantus Factory Locating Service, of Chicago and New York, an organization which specializes in locating factory sites for its clients. Part I of the check list deals with the factors considered within a company prior to instituting a search for a new plant site, while Part II lists the items evaluated in each town chosen for investigation.

PART I--ANALYSIS OF PRESENT FACILITIES

A. General Historical Outline

1. When founded
2. Mergers or business changes
3. Affiliations or subsidiaries
4. General growth of company

B. Markets (including information on finished products)

1. Annual volume in dollars of finished products
2. Total tonnage of finished products
3. Location of principal markets, and percentage of tonnage shipped to major market areas
 - a. Rail (LCL--Carload)
 - b. Truck (LTL--Truckload)
 - c. Carloading companies
 - d. Waterway (LCL--Carload)
 - e. Others
4. Freight classification description of finished products, and how packed for shipment
5. Location of warehousing facilities, including public warehouses
6. Terms of sale: FOB, FAS, CIF, prepaid, etc.
 - a. Equalization
 - b. Freight allowances
7. Total annual freight costs on outgoing products
8. Location of principal competitors
9. Is time in transit an important factor in reaching the market?

C. Raw Materials

1. Primary (Source. . . .Quantity. . . . and Total freight charges.)

- 2. Secondary (Source. . . . Quantity. and Total freight charges.)

D. Labor

- 1. General summary of labor needs, skills required, training time, etc.
- 2. Direct labor
 - a. Male

Job Classifications	Quantity	Hours	Wage Scale		
			Minimum	Maximum	Average

- b. Female

Job Classifications	Quantity	Hours	Wage Scale		
			Minimum	Maximum	Average

- 3. Nonproductive labor
 - a. Male (detail as above)
 - b. Female (detail as above)
- 4. Total annual factory payroll
- 5. Fringe benefits now in effect
- 6. Shift differentials
- 7. Hours worked in average week, overtime provisions, etc.
- 8. Labor turnover
 - a. Discharges
 - b. Voluntary quits
 - c. Percentage of labor turnover to average number of payroll
 - d. Seasonal fluctuations, if any
- 9. Union setup
- 10. General summary of labor conditions in area
- 11. Personnel to be transferred if branch plant is established
 - a. Executive
 - 1. Number
 - 2. Housing requirements
 - 3. Social and recreational hobbies
 - 4. School and church preferences
 - b. Superintendent and foreman
 - 1. Number
 - 2. Housing requirements
 - 3. Social and recreational hobbies
 - 4. School and church preferences

- c. Key workers
 - 1. Number
 - 2. Housing requirements
 - 3. Social and recreational hobbies
 - 4. School and church preferences

E. Power, Gas, Water

- 1. Electrical power
 - a. Present power rate per K.W.H. including demand, energy and load factor charges
 - b. Total number of K.W.H. used annually
 - c. Is consumption of power steady, or are there seasonal peaks?
 - d. Motor equipment A.C. or D.C.
 - e. Motor equipment is. . . volt. . . phase . . . cycle
- 2. Coal (or oil)
 - a. Total quantity consumed for processing only
 - b. Type and quality used
 - c. Delivered price per carload
- 3. Gas
 - a. Natural or artificial
 - b. Annual consumption
 - c. Cost per 100 cubic feet
 - d. B.T.U. per cubic foot
- 4. Water
 - a. Annual consumption
 - b. Cost per 1,000 gallons
 - c. Characteristics
 - d. Disposal of effluent

F. Workmen's Compensation Insurance

- 1. Classification
- 2. \$. . . . per \$100 of payroll
- 3. Total annual cost of Workmen's Compensation Insurance

G. State Taxes, etc.

- 1. Corporation income, excise, franchise, and personal property taxes
- 2. Are state labor laws, unemployment compensation provisions or other regulations prohibitive or restrictive?

H. Present Plant(s)

- 1. Total floor space currently occupied
- 2. Does present layout of plant(s) restrict free flow of production?

3. Rent or total annual carrying costs (excluding taxes)
 4. Estimated additional annual costs due to poor layout, lack of siding, etc.
 5. Total local real estate taxes (real property only)
 6. Personal property and other locally assessed taxes
 7. Heat by coal or oil--total cost
- I. In the Event That a Building Already Constructed Can Be Utilized in the Area Finally Chosen, the Following Information Should Be Developed
1. Total floor area required
 2. Type of building required
 - a. Materials
 - b. Dimensions
 - c. Floor materials and floor load
 - d. Ceiling heights
 - e. Sprinkler
 - f. Siding and loading facilities
 - g. High or low pressure boilers (coal or oil)
 - h. Bays
 - i. Type of roof (monitor, sawtooth, etc.)
- J. Construction of New Plant (if suitable building is not available)
1. Give brief description of type of building to be constructed
 2. Preferred elevation of land
 3. Size of plot required
 4. Is proximity to railroad siding essential?
 5. Size of water mains, gas line, and power line necessary
 6. Sewerage and disposal requirements
 7. Will tank for sprinkler system be installed, or will fire protection depend entirely on local water pressure?
 8. Do operations give off any offensive odor?
 9. Is employee convenience a factor?
- K. Location Preference
1. Geographical boundaries
 2. Size of community
 3. Type of community
 4. Community cooperation required
- L. Computation of Present Costs

In order to arrive at a correct valuation of the factors involved, it is advisable to compute present costs along the following lines:

<u>Total Transportation Costs</u>	Inbound materials. . . . \$
	Outbound products. . . . \$
	Total \$

<u>Labor</u>	Direct \$
	Nonproductive \$
	Total \$
<u>Plant Overhead</u>	Rent or carrying costs, excluding taxes \$
	Additional costs due to inefficient layout, lack of siding, etc. \$
	Real estate taxes \$
	Personal property and other locally assessed taxes . . \$
	Fuel for heating purposes only. \$
	Total \$
<u>Utilities</u>	Power \$
	Gas \$
	Water \$
	Total \$
<u>State Factors</u>	State taxes \$
	Workmen's Compensation Insurance \$
	Total \$
<u>Miscellaneous</u>	Other cost factors inherent or peculiar to present location(s) \$
	Total \$
	GRAND TOTAL \$

PART II--ANALYSIS OF SELECTED SITES

- A. Location
- B. Character of Surrounding Territory
 - 1. Terrain
 - 2. Elevation
 - 3. Flood hazards
- C. Population Statistics
 - 1. Growth
 - 2. Corporate limits
 - 3. Suburban
 - 4. Labor drawing area
 - 5. Brief historical sketch

D. Civic Administration

1. Political party
2. Form of government
 - a. Police
 1. Personnel
 2. Equipment
 3. Do industrial properties receive patrol service?
 - b. Fire
 1. Personnel
 2. Equipment
 3. Annual losses
 4. Insurance class
 5. Do existing plants have sprinkler tanks?
 - c. Streets and highways
 1. How cleaned
 2. Miles paved and unpaved
 3. Contemplated building program
 - d. Sewers
 - e. Garbage disposal
 - f. Hospital facilities
 1. Number of doctors
 2. Number of beds
 - g. Judiciary
3. Taxes
 - a. Rate
 1. Real estate
 2. Personal property
 - b. Assessments, per cent of value
 - c. Rates for
 1. Township taxes
 2. Municipal taxes
 3. County taxes
 4. Park Board taxes
 5. School taxes
 6. Other taxes
 - d. Poll tax
 - e. Business license fees
 - f. Exemptions
 - g. Contemplated expansion of city facilities affecting tax rate
4. Is the attitude of present city government favorable to industry?
 - a. Impartially check past newspaper clippings
 - b. Make personal contact with every industrial employer of 25 people in the community. (Obtain an expression of their experience in the community)
5. Income and expenditures
6. Indebtedness

E. Climate

1. General description of weather
2. Temperature
 - a. Annual average
 - b. Seasonal average
 - c. Maximum temperature
 - d. Minimum temperature
3. Precipitation
 - a. Average rainfall
 - b. Average snowfall
4. Humidity (Average relative humidity)

F. Cost of Living (per capita)

1. Rent
2. Food
3. Clothing
4. Other necessities
5. Luxuries
6. Department and merchandise store expenditure
7. Residential rates
 - a. Power
 - b. Gas
 - c. Water
8. Transportation
 - a. Street car fares
 - b. Bus fares

G. Labor

1. Total employment
2. Analyze supply of suitable labor available
3. Analyze supply of unskilled labor
4. Elements of labor unrest
 - a. Labor organizations
 - b. Radical groups
 - c. Unemployed councils
5. Past history of labor disturbances
 - a. Check labor files from 1917 revealing, where possible:
 1. Strikes
 2. Threatened strikes
 3. Wage disputes

- 4. Walkouts
- 5. Lockouts
- b. Determine number of employees directly and indirectly affected in each instance
- 6. Prevailing wage scale for all classes and types of employment
- 7. Minimum, average, and maximum hour shifts
- 8. Labor turnover
- 9. Characteristics of labor
 - a. Rural
 - b. Urban
 - c. Agricultural, industrial, mining
 - d. Per cent illiteracy
 - e. Per cent foreign born by nationalities
 - f. Per cent negro labor
- 10. Sex and type
 - a. Per cent male gainfully employed
 - b. Per cent female gainfully employed
- 11. Efficiency of labor
- 12. Bonus systems
 - a. Describe piece work and bonus systems now in effect
- 13. Seasonal variations (If seasonal variations occur, examine causes and effects)
- 14. Training facilities
 - a. Apprenticeship courses
 - b. Trade schools
 - c. Foremen's courses

H. Transportation facilities

- 1. Railroads
 - a. Trunk lines
 - b. Short lines and switching lines
 - c. Volume of freight traffic
 - 1. CL
 - 2. LCL
 - d. Reciprocal switching agreements and switching charges
 - e. Transit privileges
 - f. Facilities for handling LCL traffic
 - 1. Frequency of service
 - 2. Scheduled merchandise trains
 - 3. Trap car service--weight minimum
 - 4. Store-door pickup and delivery service

- g. Freight rates
 - 1. Inbound raw materials
 - 2. Outbound products
- h. Time in transit

2. Motor trucking

- a. Over-the-road companies serving city
 - 1. Frequency of service
 - 2. Terminal facilities
- b. Local drayage companies and pool-car distributors
- c. Motor freight rates
 - 1. Inbound raw materials
 - 2. Outbound products
 - (a) TL--minimum weight
 - (b) LTL--weight breakdown
- d. Time in transit

3. Waterways

- a. River (or lake) transportation
 - 1. Description of system
 - 2. Frequency of service
 - 3. Water freight rates
 - (a) Inbound raw materials
 - (b) Outbound products
 - 4. Time in transit
 - 5. Incidental costs
- b. Intercoastal and coastwise transportation
 - 1. Description of system
 - 2. Frequency of service
 - 3. Water freight rates
 - (a) Inbound raw materials
 - (b) Outbound products
 - 4. Time in transit
 - 5. Incidental costs

4. Other traffic information

- a. Freight forwarder service
- b. Air service
 - 1. Air cargo and forwarder service
 - 2. Passenger service
- c. Parcel Post (including Air Parcel Post)
- d. Railway Express (including Air Express)
- e. Public warehouses
- f. Electric railways
- g. Local bus service

I. Power and Fuel

1. Power

- a. Service
 - 1. Steam
 - 2. Hydro-electric
 - 3. Diesel
- b. Reliability of service
- c. Adequacy of supply
- d. Kind
 - 1. Phase
 - 2. Cycle
 - 3. Voltage
- e. Seasonal restrictions
- f. Rates
- g. Availability of off-peak contracts
- h. Lighting allowance
- i. Discounts and penalties

2. Coal

- a. Closest coal-producing fields
- b. Cost
 - 1. Per ton
 - 2. Per carload
- c. Characteristics of coal by districts
 - 1. Free burning
 - 2. Flame
 - 3. High or low volatile
 - 4. Ash

3. Gas

- a. Natural
 - 1. Description of source and adequacy of future supply
 - 2. Quality and quantity
 - 3. Distribution facilities
 - 4. Rates for industrial consumers
- b. Artificial
 - 1. Description of facilities for manufacturing
 - 2. Quality and quantity of supply
 - 3. Distribution facilities
 - 4. Rates

J. Water

1. Water from city mains

- a. Description of system
- b. Pressure
- c. Capacity
 - 1. Pumping
 - 2. Softening
- d. Purification treatment
- e. Consumption

- f. If hard, is it suitable for boiler use?
- g. Rates (industrial)
- h. Chemical analysis
- i. Temperature

2. Water from rivers

- a. Describe source of supply, distance from city, and volume of flow
- b. Is special treatment necessary?
- c. Approximate cost
- d. Temperature

3. Water from wells

- a. Describe sources
- b. Cost of wells--depth necessary, etc.
- c. Quality of water
- d. Temperature
- e. Cost of treating water

K. Data on Present Manufacturing Concerns

- 1. Number of establishments
- 2. Average number of employees
- 3. Total wages paid
- 4. Cost of materials
- 5. Value of products
- 6. Types of industry
- 7. What industries have transferred their operations to some other city during the past six years? Why?
- 8. What industries have moved in during the past six years?
- 9. Related lines of manufacturing
- 10. Competition between industries for skilled labor

L. Industrial Legislation

- 1. Safety inspections
- 2. Zoning
- 3. Building code

M. Financial Data

- 1. Banks
 - a. State
 - b. National
 - c. Trust companies
 - d. Savings banks
 - e. Building and loan associations

2. Resources

- a. Deposits
- b. Capital
- c. Surplus
- d. Total assets
- e. Credit lines available

3. Prevailing interest rate

N. Educational, Recreational and Civic Data

1. Schools (with enrollment)

- a. Primary
- b. High school
- c. Junior college
- d. Universities
- e. Parochial
- f. Facilities for occupational training

2. Churches

3. Fraternal organizations

4. Libraries

5. Parks

6. Playgrounds

7. Motion picture theaters

8. Facilities for

- a. Golf
- b. Swimming
- c. Tennis
- d. Fishing
- e. Hunting
- f. Boating

9. Newspapers

- a. Weekly
- b. Daily
- c. Circulation of each
- d. Obtain 1 issue weekly of each for past 3 months

10. Special agencies

11. Hotels

12. Postal facilities

13. Public buildings

O. Special Inducements

- 1. Free site
- 2. Tax exemptions

3. City cooperation for construction of

- a. sewers
- b. Water mains
- c. Railroad siding
- d. Streets

4. Other cooperation

P. Building Costs

Average per square foot building costs for modern industrial plants.

Q. Available Industrial Properties

Describe suitable properties in detail

R. Sites

- 1. Acreage
- 2. Proximity to railroad
- 3. Elevation
- 4. Foundation
- 5. Accessibility to
 - a. Power lines
 - b. Gas lines
 - c. Water mains
- 6. Sewerage facilities
 - a. Storm
 - b. Sanitary
- 7. Nearness to transportation
- 8. Location in the city
- 9. Fire protection facilities
- 10. Zoning ordinances
- 11. History of floods

Source: Malcolm C. Neuhoff, Techniques in Plant Location, Studies in Business Policy, No. 61, National Industrial Conference Board, Inc., New York, 1953, pp. 43-48.

APPENDIX B

A COMMUNITY APPRAISAL GUIDE

MARKETS--PEOPLE

LOCATION

City

County

State

Metropolitan or market area (radius)

Distances to Other Principal Cities

Topography

Elevation

Flood hazard

Maps and Photos

City; county

Arterial highway approaches

Street map; location of principal buildings

Aerial photos of city

Views of downtown area and public buildings--city hall, hotels, hospitals, etc.

Typical local plants

Is the community in or near the major market area for the product(s) you will manufacture?

POPULATION

(City, Metropolitan Area, and County)

Size

1940 census

1950 census

Present estimate

Projection, 10 years hence

Population per square mile

Composition

Native-born white

Foreign-born white

Non-white

Other

Principal national origins of foreign-born

Age

Age bracket (male and female)

Under 5

5-15

16-20

21-45

46-65

Over 65

Median age

Schooling

Median school years completed

Levels of schooling completed

Percent of population holding advanced degrees

Percent of college graduates

Percent of high school graduates

Percent with less than high school education

Families

Number of families

Population per family

Income

(Present and 10 years ago)

Per capita income

Family median income

Levels of income by groups

Percent of families with income less than \$5,000

Percent between \$5,000-\$10,000

Percent over \$10,000

Retail Sales

(Present and 10 years ago)

Bank Deposits

(Present and 10 years ago)

Is educational level increasing?

Is per capita income increasing?

Is standard of living at or above the national average?

HOUSING(City, Metropolitan Area, and County)Dwelling Units

Type

Single-family
 Two-family
 Apartments
 Percent dwellings occupied
 Percent owner occupied
 Percent with water, toilet, bath

Availability

Houses for sale; for rent
 Typical price brackets
 Units constructed during each of past 5 years
 Construction cost of houses (\$ per square foot)
 Relation to national figures

What is trend of property values related to area average?
 What is percent of city property not yet developed?

LABOR AND MANUFACTURINGLABOR (City, Metropolitan Area, and County)Labor Force

(Present and 10 years ago)

Total employment
 Manufacturing
 Farming (farm mechanization)
 Professional and managerial
 Clerical and sales
 Skilled
 Semi-skilled
 Unskilled
 Manufacturing accounts for what percent of community's total population? Income?
 Is labor force predominantly of one sex?
 Is it customary for employees to insist on working only within closely restricted occupations or crafts?
 Is the community's economy sufficiently diversified industrially to provide reasonable stability of employment?

Labor Supply

(Present and 10 years ago)

Percent labor force employed
 Job openings in local plants
 Registered unemployment by job classifications
 Trend
 Type of job applicants: skilled; semi-skilled; unskilled;
 professional; managerial; sales; clerical

Engineers and scientists in area by categories
 Skills by occupational groups
 Specialized skills available
 Skills in short supply
 Seasonal fluctuations
 Resort areas' effect on labor availability
 Prospective workers' growth in responsibility
 Acceptance of in-plant training
 Is there an imbalance of labor requirements so that certain types
 of employees are difficult to find?
 Are there restrictions in making job assignments due to racial or
 other differences?
 Are young people taking jobs elsewhere?
 Is the supply adequate and qualified for your requirements?
 Is it adequate for all other employers?
 Can you complement rather than compete with existing industry?
 Will you be directly or indirectly competitive with an industrial
 pace-setter?

Labor Turnover

Quits
 Layoffs
 Involuntary separations
 Stability
 Own homes
 Roots in community

Wages

Industrial pace-setter
 Rates compared with those of your competitors
 Rates compared with competing communities
 Hourly or incentive
 Year-end bonuses
 Fringe benefits
 Insurance plans
 Pension plans
 Savings plans
 Blue Cross
 Blue Shield
 Will community progress along lines of guaranteed annual wage fit your
 proposed wage picture?
 Have employers kept pace on a voluntary basis with rising wage standards?

Working Hours

Shift patterns
 Starting and quitting schedules
 Special local holidays
 General health conditions
 Absenteeism

Attitude

Abuse of special privileges (coffee breaks, wash-up time, etc.)
 Good housekeeping, interior and exterior
 Industrial accident rate
 Adjustment to technological changes
 Do local people understand the importance of the profitability and growth of local industry to their own welfare?
 Is an undistorted, easy-to-understand explanation of how the American business system operates being given to the youth of the community?

Unions

Percent of industrial firms having union contracts
 Percent of union contracts specifying union membership as a condition of employment
 Dominant labor unions in community
 Dominance politically
 Dominance in other ways
 "Pattern-maker" in collective bargaining
 Recent strikes: locally inspired; nationally inspired
 Effect of local unions on employee productivity
 Disputes on job classification
 Special privileges for union stewards
 Featherbedding
 Constructive and fair union leadership
 Community's attitude toward unions

Labor History

Strikes
 Man-days lost because of work stoppages
 Trend
 Jurisdictional disputes
 Union negotiations
 Future labor tranquility

Has the community been dominated by union influence?
 Is there wide participation on the part of all employees represented by the bargaining unit, or does a small minority of membership determine union policy and action?
 Do local union officials generally oppose the position taken by the majority of business men on civic matters?

Management

Have employers generally provided good management and supervision over the years?
 Do local employers make a serious effort to provide steady employment (year to year--season to season)?
 Have employers generally improved employment opportunities, wages, and working conditions on a voluntary basis?

Are plant communications between employer and employee satisfactory?
 Do employers exchange data concerning labor contracts and wages?
 Do local employers work well together on joint efforts to improve
 the business climate of the community?
 Are local employers explaining their business policies and plans in
 terms of community's interest?
 Are a significant number of employers consistently willing to be
 identified as aggressively for or against controversial issues
 which affect the business climate?
 Do branch plants in the community represent national concerns with
 progressive management-labor-community policies?

MANUFACTURING

Manufacturers

(Present and 10 years ago)

Total number
 Employing 20-99
 Employing 100 or more
 Production workers' annual average income
 Wages entire year
 Value added by manufacture
 New capital expenditures
 Manufacturers employing more than 20 by major industry groups
 Manufacturers employing 100 or more
 Type of industry
 Employment: Male; female
 Date established
 Manufacturers employing 1,000 or more
 Type of industry
 Employment: Male; female
 Date established

Governmental Activity

Military installations in area
 Defense manufacturing
 Dispersion considerations

Suppliers' Nearness

Key parts and subassemblies
 Transportation; consultation

Service Industries

Repair shops
 Industrial and engineering supplies
 Professional services
 Construction facilities

What is the general economic situation?
 How important is industry to the community?
 How important is defense manufacturing to the community?
 Is the community well diversified industrially?
 Would the failure of one industry or concern seriously cripple the
 local economy?
 What is the record of business failures compared to national averages?

RAW MATERIALS

WATER

Supply

Public (reservoirs); private

Source

Streams; dry months' flow
 Ground water table; legal restrictions

Quality

Chemical analysis (degree of hardness, foreign elements, etc.)
 Incoming water temperature

Rates

Treatment costs (if needed)

Disposal (Legal Restrictions)

Nearby streams
 Waste treatment
 Cost of treatment

Will future municipal and industrial users seriously affect your water
 supply?
 Are municipal authorities looking ahead at the community's water
 problems?

MINERALS; SAW TIMBER

Immediate Vicinity

Availability

Sources

Prices

TransportationDepletion or ShortageMultiple Supply AreasPOWER AND FUELPOWERRates

Off-peak
 Discounts and penalties
 Fuel adjustment clauses
 Lighting allowances

Stoppage History

Causes
 Severity

Are you planning to manufacture part or all of your own electric power?
 Will nuclear power be available?
 Can the local power system fill the plant's needs as far as voltage,
 phase, cycles and capacities are concerned?
 Can the distribution lines handle a plant expansion program?

FUELOil; Gas; Coal

Delivery (time and cost)
 Stand-by facilities

Are oil, natural gas, and coal competitive fuels in the area?

TRANSPORTATIONRAILROADSPhysical Characteristics

Railroads serving community:
 Class I--main line
 Class I--branch line
 Class II--short line
 Switching and terminal

Is community a terminal point, i.e., one where freight trains originate and terminate, or an intermediate point, i.e., between terminals?
 Distance to nearest major freight terminal or classification point.
 Is there a local freight yard?

Plant sites available:

- Adjacent to main line
- Branch line
- Industrial spur
- Between railroad and highway

Would construction of a siding to your plant, now or later, involve any special difficulty or cost, e.g., difference in relative elevations, necessity of crossing intervening streams or highways, etc.?

Highest ranking local railroad traffic officer; operating officer
Truck facilities at local freight house

Services

Freight trains per day, each direction

Effective carload transit time:

- To nearest major terminal or classification point
- To major points to which you expect to ship
- From major sources of raw materials

Other cities served by direct LCL car lines

Effective LCL transit time:

- To nearest major transfer
- To major points to which you expect to ship
- From major suppliers

Local switching:

- By locally assigned engines and crews
- By road trains
- Number of switchings per day
- Reciprocal switching (if more than one railroad)

Piggyback service:

- For common carrier truck trailers
- For railroad trailers
- For private trailers

Pick-up and delivery service

Railroad policy re spur track construction.

HIGHWAYS

Physical Characteristics

Major highways--width, capacity, points directly reached

Toll roads

Federal aid roads--present, projected

Plant sites available adjacent to major highways

Legal

State laws as to speed, truck size and weight

Truck Lines

Common carriers; Local; interstate; locally owned

Contract carriers

Truck terminals: Private; public
 Effective transit time: Truckload and LTL to major destinations;
 from major suppliers

AIR

Local Airport

Types of planes accommodated
 Lengths of runways
 Distance from city
 Facilities for private planes

Air Lines Handling Air Express, Air Freight

PIPE LINE

Oil or Gas Pipe Line

WATER

Water Transport Available:

Deep water (ocean or lake)
 River or canal
 Maximum depth of water
 Length of navigation season

Port or Harbor Facilities

Piers Warehouses
 Cranes--maximum lift
 Lighterage
 Port or harbor authority

Water Services--common and contract

Ocean Lake Inland
 "Fishyback" or "Seatrain"
 Effective transit times to major destinations and from major suppliers

RATES

General Rate Territory

Rates (by different methods of transportation) on major products to major destinations; on major raw materials from major suppliers.

Probable Rates, as compared to those paid by competitors.

Special Charges

Local arbitraries
 Terminal service
 Switching
 LCL handling; LCL minimums
 Other

Special Reductions

"Incentive" or "multi-car" rates

Availability of Stop-Off Privileges

"In-transit"
 For partial loading or unloading

PASSENGERPublic

Points directly served by through trains; local trains; trunk air lines; feeder air lines; buses
 Number of daily trains, planes, buses
 Schedule time to major cities by rail, air, bus
 Arrival and departure times of principal trains, planes, buses
 Availability of Pullman service; charter plane service

Private (also see "Highways--Physical Characteristics" above)

Normal driving time to principal nearby cities
 Auto rental service

LOCAL

Local Transit--extent, condition, service frequency, fares.

Suburban Service, Rail or Bus--extent, condition, service frequency, fares.

Practical Daily Commuting Distance by public, private transport.

General Condition of City Streets, Roads, Bridges, etc.

Improvement plans
 Connection with state or national highway network
 Access roads
 Toll roads and bridges
 Parking facilities--public, private

Efficiency of Traffic Control

Auto Accident Rate as measured by insurance classification.

Effect of Winter ConditionsFORWARDERSForwarders or Car Lines

Physical facilities maintained
 Effective transit times to major destinations and from major suppliers

Local Cooperative Forwarding or Pooling GroupSpecial Taxes

Personal property
 Local sales tax
 Payroll tax
 Machinery, equipment, inventory, sales, franchise, municipality,
 road improvements, sewer, licenses, permits, fees, etc.

State

Financial condition--present and 10 years ago
 Expenditure balance between needs and income
 Total revenue all sources
 Revenue per capita
 Corporate tax rate
 Corporate taxes compared with competing states
 Percent general revenue from business taxes
 Franchise tax on out-of-state companies
 Sales or use taxes
 Property taxes
 Income tax
 Federal income tax deductible from state business taxes
 Gross debt
 Debt per capita
 Total cost all public works now approved
 Contemplated expansion of public facilities or service
 Taxes and debt picture compared with competing states
 Trend of state taxes

LABOR LAWSState

Right-to-work
 "Little Wagner Act"
 Wage and hours
 Compulsory mediation or arbitration
 Taft-Hartley
 Minority union picketing
 Secondary boycotts
 Featherbedding

Compulsory unionism

- Industry-wide bargaining
- Strike vote
- Disclosure of management information
- Injunctions
- Walsh-Healey Law
- Davis-Bacon Act
- Application of anti-trust laws to unions
- Equal pay for equal work
- FEPC
- Hidden restrictive laws
- Others
- Compensation
 - Unemployment compensation:
 - Cost compared with other states
 - Average employers' contribution
 - Workmen's compensation:
 - Cost compared with other states
 - Average payment

Local

Regulations

- Industrial noise, smoke, odors, waste disposal
- Zoning
- Building codes
- Highways and transportation
- Industrial health and safety
- Other regulatory laws

Courts

- Impartial decisions
- Promptness in enjoining illegal strikes and picketing
- Enforcement determined by political expediency

FINANCEBANKSReputation of Local Banking InstitutionsLeading Banks' Statements of ConditionAvailability of Mortgage Loan MoneyPrevailing Interest RatesState Branch Banking LawsSavings and Loan Associations' Statements of ConditionFederal Reserve System

FDICNon-Par

Are local banking facilities adequate to serve the community's needs?

FINANCING

Financial Aids to New Industry

Tax Relief to New Industry

Locally Financed Industrial Development Organizations

Means of State Financial Assistance

CLIMATEElevationTemperature (°F)

January normal monthly average

July normal monthly average

Annual normal monthly average

Precipitation (inches)

Wettest month

Driest month

Annual average

January snow, sleet

Season average snow, sleet

Relative Humidity (%)

January 1:00 p.m.

July 1:00 p.m.

Mean Frost Dates

First

Last

Sunshine (% of possible)

January

July

Annual average

Annual Mean Days (number)

Clear
 Partly cloudy
 Cloudy
 Precipitation (0.01 inches)
 Snow, sleet (1.00 inch)
 Heavy fog
 90° and above
 32° and below
 Zero and below

What are the climatic extremes?

Are there unusual wet or dry conditions?

What are effects of weather extremes on transportation, utilities, and plant operations?

What is history of unusual climatic conditions (tornadoes, hurricanes, floods, snowfall)?

INDUSTRIAL DEVELOPMENTMajor Industries

Fast-growing firms
 Branch operations (nationally known firms)
 Manufacturers with expanding employment
 Manufacturers with contracting employment
 Principal manufacturers having come into community during last 10 years--
 average employment of each
 Principal manufacturers having left community during last 10 years--
 average employment of each

Value Added by Manufacture--1947 = 100--U.S. and community (or comparable employment figures)

Food and kindred products
 Tobacco manufactures
 Textile mill products
 Apparel and related products
 Lumber and wood products
 Furniture, and fixtures
 Pulp, paper, and products
 Printing and publishing
 Chemicals and products
 Petroleum and coal products
 Rubber products
 Leather and leather products
 Stone, clay, and glass products
 Primary metal industries
 Fabricated metal products
 Machinery, except electrical

Electrical machinery
 Transportation equipment
 Instruments and related products
 Miscellaneous manufactures
 All manufactures

Potential

Is it reasonable to expect normal industrial growth in the community?
 Are the community's industries dynamic and growing or are they static and declining?
 Are the state and community making adequate effort to attract new industry? Are state and local officials realistic as to how state and community really compare with competing states and communities on important issues affecting the business climate?
 What is being done legislatively at a local or state level to encourage local industrial development?
 Available plant sites? Municipal and utility sources?
 Are local officials sympathetic and enthusiastic toward new industry?
 Are present efforts to attract new industry consistent with community needs and orderly growth in terms of labor supply?
 Are there special inducements to new industries? Free land? Free plant? Nominal rent? Low interest rates? Tax relief?
 If so, do they cause hardship to present companies?
 Do local citizens really encourage new industry?
 Does the community want a new industry?

Interview:

Chamber of Commerce
 Mayor or city manager
 City planning director
 Chief of police
 Newspaper publisher or editor
 Bureau of employment security (state employment service) local office manager
 Superintendent of schools (inspect vocational training facilities)
 Housing--reputable local builder or real estate agency (personally inspect typical houses and residential areas)
 Banker
 Several local employers--particularly those who have come into the community within the past 10 years
 Others

GENERAL

EDUCATION

Schools

Classifications
 Kindergartens

Public nurseries
 Private schools
 Parochial schools
 Junior colleges
 Colleges and universities
 Exceptional children
 Handicapped
 Building program for future needs
 Projected attendance by age levels
 Number additional schools needed in 5 years
 Number additional classrooms needed in 5 years
 Buildings and grounds
 Number and area of classrooms
 Condition and maintenance
 Light, heat, ventilation
 Auditoriums, gymnasiums, playgrounds
 Medical facilities, libraries, cafeterias
 School equipment and supplies
 Vocational, trade, apprentice, foremanship training
 Key personnel college courses
 Adult education program
 Career guidance
 College extension courses
 Expenditures
 Annual expenditure per pupil
 Tax revenue all sources
 Percent of local taxes for public schools
 Levied separately
 Debt
 Bond issues
 Transportation
 Schedule operation--vehicle maintenance
 Enforcement of laws
 Service to population
 Segregation policy

Enrollment

Median school years completed
 Percent community's 14-17-year-olds enrolled
 Percent completed high school or more
 Percent completed less than 5 years
 Number of high school graduates
 Percent high school freshmen planning to attend college
 Percent seniors planning to attend college
 Ratio of Negro to white

Teachers

Adequately staffed
 Requirements--educational background--certification
 Percent staff fulfilling requirements

Teachers' pay schedules
 Teacher/pupil ratio
 Community-teacher relationship
 PTA

RECREATION--CULTURE

Recreational Facilities

Participator:

Hunting	Riding
Fishing	Golf
Swimming	Tennis
Boating	Skiing
Camping	Bowling

Spectator

Baseball	Basketball
Football	Hockey

Family recreational areas

Parks, playgrounds, picnic areas

Paid amusements

Movies, etc.

Organizations

Civic	Service
Fraternal	
Business and professional societies	

Clubs

Country	Golf
City	Yacht

Youth programs

Boy Scouts	Girl Scouts
YMCA	YWCA
YMHA	YWHA
Boys Club	4H
Church and school sponsored	

Cultural Facilities

Libraries
 Museums
 Zoos
 Art galleries
 Civic theaters
 Musical functions
 Legitimate theater
 Symphonic orchestra
 Concerts
 Dramatics
 Lecture series

Resort Area

Nearness; facilities

Is there any glamor attached to living in community?

MEDICAL

Hospitals

Area served
 Beds per 1,000
 Types
 Ownership
 Equipment
 Ambulance service
 Blue Cross, Blue Shield, and allied plans
 Clinics

Doctors

General practitioners per 1,000
 Surgeons per 1,000
 Specialists per 1,000
 Dentists per 1,000
 Visiting Nurse

Public Health Program

General health conditions
 Mortality rates--causes
 Mental health facilities
 Sanitary, industrial, and health laws
 Disaster plan

CHURCHES

Number; adequacy
 Census
 Denominations
 Condition: buildings; grounds
 Community activities
 Young people--recreation

MEDIA

Newspapers

Daily, Sunday, weekly
 Editorial philosophy
 Relation to City Hall
 out-of-town
 Labor press

Radio and Television

Types of programs
 Business-sponsored
 Commentator philosophy toward business

COMMUNITY SERVICESPolice

Personnel per 1,000 population
 Equipment
 Training; morale
 Annual expenditure per capita
 Patrol industrial property
 Plants outside city limits
 Private watchmen available
 Protection in case of strike
 Detention facilities

Crime

Over-all rate
 Murder; robbery; assault; larceny; auto theft
 Juvenile delinquency
 Judiciary system

Traffic

Control; laws and enforcement

Fire

Personnel per 1,000 population
 Equipment
 Training; morale
 Unit areas protected
 Annual expenditure per capita
 Fire protection for plants outside city limits
 Apparatus of adjacent communities
 Annual fire loss in dollars last 5 years

Water Pressure

Hydrants; proper size mains
 Fire insurance classification

BUSINESS SERVICESBusinesses

Department stores; other retail stores
 Hotels; motels; restaurants; other

Business District

Parking facilities; traffic flow
 Development plan

Trash, Garbage, and Sewage

Pick-up; contractors
Sewage limits

PLANNING

Is city planning commission active and forward-looking?
Is there a long-range program for physical improvements?
Is planning financially realistic?
Are following facilities or programs well planned for future growth:
Slum clearance
Streets and highways generally
Street lighting
Public transportation
Sewage program
Flood control
Development of land for industrial use
Annexation program
Recreational facilities and other public uses
Are smoke, noise, odors, etc., controlled?

ZONING

Does the community have an intelligent, far-sighted approach to industrial and residential growth?
Is it well zoned for industrial use? Commercial use? Residential use?
Can industry locate in any area, or is this controlled by proper zoning ordinances?
How are industrial areas defined?
Are industrial zones protected against residential encroachment?
Can you expect protection against undesirable neighbors?
When was zoning code last revised?

POLITICALPolitical Awareness of Citizens

Number of persons of voting age
Number registered
Percent voted in last national election
Percent voted in last municipal election

Local Administration

Financial management
Efficiency
Attitude toward business

State Administration

Financial management
Efficiency

Attitude toward business
 Department of Labor's attitude toward business
 What are the voting records of state legislatures on key issues
 affecting the community's business climate?

CITIZENSHIP

Leadership

Are local business leaders active in serving on legislative affairs committees and other legislative groups interested in formulating local and state government policies?
 Are they represented on such groups as the municipal planning commission, school boards, tax councils, etc.?
 Are they setting a personal example of civic leadership and encouraging their employees to do likewise?

Business Organizations

Does the community have one or more active and well-supported business-sponsored organizations which have accomplished tangible results toward improving the economic, social, and political climate in community?
 Are all segments of community's industry and commerce represented in these organizations?
 If more than one such business-sponsored group, is there needless duplication of effort?
 Do these organizations have proper leadership. . . receive sufficient financial support. . . have sufficient staff?

Solicitations for Donations

Is there a state law dealing with solicitations for charitable purposes?
 Are municipal ordinances dealing with solicitations effective and well enforced?
 Is the local community chest or united fund method of financing social work programs satisfactory?
 Does community participate actively and responsibly in community fund program?
 Do local employers do their reasonable share in contributing to charitable needs?

LIVING

Is the general physical appearance of the community pleasant and attractive? Are houses painted? Is the grass cut? Are schools, churches, and public buildings well maintained?
 Are there submarginal or slum areas in community?
 If so, are clearance and rehabilitation plans progressing?

Are there attractive suburbs within convenient distance of community?
Would you like to work in this community?
Would you like to live there with your family?

Source: Plant Location (New York: Simmons-Boardman Publishing Corporation, 1959), pp. 17-29.

APPENDIX C

EGYPTIAN INDUSTRIES AS INFLUENCED BY
FACTORS OF LOCATION, 1952-1964

Industries	Location	Factor of Location
<u>Petroleum Industries</u>		
Bottled Gas Blown-Asphalt	Suez	Raw Materials
Refining Pipelines	Alexandria Mex to Kafr el Dawar Mex to Tanta Agrud to Cairo	Market
<u>Mining Industries</u>		
Exploitation of Nile Valley Phosphate	Aswan Suez	Raw Materials
Marble and Ornamental Stones	Abu Zneima	
Exploitation of Manganese	Abu Ghusun	
Exploitation of Ilmenite	Alexandria	
Exploitation of Black Sands	Mex	
Salt Refining and Packing		
<u>Metallurgical Industries</u>		
Aluminum Foil Copper and Aluminum	Hagar el Nawatia Alexandria	Raw Materials and Market
Spirally Welded Steel Pipes Pipes Fitting Aluminum Cables Iron and Steel	Helwan	Industrial Concentra- tion and Market
<u>Metalic Industries</u>		
Automobiles Diesel Engines Tractors Trucks, Buses, and Trailers	Helwan	Raw Materials, Industrial Concen- tration and Market
Steam Boilers Coil Springs Telephone Cables	Giza Amiria Mostorod	Market

APPENDIX C (Continued)

Industries	Location	Factor of Location
<u>Metallic Industries (Cont.)</u>		
Record Players and Radios	El Nuzha	Labor and Market
Building Accessories	Mostorod	Market
Air Conditioners and Refrigerators	Almaza	Climate and Labor
Cutlery	Helwan	Facilities of
Machine Tools		Military Factories
Fire Equipment		
Gasoline Pumps		
Tin	Abu Ker	Facilities of
Cutting Tools	Maadi	Military Factories
Water Meters	Maasara	
Ship Yard	Port Fouad	Natural Facilities
Floating Dock	Port Said	and Market
Auxiliary Floating Craft		
Ship Yard	Ismailia	
Asphalt Tiles	Ismailia	Geographical
Light Bulbs		Distribution
Butagaz Heaters	Port Said	Facilities
Television Sets	Cairo	Labor and Market
Water Heaters	Helwan	Facilities and
Electrical Supplies	Shubra	Market
Marble Cutting	Ghamra	Materials and Market
Radio Assembly	Ismailia	Geographical
Files Production	El Basatin	Distribution
Pick-up Manufacturing	Kubbeh	Labor
Gas Cookers	Alexandria	Facilities and Market
Railway Wagons	Helwan	Raw Materials and
		Ind. Concentration
Bolts and Nuts	Maasara	Facilities of
Electric Meters		Military Factories

APPENDIX C (Continued)

Industries	Location	Factor of Location
<u>Metalic Industries (Cont.)</u>		
Bottled Gas Cylinders	Helwan	Facilities of Military Factories
Radiators Sewing Machines	Maadi	Facilities of Military Factories
Bicycles Transistor Radios	Kaliubia Giza	Geog. Distribution Labor and Market
Electric Transformers Dry Batteries Brake Lining Leaf Springs	Cairo	Market and Labor
Washing Machines Automobiles	Alexandria Giza	Market and Labor
Spinning Machines Spare Parts	Beheira	Market
<u>Textile Industries</u>		
Cotton Spinning and Weaving	Mahalla el Kubra Kafr el Dawar Alexandria Shibin el Kom	Raw Materials and Market
Medium Spinning	Kena	Geog. Distribution
Fine Spinning and Weaving	Mahalla el Kubra Kafr el Dawar Alexandria	Raw Materials and Facilities
Fine Spinning and Weaving	Tanta Meit Ghamr Mahmoudia Damietta	Climate, Market, Geog. Distribution, and Labor
Wool Textiles	Mahalla el Kubra Alexandria	Facilities and Market
Nylon and Rayon	Kafr el Dawar	Facilities and Raw Materials
Nylon and Rayon	Bahtim	Raw Materials

APPENDIX C (Continued)

Industries	Location	Factor of Location
<u>Textile Industries (Cont.)</u>		
Wool Spinning and Weaving Fine Textiles	Mostorod Alexandria	Market
Cotton Waste Spinning	Mahalla el Kubra Alexandria	Raw Materials, Facilities, and Market
Dyeing and Finishing	Mahalla el Kubra Alexandria	Industrial Concentration
Dyeing and Finishing	Shobra el Kheima	Market
Combed Wool Knitted Products	Port Said	Market and Geog. Distribution
Sewing Strings	Kafr el Dawar	Raw Materials and Market
Jute	Shubra el Kheima Belbeis	Market Geog. Distribution
Medium and Thick Yarn	Mahalla el Kubra	Industrial Concen- tration
Spinning and Weaving Equipment and Accessories	Helwan	Raw Materials and Industrial Con- centration
<u>Chemical and Building Materials Industries</u>		
Calcium Ammonium Nitrate	Aswan	Raw Materials
Ammonium Sulphate Calcium Nitrate	Suez	Raw Materials
Caustic Soda, Chlorine, and Ferric Chloride	Alexandria	Raw Materials
Portland Cement	Alexandria	Market
Portland and Slag Cement White Cement	Helwan	Raw Materials

APPENDIX C (Continued)

Industries	Location	Factor of Location
<u>Chemical and Building</u>		
<u>Materials Industries (Cont.)</u>		
Stationery and Printing Paper Cigarette Paper Filter Corrugated Cardboard Wrapping Paper	Alexandria	Market and Industrial Concentration
Particle Board	Tanta Mansoura	Geographical Distribution
Wrapping Paper	Ataqa	Geographical Distribution
Glass Laminated Plastics	Shubra el Kheima	Market and Industrial Concentration
Bicycle Tires	Alexandria	Market
Pharmaceuticals Cosmetics	Cairo	Market
Catgut Surgical Sutures	Dokki Giza	Market
Paints, Varnishes, and Lacquers	Materia	Market
Chinaware and Stoneware	Mostorod	Market
Film Development and Printing	Giza	Market
Dynamite Medical Ether	Abu Zaabal	Facilities of Military Factories
Cosmetics	Hawamdia	Raw Materials
<u>Food Industries</u>		
Sugar	Armant Kom Ombo Edfu	Climate and Raw Materials
Sugar	Hawamdia	Market
Onion Dehydration	Souhag Hawamdia Port Said	Market

APPENDIX C (Continued)

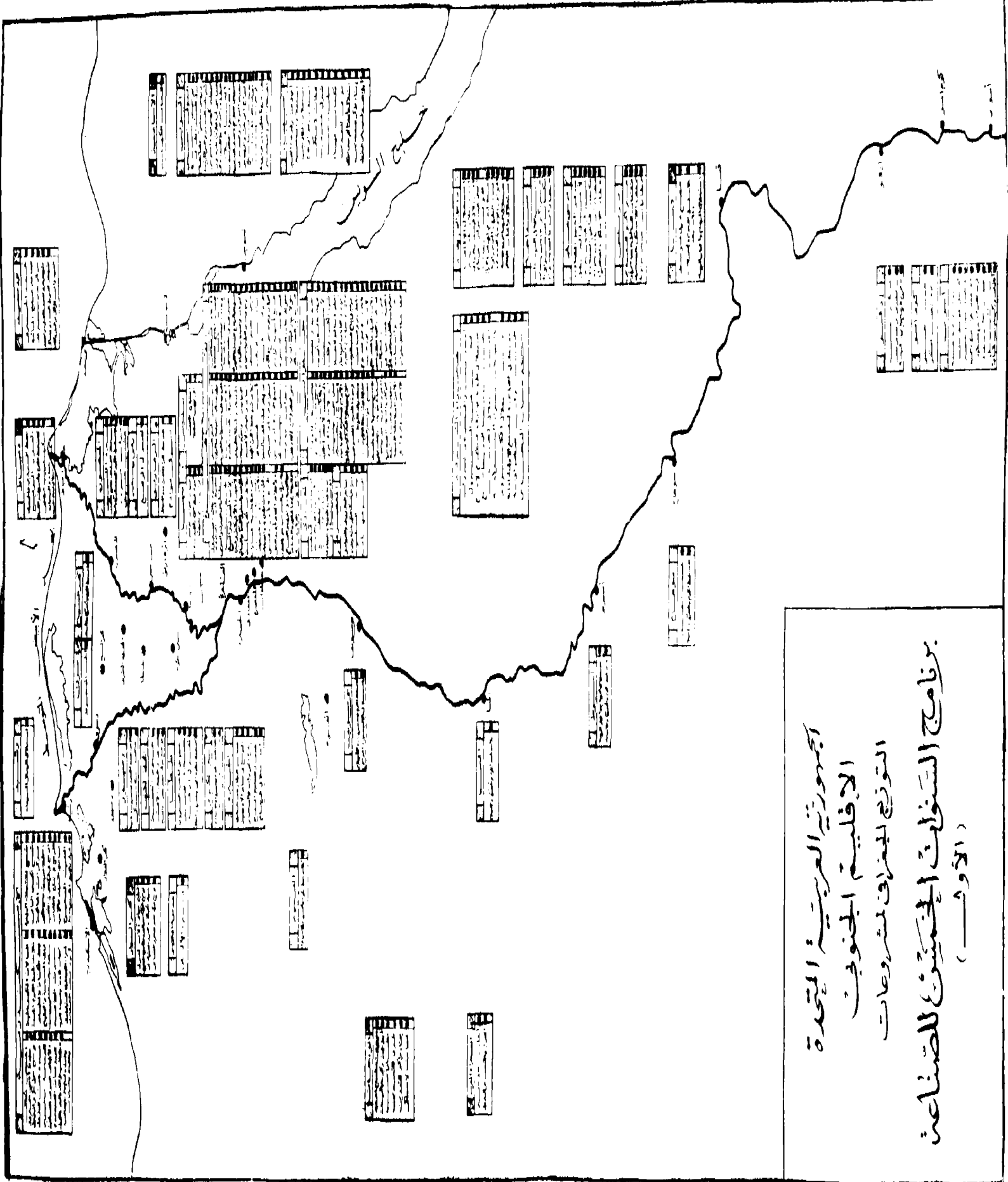
Industries	Location	Factor of Location
<u>Food Industries (Cont.)</u>		
Date Drying and Packing Acetic Acid	Giza Hawamdia	Raw Materials
Food Canning or Freezing	Qaha Ras el Sawda Port Said El Tahrir Governorate Ezbet el Borg	Raw Materials and Market
Raison Wine	Beheira	Land Soil and Raw Materials
Baking Dairy Products	Kubbeh	Market
Oil Extraction	Alexandria	Transportation
Essential Oils Ice	Qutur Port Said	Founder's Residence
Tobacco and Cigarettes	Giza	Market
Rice Processing	Alexandria	Transportation
Rice Processing	Mahalla el Kubra Damaouhour	Raw Materials
Rice Processing	Rashid Damiatta	Founder's Residence
Detergents	Kafr el Zayat Bahtim	Raw Materials Geog. Distribution

Source: Based on Tables in U.A.R. Government, 12 Years of Industrial Development (Cairo: Government Printing Office, 1964), pp. 325-338.

APPENDIX D

THE UNITED ARAB REPUBLIC
EGYPT
GEOGRAPHICAL DISTRIBUTION OF INDUSTRY
THE FIRST INDUSTRIAL FIVE-YEAR PLAN
1957-1962

Source: The General Organization for the Industrial Five-Year Plan.
Annual Report -- 1958-1959 (Cairo: Government Printing
Office, 1960).



الجمهورية المغربية المتحدة
 الإقليم الجنوبي
 التوزيع الجغرافي لمشروعات
 برنامج الستة والخمسين للصناعة
 (الأولى)

APPENDIX E

GEOGRAPHICAL DISTRIBUTION OF INDUSTRY
IN EGYPT, 1952-1964

Governorate	No. of Projects	Total Cost E.L.*
Cairo	280	99,340,364
Alexandria	164	78,329,397
Port Said	21	6,036,745
Ismailia	20	14,963,345
Suez	17	70,654,165
Damietta	22	8,897,604
Sinai	35	33,908,687
Red Sea	51	53,721,977
Western Desert	13	17,350,086
Kaliubia	85	33,534,977
Menoufia	19	11,898,301
Sharkia	20	8,604,350
Gharbia	56	20,245,725
Dakahlia	45	8,980,763
Beheira	46	24,038,668
Kafr el Sheikh	11	1,274,007
Giza	62	74,870,299
Beni Suef	12	5,248,922
Minia	50	8,913,600
Assuit	26	11,318,967
Souhag	21	5,307,230
Kena	16	17,106,475
Aswan	32	84,364,149
Fayoum	18	4,880,022
Other Parts	150	130,793,307
Undefined Projects	22	102,925,868
	1,314	937,508,000

*L.E. - Egyptian Pound = \$2.87.

Source: U.A.R. Government, 12 Years of Industrial Development (Cairo: Government Printing Office, 1964), p. 300.

SOURCE DATA FOR TABLES

Table	Source
I	Fuchs, Victor R. <u>Changes in the Location of Manufacturing in the United States Since 1929</u> . New Haven: Yale University Press, 1962, p. 3.
II	<u>Ibid.</u> , pp. 5-6.
III	<u>Ibid.</u> , pp. 7-8.
IV	Administration of Public Mobilization. <u>Statistical Pocket Book--1952-1962</u> . Cairo, UAR, April, 1963, pp. 33-34.
V	Grunwald, Kurt and Joachim O. Ronall. <u>Industrialization in the Middle East</u> . New York: Council for Middle Eastern Affairs Press, 1960, p. 188.
VI	National Bank of Egypt. <u>Economic Bulletin</u> , X, No. 4 (1957), p. 343.
VII	<u>Ibid.</u> , p. 341.
VIII	Administration of Public Mobilization, <u>op. cit.</u> , p. 32.
IX	National Bank of Egypt. <u>Economic Bulletin</u> , XVI, No. 1 (1963), p. 13.
X	<u>Ibid.</u> , p. 62.

SOURCE DATA FOR FIGURES

Figure	Source
1	Vilbrandt, Frank C. <u>Chemical Engineering Plant Design</u> . New York: McGraw-Hill Book Company, Inc., 1942, p. 366.
2	Moore, James M. <u>Plant Layout and Design</u> . New York: The Macmillan Company, 1962, p. 40.
3	Garzouzi, Eva. <u>Old Ills and New Remedies in Egypt</u> . Cairo: Dar el Maaref, 1958, p. 9.

SCURCE DATA FOR APPENDICES

Appendix	Source
A	Neuhoff, Malcolm C. <u>Techniques in Plant Location</u> . New York: National Industrial Conference Board, Inc., 1953, pp. 43-48.
B	<u>Plant Location</u> . New York: Simmons-Boardman Publishing Corporation, 1959, pp. 17-29.
C	U.A.R. Government. <u>12 Years of Industrial Development</u> . Cairo: Government Printing Office, 1964, pp. 325-338.
D	The General Organization for the Industrial Five-Year Plan. <u>Annual Report--1958-1959</u> . Cairo: Government Printing Office, 1960.
E	U.A.R. Government, <u>op. cit.</u> , p. 300.

VITA

Abdel Hady Koraitim was born in Hoch Issa, Egypt, on February 10, 1928. He completed his primary school in Abu el Matameir and his secondary school in Alexandria. He graduated from the Faculty of Commerce, Alexandria University, with a Bachelor of Commerce in June, 1950. Shortly after graduation, he was appointed as an instructor at the Department of Business Administration, Faculty of Commerce, Alexandria University where he received the Master of Commerce degree in October, 1955. He came to the United States on a study leave and joined Louisiana State University in February, 1956, but went back home during the Suez Crisis in December of the same year. In September, 1958, he was granted a government scholarship to work for the Doctor of Philosophy degree in the United States. He enrolled at Indiana University from September, 1958 to August, 1959, and at the University of Wisconsin from September, 1959, to January, 1963, where he obtained the Master of Business Administration degree. In February, 1963, he re-entered the Graduate School of Louisiana State University where he is now a candidate for the degree of Doctor of Philosophy.

EXAMINATION AND THESIS REPORT

Candidate: *Edward Dean Hamilton*

Major Field: *Government and Politics*

Title of Thesis: *An Analysis of the Foreign Relations of the United States as Applied to the United Arab Republic*

Approved:

Raymond Seckman
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Date of Examination:

March 1, 1956