AN ANALYSIS OF INDUSTRIAL LOCATION FACTORS WITH PARTICULAR REFERENCE TO INDONESIA

by

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ABSTRACT

The main purpose of this thesis was to analyze industrial location factors and their influence on the industrial development of a particular area.

The first half of the thesis contained a review of the literature on the location of industry followed by an analysis of some of the basic industrial location factors which have been instrumental in the location and development of American industries. In the second half of the thesis an attempt was made to relate these findings to the situation in Indonesia, and to evaluate any correlation or disparity which may exist. It was found that in general the same industrial location factors would apply in both cases, but that their relative importance would vary. This could be explained partly by the difference in the form of government of both countries, and partly by the difference in the stage of industrialization. Other factors such as the nature of the people was also important.

Indonesia's industrial location factors were then considered with respect to their potentialities to aid in the industrial development. It was found that Indonesia's natural resources could provide a basis for this development, but that much would still be required to transform them into usable resources.

Indonesia lacks many basic facilities. It has little technical and managerial skill and meagre capital, all of which limit industrial growth. This situation is aggravated by the presence of some of the more fundamental economic problems, such as the problem of population, the problem of low income, and also the problem of low productivity.

A solution to these problems must be found before Indonesia can begin to develop industrially.

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CHAPTER I

INTRODUCTION

Industrial growth in the American continent is taking place at an amazing rate. America has evolved methods of production and social organization creating a standard of living which is unsurpassed by any other nation in the world. Still, the process of industrialization is being continued at an ever growing pace.

During recent years, in particular, interest in industrial development has been accelerated. This is evidenced by the number of agencies which have emerged within the last few years to promote industrial development of their particular area. Much literature has been published with the purpose of attracting new industries into their regions. Prospective employers are increasingly becoming aware of the importance of industrial location factors for the survival of their new enterprises. Ideal plant location has now become extremely important.

In striking contrast to development in the American continent, the majority of people outside it, especially those in under-developed areas, are still living on a meagre income. Industrialization has frequently been stressed as the key solution to this problem.

Many Indonesians look upon industrialization as a

panacea. Yet, few of them realize the problems involved and the conditions which must be satisfied before any industrial development can take place. There has been a widespread feeling among the people of Indonesia that independence would automatically bring prosperity. They fail to comprehend that the prospects for a better future can only be achieved by working harder and better now. Many of them are still unaware that productivity must be increased and capital accumulated before any marked increase in the standard of living is possible.

It is the writer's opinion that Indonesians, in general, must learn to depend more on individual efforts. Blind reliance on the richness of the motherland is not sufficient. Great emphasis is too often placed on the mere presence of abundant untapped natural resources. Admittedly they are important as the basis for economic development, but they do not in themselves ensure industrial expansion. Their contribution to the development of the country depends not only on economic feasibility, but also on the nation's ability to work.

Statement of the Problem. The purpose of this study is to analyze industrial location factors and their influence on the industrial development of a particular area. More specifically, the objectives of this thesis are:

(1) to analyze the industrial location factors which have been instrumental in the location and development of American industries, verified by some empirical studies done by others,

(2) to relate this analysis to the Indonesian scene and to discover any correlation or disparity which may exist,

(3) to analyze and evaluate those location factors in Indonesia which may promote or limit industrial development.

Importance of the Study. Since the establishment of a State Planning Bureau in Indonesia, an increasing interest has been shown in the industrial development. The First Five Year Economic Development Plan is now in progress. Plans for a second and perhaps a third five year development are now being drafted. It is highly important that the foundation of these plans should be drawn from a thorough knowledge and understanding of the resources of Indonesia.

In view of the complexity of the problems involved and the lack of accurate information as to Indonesia'a actual potentialities, a realistic appraisal is necessary, in which trends and figures are considered in true perspective.

It is the writer's hope that this study, which views the industrial potentialities of Indonesia in terms of its

location factors, will contribute something to the existing knowledge on the subject.

Scope of the Study. An exhaustive analysis of industrial location factors would be impractical and unnecessary in view of the purpose and the limited scope of this study. For this reason, only those industrial location factors which, in the writer's opinion, are basic and pertinent, are included.

There are two main reasons for discussing factors applicable to the American scene. First of all, American data can easily be obtained because of the availability of extensive literature on the subject. Secondly, it is the writer's desire to discover any correlation or disparity which may exist between the impact of location factors on the industrial development of both the United States and Indonesia.

The material for this study has been acquired from available literature. Many difficulties have been encountered in gathering data on Indonesia. Where figures are available, they are quite often of an approximate nature. This is apparent throughout the study. Nevertheless, every effort has been made to keep data up-to-date.

Plan of Thesis. This thesis is divided into six chapters, including an introductory and a concluding chapter.

Chapter II contains a review of the literature on location theories.

In Chapter III some of the basic location factors are discussed and their influence on the location of American industries analyzed. This chapter concludes with a section indicating the interrelationships which exist among industrial location factors and a section showing the changing importance of these factors.

Chapter IV contains some of the more important empirical studies on location which have been made in the United States since the beginning of this century. This is done in order to appraise the validity of some of the assumptions and hypotheses made by the earlier location theorists.

Chapter V is devoted entirely to Indonesia. It begins with a survey of the topography, population and economic structure, and the effects of the physical environment and other location factors on the location and development of manufacturing and industries in Indonesia. The latter part of the chapter deals with the relationship between Indonesia's industrial location factors and its industrial development. Special attention is given to the factors which may promote or limit this development. In the final section of this chapter some of the basic economic problems are discussed.

The findings of the study are summarized in Chapter VI.

CHAPTER II

LOCATION THEORIES

Many early economists have been concerned with the factors which influence industrial location patterns. Yet, none of them has evolved a generally acceptable location theory which would harmonize with the existing system of economic principles. Some economists have concerned themselves with location factors applicable to every situation, regardless of economic system. Others have restricted themselves to analyzing factors which determine industrial location in a capitalistic economy. Nevertheless, all the writers have one thing in common. They recognized the importance of some basic factors which affect the location of industries.

REVIEW OF THE LITERATURE

One of the earliest economists who dealt with the problems of industrial location was Adam Smith. In his famous "Wealth of Nations," he suggests that manufacturing might be introduced into a country in one of the two following ways: Firstly, it might develop as an offspring of foreign trade through imitation of foreign manufacturing. This type of manufacturing would generally locate itself in coastal areas, and only in rare cases in an inland town.

Secondly, manufacturing might develop as the result of a surplus of production in the inland regions. This surplus, which could not be exported because of the high transportation cost over land and the lack of navigable rivers, would attract a great number of workers into the area. These workers expected to attain a higher standard of living from the availability of cheap food. As more and more people began to settle in the area, more and more land would be cultivated and the market would gradually expand. Finally, by improvements of the method of production the unit value of the product would be raised so that the surplus could eventually be exported. A manufacturing centre is thus established.[1]

Von Thunen was perhaps the first writer to make a valuable contribution to the location theory. As an agriculturist he was more concerned with the location of agricultural production. His theory attempts to explain the type of crops that would be most advantageously grown on a particular plot of land. Von Thunen imagines his "Isolated State" as a uniform homogeneous plain with a city in the centre of it, supplying the surrounding areas with

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[1]Adam Smith, An Inquiry into the Nature and Causes of the Wealth of Nations, vol. II, third edition, (London: 1784), pp. 113-116.

its manufactured goods. In exchange for these goods, the city receives foodstuffs and raw materials which are supplied by farms located in concentric circles around it. Those farms producing crops which are heavy or bulky in relation to their value, and cannot thus be transported easily and profitably, would occupy the inner rings closest to the consuming market, while the outer rings would contain those farms producing crops with relatively low transportation costs. Thus, von Thunen sees a definite pattern of agricultural location developing around the city with type of crops determined by the cost of transportation from the farm to the city.[2]

In the isolated state, all land is assumed of equal fertility. Furthermore, unit wage rate and interest on capital are also assumed to be constant and the cost of production is the same everywhere. Those estates located in the inner circles of cultivation yield a land rent by virtue of their relatively advantageous position with respect to the central city. Since all the crops of one type is sold in the city at one price, regardless where they come from, land rent would be less the farther the plot of land is from the city.[3]

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[2]J. H. von Thunen, Der Isolierte Staat in Beziehung auf Landwirshaft und Nationalokonomie, as discussed by Melvin L. Greenhut, Plant Location in Theory and Practise (Chapel Hill: University of Carolina Press, 1956), pp. 254-255, and pp. 5-6, and Walter Isard, Location and Space Economy (New York: John Wiley & Sons, Inc., 1956), p. 34.

[3]Arthur H. Leigh, "von Thunen's Theory of

Von Thunen, in effect, substitutes land cost for transportation cost until he obtains the least-cost combination and thus the best plant site.[4]

The first author to be concerned with the location of industries was G. Shaffle. He ascribes the greatest importance to natural conditions and to the distribution which make it possible for the factories to be located away from the market. He contends that the large cities have an attractive force directly proportional to the square of their size and inversely proportional to the distance between them and the factories.[5]

Wilhelm Roscher states that industry has a certain historical point of gravity and that the forces of economic history are the natural laws which decide location. He mentions raw materials, labor, and capital as factors influencing location. Which of the three factors is most determinant depends on its influence on the price of the product. For example, an abundance of raw materials is of

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Distribution and the advent of Marginal Analysis," Journal of Political Economy, 54: 481-502, December, 1946.

[4]Greenhut, op. cit., p. 8.

[5]G. Fr. Shaffle, Bau und Leben des Socialen Korper, also Gesellshaftliches System der Menslichen Wirtshaft, as discussed by Witold Krzyzanowski, "Review of the Literature of the Location of Industries," Journal of Political Economy, 35, April, 1927, pp. 278-291.

great importance when there is a great loss of weight during the process of production.[6]

Both Rosher and Shaffle were thus primarily concerned with discovering whether or not there were any natural laws or regularities in the evolving locational structure of economics.

Edward Ross considers the presence of natural deposits as the most important factor influencing the location of certain extractive industries. Nearness to sources of raw or auxiliary materials is of special importance for those products which are bulky and heavy in relation to their value, when the finished product contains only a small part of the material employed, or when transportation cost is excessive because of the mountainous district or inland region location.[7]

Alfred Marshall contends that the chief causes which have led to the location of industries have been physical conditions such as the character of the climate, nature of the soil, existence of mines, and availability of transportation.[8]

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[6]Wilhelm Rosher, Ansichten der Volkswirtshaft, as discussed by Krzyzanowski, loc. cit.

[7]Edward A. Ross, "The Location of Industries," Quarterly Journal of Economics, 10: 247-268, 1895-96.

[8]Alfred Marshall, Principles of Economics, fourth edition (London: MacMillan and Co., Ltd., 1898), p. 347.

He also points out the immobility of the industries, because of the growth of subsidiary trades, the use of highly specialized machinery, and the availability of skilled labor.[9]

The most comprehensive and perhaps the best work on the subject of industrial location is that of Alfred Weber, first published in 1909.[10] Weber's attempt to construct a general theory of location was greatly influenced by the writings of Rosher and Shaffle.[11]

Weber classifies location factors into general factors, which must be considered for every industry, and special factors, which are particular only to one industry or to a group of industries. These factors are further classified into: (1) regional factors, such as transportation and labor costs which attract industries to definite regions, and (2) agglomerative and deglomerative forces, which may cause concentration or dispersion of industries. Industries may be brought together at certain points by factors such as more economical use of machinery or merely

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[9] Ibid., p. 350.

[10] Alfred Weber, Uber den Standort der Industrien, Tubingen, 1909; English translation by Carl J. Friedrich, Alfred Weber's Theory of the Location of Industries (Chicago: The University of Chicago Press, 1929).

[11] Isard, op. cit., p. 28.

advantage of being situated where auxiliary trades are located.[12] However, every agglomeration may create opposing forces, which may cause expenses to increase. The net result of these conflicting factors is the effective agglomeration power.[13]

Weber simplifies his theory by reducing his regional factors to only two: cost of transportation and cost of labor. Any price differential in raw materials or power is treated as a difference in transportation costs. He then contends that, if we assume that the basic network of industrial orientation is determined firstly by transportation costs, then differences in labor costs will form the first distortion forces, which will alter the basic network. And any agglomerative power will act as the second altering force, tending also to distort the transportation network and shifting it to the "points of agglomeration."[14]

Weber then points out in greater detail that as far as the transportation factor is concerned, the process of determining location is a matter of deciding on a site between the place of consumption and the place of raw material deposits. In this connection he introduces the

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[12]Friedrich, op. cit., pp. 20-21.

[13]Ibid., p. 131.

[14]Ibid., pp. 34-35.

rather too simple rule that "all industries whose material index is not greater than one and whose locational weight, therefore, is not greater than two lie at the place of consumption."[15]

With respect to the labor cost factor, Weber's contention is that industry will move from the point of minimum transportation costs to a more favorable location only if the expected savings in the labor cost are larger than the additional costs of transportation as a consequence of the moving.[16]

Finally, Weber's theory of agglomeration deals with local concentration of industries which arise because production could be performed more economically.[17] Large scale economies, division of labor, proximity of auxiliary trade and services, etc., are considered among these factors.

Andreas Predohl states that the problem of location can be conceived as the problem of combining particular groups of means of production: land, labor, and capital. He therefore suggests the principle of substitution. For example, changing a location means substituting units of

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[15] Ibid., p. 61. Weber's "material index" is defined as the proportion of the weight of used localized material to the weight of the product. "Locational weight" is the total weight per unit of product which has to be moved in a locational figure.

[16] Ibid., p. 103.

[17] Ibid., p. 134.

use of land for units of all other factors of production, or conversely. The ratio of these groups of factors will be determined by the point of indifference or point of lowest cost. However, a change of location may also mean a substitution of capital and labor for means of transportation, or conversely, the proper ratio again being determined by their point of lowest cost. Furthermore, if the process of production needs to have raw materials transported to its location, a substitution of means of transportation for carrying finished products for those carrying raw materials may take place. Thus, the location of each process can be analyzed in terms of a system of indifference points, each pair of interchangeable groups being subordinated to a larger group.[18]

One of the most outstanding American contributors to location theories is Edgar Hoover, who combines Weber's theory with the partial equilibrium analysis of the general economic theory.

In his work as applied to the shoe and leather industry, Hoover states that the theory of location may take only three things for granted: (1) distribution of natural resources, (2) desires and tastes of human beings,

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[18]Andreas Predohl, "The Theory of Location in its relation to General Economics," Journal of Political Economy, 36: 371-389, 1928.

and (3) economic techniques, i.e., the ways in which man is able to combine the agents of production so as to make natural agents produce consumable utilities. He distinguishes between what he calls quality and local differentials of agents of production, meaning that each agent of production may vary locally in productivity and in price. In the case of land, there is no tendency for both quality and local differentials to be eliminated. In the case of capital, labor, and management, however, competition will tend to wipe off local differentials, thereby leaving only those based on quality.[19]

Hoover's approach to the theory of location as expounded in his "Location of Economic Activity"[20] is basically the same as Weber's, although he admits that he has drawn much "enlightenment and inspiration" from the work of August Losch.[21]

Hoover classifies the cost factors into two groups: (1) the transfer costs, which include procurement and distribution costs, and (2) the processing costs.[22]

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[19]Edgar Hoover, Jr., Location Theory and the Shoe and Leather Industries (Cambridge: Harvard University Press, 1937), pp. 3-4.

[20]Edgar Hoover, The Location of Economic Activity (New York: McGraw Hill Book Company, Inc., 1948).

[21]Ibid., p. v.

[22]Ibid., p. 8.

Hoover believes that producers have an incentive to locate as close as possible to their suppliers and markets.[23] However, intermediate points have special transfer advantages when they are transshipment points and the plant draws materials from several sources or sell to several markets.[24]

Producers will also look for sites where processing costs are minimized. This implies that the prices of the production factors will determine the choice between different locations.[25]

Hoover's analysis differs from Weber's in the sense that he, unlike Weber, considers all possible locating factors, and not only the general ones which influence every plant location, regardless of economic system.

August Losch contends that "in a free economy, the correct location of the individual enterprise lies where the most profit is greatest."[26]

He criticizes Weber for taking gross revenues as constant by assuming a given demand and price. In reality, demand not only varies with price and the size of the market but also with the chosen site of production. In fact, says

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[23]Ibid., p. 26. [24]Ibid., p.46. [25]Ibid., p. 69.

[26]August Losch, The Economics of Location, translated from the second revised edition by William H. Woglom with the assistance of Wolfgang F. Stolper (New Haven: Yale University Press, 1954). The German title is Die raumliche Ordnung der Wirtshaft; eine Untersuchung uber Standort, Wirtshaftsgebiete und internationalen Handel (Jena: Fisher, 1943). See p. 27.

Losch, "the optimum location would shift with each change in price."[27]

Losch recognizes the complexity of determining the point of maximum profit. He concludes that the solution can only be obtained by means of trial and error. In other words, for every prospective location one has to determine the total attainable demand with the aid of market analysis and also the optimum output through cost analysis. Losch admits that this method does not exclude the possibility that other points, which are not considered, may yield a higher profit.[28] But at least, unlike the earlier writings, his has a more realistic ground.

Two of the latest writers on industrial location are Walter Isard and Melvin Greenhut.

In his "Location and Space Economy," Walter Isard attempts to bring the separate location theories into one general doctrine.[29] Recognizing the deficiencies in the theories as developed by Weber, Predohl, and Losch, Isard came up with a mathematical formulation of location theory.[30]

Greenhut states that location factors can be classified into three broad groups: (1) demand, (2) cost, and (3) purely personal considerations, each of which is further

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[27] Ibid., pp. 27-28.

[28] Ibid., p. 29.

[29] Isard, op. cit., p.23.

[30] Ibid., pp. 243-250.

divided into several subgroups. The first two determinants are influential in all site selections, while the personal considerations, which partially determine the demand for goods or its cost of production, apparently influence many small plant locations.[31]

There are, according to Greenhut, three possible choices to explain a plant location: (1) a maximum-profit and maximum-satisfaction theory; (2) a maximum-profit theory which attains generality by defining psychic income as a part of maximum profit; and (3) a general maximum-satisfaction theory which makes either maximum profits or maximum pecuniary plus non-pecuniary returns equivalent to maximum satisfactions.[32]

Greenhut contends that the general maximum-satisfaction theory is logically more consistent than the maximum-profit theory, as it does not require consideration of non-pecuniary satisfactions as a special kind of monetary reward. However, he says, that the general maximum-satisfaction theory is less useful than the general maximum-profit theory, because the assumption of economic man motivated by pecuniary returns must be given up.[33]

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[31]Greenhut, op. cit., p. 279. [32]Ibid., p. 282.

[33]Ibid., p. 283.
Says Greenhut: "Thus, while its basic postulates have greater public validity, a possible loss in econometric type of research possibilities may overcompensate the attainment of generality."

CHAPTER III

LOCATION FACTORS

There are unquestionably numerous factors which may influence industrial location. McKinley Conway, editor and publisher of Industrial Development, has published a checklist of as many as 700 plant location factors which may enter into a plant decision.[1] Although it is believed that this is by far the most extensive checklist yet issued, there are perhaps many more factors still unconsidered.

However, it would be impractical and unnecessary to analyze each and every item on this list in view of the purpose and limited scope of this study. For this reason, only those industrial location factors which, in the writer's opinion, are basic and pertinent, will be treated in this chapter. These factors have been considered most important by the early location theorists and have occurred most often in empirical studies. Some of these empirical studies are included in Chapter IV.

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[1] McKinley Conway, Jr., "700 Plant Location Factors," Industrial Development, 4: 17-20, No. 11, October, 1957. See also Appendix A.

TRANSPORTATION

It is generally recognized that transportation is one of the most important considerations in determining plant location. Edward Lynch of the United States National Resources Planning Board states that its peculiar importance as a location factor arises out of the fact that location is a matter of spatial consideration and transportation costs are the price for overcoming distance.[2]

If it is assumed that manufacturing costs and other costs except those of transportation are constant and thus the same at any location, the choice of location is determined by ascertaining the site with the lowest cost of transportation.

From this standpoint, an industry would then locate either near the market or near the source of materials or at a point somewhere in between. The exact site will depend on the relative cost of transporting raw materials and finished goods. Processing will be done near the market if it costs less to transport the raw material than the product, and near the source of material if the situation is reversed. Here it is assumed that there is

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[2]Edward S. Lynch, "Transportation," Industrial Location and National Resources (Washington: U.S. National Resources Planning Board, U. S. Government Printing Office, 1943), p. 186.

little or no weight gain or loss to the product during the manufacturing process. However, when there is considerable weight loss during the fabrication, such as is the case with the manufacture of pulp from wood, the locational pull towards the source of material will be greater. On the other hand, when a weight gaining process is involved, such as the manufacture of beverages, the plant tends to be attracted toward the market.

The problem of seeking the point of minimum cost of transportation is not simple for an industry which uses several sources of raw materials and sells its finished products to different markets, although the same principles as outlined previously apply. "To the extent that one material or one product involves greater cost of movement than others, its source or market will have a correspondingly greater influence."[3] In this case, however, competition among producers may be less direct and the pressure on transport costs somewhat reduced.[4]

The problem is further complicated by other factors. In the first place, transportation cost will vary according to the medium used. Water transportation is ordinarily cheaper than by rail. Air transport rates are usually

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[3]Ibid., p. 187.

[4]Glenn E. McLaughlin and Stefan Robock, Why Industry Moves South (Washington: N.P.A. of the South, 1949) p. 85.

highest of all. Which of the media will be utilized depends among other things on the speed required either for the materials to reach the plant, or for the finished products to reach their place of destination, in relation to the cost of transportation.

Where large quantities of low value materials have to be moved at low costs, the availability of water transportation may be an important element in plant location.[5] The importance of Pittsburgh in steel making is attributed largely to waterways.[6]

Rail lines are also important for the transportation of other heavy materials such as coal, ores, etc., while air lines are handlers of high-grade commodities and expedited shipments.[7]

In some industries speedy transportation is essential in order to minimize interest charges on capital tied up and also on storage costs. As goods in transit frequently represent a considerable absorption of working capital, it is customary to sell zinc and electrolytic copper at delivered prices including the interest charges

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[5] Ibid., p. 90.

[6] Melvin Greenhut, Plant Location in Theory and Practise (Chapel Hill: The University of North Carolina Press, 1956) p. 110.

[7] Mc. Laughlin, op. cit., p. 90.

on the value of it while in transit.[8]

Transportation cost is also dependent on the rate structure. Rates not only vary for different products, but they also tend to decline as the distance of the haul increases. This makes the total transportation charges lower if the plant is located near the source or at the market than anywhere else, since the total cost of two short hauls is greater than that of a single long haul. Thus, unless processing costs at some other point is low enough to effect the difference in transportation cost, manufacture will tend to occur either near the market or the source of material.[9]

As rates are usually higher for finished products than for raw materials, there is a tendency for manufacturing to be located away from the source and close to the market.[10]

Because of the relative immobility of resources, changes in freight rates do not usually have an immediate effect on industrial location, although in some cases it may cut off some producers altogether. An increase in transportation costs may, for example, be borne either by the producer, by his suppliers, his customers, or divided among all, without changing the location of manufacturing.[11] But with time, changes in freight rates, in particular the

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[8]Lynch, op. cit., p. 187.

[9]Ibid., p. 188.

[10]Ibid., p. 188.

[11]Ibid., p. 190.

difference in rate between materials and finished goods, and changes in the form of service, may alter the geographical pattern of industry.[12]

Summary

Transportation is an important determinant of plant location. Transportation costs vary in different locations for different industries. The determination of the point of minimum transportation costs, ceteris paribus, is complicated by factors such as rate structure, multiplicity of materials used and markets served, etc.

Transportation is clearly not the sole determinant of plant location. Production costs and other factros, which are assumed constant to arrive at the point of minimum transportation costs, are not usually constant, nor are they the same for all locations. Other factors, such as will be discussed below, must therefore be considered before a definite location can be ascertained.

RAW MATERIAL SOURCE

Historically the proximity to sources of raw materials has greatly influenced the location of American industry.[13] Today, however, technological advance which

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[12] McLaughlin, op. cit., p. 95.

[13] Leonard C. Yaseen, Plant Location (New York: American Research Council, 1956), p. 29.

brings with it the possibility of utilizing synthetic materials and rapid communication, has greatly reduced the importance of the source of raw materials as a location factor. Yet, there are certain industries, mostly of the extractive type, which still tend to be located near their material sources. This is mainly because of the immobility of the latter. Typical industries are mining, oil refining, and ore smelting. The raw material, following extraction, becomes mobile and has a locating effect proportionate to the transfer cost and the amount used in production.[14] In other words, those industries which incur a great reduction in weight during the processing of its raw material will locate at or near the source of its raw material. For example, pulp and paper, newsprint, and other paper manufacturing industries tend to be located near the place where pulpwood is available. Other industries using low-valued, heavy and bulky raw materials are also likely to be located in the proximity of their raw material source. Among these are brick manufacturing from common clay, the ginning of cotton, and the sawing of lumber.[15] Similarly, the extraction of sugar from sugar beet is carried out near the fields because the beet cannot be transported

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[14]Stephen Helburn, "Location of Industry," Journal of Land and Public Utility Economics, 19: 253-263, August, 1943.

[15]Russell Smith, Ogden Phillips, and Thomas Smith, Industrial and Commercial Geography, (New York: Henry Holt and Company, 1955), fourth edition, p. 270.

economically.[16]

McLaughlin and Robock[17] mention perishability of the raw material as another factor which causes certain industries to locate near their raw material source. Examples of these are the dairy and the meat packing industries.

In general, the sources of raw materials have a definite locational attraction for those industries which are predominantly raw material users. The United States Bureau of Census defines raw material consuming industries as those in which the expenditures for raw materials are more than half of the total.[18] Establishments falling under this classification are likely to feel the pull toward raw material sources.

The United States National Resources Planning Board reports that for manufacturing industries the percentage of material cost to the finished product value in 1939 ranged from 31.5 to 77.1 per cent. Food products, tobacco manufacturers, petroleum products, nonferrous metals and their products, automobile and automobile equipment belong to those industries where the cost of material is highly

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[16]Political and Economic Planning, Report on the Location of Industry (London: PEP, 1939), p. 62.

[17]McLaughlin, op. cit., p. 52.

[18]U. S. National Resources Planning Board, Industrial Location and National Resources (Government Printing Office), p. 133.

significant.[19] Thus, these industries tend to have their processing factories near the sources of raw materials.

The locational influence of raw materials also depends on the multiplicity of materials necessary in the manufacturing process. A strong locational pull of a material in any one area may be counteracted by an equally strong pull of a second material in another area. In general, the greater the combination of materials required, the less is the locational influence of any of them.[20] This may result in more emphasis being given to locational factors other than raw material.

When other locational factors, such as transportation or labor are considered together with raw material, it is the cost of the latter which demands a major consideration. In this cost is included the cost to transport the raw material to the processing site.

To generalize, the locational influence of materials is predominant only when the saving in the cost of raw material due to such location exceeds the saving in the cost of labor if a labor orientation is followed, or exceeds the savings in the transportation cost for the finished product in case of a market orientation.[21]

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[19] Ibid., p. 129.

[20] Ibid., p. 136.

[21] Hermann Schumaker, "Location of Industry," Encyclopaedia of the Social Sciences, IX, 585-593 (New York: The MacMillan Company, 1933).

Summary

Raw materials source is declining in its importance as a location factor.

It is, however, still the most important consideration for industries of the extractive type, for those processing perishable materials, and for those in which the cost of materials is a significant part of the total value of the product.

MARKETS

Markets have always been an important factor influencing the location of industry. In fact, their relative importance as a location factor has greatly increased during recent years owing to the change in the character of industry as a whole and the present necessity of speedy and regular delivery of goods.[22]

Whereas activities tied to the location of raw materials are waning in relative importance, those carried on near the markets are surging upward. This is indicated by a fall of employment in raw-material-oriented activities, and a rapid increase in employment in the secondary and tertiary activities.[23]

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[22] Political and Economic Planning, Report on the Location of Industry (London: Political and Economic Planning, 1939), p. 72.

[23] Chauncy Harris, "The Market as a Factor in the Location of Industry in the United States," Appraisal Journal, January 1956, pp. 57-86.

Although iron and steel industry is a raw-material-processing industry, it has now become more and more market oriented. The Fairless Steel Works on the Delaware River in New York State, for example, is located there because of the low cost of water transportation and the nearness of the markets.[24]

Markets are comprised of ultimate consumers, industrial consumers, and other organizations which handle the commodities for further distribution.

McLaughlin and Robock give three explanations as to why an industry would want to locate near the market: (1) to minimize transport costs, (2) to secure an increased share in the business, and (3) because the finished products are perishable. An example of locating near the market to minimize transport costs is the location of a du Pont sulphuric acid plant at Richmond, Virginia, which is mainly to provide the company with sulphuric acid, the manufacture of which involves a "weight-gaining" process.[25]

The minimizing of transport cost is especially critical for those industries in which transportation charges form a large percentage of the selling price of the finished product when it is transported over a great distance, such as the cement industry, for example. Industries where

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[24] Ibid. See also Walter Isard, "The Future Locational Pattern of Iron and Steel Production in the United States," Journal of Political Economy, LVII, April 1949, pp. 118-133.

[25] McLaughlin, op. cit., p. 32.

the finished product is bulkier than the raw materials also tend to be market-oriented, among these are the manufacture of agricultural machinery, printing presses, and large machine tools.[26]

In order to secure an increased share in the business, speedy delivery and close contact with customers are often essential. Belonging to this category are industries such as photoengraving, newspaper publication,[27] and also various service and repair industries where customers specifications must be satisfied.[28]

Market-oriented industries, such as ice, ice cream, and beverage industries, belong to those where the perishability of the finished product is of major importance in deciding on a location.[29]

The market under consideration may be localized to a certain extent or spread over a large area. In other words, it may be local, regional, national, or even international in scope.[30] In the last three cases a compromise solution to the location problem may have to be taken. For example, if the finished goods are sold all over the country,

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[26]Smith, op. cit., p. 269.

[27]National Resources Planning Board, op.cit., p. 220.

[28]Smith, loc. cit.

[29]National Resources Planning Board, loc. cit.

[30]McLaughlin, op. cit., p. 31.

it would not be possible to locate the plant near all its markets. Two ways are open. The plant could either be located at a point where the transport costs for its particular group of markets are minimized, or it could go to the place where the major market is situated. In both cases, however, something is sacrificed. In the first case, it might lose the ready access for service for the customers, whereas in the second case the transportation charges are likely to be higher.[31]

Summary

The relative importance of markets as a location factor has increased at the cost of the raw material factor.

The factor "markets" is especially of prime importance in a location decision for those industries in which there is a considerable gain of weight during the process, for those where speedy delivery and close contact with customers is required, and for those where the finished goods are perishable.

Where finished goods are sold to several markets, a location near all the markets, however desirable, is technically not feasible. In this case the entrepreneur would have to be satisfied with a compromise solution.

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[31]Political and Economic Planning, op. cit., p. 73.

LABOR

Leonard Yaseen, a Plant Location expert, contends that the selection of a general geographic area for the location of a plant is based on raw material costs, market accessibility, and economic considerations. And that it is the labor factor which in the final stage determines the particular community.[32]

McLaughlin and Robock discovered from their study that as a location factor labor was less important than markets and raw materials.[33]

The influence of labor on industrial location may be considered in terms of (1) wage rates, (2) productivity, (3) skill, (4) turnover, (5) supply, and (6) labor laws.[34]

Wage Rates

There appears to be geographic differences in wage rates of workers doing the same task. Yaseen states that in the United States wide variations exist in wage level between large cities and small communities, and that highest wages are paid on the Pacific Coast.[35] The United

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[32]Yaseen, op. cit., p. 50.

[33]McLaughlin, op. cit., p. 67.

[34]See Greenhut, op. cit., p. 129.

[35]Yaseen, op. cit., p. 65.

States National Resources Planning Board suggests that these differences are a reflection of differences in cost of living, in other non-monetary advantages, or differences in bargaining power, each of which is often sufficient to restrict the mobility of labor, thereby barring equalization of wage levels.[36]

A low wage rate in any particular area does not necessarily attract industry. In order that this may be so, the ratio of the labor cost to the total cost of the product must be sufficiently high to override other location factors.

The ratio of labor cost to the total cost of the product may vary between fifteen to eighty-five per cent. If an industry is at the eighty-five per cent end of the scale, all other costs would have to be cut by one-third to equal a saving in labor cost of one-seventeenth.[37]

It has been reported that the five industry groups with the highest values of this ratio in 1937 and 1939 were transportation equipment (except automobile), lumber and timber basic products, printing and publishing and allied industries, machinery (except electrical), and other miscellaneous industries. All these industries, except those

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[36]U. S. National Resources Planning Board, op. cit., p. 221.

[37]Helburn, op. cit., p. 257.

in the lumber and timber group,[38] tend to be oriented toward labor.[39]

Although industrial location pattern may in time adjust itself to geographic labor cost differentials, there are certain factors, such as the sunk cost of a plant, which may prevent the latter from moving to a better location.[40] Another factor which might prevent a change of location is the fear that apparent savings might actually only be transitory, considering the rapid wage increases which have occurred recently in lowest wage areas.

In general, difference in wage rates alone is not a sufficient measure to cause labor orientation. Other attributes of the labor factor, such as skills, productivity, availability, etc., are often more important considerations in determining a location.

Productivity

Labor may vary greatly in productivity from region to region and from place to place because of climatic or environmental differences. It may even vary from plant to

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[38]Although the lumber industry has a high labor to total cost ratio, it is oriented toward raw material, which forms its basic requirement.

[39]U. S. National Resources Planning Board, op. cit., p. 222.

[40]Ibid., p. 221.

plant as a result of different administrative methods.

Industry may, therefore, locate in an area where labor is highly efficient, although the wage rates may be higher as compared to another low-productivity area.

Skill

It is generally recognized that the need for special skill is losing its relative importance as a location factor. This is due to rapid technological changes. Mechanization of processes and, in recent years, automation has made it possible to do away with all-round skilled craftsmen and increased the demand for skilled and semi-skilled machine operators. And as the report on the location of Industry in Great Britain states: "the process of replacement of skilled labour by machinery has not diminished the demand for skilled labour so much as changed the nature of demand."[41] Super-skilled men are required for the maintenance of intricate plants and other specialized jobs, such as tool-making, etc. The availability of these men may have some influence on industrial location. However, it is believed that their locational influence tends to be neutralized as they are considered the most mobile of all classes of labor.[42]

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[41] Political and Economic Planning, op. cit., p. 66.

[42] Ibid.

Turnover

Employers are increasingly giving more attention to labor turnover in a particular area when considering new plant location. It has become a location factor for labor-oriented industries, as it is reflected in labor cost and is related to labor productivity. Present day employers are very much concerned in creating a healthy labor-management relation, not only for their own good, but also because they are becoming more aware of their responsibility toward their employees. Labor turnover is considered one of the measurable indicators of labor-management relations in a community.

Yaseen suggests that a monthly net turnover rate in the average manufacturing establishment should not be more than five per cent, although in such industries as logging or shipbuilding this figure may go up to as high as eleven to twelve per cent.[43]

Supply

The size of the labor force in a particular area or community is the next important labor consideration which influences plant location. It is generally true that the largest labor markets are found in large cities with its

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[43]Yaseen, op. cit., p. 76.

correspondingly higher wage rates than in small towns. However, for the labor oriented industries it means that the larger the labor market the easier it is to select a labor force which will fill their need, despite the disadvantage of having to pay higher wages.

Whereas unskilled labor has little, highly skilled labor has a strong locational effect. Industries which require skilled labourers have a very strong incentive to locate close to areas of trained labor. The jewelry industry of Providence and Attleboro in the United States is believed to have started purely on the basis of labor supply.[44]

The importance of labor supply as a location factor may be summarized with a statement by McLaughlin and Robock, which says:

> ....there has been increased concern about achieving labor savings through location, where the supply of labor is adequate to reduce costly turnover, to reduce competition for workers which bid up wages, and to provide some assurance that the plant will be able to secure a satisfactory proportion of the more efficient workers, and also where labor relations are likely to be comparatively peaceful.[45]

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[44]Helburn, loc. cit.

[45]McLaughlin, op. cit., p. 68.

Labor Laws

In the final stage of industrial location, prospective entrepreneurs in a particular community will look at the existing labor laws. They will be most interested in the workmen's compensation laws, unemployment compensation laws, and statutes regulating hours of work, as stringent compensation laws can be costly to them.[46]

Summary

In short, the location of labor oriented industries is determined by a balance of the relative importance of wage rates, productivity, skill, turnover, supply of labor, and labor laws, each of which by itself is very rarely, if ever, the deciding consideration.

Examples of labor oriented industries are: apparel, machinery (including automotive parts), shoes, and textile mill products.[47]

On the whole, labor is considered the most complicated of all the principal locating factors. For example, since the labor force is distributed geographically according to the population, which is the same as the ultimate consumers, what appears to be a labor oriented industry

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[46]Greenhut, op. cit., p. 132.

[47]McLaughlin, op. cit., p. 75.

may actually be market oriented, and vice versa.[48] Furthermore, the influence of labor is largely unpredictable as it is likely to be affected by the advent of industry, and as its character may also change.[49]

The United States National Resources Planning Board sums up by saying that:

> ....the disadvantages of locating an industrial plant away from the sources of labor are so intermingled with perhaps even stronger disadvantages with respect to the other locational forces, that no accurate estimate can be made of the independent effect of labor on location.[50]

FUEL AND POWER

Historically, the availability of power resources has been a significant factor for industrial locations. For decades prior to the invention of Watt's steam engine the necessary mechanical energy was derived from water power by means of water wheels. Riverbanks were, therefore, considered the ideal site for manufacturing.

The early textile mills and factories in England were all located along streams, and up to about 1850 sixty per cent of the American factories were still dependent on water power.[51]

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[48] National Resources Planning Board, op.cit., p.221.

[49] Political and Economic Planning, op.cit., p. 63.

[50] National Resources Planning Board, op.cit., p.231.

[51] Smith, op. cit., p. 333.

There is no doubt that all industries require some form of power, whether it is manpower, animated or inanimated power, including water or wind power, power derived from the burning of wood, coal, oil or gas, or perhaps solar or atomic power in the not too distant future.

The locational attraction of power depends on the extent to which power is used in the production or manufacturing process.

For certain electroprocess industries where energy consumption forms a large part of the value of the product, power costs are definitely a dominating, although not necessarily, the sole locational consideration. Among these industries are: calcium carbide, aluminum, electrolytic zinc, magnesium, and electrolytic soda. The production of aluminum metal by electrolysis of fused alumina, especially, requires cheap hydroelectric power more than anything else, whereas for the production of magnesium, cheap power stands about on an equal footing with availability of materials.[52]

Power is also a locating factor in those industries using large amounts of machinery, such as those for cotton and wood textiles, knit goods, planing-mills, rolling mills, wood products, paper and printing, etc.[53]

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[52]National Resources Planning Board, op.cit., p.177.

[53]Helburn, op. cit., p. 256.

Low-cost power alone is, however, not sufficient to create an industrial area with a wide range of diversification, as there are only a few specifically power oriented industries. But when cheap power and raw materials suitable for electroprocessing industries occur concurrently, a basis may exist for industrialization on a substantial scale.[54]

The influence of power as a location factor has been affected by recent technological advances, which have resulted in a more efficient utilization of fuel and changes in the method and cost of transportation and transmission. For example, in 1950 the electrical stations produced as many kilowatt-hours of electrical energy out of one pound of coal as they had out of seven pounds in 1900.[55] Furthermore, with the development of high voltage transmission, energy in the form of electricity can be transported with very slight loss.

These developments have made manufacturing establishments and industries in general less dependent on the proximity to power resources, and have thus substantially reduced the importance of power as an industrial location factor.

The question now is whether the advent of a new source of cheap power, say, atomic power, would affect plant location in the future.

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[54]National Resources Planning Board, op.cit., p.180.

[55]Frederic Dewhust, America's Needs and Resources: A New Survey (1955), p. 907.

Walter Isard contends that, even for those industries such as cement, glass, aluminum, and iron and steel industries, where power requirements are substantial, there is little evidence that atomic power even at a cheap price would cause much plant relocation.[56]

Furthermore, he adds that "in the short run at least, all available evidence supports the belief that atomic power will cost more--and perhaps considerably more--than will power from existent energy sources."[57]

Fuel as a location factor varies in importance from industry to industry. It may be employed either as a source of energy or as a basic raw material, or as both. And it is to be noted that as sources of energy fuels may be readily substituted for one another over a wide range, i.e., oil for coal, gas for oil, or vice versa. On the other hand, when they are used as basic raw materials, substitution of other fuels may be difficult, if not impossible. For example, in the manufacture of coke only bituminous coal may be used, and similarly natural gas is used as raw material to make carbon black.[58] In the smelting of iron ore, coke is used as a reducing agent and as fuel as well.[59]

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[56]Walter Isard and Vincent Whitney, "Atomic Power and the Location of Industry," Harvard Business Review, 28: 45-54, March, 1950.

[57]Ibid. [58]Yaseen, op. cit., p. 90.

[59]National Resources Planning Board, op. cit., p.156.

There are four categories of industries in which fuel plays a role with different degrees in the locational decision.

In the first place, the industries in which fuel orientation is the dominant factor are the consumers of fuels as raw materials. In this group are the coke and carbon black industries. In a second group of industries, fuel has played an important role in plant location together with considerations for the factors raw materials and markets. Belonging to this group are industries such as glass, which uses natural gas as fuel, clay products, which uses coal or gas, metal refining and fabrication and chemicals, which use coal and gas as fuel. In a third group, materials and markets are the dominant factors, but raw materials are so widely available that fuel costs also play some role in locational decisions. This group is represented by the paper, cement, and lime industries. And finally, there is a fourth group in which other factors override the factor fuel in importance, although the industries concerned consume a great deal of fuel. Typical examples are manufactured ice, which is market oriented, and naval stores and salt, which are material oriented.[60]

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[60] Ibid., p. 167.

Summary

Power has been a major location factor in the past. With the advances in technology, which bring about more efficient use of fuel and changes in the methods and costs of transportation and transmission, there is less need for industries to locate close to their power resources.

For certain electroprocess industries and those using a great number of machinery, power may still be the dominating location factor.

Fuel may be utilized as a source of energy or as a basic raw material, or as both. The major fuel oriented industries are those which use fuel as a raw material. In others fuel is considered along with other location factors, such as raw materials and markets, and its influence on location may or may not be apparent.

TAXATION

Taxes are, in most cases, an important consideration in the selection of a location for new businesses and industries. Its importance relative to other location factors varies among industries, but other considerations usually outweigh potential savings as a result of tax differentials. In fact, only relatively permanent tax differentials will have appreciable effects on the growth of industrial activity. Yet, even in this case, it does not necessarily follow

that those communities with the highest rate of taxation will lose their industries to other areas, and that those with the lowest rates of taxation will be swamped with new industries. Unfavorable tax conditions may very well be, as it usually is the case, offset by other favorable factors.

Taxes have an effect on location so long as they can be evaded. While an enterprise cannot escape the impact of Federal taxes by a change in location, it can do so with State (or Provincial) and local taxes. Therefore, any concern will always try to locate where the tax climate is most favorable.[61]

Tax differentials between states are unavoidable, at least in the foreseeable future. There are, according to Floyd,[62] four basic factors--fiscal capacity, need for public services, service standards, and type of tax system--which have caused interlocal tax differentials. Depending on its fiscal capacity and the extent of the need for public services, a community may levy low or heavy industrial taxes. The question now is whether these tax differentials in fact do turn up as a locational determinant.

Bloom[63] came up with a negative answer. In his

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[61]Stephen Helburn, "Location of Industry," Journal of Land and Public Utility Economics, 19: 253-263, August, 1943.

[62]Joe Summers Floyd, Jr., Effects of Taxation on Industrial Location (Chapel Hill: The University of Carolina Press, 1952), p. 36.

[63]Clark C. Bloom, State and Local Tax Differentials and the Location of Manufacturing, Studies in Business & Economics, New Series No. 5, (Iowa State University, 1956), p. 38.

extensive research in the tax structure of the State of Iowa, he found that "higher per capita levels of state and local tax collections have not been associated with slower rates of growth in manufacturing employment." Furthermore, Bloom contends that higher service levels which generally accompany higher tax levels, encourage growth rather than decline of manufacturing activity; and that taxes levied directly on manufacturers are relatively light in comparison to other factors which impinge upon earnings. He then concludes by stating that factors other than taxes are determining industrial location.

Mabel Walker of the Tax Institute of New Jersey agrees with Bloom when she says that "the effect of the general tax burden upon industrial location has been grossly exaggerated."[64] In most cases, other factors will more than outweigh tax considerations, but she adds that "in situations where other considerations largely cancel out, a tax differential may very well be the marginal factor which will tip the scales."[65]

On the other hand, there are people who believe that tax differentials do influence the choice of industrial location.

In the first place, cities and localities in the

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[64]Mabel L. Walker, Business Enterprise and the City (Princeton, New Jersey: Tax Institute, 1957), p. 47.

[65]Ibid.

United States have always used tax concessions to induce new industries to locate in their areas, although this practice is gradually disappearing. Whereas in 1938 there were sixteen states in the United States which allowed temporary tax exemption to new enterprises, there were only seven states which did so in 1957.[66] This is interpreted as a realization on the part of the states that tax exemptions are unnecessary.

The strongest evidence supporting taxes as an important location factor is perhaps the Detroit Free Press Survey of 1957 conducted among major manufacturers on the importance of the level of business taxes in Michigan in manufacturing location. The Free Press reported that the level of business taxation in Michigan has led General Motors to locate plants in other states, that Ford and Chrysler were considering doing the same if taxes were increased, and that Jones and Laughlin Steel Corporation decided to locate its sixteen million dollar plant in Ohio, rather than in Michigan because of the differentials between the states.[67]

A weaker statement is given by Floyd, who concludes his study by stating that tax differentials may influence

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[66] Ibid., p. 42.

[67] Missouri State Chamber of Commerce, Why is Missouri falling behind other States in Economic Growth? Research Report No. 34, (Jefferson City: October 31, 1957), p. 17.

the selection of sites for certain types of manufacturing.[68]

Summary

There seems to be no agreement as to how important taxes are as an industrial location factor. Some people have expressed their opinion that taxes have no influence on the location of industries. Others feel that taxes do have a locating effect, and that in many cases high taxes have prevented prospective enterprises from locating in the areas concerned.

It is perhaps safe to conclude that taxes are a factor which must be considered by companies seeking new location, and by the localities who wish to attract new businesses and industries.

CAPITAL

Although capital is a prerequisite to the establishment of a company, it does not necessarily follow that the plant or manufacturing concern would be located near the supply of capital. An industry would logically be attracted toward its source of raw materials, power resources, or other location factors, but it very seldom, if ever, moves toward capital.[69]

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[68] Floyd, op. cit., p. 123.

[69] Russell Smith, Ogden Phillips, and Thomas Smith, Industrial and Commercial Geography (New York: Henry Holt and Company, 1955), fourth edition, p. 276.

Capital plays a more significant role as a location factor in the forming of a new company than in the expansion of an established enterprise, in the decisions of smaller companies more so than in larger organizations. In the first case, capital may be expected to exert its prerogatives more fully than after management has assumed its full responsibility.[70] In the second case, it may be assumed that large organizations have funds available, or can obtain them through the money market by issuing stocks or bonds.[71]

As a broad generalization, it may be said that capital has a specific locational force, and is not a regional determinant.[72] For example, a municipality may offer substantial financial assistance in the form of, say, a free building, to induce a prospective entrepreneur to locate his plant there. This type of financing is often necessary for the development of less industrialized areas, as was practiced in the so-called depressed areas in Britain. The Political and Economic Planning of Great Britain at that time reported that a vicious circle existed:

> A region is depressed because it needs industries to employ its workpeople. Because it is depressed, it is a poor market for consumer goods, and therefore

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[70]National Resources Planning Board, op. cit., p.234.

[71]Greenhut, op. cit., p. 136.

[72]Ibid.

> probably a bad location for a light industry, finance for which is consequently difficult to obtain.[73]

Large amounts of capital are necessary in particular to mass production industries, such as iron and steel, automobiles, and meat packing.[74] Yet, even for these industries, the question of accessibility of capital is never considered as an exclusive location factor, for capital is extremely mobile, more so than any of the other factors of production, and it tends to flow wherever it can be profitable. This mobility is believed to have increased over the last decades. Perhaps this is due to the more effective ways in which surplus capital is being invested--"the corporate form of business, the growth of the stock exchanges, adherence to the principle of limited liability and the development of rapid and efficient means of transportation and communication."[75]

To the extent that the mobility of capital is still imperfect, it being more readily available in one place than in another, capital may remain a location factor.[76]

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[73]Political and Economic Planning, op. cit., p. 74.

[74]National Resources Planning Board, op. cit., p.270.

[75]Othel D. Turner, Industrial Location Factors in Wyoming, A Functional Analysis, An unpublished doctoral dissertation, The University of Texas, January, 1958.

[76]National Resources Planning Board, loc. cit.

Summary

Capital may exert some influence on the location of industries. However, it is very seldom, if ever, a governing factor. Even for mass-producing industries where large amounts of capital are required, other location factors appear to override capital in importance. As the mobility of capital is increasing, the significance of it as a location factor is declining. And to the extent that capital is not perfectly mobile, it may have some locational effect.

MANAGEMENT

The importance of management as a location factor depends on the number and type of men required to fill management's position. It is generally believed that management has become an increasingly important factor to be considered in every location decision, especially with the rapid growth of industries and its accompanying complexities.

Some industries with complicated processes require a large number of technical and executive personnel and it is for those industries that the availability of management personnel is a critical factor in considering new location. In other industries, general business ability may be

considered sufficient for the concern to operate effectively; in this case, management does not constitute a significant location factor.

Although management is believed to be relatively mobile, few companies, when considering moving into another town or city, would want to transfer their entire staff to the new location and thus to have no local management representatives.[77]

The mobility of management personnel depends to a certain extent on economic conditions and the supply and demand situation. If executive personnel are easily available because of a large supply, managers are more willing to move than when there is a great demand for their services in the place where they live.[78] The development of large corporations which are prepared to pay the highest salaries to unusually competent managers has helped to increase the mobility of management personnel.

There are, however, other factors which tend to reduce this mobility. Many executives and technical personnel are reluctant to move to other areas because of their unwillingness to sever established professional, personal and trade relationships.[79] Factors such as

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[77]McLaughlin, op. cit., p. 97.

[78]Turner, loc. cit.

[79]National Resources Planning Board, op. cit., p.241.

climate, recreational facilities and social facilities, if not considered suitable or adequate, may also restrain them from moving. It is, therefore, not surprising to often find management abilities concentrated mainly in large industrial areas.

Regional differences in local leadership may vary, although it would be difficult to measure. They may arise from differences in types of skills or in experience, all of which help to account for the differences in the rate of growth of industry for different regions.

Summary

The importance of management as a location factor varies from industry to industry. Although management ability is becoming increasingly mobile, there are still many forces which tend to work against it, causing management ability to be localized.

The effect of management on location is difficult to measure, but it is believed that there exist regional differences in business leadership which accounts for at least some of the differences in regional rates of growth.

CLIMATE

Climate is probably the most important of all the geographic factors when considering industrial location. Friedrich List, a German economist, regarded climate as

the principal factor governing the distribution of industry. He contended that the temperate zone is the natural seat of machine industry, whereas the tropics are unsuited to manufacturing.[80]

The most significant effect of climate on industrial location is perhaps the fact that it has accounted for the present population distribution. Many people are attracted to places with pleasant weather conditions, and are willing to work for lower wages than they would expect in areas with unfavorable climate. This movement of people to preferred regions would create a market area and labor force, the area of which would readily become the centre of manufacturing and industry. The development of Southern California as an industrialized area is an example of this evolution.[81]

In a location study conducted by McLaughlin and Robock in the thirteen states of the South it was shown that attraction of industries to the South was partly due to climatic advantages, which were related to: the opportunity for year-round construction, the ability to use less expensive construction materials, the lower plant operating and maintenance costs, the lower heating costs, and the fact that shipping and deliveries were not interrupted by weather.[82]

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[80] Schumaker, op. cit., p. 588

[81] Turner, loc. cit.

[82] McLaughlin, op. cit., p. 98.

The advancement in technology, particularly in the field of heating and air-conditioning, has to some extent reduced the influence of climate on industrial location. Whereas the earlier textile mills had to be located in areas possessing just the right humidity necessary for the yarn spinning process, today they are free to locate in response to factors other than humidity requirement since the latter can be mechanically controlled. Also, the working force, including executive personnel, are now more willing to go to places with less favorable climatic conditions in order to meet new challenge or to acquire other non-climatic advantages.

For certain industries, however, climate is still the most vital consideration. Leonard Yaseen reports that one of the principal airplane manufacturers in the United States in deciding on a new location, finally chose a city in Tennessee above that in Pennsylvania because of its higher number of sunny days per year.[83] This is an example of a climatic problem which man cannot yet control.

Whereas on the one hand the effect of climate on industrial location has been reduced, it is believed that in the future climate may again become an important location factor. As the standard of living rises, people would demand

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[83]Yaseen, op. cit., p. 124.

more and more of the best of everything. With this in mind, management of the future would probably choose locations more in line with the wishes of its employees for climatic conditions. This trend would be followed especially by those industries which, for their location, are not oriented toward raw materials source or other non-climatic factors.

Summary

Climate has been of major importance in creating the industrialized areas in Southern United States. Historically, it has been the governing location factor for the early textile mills. However, with the development of temperature and humidity control devices, unfavorable climatic influences have been largely eliminated. And only in very rare cases, where weather condition is vital to the operation of the industry, is climate still of prime importance.

Although it has largely been reduced in importance as a location factor, it is believed that climate may again have an important role to play in locational decisions by future management.

ATTITUDES

The choice of an industrial location may, to a certain extent, be influenced by the attitudes of particular groups toward industry in the prospective community.

Among these groups are the government, the public and labor in general.

Government

As the impact of Federal Government administration and laws on industry is the same, regardless of location, a company seeking a new location will mainly be involved with state (or provincial) and local governments.

A favorable attitude of the state government toward industry is considered essential. McLaughlin and Robock reported in their study of industries in the South that some manufacturers indicated that they were located just across state boundaries in order to find a more favorable environment, and still serve the same market.[84] The selection of a state or a community is often a second step after the determination of an area within which major requirements could be satisfied.

The attitude of governments toward industry is usually reflected in their laws. Of particular importance to industries are labor legislation and tax laws. Some textile manufacturers in the South were reported to have located there because of less stringent regulation with respect to hours of employment for women, as compared to the North.[85]

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[84] McLaughlin, op. cit., p. 105.

[85] Ibid., p. 107.

The influence of tax provisions on industrial location has been dealt with separately in a previous section of this chapter.[86]

With respect to local government, prospective companies are not only interested in its attitude toward industry, but also in its operating costs and efficiency, including the quality of municipal services of sewage disposal, fire protection, police protection, highway maintenance, etc.[87] Another important consideration is the willingness of the local government to cooperate in extending services, such as additional roads, sewer and water connection, and the like.

Public

The attitude of the public is considered conducive if it favors increased industrialization. Many prospective manufacturers are looking for a community with active local leadership, not only in view of their requirements for management personnel, but also to help them to influence the attitude of the public and to overcome the fear of the latter, which sometimes develops over the reported introduction of a new factory.[88]

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[86] See supra, pp. 44-48.

[87] McLaughlin, op. cit., p. 108.

[88] Ibid., p. 106.

Labor

Favorable labor attitudes are often given more emphasis than availability or wage rates in the selection of a plant location, especially by labor oriented industries.

McLaughlin and Robock sum up the importance of favorable labor attitudes as follows:

> A history of cooperation on the part of local labor was taken by prospective manufacturers to indicate a willingness to learn new processes and an opportunity for the management and labor force of a new plant to achieve favorable rates of productivity.[89]

Summary

In most cases, favorable attitudes of local and state governments, public and labor, in general, toward industry are considered essential for the successful launching of a new industry.

In connection with the attitude of the government, management is most interested in the existing labor legislation, tax laws, and other municipal sanitary and protective services of the prospective community.

Favorable attitudes of labor and the public are next in importance in the final selection of the location of a new plant.

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[89] Ibid., p. 71.

INTERRELATIONSHIPS AMONG LOCATION FACTORS

For certain industries, especially those which are oriented toward raw materials source, markets, or power resources, it is clear that one factor overrides all others in importance. In each of these cases, which are but few in number, there is very little, if any, freedom of choice of location.

In most cases, however, several of the location factors as discussed previously, together influence the final selection of a location with none of the factors playing an all-exclusive role.

A good example of this interrelationship is given by the Political and Economic Planning in Great Britain in its Report on the Location of Industry:

> The cutlery industry began in the Sheffield district some 400 or 500 years ago. An iron industry based on local coal-measure ironstones, charcoal supplies and water power had existed long before, but specialization in cutlery was made possible by the excellent grindstone material provided by the local millstone grit, and it was encouraged by the advent in the sixteenth century of skilled Flemish settlers. Skill tended to accumulate in the district and the industry has remained highly localized there. The discovery of stainless steel by Sheffield manufacturers some twenty-five years ago has emphasized the supremacy of the district in cutlery manufacture.[1]

Here three of the primary factors, raw materials, water power, and skilled labor, have combined to locate the cutlery industry in Sheffield.

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[1]Political and Economic Planning, op. cit., p. 86.

THE CHANGING IMPORTANCE OF LOCATION FACTORS

In our dynamic world everything is bound to change. Thus, the importance of location factors are constantly changing in response to several external forces.

Whereas some location factors such as water power, climate, and the like, can be attributed to natural causes, technology will always attempt to conquer them if they happen to go against human wishes. For example, the possibility of developing energy in the form of electricity has overcome the necessity to locate plants along streams to obtain water power; the more efficient transmission of electricity has reduced the attraction of industries toward sources of energy, giving manufacturers more freedom to locate their plants near the markets. Unfavorable climatic influences have largely been eliminated by temperature and humidity control devices. Raw materials source has declined in importance as a location factor, as the chain of processing between raw materials and final products has become longer and longer, and as the tendency of any plant to use semi-processed materials continues to grow.[1] These examples illustrate the erratic nature of industrial location factors.

It must be noted, however, that, in certain cases, the locational attraction of some factors have not only

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[1]Benjamin Chinitz and Raymond Vernon, "Changing Forces in Industrial Location," Harvard Business Review, 38, January-February, 1960, pp. 126-136.

changed but have disappeared altogether. It has often happened that certain industries have remained in the same location although the original reason which has caused them to locate there has long disappeared. For example, the brass-founding near Birmingham was originated there because of the availability of natural sand which was suitable for moulding. The sand supply later became exhausted but the industry remained there using artificially prepared sand which could equally well be obtained elsewhere.[2]

Changes of events in the local, national or world scene may create new industrial location factors. In the first place, the complexity of industrial processes and the necessity of mass production have made water an increasingly important element in industry. For example, not only is large amounts of water required for the production of pulp and paper, hides, leather, and so on, but also in other manufacturing activities, such as boiler make-up, and for cooling purposes. And in the future, this may mean that certain areas, because of water shortage, are not suitable for locational consideration.[3]

For the electronics and aircraft industry new location factors may emerge. Dr. Turner introduces "space" as a probable location factor in the near future in the Southern

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[2]Political and Economic Planning, op. cit., p. 57.

[3]Maurice Fulton, "Plant Location - 1965," Harvard Business Review, 33: 2, March-April, 1955, pp. 40-50.

States of the United States. He contends that new missile and electronic gear plants will be located in relatively isolated areas, thereby promoting "space" as an exclusive location factor overriding all the others.[4]

Maurice Fulton, in his article "Plant Location-1965," predicts that instead of having railroad, truck and ship as means of transportation, management of the future will not only have just planes but also rocket propelled vehicles.[5]

Thus, it may be concluded that, because of the dynamic nature of location factors, and the great variety of forces which may influence them, it is extremely difficult, if not impossible, to attempt to reduce the theory of location to a formula as has been done by several writers. Dr. Turner concludes:

> In appraising the industrial location possibilities of an area, it is important that the particular factors affecting that area be studied and analyzed, rather than attempting to apply some magic formula that is not applicable or appropriate.[6]

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[4]Turner, loc. cit.

[5]Fulton, loc. cit.

[6]Turner, loc. cit.

CHAPTER IV

SOME EMPIRICAL STUDIES IN LOCATION

All of the leading theorists of location as discussed in Chapter I have arrived at their theories through logical deductions. In order to appraise the validity of their assumptions, many empirical studies have been carried out since as early as the beginning of the century. These studies which were made either through the use of statistical data or by means of interviews or questionnaires, were an attempt to discover the reasons for particular site selections. The results of these studies were usually reported in a list of factors, in order of importance, which have influenced the final selection of the location of the plants concerned.

FREDERICK S. HALL

The first empirical study in the United States was conducted by Frederick S. Hall. He based his work on statistical data which were obtained from the twelfth census of the United States in 1900.[1]

Hall mentions seven factors as the chief causes of

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[1] Frederick S. Hall, "The Localization of Industries," XII Census, "Manufacturing," Part I, p. cxc.

location of industries:

1. Nearness to raw materials
2. Nearness to market
3. Nearness to waterpower
4. Favorable climate
5. Supply of labor
6. Capital available for investment in manufactures
7. The momentum of an early start

The first six factors determine the general area within which an industry is economically feasible, whereas the exact site within this area is usually a matter of chance. The decision is believed to have been made by some pioneer in the industry during the early days of settlement in the particular region.

NATIONAL ELECTRIC LIGHT ASSOCIATION

CIVIC DEVELOPMENT COMMITTEE

A location study was made by the above committee based on original observation and research.[2] Sixteen reasons were listed for the location of manufacturing establishments. These were, in descending order of importance:

1. Markets
2. Labor
3. Transportation
4. Materials
5. Available factory buildings
6. Personal reasons

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[2]National Electric Light Association Civic Development Committee, and Metropolitan Life Insurance Company Policyholders Service Bureau, Industrial Development in the United States and Canada, 1926 and 1927 (New York: Metropolitan Life Insurance Company Press) No. 10204, n.d.

7. Power and Fuel
8. Cheap rent
9. Near related industries
10. Living conditions
11. Financial aid
12. Taxes
13. Mergers and consolidations
14. Cheap land
15. Near parent company
16. Banking facilities

UNITED STATES DEPARTMENT OF COMMERCE

In 1947 the United States Department of Commerce published a guide for evaluating an area's resources for industrial development. It listed thirteen basic location factors which usually govern the evaluation of industrial plant location.[3]

Included were also charts which showed the relative importance of each factor for groups of industries having similar location requirements.[4]

In order to show the descending order of importance of each of the location factors, the following tabulation is compiled indicating the number of times each factor was mentioned as the most important locational consideration for a particular group of industry.

1.	Distribution facilities	66
2.	Tax structure	63
3.	Transportation facilities	56

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[3]United States Department of Commerce, Basic Industrial Location Factors, Industrial Series No. 74 (Washington, D. C.: U. S. Government Printing Office, 1947).

[4]Ibid., p. 6-9.

4.	Sites	47
5.	Labor	39
6.	Market	32
7.	Industrial Fuel	31
8.	Location of production material	27
9.	Laws and regulations	27
10.	Power	19
11.	Water	13
12.	Living conditions	4
13.	Climate	0

McLAUGHLIN AND ROBOCK

In 1949 Dr. McLaughlin and Dr. Robock conducted a study covering eighty-eight plants located in the thirteen states of the South in order to find out the factors which have influenced their recent location.[5]

Among the factors which were considered of major importance were included: (1) market, (2) materials, (3) labor, and (4) transportation.

In addition to these major factors, there were other location factors which were taken into consideration: (1) capital and bank credit, (2) management, (3) climate, (4) availability of buildings and sites, (5) local industrial structure, (6) size of the community, and (7) centralization vs. decentralization.

As most of the companies interviewed had their headquarters in the North, they depended more or less on capital

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[5]Glenn E. McLaughlin and Stefan Robock, Why Industry Moves South, National Planning Association Committee of the South, Report no. 3 (Washington: NPA, 1949).

from outside the South. The availability of credit was rated important for certain processing facilities interested in the problem of furnishing working capital to farm producers.[6]

Management was only occasionally mentioned as a location factor. Some concerns indicated their preference for communities where they could expect to find management talent or could attract from outside trained and competent executive personnel.[7]

The Southern climate was considered favorable because of the possibility of year-round construction, lower plant operating and maintenance costs, and shipping and deliveries uninterrupted by weather.[8]

The availability of buildings or sites was found to be of influence only in the selection of a particular locality within a satisfactory zone.[9]

Different views, depending on the type of concern, have been expressed on the question of local industrial structure. Some firms wished to locate in cities where manufacturing is well developed; others preferred a community where they can attain a prominent position. Some firms have sought location where their industry was already present in order to obtain external economies, others have

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[6] Ibid., p. 96.

[7] Ibid., p. 97.

[8] Ibid., p. 98.

[9] Ibid.

avoided communities where competition could be expected.[10]

With regard to the size of the community preferred, there was again considerable variation. Where the prospective manufacturer expected to employ a large number of workers, he would give preference for a large city. However, the authors believed that probably a majority of the concerns preferred to locate plants outside of a large metropolitan area.[11]

Several concerns indicated their interest in scattering their plants over a wide area rather than developing new facilities in an established area.[12]

NATIONAL INDUSTRIAL CONFERENCE BOARD

The factors affecting plant location in the United States during the period 1946 to 1951 have been assessed by Malcolm Neuhoff in a report for the National Industrial Conference Board. One hundred and thirty-eight companies, which together operated 1446 separate plants, provided the information. Although not all of the 614 reported expansions involved a consideration of location, most of them were located after definitive studies of the economic and social factors which influence the choice of plant sites.[13]

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[10] Ibid., p. 99. [11] Ibid., p.100. [12] Ibid., p.101.

[13] Malcolm C. Neuhoff, Trends in Industrial Location, Studies in Business Policy, No. 59 (New York: National Industrial Conference Board, 1952), p. 6.

The relative importance of the location factors was found to vary greatly from region to region.[14] On a national basis the following list of factors was given, in a descending order of frequency:

1. Near existing plant or warehouse
2. Markets
3. Raw materials
4. Labor supply
5. Water, fuel, or power
6. Transportation
7. Miscellaneous

Although proximity to existing facilities was mentioned more than any other factor as a consideration, the report noted that other factors such as market, raw material, labor and other conditions were also considered.[15]

BUSINESS EXECUTIVES' RESEARCH COMMITTEE
UNIVERSITY OF MINNESOTA

In this study a questionnaire was sent out to a sample of 600 firms of the some 5000 manufacturers in Minnesota with the purpose of ascertaining the importance and position of Minnesota with respect to twenty-four specific location factors.[16]

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[14] Ibid., p. 12.

[15] Ibid., p. 6.

[16] Business Executives' Research Committee, Industrial Location and the Minnesota Economy (Minneapolis, Minn., 1954) pp. 52, 57-59. Quoted in John I. Griffin, Industrial Location in the New York Area (New York City: The City College Press, 1956), p. 200.

The 215 manufacturers who responded found that work attitudes of individuals, followed by hourly wage rates, availability of truck transport services, nearness to markets, and availability of rail transport services were the most important factors. Among those considered as disadvantageous were: personal property taxes, real property taxes, nearness to sources of components, parts of services and major markets for products.[17]

TEXAS ENGINEERING EXPERIMENT STATION

As a part of its research program, a study was conducted to find out the factors which industries look for in selecting a location. Questionnaires were sent to 850 manufacturers, of whom 424 responded.[18]

The results showed that, in order of importance, the following were the location factors:

1. Market
2. Labor
3. Raw materials
4. Building
5. Site
6. Transportation
7. Distribution
8. Living conditions
9. Climate
10. Industrial fuel
11. Water
12. Industrial power
13. Financial help
14. Taxes
15. Laws and regulations
16. Miscellaneous

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[17] Ibid.

[18] L. S. Pain, An Evaluation of Plant Location Factors in Texas, (College Station, Texas, 1954), p. 5. Quoted in Griffin, op. cit., p. 201.

JOHN I. GRIFFIN

In 1955 John I. Griffin made a study of industrial location in the New York area for the City College of New York. A questionnaire was sent to a fifty per cent systematic sample of the 2582 large firms in the fifteen-county New York area. The respondent firms were asked to rank the factors influencing their present location, and clarify these factors as favorable or unfavorable.[19]

The findings show that the factors ranked as the most important favorable ones included:

1. Access to markets
2. Factory buildings
3. Room for expansion
4. Rent

The most important unfavorable factors were:

1. Municipal taxes
2. Wages
3. Taxes in general
4. Waste disposal
5. Workmen's compensation costs
6. Parking, traffic conditions
7. Attitude of local government
8. Real estate tax.

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[19] John I. Griffin, Industrial Location in the New York Area (New York City: The City College Press, 1956) p. 1-2.

CHAPTER V

A SPECIAL REFERENCE TO INDONESIA

In the previous two chapters an analysis has been given to some of the more basic and pertinent location factors, together with some empirical studies applicable to the North American continent, the United States in particular.

As these factors are considered basic to any industrial location, they will also apply to some extent to the development of industries in Indonesia.

This chapter will attempt to survey and appraise those factors which, in the writer's opinion, are fundamentally important in the location and development of industry in Indonesia.

As an integral part of this thesis and to understand more fully the interaction between the Indonesian man and the natural resources of his country, a survey is included of physical environment and population, together with the employment pattern and the structure of the economy.

TOPOGRAPHY

The Republic of Indonesia[1] comprises most of the island archipelago which stretches between Southeast Asia and Australia (see Fig. 1). The island chain which consists of four main islands and more than 3000 smaller islands, extends some 3000 miles from east to west, with a width of about 1000 miles. It straddles the equator between 6° N. to 11° S. and stretches from 95° E. to 141° E. The actual land area is 576,000 square miles, of which roughly eighty-five per cent is occupied by the four principal islands: Java, Sumatra, Kalimantan, and Sulawesi.

The country is predominantly mountainous with a central range running along the chain of islands. Indonesia's mountains comprise the most volcanic region in the world. The volcanic ash carried down by the rivers enriches the plains. This has been the main factor affecting fertility of the soil and, in turn, Indonesia's agricultural development.

CLIMATE

Indonesia is a tropical country. Days and nights are almost equal in length throughout the year. Due to

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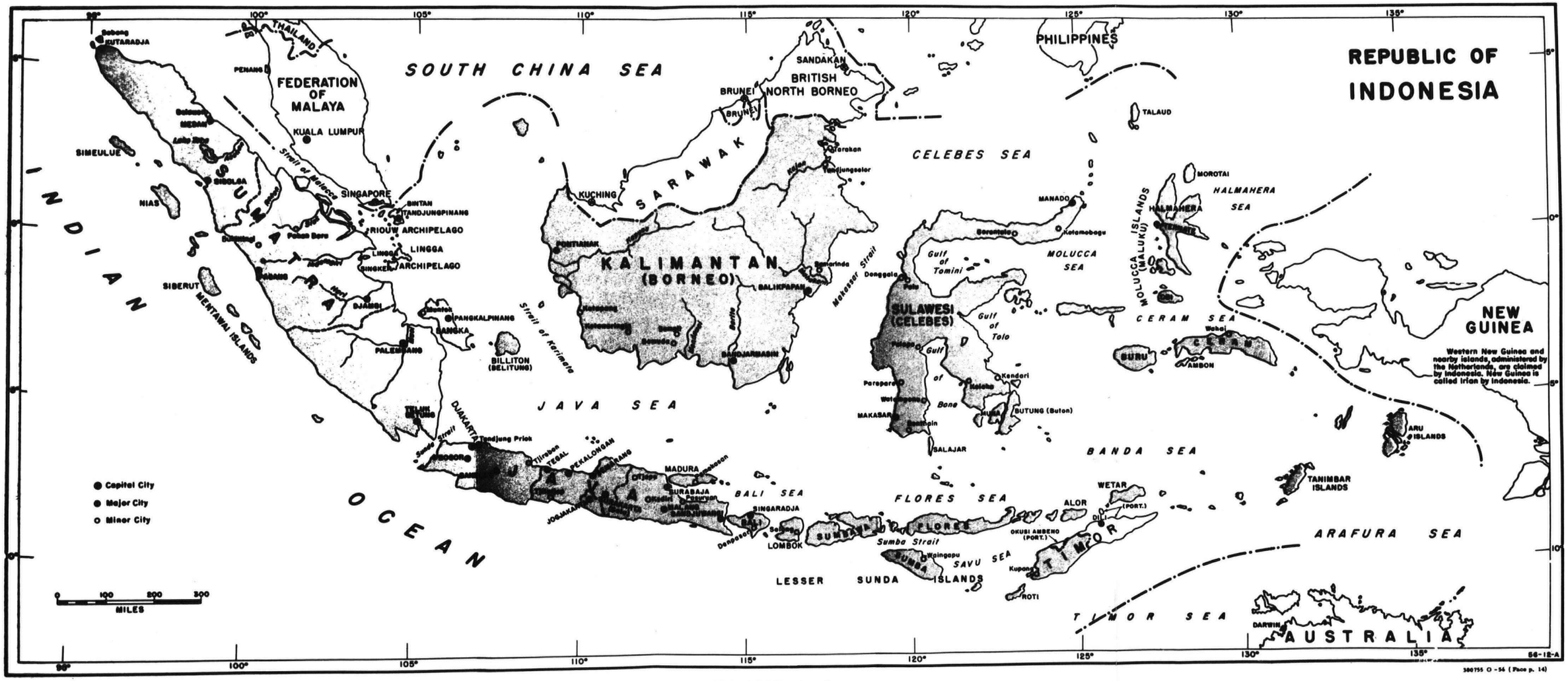
[1] Formerly the Netherlands East Indies and under oppressive colonial rule for more than 300 years. It gained autonomy, following 3½ years of Japanese occupation, through a revolution under the leadership of Sukarno and Hatta, who proclaimed independence on August 17, 1945.



SOURCE: U.S. DEPARTMENT OF COMMERCE

FIGURE 1

this uniform duration of sun's radiation, there are only slight differences in seasonal temperatures. The daily variations in temperature are also small because of the tempering influence of the ocean winds. The mean annual temperature at coastal sea-level points is about 77° to 81° F, and the absolute maximum temperature about 93° to 97°. The average maximum temperature varies from 86° to 89° F, whereas the average minimum may range from 70° to 75° F. With an increase in altitude the temperature decreases 1° about every 300 feet. Humidity is usually high, with an annual average of about eighty-two per cent. Rainfall is generally heavy, with more than eighty inches annually in most parts of the country (see Fig. 2). Some mountain areas are drenched with ten to twelve feet of rain, while in the lowland areas it may range from seventy to 125 inches.

POPULATION

The last population census was taken in 1930, which recorded a population of sixty-one million. The present figure, as estimated by the Central Bureau of Statistics, is close to eighty-nine million. Vital statistics are still not sufficient to allow an accurate estimate of the rate of growth of population, although a figure of 1.5 to 2 per cent for the country as a whole is considered fairly accurate. The population distribution is quite uneven,

with some areas belonging to the most densely populated in the world while others are under-populated (see Fig. 3). Java and Madura alone have a population of roughly fifty-eight million, or sixty-five per cent of the total; yet these islands make up only nine per cent of the total land area. This gives a density of roughly 1100 persons per square mile. The outer islands, on the other hand, have an average density of only sixty persons per square mile. The pressure of population on the resources in Java is particularly severe and seems likely to be an increasingly serious and difficult problem. The only solution is transmigration from the densely populated to the under-populated areas. So far, however, the implementation of this policy has not been satisfactory due to the lack of funds. The number of persons transmigrated in 1958 still was below the peak pre-war level in 1940.[2]

THE ECONOMY

Structure

The economy of Indonesia is mainly agricultural. Approximately seventy-five per cent of the total employment is in agriculture, which includes forestry and fishing.

The activities in agriculture can be divided into two groups: small-scale farming and large-scale estate

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[2]See Appendix B, Table I.

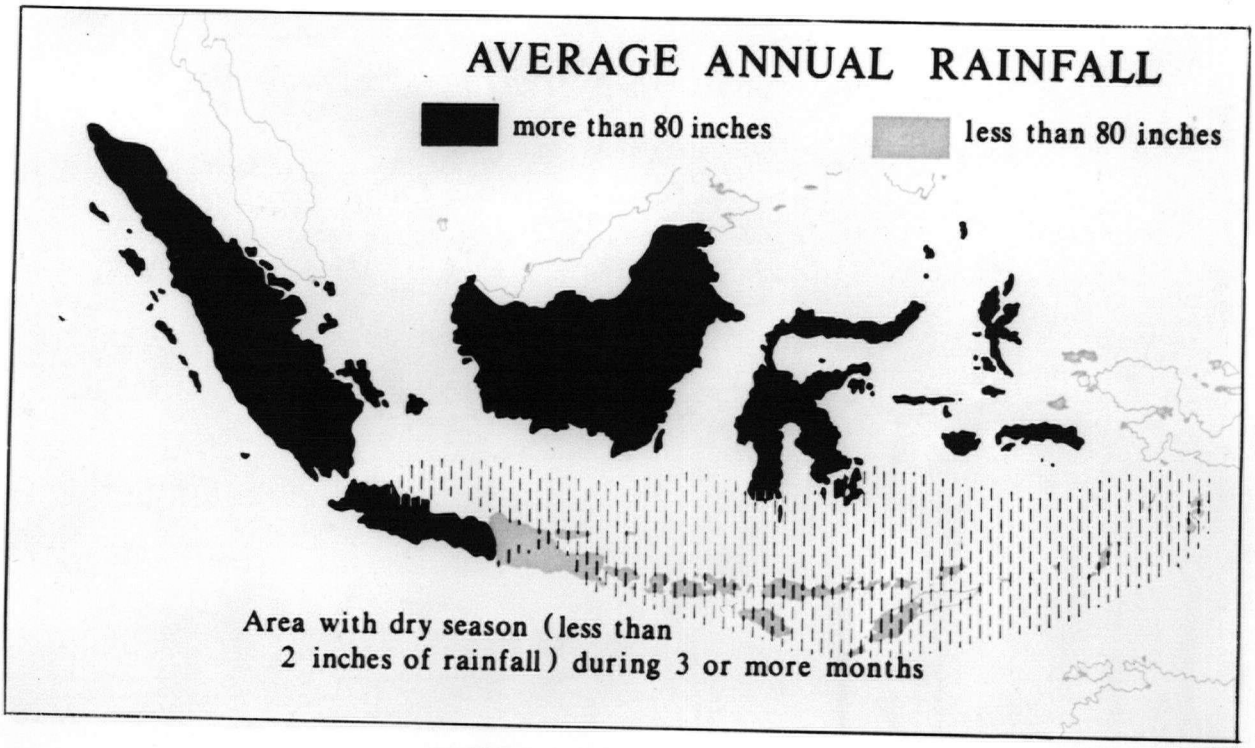

FIGURE 2

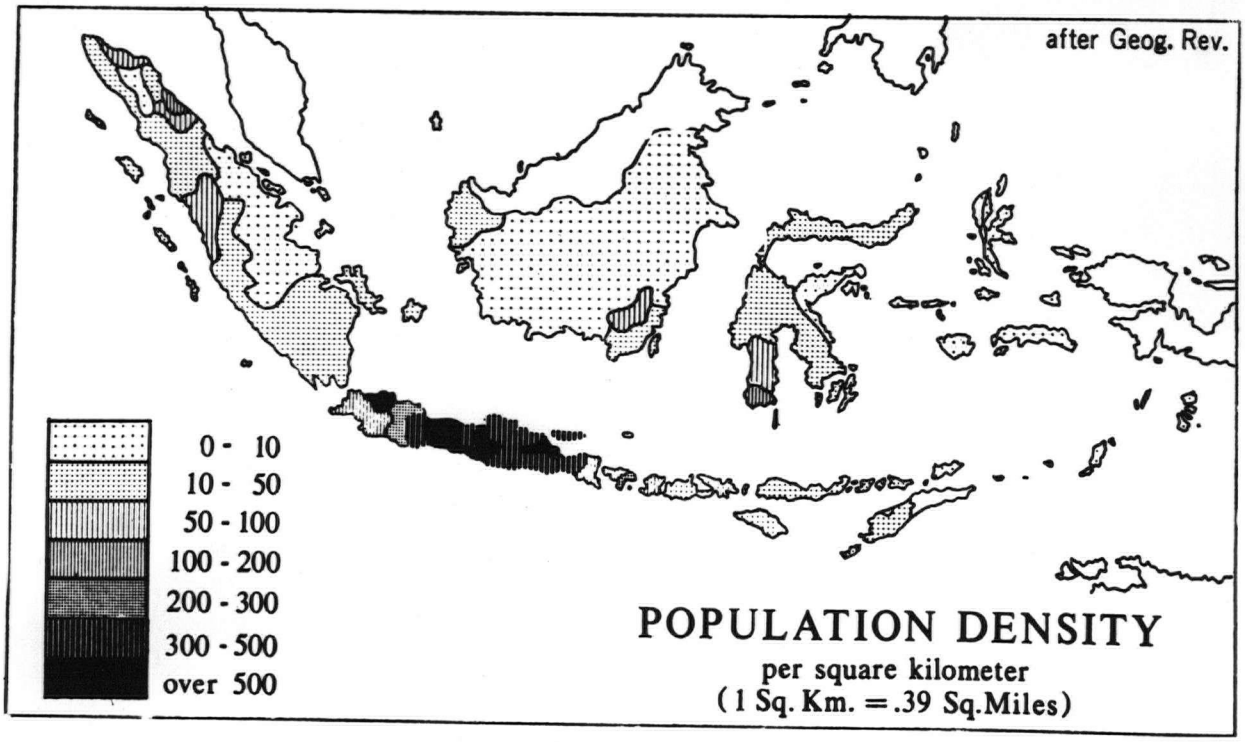

FIGURE 3

SOURCE : AMERICAN GEOGRAPHICAL SOCIETY

agriculture. The output of the first group is primarily for domestic consumption, while most of the estate production is meant for export.

The most important produce of small-scale farming is rice, the staple diet. Other agricultural products include sweet potatoes, cassava, corn, sago, peanuts, soybeans, vegetables and fruits. Farm fields are generally very small, amounting to only two or three acres per farmer on the average. By contrast with the farms, the estates average 2000 acres in size, cultivating some thirty products including rubber, tobacco, sugar, palm oil, hard fiber, coffee, tea, cacao and cinchona.

Some ten per cent of the total employment is in village industry and manufacturing. There are a few industries in larger urban areas, such as textile and paper mills, soap, rubber, shoe factories, and breweries. Mining has become increasingly important with petroleum and tin as the main products.

Indonesia's trade pattern reflects the excessive dependence on the export of primary products. Rubber and petroleum products account for more than seventy per cent of the total exports and tin and copra another ten per cent. Indonesia is also increasingly dependent on the first two main products to obtain its foreign exchange. Whereas in 1938 rubber and petroleum products accounted for 22.6 and

23.5 per cent, respectively, the corresponding figures for 1958 were 34.6 and 37.0 per cent.[3]

Indonesia is nearly self-sufficient in foodstuffs. Although rice production has exceeded pre-war levels, it has not kept pace with population growth. Thus, large amounts of rice still have to be imported annually.[4]

Employment Pattern

The labor force as of 1953 was estimated at thirty million, divided among the following occupational groups:

	Number (in millions)
Production of raw materials	18.2
Industry	4.0
Transportation	0.8
Trade	3.0
Professions	0.2
Government Service	1.8
Other	2.0
TOTAL	30.0

As of 1955 the total labor force was roughly between thirty-two to thirty-six million persons, or about forty to forty-five per cent of the total population.[5]

The availability of labor in urban areas toward which farm people tend to migrate, exceeds the demands of

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[3]See Appendix B, Table II.

[4]See Appendix B, Table III.

[5]U. S. Department of Commerce, Investment in Indonesia (Washington: Government Printing Office, 1956), p. 97.

the present limited industrial base. It is believed that twenty per cent of the total labor force is without regular work, although the employment situation has improved since 1952.[6]

Income

No detailed figures concerning national income of Indonesia are available. Dr. Neumark's calculations showed that the per capita income amounted to eighty dollars in 1951 and ninety dollars in 1952. However, the total national income in 1952, if based on the prices of 1938, did not show an appreciable change.[7]

Compared to national income figures of other Asian countries, Indonesia stands in the middle of the list. For example, Burma (1955) $44, India (1954) $55, Pakistan (1954) $70, Ceylon (1955) $126, Philippines (1955) $178. However, compared to those of industrially advanced countries, these figures are minute. For example, United States (1955) $1950, Canada (1955) $1320, United Kingdom (1955) $840.[8]

Recent estimates of Indonesia's gross National Product and National Income were made by the State Planning

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[6] Ibid.

[7] Quoted in B. H. M. Vlekke, Indonesia in 1956, Political and Economic Aspects (The Hague: Netherlands Institute of International Affairs, 1957) p. 68.

[8] Computed from figures given in Paul Studenski, The Income of Nations (Washington Square: New York University Press, 1958), pp. 508-510.

Bureau assisted by some experts from the United Nations and the ICA (International Cooperation Association). Their figures show that national income from 1953 on is increasing, reaching a peak per cent increase of eight per cent in 1957. However, the year 1958 showed a sudden drop from Rp. 134.5 milliard to Rp. 117.1 compared with the previous year, a drop of 12.9 per cent.[9] This sudden fall is believed to have been caused by difficult economic and political situations in the country, and partly also by the recessions in countries of Western Europe and North America which ordinarily import goods from Indonesia.[10]

There does seem to exist a relationship between the occupational pattern of a country and the level of per capita income. Low per capita income is encountered when a large proportion of the labor force is engaged in primary production--agriculture, fishing, and forestry. With the advancement of industrialization, the employment in the secondary production--for example, manufacturing, construction, and public works, gas and electricity supply--will increase and national income will rise. Then, as in the case of industrially advanced countries, the majority of the labor force will be employed in tertiary production,

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[9]See Appendix B, Tables IV and V.

[10]Biro Perantjang Negara (State Planning Bureau), Laporan Pelaksanaan Rentjana Pembangunan Lima Tahun, 1956-1960. (Report on the execution of the Five Year Development Plan), p. 110.

such as distribution, transport, and services, and national income will again rise.[11]

This point of view is also shared by the Economic Commission for Asia and the Far East of the United Nations.[12]

In the case of Indonesia, it appears that since 1954 the contribution of the non-agricultural sector to national income is increasing, indicating an increase in employment in the secondary production. On the other hand, the percentage contribution made by the agricultural sector shows a decreasing trend.[13] This is in agreement with the statement made previously.

Saving and Investment

Savings are of three types: personal, business, and government.

The amount of personal savings in Indonesia is quite limited. People in general have low income and do not have a strong tradition of saving. As one Indonesian economist says: "the desire to save is nonexistent in Indonesia. Not only because the people do not desire it, but because there

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[11]Colin Clark, Conditions of Economic Progress (London: MacMillan and Co. Ltd., 1940), pp. 182-183.

[12]See United Nations, Economic Bulletin for Asia and the Far East, vol. IX, No. 4, Part II, 1958, Table 48, p. 148.

[13]See Appendix B, Table VI.

is no money to spare."[14] The role of the stock exchange in mobilizing private savings is negligible and savings through life insurance companies are also of minor importance. On the other hand, Post Office Savings Banks and Cooperative Savings are gaining in importance. The total money saved at the Post Office Bank increased from 123 million rupiah in 1953 to 375 million rupiahs in 1958.[15] And between 1954 and 1958 cooperative savings increased from 148 million rupiahs to 908 million rupiahs.[16]

Measured according to international standards, Indonesia's personal savings are indeed small. The Department of Economic affairs of the United Nations estimated that in under-developed countries in Asia personal savings accounted for one per cent of gross national product or even less. This is not so surprising in view of the fact that in advanced countries like Canada and the United States with very high per capita income, personal savings range from four to six per cent of their gross national product.[17]

The second source of savings, namely, business savings composed of retained funds and funds to provide for depreciation, is also small.

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[14]Soeparman Soemahamidjaja, "Reconstruction and how to Finance it in Indonesia," The Indonesian Spectator, April 1958.

[15]Bank Indonesia, Report for the year 1958/1959, p.124.

[16]Statistical Pocketbook of Indonesia 1959, p. 210.

[17]United Nations, Economic Bulletin for Asia and the Far East, vol. IV, No. 3, November, 1953, p. 1.

In view of the significant role that the government plays in economic development, it may be expected that it is the most important source of savings. However, in the case of Indonesia, the government has been spending a large part of its expenditures for defense and administration, and capital formation is therefore handicapped. In fact, budget deficit spending has been the fiscal policy of the government for recent years.

In line with the small amount of money saved, investments are also small. Only a relatively small part of the nation's income is invested. The United Nations estimated that annual net investment is about five per cent of national income as compared to fifteen per cent or more for countries in Western Europe and North America.[18] This five per cent figure is hardly sufficient to replace worn-out capital resources. In fact, the United Nations Report states that "in countries where population is increasing by 1½ per cent per annum or more, annual net investment of five per cent or less of national income is not enough to raise the standard of living and may not be enough to prevent the standard of living from falling."[19]

The small private investment in Indonesia is attributed to several limiting factors, for example, lack

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[18]United Nations, "Some Financial Aspects of Development Programmes in Asian countries," Economic Bulletin for Asia and the Far East, Vol.III, No.1-2, January-June, 1952, pp. 1-2.

[19]Ibid.

of well-organized capital market, lack of interest in joint stock investment, lack of experienced entrepreneurial class, doubt as to the steadiness of domestic demand, fear of competition from foreign products, and lack of confidence in political and economic stability.

The government has so far contributed the major part in the total investment, although the amount is far below the required level.

ECAFE experts state that an investment of four dollars per person is necessary in order to keep up with the increase in population in ECAFE countries. If in addition to that real income is to increase by two per cent annually, an investment of nine dollars per person would be required.[20] For Indonesia this would mean an annual investment in the order of Rp. 10,000 million.[21] The total investment for the First Five Year Plan which called for an amount of Rp. 11,400 million, is therefore too small to be expected to pull Indonesia beyond the "hump."

Thus, in order to achieve the required amount of investment, a very substantial contribution from abroad, whether in the form of loans or foreign investments, is required.

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[20]United Nations, Economic Bulletin for Asia and the Far East, vol. V, No. 3, November, 1954, pp. XIII and XIV.

[21]Applying a conversion rate of Rp. 11.4 to $1. Since October 1959 the official exchange rate is Rp. 45 to $1.

MANUFACTURING

The output of manufacturing does not represent a significant part of the national product of Indonesia. Manufacturing does, however, play an increasingly important role in the economy as a whole. It is one sector which requires rapid expansion if a stable economic growth is to be achieved.

Development

Up to the beginning of the twentieth century Indonesia was almost exclusively an agrarian country. The small amount of industry--sugar mills, tapioca flour mills, indigo mills--was established to complement the major business of agriculture. From the 1920's on, however, the colonial government's policy shifted toward encouraging and aiding industrialization so that gradually the number of industries increased.

The textile industry was perhaps the first to develop and expand. Not only was this development a result of pressures to meet the primary consumptive requirements of the masses, but also because weaving was considered natural to the Indonesian farming community who have always used their spare time for weaving for local requirements. The textile industry developed rapidly, although it was split into numerous small units. It was reported that in

1930 there were in Java 500 modern handlooms and forty mechanical looms; in 1941 there were 49,000 modern handlooms and 9800 mechanical looms.[22]

Beside the textile industry other small-scale and cottage industries began to sprout. Among these were the industries of batik, shoe-making, native cigarette production, basketry, pottery, and hat-making.

Factory enterprise was encouraged towards production which was unsuitable for small-scale industry. The most important industries belonging to this group were printing, ice factories, cigarette factories, dock and stevedore establishments, rubber mills, and rice mills.[23]

By 1937 Java had 2276 establishments, while the outer provinces had 1428. Most of the factories in Java employed no more than between ten and 200 persons with only a few employing more than 1000 persons.[24]

During the 40's preliminary investigations were conducted as to the feasibility of manufacturing steel (based on scrap metal), aluminum, paper, and chemicals. When the transfer of sovereignty took place in 1949,

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[22]G.H.C. Hart, Towards Economic Democracy in the Netherlands Indies (The Netherlands and Netherlands Indies Council of the Institute of Pacific Relations, 1942), p.96.

[23]Ibid., p. 97.

[24]Charles Robequain, Malaya, Indonesia, Borneo, and the Philippines (London: Longmans, Green and Co., 1954), p. 373.

Indonesia was largely agrarian with very little heavy industry but with a considerable variety of small- and minimum-scale enterprises producing light manufacture.[25]

Since independence the government has put emphasis on industrialization to diversify the economy and reduce dependence on imports for foods and manufactured goods. Priority has been given to industries utilizing local raw materials and not requiring much foreign exchange.

Present industries are mainly of two types: (1) processing of primary products for export or domestic consumption, such as the refining of petroleum, sugar milling, and the processing of rubber, tea, coconuts, palm seeds, sisal, and kapok; (2) production of consumer goods dependent on both domestic and imported raw materials, which include the manufacture of automobile and bicycle tires and tubes and rubber shoes, radios, batteries, soaps, margarine, cigarettes, and light bulbs.[26]

A government survey indicated that at the end of 1957 the number of establishments in the manufacturing industry was 10,861 with a total employment of 465,203.[27]

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[25]U. S. Department of Commerce, Investment in Indonesia (U. S. Government Printing Office, 1956), p. 51.

[26]Ibid.

[27]See Appendix B, Table VII.

At the present stage, manufacturing is dominated by the existence of a great number of small establishments. In 1955 about eighty per cent of all establishments engaged less than twenty workers, and accounted for thirty-three per cent of the total manufacturing employment. This is in striking contrast with the United States where sixty-eight per cent of the total number of establishments were small-scale, but accounted for only 7.5 per cent of manufacturing employment. About four per cent of the total number of establishments employed more than 200 workers, but contributed about sixty per cent of total manufacturing employment.[28]

FACTORS AFFECTING THE LOCATION AND DEVELOPMENT OF INDUSTRIES

The most cogent impulse to industrial expansion in Indonesia has been the pressure of population in Java. The colonial administration, therefore, considered Java the obvious centre of industrial enterprise, with the result that manufacturing has been heavily concentrated on Java. It was hoped that the widening scope of employment would afford direct relief where the burden was heaviest.[29]

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[28]United Nations, "Economic Development and Planning in Asia and the Far East," Economic Bulletin for Asia and the Far East, vol. IX, No. 3, December, 1958, p. 9.

[29]Hart, op. cit., p. 91.

Factors which were considered influential in the location of industries on Java were: (1) large labor supply, (2) large market for new industrial products, (3) well developed system of transportation, including highways and railways, (4) availability of power, (5) availability of plants turning out machine-tools and other implements, (6) availability of repair shops.[30]

The establishment of certain industrial enterprises in the outer islands was done only for some specific reason, for example, the local availability of bulky raw materials, coupled with low labor intensity.[31]

Raw material-oriented industries. Since Indonesia is still in the early stages of its industrial development, it may be expected that a substantial portion of its industries is raw material-oriented.

As has been stated on page 25, those industries which incur a great reduction in weight during the processing of its raw materials will locate at or near the source of its raw material. This principle holds true for a number of industries in Indonesia. For example, the weight lost in preliminary processing of paddy amounts to one-third, and in the extraction of coconut oil from copra about thirty-eight per cent. In the case of refining sugar from sugarcane,

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[30] Ibid.

[31] Ibid.

ninety per cent or more of the weight is lost. Tea is prepared from green leaves with a reduction in weight in the process of about seventy-five per cent.[32] Hence, rice milling, vegetable oil and sugar extraction, and tea drying are all undertaken at or close to the raw material source.

Similarly, lumber processing usually takes place near the timber stands, leaving the bark and sawdust.

Tin ore processing into concentrates involves a substantial weight reduction, and is therefore carried out at the mine. The smelting of concentrate into tin metal does not result in a great loss of weight, but the process requires a large-scale operation to be efficient, and thus also a large capital investment. For these reasons, all the tin ores are washed at the mine. Some of the concentrates are smelted locally and the remainder exported to the United States, the United Kingdom, and the Netherlands (up to April 1958).

Another industry which involves a weight reduction process and is therefore raw material-oriented is the cement industry. The Central Sumatra's Indarung cement plant reported that to produce one ton of cement it needs 1.63 tons of raw materials, chiefly limestone, and 0.32 tons of fuel.[33]

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[32]United Nations, "Economic Development and Planning in the Far East," Economic Bulletin for Asia and the Far East, vol. IX, No. 3, December, 1958, p. 39.

[33]Ibid., p. 44.

The recently built cement plant at Gresik in Eastern Java was also located at the source of its raw material, where the supply of lime and clay deposits was estimated to last sixty years.[34]

The aluminum industry, although of the extractive type, is not necessarily raw material oriented because of its large requirement of power.[35] At the present time all bauxite is produced entirely for export. But in the near future, an aluminum industry will be established in northern Sumatra close to the bauxite deposits as well as to the cheap electric power source at Asahan.

Market-oriented industries. It has been pointed out elsewhere that processing will be done near the market if it costs less to transport the raw material than the finished product, and near the source of material if the situation is reversed. When a weight gaining process is involved, the pull toward the market will be stronger.[36] A perfect example of this is the Coca-Cola plant in Indonesia. The extract is made in Atlanta, United States, and is then carried to the bottling plant in Indonesia, where carbonated water is added and the product bottled. Other soft drink industries and

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[34]"The Gresik Cement Plant," The Indonesian Spectator, August 15, 1957.

[35]See Supra, p. 40.

[36]See Supra, pp. 20-21.

and the breweries are also located at the market.

The assembly plant of Borgward automobiles in Surabaja is located at the market. Unassembled parts are less bulky to transport than an assembled automobile.

Other perishable commodities[37] such as bread, ice, and foodstuffs in general are also sold at the market.

Labor-oriented industries. Indonesia has an abundant supply of unskilled labor. Certain industries which are labor intensive, or those which can produce in varying proportions of capital and labor, tend to be labor-oriented. Indeed, it was reported at one time that the manual labor of the small-scale industry quite often economically outstripped mechanical industry as the cost of production proved to be lower than that of mechanized processes.[38] This situation is, however, not necessarily true at the present time.

The textile industry in Indonesia is labor-oriented, although not for reasons as outlined above. It is considered indifferent to the pull of raw materials or market. But since the labor cost forms a large portion of the total cost of production, the industry tends to be located where labor supply is ample and wages are low.

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[37] See Supra, p. 26.

[38] Hart, op. cit., p. 92.

LOCATION FACTORS AND INDUSTRIAL DEVELOPMENT

The rate of industrial growth of a country depends primarily on the exploitation and utilization of its natural resources. The presence of these resources (see Fig. 4) together with other location factors, although basic for any economic development, does not in itself guarantee industrial expansion.[39]

Therefore, the extent of industrial development in Indonesia will depend largely on the nation's ability coupled with the economic feasibility to transform undeveloped natural resources into available and usable resources. Whether or not such transformation takes place depends to a great extent on internal factors such as government policy and public attitude toward industrial development, which are reflected in laws and regulations. Economic events inside the country and outside it will also affect the rate of this transformation.

In order to appraise the industrial potentialities of Indonesia with respect to its economic development, an analysis of its industrial location factors is essential. However, it is neither possible nor necessary to appraise each and every one of these. Only those industrial location

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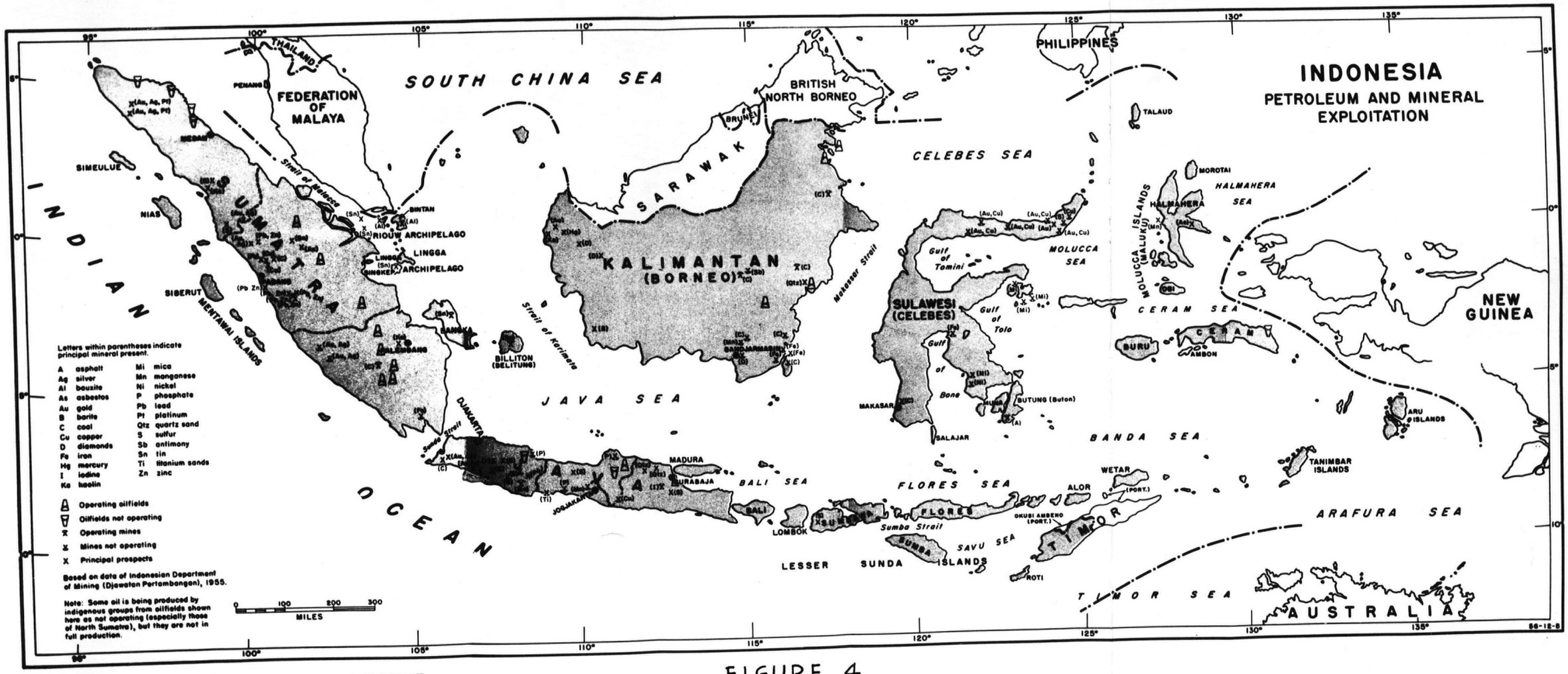
[39]Othel D. Turner, Industrial Location Factors in Wyoming: A Functional Analysis, An unpublished doctoral dissertation, the University of Texas, January, 1958, p. 39.



SOURCE : U.S. DEPARTMENT OF COMMERCE

FIGURE 4

factors which are basic, and those which play a significant role in the Indonesian economic scene will be taken up.

Energy sources

Energy sources, which include coal, oil, natural gas and water power, are the most basic and primary factors for any industrial civilization. Indonesia's position with respect to these sources, its ability to develop them, and the possible limiting factors in developing them, will be treated in the following section.

Coal. Indonesia's coal deposits are mostly of low and non-coking quality, and their economic usefulness are, therefore, rather limited. The large known reserves are in South and Central Sumatra, and Eastern Kalimantan. No extensive survey has been undertaken to determine the amount of coal deposits. The most recent estimate placed it at 2500 million tons.[40] The yearly production, which averaged 822,000 tons[41] for the period 1951 to 1958, is insignificant in comparison of close to 2000 million short tons of total world production.[42]

Approximately ninety-three per cent of the total

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[40]United Nations, Economic Bulletin for Asia and the Far East, vol. IX, No. 3, December, 1958, p. 40.

[41]Statistical Pocketbook of Indonesia 1959, p. 88.

[42]Erich W. Zimmerman, World Resources and Industries, (New York: Harper & Brothers, 1951), p. 470.

coal produced originates from the government coal mines at Bukit Asam and Umbilin. The remaining is accounted for by small private companies. Coal production in 1958 which amounted to 606,000 tons[43] was fifteen per cent less compared with the output in the preceding year. This drop was due to a decline in domestic demand as the result of increasing dieselization of the railways and shipping.

Crude oil and natural gas. Indonesia is considered to be the largest oil producer in the Far East. The resources are, however, small as compared to those in the Middle East and Latin America. The major oil producing areas are Sumatra, Kalimantan, and the northeastern part of Java, in this order of importance. The total oil reserves is estimated between 1.2 to 1.9 billion barrels, or roughly one to two per cent of the world's reserves.[44]

Crude oil production by the oil companies, the majority of which is foreign owned, amounted to 16,110,000 tons in 1958, indicating an increase of about sixty per cent from 1953.[45] Approximately two-fifths of the total production is exported to countries such as the United States, Australia, and the Philippines.

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[43]See Appendix B, Table VIII.

[44]U. S. Department of Commerce, Investment in Indonesia, op. cit., p. 40.

[45]See Appendix B, Table IX.

The production of natural gas has increased steadily since after World War II, reaching about 2.7 million metric tons in 1958.[46] The natural gas reserves are placed at over one trillion cubic feet.[47]

Water Power. A conservatice estimate gives a figure of 2,860,000 kilowatt for Indonesia's water power capacity.[48] Compared to potential capacity of other countries, Indonesia, together with Ceylon (550,000 kilowatt), the Philippines (2,276,000), and the United Kingdom (1,128,000) rank low. The United States heads the list with 109,500,000 kilowatts. On a per capita basis, however, the figure for Burma is highest at 1.01 kilowatt, as compared to 0.65 for the United States, and only 0.03 for Indonesia.[50]

From the 2,860,000 kilowatt potential capacity of Indonesia's water power, only 135,100 kilowatt or roughly 4.7 per cent was installed in 1956.[50] It is expected that by 1965 another 359,000 kilowatt will be added.[51]

Outlook for Energy Sources Development

The short-run outlook does not seem too bright. Production cannot be sustained without a favorable demand

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[46] See Appendix B, Table IX.

[47] World Trade Information Service, Basic Data on the Economy of Indonesia, Part I, No. 58-84.

[48] See Appendix B, Table X. [49] Ibid.

[50] Ibid. [51] See Infra, p. 115.

for the product. Demand is the basic force which causes the transformation of untapped natural resources into usable resources. Most of the output of Indonesia's coal industry is consumed by the railway service and shipping. Due to the increase in the utilization of diesel machines in these services, domestic demand for coal has declined substantially and so has production. Furthermore, because of the low quality of the coal, only a fraction of the total output can be exported. Main export destinations in 1958 were Thailand (15,000 tons), and Hongkong (4,000 tons), and even these export figures formed a decrease of fifty-three per cent from the previous year.[52]

Unless the demand for coal changes favorably, the coal industry is going to suffer more and more, with the consequence that it may be forced to cut back its production drastically. At this stage there is little likelihood that the undeveloped coal reserves will emerge as attractive factors for the development of new industries.

The outlook for the oil and gas industries seem favorable. Export of crude oil is steadily increasing, and so is the domestic consumption of oil derivates,. Investments, although only relatively small, are undertaken by the major foreign oil companies. Some possible limiting

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[52]Bank Indonesia, Report for the Year 1958/1959, p. 214.

factors are labor problems, competition from the Middle East, and the high wax content of Indonesian crude

As shown previously, Indonesia's water power reserves are quite modest if compared with those of other countries. However, as the present installed capacity amounts to only a small fraction of the potential, there is still ample room for development.

Power shortage is felt in all sectors of the economy. Therefore, any additional capacity available, however small, will surely help to relieve the industries from their strained operation. Electric power development, especially if derived from water, requires a large investment of initial capital. For this reason, the planned power development, including that generated by means of fuel, in the next few years will still be inadequate to meet the current shortage of electricity. Thus, for many years to come, this deficiency of power will remain the most acute limitation for the establishment of new industries. In order to keep pace with the required level of industrialization, thermal power development will be of increasing importance in the total generation of power in Indonesia.

RAW MATERIALS

Indonesia is fortunate to be endowed with an abundance of raw materials. It has maintained the position of major producer of rubber and tin. Other important ores and

industrial minerals including bauxite, nickel, manganese, phosphate, etc., are among those raw materials which are conducive to the establishment of new industries.

The following section will appraise only those raw materials which have become industrial resources, and those which appear to hold promise for development and utilization in the near future.

Rubber. Indonesian rubber is produced in large estates as well as by small holders. The planted area on rubber estates before World War II was 1,557,000 acres, of which forty per cent were in Java, fifty per cent in Sumatra, and the rest in Kalimantan and Eastern Indonesia.[53] Due to heavy losses during the war, the political unrest thereafter, and other causes, the total acreage in 1952 was only about 900,000.[54]

The small holders' rubber areas, which at present account for more than half of the total rubber output, have increased substantially since the early 1920's. The total planted area was then estimated at 300,000 acres, and just before the outbreak of World War II the figure was close to three million acres.[55]

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[53] U. S. Department of Commerce, Investment in Indonesia, op. cit., p. 22.

[54] Ibid.

[55] John E. Metcalf, The Agricultural Economy of Indonesia (U. S. Government Printing Office, 1952), p. 57.

The annual rubber production varies in response to rubber prices in the world market, reaching a peak of 814,406 tons in 1951, the highest level ever achieved in Indonesia.[56] In 1958 Indonesia accounted for about thirty-three per cent of the total world production of 1,855,000 tons.[57]

The outlook for the rubber industry in Indonesia does not seem too promising. Although rubber has become one of the vital raw materials in any industrial civilization, the trend today is toward utilizing synthetic rubber. Whereas the world's consumption for synthetic rubber increased from 1,133,000 tons in 1956 to 1,258,000 tons in 1957, the consumption of natural rubber decreased from 1,903,000 tons in 1956 to 1,855,000 tons in 1957.[58] Certain types of the synthetic rubber such as "Ameripol-SN" and "Coral Rubber" in their usage for heavy duty tires have the same qualities as natural rubber. The exhaustic research in the United States on butyl rubber, and on the discovery of isoprene may form a threat to the position of the natural rubber industry in the future.

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[56] See Appendix B, Table XI.

[57] Bank Indonesia, Report for the Year 1958/1959, p. 180.

[58] Ibid. In 1958 there was a temporary shift to a more favorable position for natural rubber, due to an increase of purchase by the Soviet Union and Red China.

The United States so far has been the largest consumer of natural rubber. The question now is whether it will continue to be so in the future. The President's Materials Policy Commission reported that the consumption of rubber in the United States will possibly reach 3.3 million tons a year by 1975,[59] of which perhaps 2.5 million tons constitutes new rubber. How much of this will be synthetic, and how much natural rubber? The answer will determine the future position of natural rubber. It is estimated that the capacity of the synthetic plants in the United States was well over one million tons in 1955.[60]

The position of natural rubber in its competition with synthetic rubber can only be strengthened with intensive research, not only to improve quality, but also to discover ways and means to reduce the cost of production, so that a more favorable cost and demand relationship may be created.

One factor which may boost the natural rubber industry is an increased domestic demand. Some rubber plantations have in the past been the dominating factor in the location of tire factories in Indonesia. New industries which utilize rubber as raw material, for a

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[59]The President's Materials Policy Commission, Resources for Freedom, Vol. II (Washington: U. S. Government Printing Office), p. 100.

[60]American Geographical Society, "Outlook for Rubber," Focus, vol. VI, No. 3, November, 1955.

purpose other than to manufacture tires, may be attracted in the future and thus compensate for the loss of foreign consumption.

Tin. Of the mineral production of Indonesia tin is next to oil in importance. The metal is produced in the so-called "tin-islands:" Bangka, Billiton, and Singkep since 1816, 1851, and 1887, respectively.[61] Indonesia is the world's second tin producer, and contributes about twenty per cent of the total world's output. However, due to unfavorable world market situation, production has declined continuously since 1954, reaching a low of 23,244 tons in 1958.[62]

The quality of Indonesia's tin ore deposits is the same as that of those in other tin fields of Southern Asia, although perhaps of lower quality than those originating from the Republic of the Congo. The deposits are of several types, but the alluvial and illuvial deposits are the most important. It is estimated that the alluvial reserve amounts to one million tons of tin content, so that there is no fear that the supply will be exhausted in the foreseeable future.[63]

The outlook for tin industry again depends on the future relationship of supply and demand in the country as

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[61] R. W. van Bemmelen, The Geology of Indonesia, vol. II, (The Hague: Government Printing Office, 1949), p. 93.

[62] See Appendix B, Table XII.

[63] U. S. Department of Commerce, Investment in Indonesia, op. cit., p. 43.

well as abroad. Conditions in the present world market are not favorable to Indonesia's tin industry. World tin prices show a downward trend due to a continuous supply of tin from the Soviet Union to Western Europe since the end of 1957. The International Tin Council in attempting to face this oversupply, fixed a reduction of tin export quota by about forty per cent for the six tin producing member countries, including Indonesia. So far, however, these measures have been unsuccessful.[64]

To expect the domestic market for tin to uphold production seems an impossible proposition, at least in the near future. In the first place, new mills are needed to process the concentrates, and this requires a large capital outlay. Secondly, being an under-developed country, Indonesia will not for a while be able to consume a significant amount of tin. The greatest consumer of tin is the tin-plate industry which manufactures food containers, and this type of industry is associated with and found only in industrially advanced countries.

In short, for the next decade at least, Indonesia's tin industry will be at the mercy of world events, without being in the position to attract new industries using tin as raw material.

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[64]Bank Indonesia, Report for the Year 1958/1959, p. 213.

Bauxite. The mining is done on the island of Bintan, one of the Riau Islands. It started with a production of 10,000 tons in 1935, rapidly reaching 275,000 tons in 1940, or six to seven per cent of the world's production.[65] In 1951 the output reached a high level of 642,000 tons, but has since then declined with great fluctuations depending on the demand.[66]

Reserves in prewar years were estimated at between twenty to thirty million tons, or about one-fifth of the then-estimated world supply of high grade bauxite.[67]

The present limiting factors to increased development of this basic ore are the non-existent domestic demand and the fact that as a producer Indonesia is too far from the major consumers (United States and Western Europe) with the result that freight rates may be too excessive to put her in a competitive position. Even for its present market, namely Japan, Indonesia must compete with Malaya.

However, one favorable factor seems to be in sight. With the establishment of an aluminum industry near the cheap power source at Asahan, the demand for bauxite will definitely be boosted.

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[65] van Bemmelen, op. cit., p. 136.

[66] See Appendix B, Table VIII.

[67] U. S. Department of Commerce, Investment in Indonesia, op. cit., p. 45.

Manganese. The mining of this metal has grown rapidly since the postwar years. Production figures show large fluctuation with a high level of 108,000 tons in 1956 and a low of 9,000 in 1952. The output for 1958 was 44,000 tons.[68] Figures on the amount of reserves are not available, although large deposits are believed to exist in Central and West Java and in some of the outer islands.

The future for manganese mining seems uncertain. Present output is largely exported in a strong competitive market. Domestic demand is insignificant because of the lack of steel industries.

Nickel and copper. Deposits of these two metals are believed to be of substantial amount. However, they are mined only in small amounts and since the postwar period, no nickel has been mined. If the world market for nickel will remain favorable as it is at the present time, and the price of copper will stay high, a stimulus could be created to expand both mining industries.

Iron ore. Whereas all the ores and minerals discussed previously have been exploited and thus become usable, Indonesia's iron ore deposits appear to be a long way from commercial exploitation.

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[68] See Appendix B, Table VIII.

The fact that much of the ore is lateric, containing nickel and chromium, which can only be removed at high cost, plus the fact that coking coal is absent, have hindered considerably the exploitation of the ore, and postponed the development of a steel industry in Indonesia. Because of the distances involved, Indonesia's ore cannot be shipped economically to centres of heavy industry such as Japan and Australia; the ores from the Philippines are closer to Japan and those from Caledonia closer to Australia.[69]

Some sizable iron ore deposits are believed to exist in Sumatra, Kalimantan, and Sulawesi, whereas the iron sands in Southwestern Java are considered suitable for small-scale steel production.[70]

Several surveys and preliminary explorations in the possible use of these ores have been carried out before the war, but the conclusions were generally unfavorable.

As part of Indonesia's First Five Year Plan, surveys were resumed in 1956 by German consulting engineers in cooperation with the Indonesian State Planning Bureau and the Department of Geology. Their joint report recommended the establishment of steel plants in two stages. The first stage will see the development of two steel plants with a

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[69] van Bemmelen, op. cit., p. 205.

[70] U. S. Department of Commerce, Investment in Indonesia, op. cit., p. 46.

capacity each of 30 to 50,000 tons per year and utilizing the abundant scrap iron now present and imported pig iron. In the second stage, a large steel plant is to be erected with a capacity of 250,000 tons a year. This latter plant is to be located in South Sumatra in order to be close to its raw material and coal. However, as the ore deposits in South Sumatra are estimated to be only 1.5 to 2 million tons, there is some doubt whether or not it would be better to center the steel operation in Kalimantan, where much larger ore deposits are believed to exist. Investigations into this alternative proposal have now been completed and reports are awaited. Construction, either in Sumatra or in Kalimantan, is expected to start in 1961, the first year of Indonesia's Second Five Year Development Plan.[71]

Fertilizer materials. Being a mainly agricultural country, Indonesia is anxious to establish a fertilizer industry in order to increase the agricultural yields to the utmost. The three basic raw materials for the commercial fertilizer industry are potassium, phosphorus, and nitrogen. One favorable factor is the reported phosphate deposits in Java, from which phosphorus is extracted. However, the estimated reserves figure for Java of one-half

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[71]Biro Perantjang Negara (State Planning Bureau), op. cit., p. 232.

million tons of phosphate seems very modest if compared to those in the neighboring oceanic islands, placed at eighty-seven million tons of phosphate rock.[72] The output of the United States alone in 1945 amounted to six million tons.[73]

The State Planning Bureau reported that feasibility studies are in an infant stage, consisting of a more accurate survey of the phosphate deposits.[74]

Forest Products. Indonesia possesses extensive areas of commercially exploitable forests. However, large-scale operation is limited to a few areas located in the more accessible forests of Sumatra and Kalimantan. Small teakwood forests are also exploited in Java. At the end of 1958 the total forest land in Sumatra is placed at 284,000 square kilometres, Kalimantan 415,000 square kilometers, and Java 29,000 square kilometers. For whole Indonesia the total amounts to 902,000 square kilometers.[75]

Production of rough timber is increasing moderately. The Forestry Service reported an increase in output of lumber from 1,200,000 cubic meters in 1951 to 2,200,000

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[72] van Bemmelen, op. cit., p. 175.

[73] Zimmermann, op. cit., p. 788.

[74] Biro Perantjang Negara (State Planning Bureau), op. cit., p. 231.

[75] Statistical Pocketbook of Indonesia 1959, p. 74.

cubic meters in 1958.[76] These figures do not include those produced by the local population, which is estimated to be at least one and a half times the above figure.[77]

The future for forest exploitation is very bright. Domestic consumption at the present time is still very low. Assuming a total lumber cut of 5,000,000 cubic meters in 1958, the per capita consumption in that year would amount to 0.05 cubic meter. As a comparison: lumber production in Canada in 1957 amounted to 7,099,758,000 board feet,[78] or 16,566,000 cubic meters, which gives a per capita consumption of close to one cubic meter.

The forests will provide raw materials for quite a number of industries such as paper, match, leather, rayon cloth, triplex and wooden box, household appliances and medicinal industries, beside the provision of wood as construction material.[79]

One possible limiting factor to development is perhaps the lack of capital. Heavy investment would be required to develop the forests on a modern and profitable basis.

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[76] See Appendix B, Table XIII.

[77] Biro Perantjang Negara (State Planning Bureau), op. cit., p. 30.

[78] Dominion Bureau of Statistics, Canadian Forestry Statistics, Revised 1959.

[79] Bank Indonesia, Report for the Year 1958/1959, p.175.

POWER

Power is one of the most vital factors for industrial development in Indonesia. Whereas it is abundantly available in industrially advanced countries such as Canada and the United States, there is an acute shortage of power in Indonesia. The need for more power is felt everywhere, especially in the industrial field, resulting in a waste of industrial capacity. Therefore, it is vital that any sizable economic development must be accompanied by increased power development.

The present Indonesian per capita production and consumption of power is extremely low. With a total generated electricity of 983 million kilowatt-hours in 1957,[80] and an assumed population of 86.7 million in the same year, the per capita production came to 11 kilowatt-hours. Corresponding figures for the same year for certain countries were: India 2.3 kilowatt-hours per capita, Philippines 4.1, Japan 72[81] and Canada 5400.[82]

The installed capacity of power plants in Indonesia in 1957 was 266,000 kilowatt.[83] Although this figure is

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[80] See Appendix B, Table XIV.

[81] Computed from figures given in Economic Bulletin for Asia and the Far East, vol. IX, No. 1, June, 1958.

[82] Derived from Electric Power Statistics, vol. 25, no. 12, December, 1957.

[83] See Appendix B, Table XIV.

significantly more than the pre-war installed capacity, it is still considerably lower if compared to the standards of advanced countries. For example, the province of British Columbia alone, which has perhaps the highest installed capacity per capita of all the provinces in Canada, produced and used about 2,500,000 kilowatts in 1958, with an estimated need to double every seven to ten years, so that by 1975 the power requirement would amount to 13,700,000 kilowatts.[84]

The greatest part of the power development has been on Java, especially West Java. On the outer islands, electric power generation is confined to a relatively few areas. Roughly sixty-two per cent of the power generated is hydroelectric, thirty per cent is generated by diesel fuel, and the remainder by steam. This is in striking contrast with Canada, where ninety-five per cent of all power produced is generated hydraulically, and with the United States, where the figure is twenty per cent.[85]

Figures on available power resources in Indonesia are scanty. The most recent estimate places the potential water power capacity at close to 3,000,000 kilowatts.[86]

The problem of power shortage in Indonesia will be

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[84]The Vancouver Sun, Electric Power in British Columbia, A Special Series, June, 1959, p. 5.

[85]Dominion Bureau of Statistics, Canada 1955, p.130.

[86]See Supra, p. 99.

solved in two stages. The short-run problem of existing power deficits is met by building a number of new small power plants, and extending the capacity of existing plants. In the second stage, large-scale hydroelectric projects are carried out as part of the First and Second Five Year Plan. The most important are the Djatiluhur Project in West Java and the multi-purpose Asahan Project in Sumatra, with a planned capacity of 150,000 kilowatts and 800,000 kilowatts respectively.

It is expected that at the end of 1965 increased capacity as installed by the government will amount to 358,950 kilowatts of hydroelectric power, 31,545 kilowatts generated by diesel machines, and 86,400 by means of steam, giving a total increase of 476,895 kilowatts or twice the present capacity.[87]

TRANSPORTATION

There is no question that transportation is of major importance for such a country as Indonesia with its many islands and great distances. Sea transportation, in particular, is vitally important, both from the strategic as well as from the economic point of view.

Much is still to be done in the way of bringing up

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[87] See Appendix B, Table XV.

the transportation network to a reasonable standard. Not only must new highways and railways be built, but a great portion of the existing road and railway system, which suffered damage and deterioration during World War II, must be restored.

Roadways. The total lengths of public roads in 1958 was 79,000 kilometers, of which 30,000 kilometers was in Java and Madura, 28,000 in Sumatra, and the remainder in the outer islands.[88]

Traffic on the highways has expanded rapidly as can be seen from the increase in the number of vehicles on the road. The total number of registered motor vehicles reached 233,000 in 1958 as compared to 68,000 in 1951, the most marked increases being accounted for by trucks and motorcycles.[89]

Postwar road construction has been very limited due to lack of funds, and efforts were almost exclusively devoted to the restoration of pre-war roads. Plans for additional roads are mainly for the outer islands, as roads on Java are considered in reasonably good condition. Long range plans envisage the ultimate lengthwise connection of the main island chain from the most northern tip of Sumatra

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[88] Statistical Pocketbook of Indonesia 1959, p. 166.

[89] See Appendix B, Table XVI.

through Java and Bali to the Sunda Islands.

In 1958 an amount of eight million dollars was allocated for road construction in Sumatra, the execution of which would be done with the aid of a technical construction firm from the United States. In the meantime, under a Russian credit of six million dollars, heavy road equipment has been purchased and Russian experts would assist in the construction of the 662 kilometers of roads connecting Bandjarmasin, Balikpapan, and Samarinda in Kalimantan.[90]

Railways. Only Java has a fairly complete railway network. It includes two trunklines, connecting Djakarta and Surabaja via a northern and southern route, and three lateral lines that connect the trunklines. Ferries connect the Java rail lines with Sumatra and Madura. In Sumatra there are three major lines serving the northcoast, the westcoast, and the southcoast.

The total length of track in use at the end of 1958 was 6,640 kilometers. No new track has been added since 1952.[91] Instead, all expenditures since 1950 went for repair and replacement of the existing roadbed and equipment. Although the number of rolling stock has

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[90]Bank Indonesia, Report for the Year 1958/1959, p.221.

[91]Statistical Pocketbook of Indonesia 1959, p. 169.

increased steadily since after the war, it is still below the pre-war figure.[92] Data on freight carried show a decline since 1955 from 6,800,000 tons to 5,900,000 tons in 1958,[93] believed to have been caused by increased truck competition. Passenger traffic, on the other hand, has increased continuously.

Water Transport

Inland waterways. No data are available regarding the volume and scope of Indonesia's river traffic. For most areas, including Java, inland waterways are of negligible importance. Only in certain parts of Kalimantan and Sumatra do they play an important role. The reason for this is perhaps the fact that Java has a well-developed road and railway network, and there is, therefore, no real need to use the rivers as a means of transportation. Sumatra and Kalimantan, on the other hand, have an inadequate system of transport. The fact that the rich petroleum and coal deposits are in these areas has also helped to develop the inland water transport in the search for a cheap means of transport to carry the heavy crude oil and bulky coal.

It is unlikely that in the future Java's inland

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[92] See Appendix B, Table XVII.

[93] Statistical Pocketbook of Indonesia 1959, p. 170.

waterways will ever attain an economic place of importance. Sumatra and Kalimantan which possess navigable rivers up to 600 kilometers and 280 kilometers upstream respectively, may very well utilize their rivers more intensively, but the shallowness of some of the rivers may remain a limiting factor.

Interisland and Ocean Shipping. Interisland and coastal shipping is of particular importance to Indonesia's economy because of the country's numerous islands and their scattered distribution.

Commercial interisland communication was paralyzed when in December 1957 the Dutch Shipping Line KPM (Royal Packet Navigation Company), which operated seventy per cent of Indonesia's shipping, suddenly broke off its services.

As of 1956 the KPM with its fleet of ninety-six ships with a total displacement of 191,000 gross weight tons transported 744,000 passengers and carried close to 3,000,000 tons of cargo. The government-owned PELNI (Indonesian National Shipping Company), operating with forty-six ships with 46,300 gross weight tons, in the same year transported 48,000 passengers and close to 1,000,000 tons of cargo.[94] Beside the KPM and PELNI, many private companies are operating interisland and coastal shipping

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[94] Statistical Pocketbook of Indonesia 1959, p. 174.

services. Their total capacity in 1957 was estimated at 60,000 motorized and non-motorized vessels with a total gross weight tonnage of 350,000.[95]

To restore sea communications it was estimated that Indonesia in the next five years would need 220 ships ranging from 230 tons to 10,000 tons each, and nineteen units of industrial enterprises directly connected with ship servicing. This over-all outlay will amount to 226 million dollars.[96]

Ocean shipping activities have declined since 1955. At that year 16,172 vessels were recorded as entering from foreign ports, with a total net capacity of thirty-four million cubic meters. In 1957, however, only 3,927 vessels have entered with a net capacity of twenty-eight million cubic meters.[97] It is to be hoped that from 1959 on the situation will again be normal.

Airways. Indonesia is connected with other countries by its national airline GIA, Garuda Indonesian Airways, and by several international airlines. The GIA, which maintains international flights and extensive inter-island service serving thirty points with an air network

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[95]Biro Perantjang Negara (State Planning Bureau), op. cit., p. 65.

[96]Bank Indonesia, Report for the Year 1958/1959, p.223.

[97]Statistical Pocketbook of Indonesia 1959, p. 173.

of 27,000 kilometers experienced a continuous increase in air transport since 1952 up to 1957. In 1958, however, a great setback occurred when foreign experts numbering 296 persons including sixty-five pilots, left Indonesia. The total passengers carried dropped from 477,000 in 1957 to 275,000 in 1958, and the total mileage covered declined from 14.5 million kilometers to only 7.6 million kilometers.[98] Since August 1958, however, the flight frequencies over a number of routes have been increased, and new air services added.

Summary

Indonesia's transport system has suffered considerably as the result of World War II, its repercussions and the internal political and economical difficulties in recent years.

Much of the efforts to normalize the country's transportation network has been concentrated in the repair and restoration of existing road and railway systems, and replacement of rolling stock and marine fleet. New road and railway construction and addition to existing equipment in recent years has been very small in relation to what was required. Lack of funds and technical skill were the main limiting factors.

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[98] Bank Indonesia, op. cit., p. 225.

For many years to come, industrial development will be hampered considerably because of inadequate transportation facilities. Under these circumstances, new industries are not encouraged to arise, and the existing ones will have a very difficult time to keep their heads above water.

LABOR

As has been discussed in Chapter II, the importance of labor as an industrial location factor depends on the characteristics of wage rates, productivity, skill, supply, labor legislation, etc. The same factors would undoubtedly also emerge as location factors in Indonesia, although their positions of relative importance may differ considerably from those known in Canada or the United States.

Supply. Generally speaking, Indonesia has a large supply of labor. Thirty million persons out of a total population of eighty million in 1953 were estimated to be employed in the several occupational groups from the production of raw materials to trade and professions.[99] With a denser population Java obviously has the largest labor supply as compared to the other islands. Accurate data on unemployment are not available, but the unemployment situation is most serious in Java, and in the urban areas

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[99]See supra, p. 80.

more serious than in rural areas.

Wage rates and productivity. Wage levels when compared to those in industrially advanced countries are extremely low. Minimum daily wages in 1958 ranged from Rp. 5.30 for workers in agricultural estates to Rp. 14.16 for those working for transport companies.[100] However, labor productivity is also extremely low. It is even believed that it is much lower than in pre-war years,[101] although no data are available either to prove or disprove this contention. The abundance of labor, its lack of training, the absence of capital, destruction of facilities and economic dislocation resulting from World War II, are considered to be factors attributing to low productivity.[102]

Wage levels have in general advanced steadily with no appreciable increase in productivity, if any. This situation certainly weakens considerably Indonesia'a competitive position in international trade and creates unfavorable affects in the monetary situation. On the other hand, the rise in wages is understandable when viewed in the light of mounting cost of living. For example, placing the cost of living index in Djakarta in

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[100] At an official exchange rate of Rp. 11.40 to $1. In 1958, the dollar equivalent would be $0.47 and $1.24 per day respectively. See further Appendix B, Table XVIII.

[101] U. S. Department of Commerce, op. cit., p. 98.

[102] Ibid.

1953 at 100, the index for 1958 was 225, an increase of more than 100 per cent.[103]

Skill. Although the over-all Indonesian labor force may be ample, skilled workmen are in short supply. A shortage of technicians and managers is also felt at all levels. The situation is aggravated by the lack of training and education facilities. As skills and supervisional ability can only be acquired through a long training period and experience, the impact of this problem will be felt for many years to come.

Labor organizations. During the Dutch administration the growth of trade unionism was tempered, and the few trade unions that existed were weakened by internal struggle for control between the communist members and the muslim nationalists. Yet, they succeeded in calling out their members to a strike among government employees in pawnshops, and other occupational groups. Strikes became such a serious threat to the Dutch economy that in 1925 the Dutch government passed a law making strike action illegal.[104]

As soon as the Republic was founded with a provisional constitution which recognized trade unions as a

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[103] Statistical Pocketbook of Indonesia, 1959, p. 234.

[104] Dorothy Woodman, The Republic of Indonesia (London: The Cresset Press, 1955), p. 375.

basic and desirable part of the social structure, the labor movement was markedly accelerated. As of 1954 the Ministry of Labor reported that there were seven national labor federation, about 180 national or regional unions, and more than 1100 local independent unions.[105] Statistics on union membership are not available, but it may be estimated to be between five and six million persons.

Labor-Management relations. Labor unrest, which includes strikes, work stoppages, and other disputes have occurred fairly frequently. However, a sign of considerable improvement in the situation seems to be in sight. Whereas the number of disputes has increased steadily from 2963 in 1954 to 4131 in 1957, the figure for 1958 showed a drop of nineteen per cent to 3350.[106] The strike picture also shows a marked improvement. The number of work stoppages and lock-outs in 1954 was 319 reaching a peak of 505 in 1956. In 1958, however, only fifty-five strikes were recorded.[107] Demand for higher wages is generally the principal cause of disputes, followed by problems connected with employment, dismissal, and working conditions.

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[105] U. S. Department of Commerce, op. cit., p. 101.

[106] See Appendix B, Table XIX.

[107] See Appendix B, Table XX.

Labor Legislation. The most important and earliest piece of labor legislation was the Labor Law of 1948, which set standards to be implemented by various ordinances. The principal provisions of the law concern the establishment of a forty-hour work-week, with a maximum of seven hours a day and an obligatory restday once a week. Night work is limited to six hours per day or thirty-five hours per week. Workers are entitled to all official holidays and vacations of two weeks annually. Female workers are to be granted two days menstrual leave and three months maternity leave.

The basic legislation concerning labor disputes is embodied in the "Emergency Act of Settlement of Labor Conflicts" or Law No. 16 of 1951. Under this law, a procedure is established for settling labor disputes by regional boards. If settlement cannot be reached, the dispute was referred to a regional committee for decision. An appeal of the decision could be made to a Central Committee, which would give the binding decision. This Central Committee is a college with an extraordinary judicial status, set up on a legal base and responsibly only to law and justice, not to the Minister concerned.[108]

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[108]Bank Indonesia, Report for the Year 1958/1959, p. 231.

This law was amended by Law No. 22 of 1957 where the composition of the Central Committee was changed to also include five employer's representatives and five worker's representatives beside those from the government. Another amendment gives the Minister of Labor Affairs the right to annul or postpone the enforcing of Central Committee decisions if they are considered as "being a risk for the State interests and in order to maintain public security."[109]

There are only few social security laws, of which the Labor Accident Law of 1951 is perhaps the most significant. Under this law, the employer is liable for medical care and full or partial wage payments to workers injured in the line of duty. In the event of death, the employer must pay burial expenses, and periodic or lump-sum payments to the dependents.

Summary

The Indonesian labor scene may prove to be most significant in influencing the establishment of new enterprises.

Among the favorable factors are the large supply and the generally low wage rates. However, these advantages tend to be nullified against the deficiency in skill,

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[109] Ibid.

education, and managerial and supervisional ability, and the extremely low productivity.

The Labor organizations, which in the past have not shown a favorable record of relationship with management, seem to have shown a more mature understanding and attitude, as indicated by the drastic drop in the number of work stoppages during the last two years.

The influence of labor legislation is difficult to appraise since they are still very limited in number.

ENTREPRENEURSHIP AND MANAGEMENT

Entrepreneurs and managers are closely associated with every aspect of production, and their presence is vital to assure effective combinations of the factors of production. Their place of importance in industrial development is much the same in under-developed countries as it is in industrially advanced countries. The only difference is that in advanced countries more emphasis is given to the quality of entrepreneurs and managers, whereas in under-developed countries it is their availability which is the major factor.

All under-developed countries are faced with the shortage in entrepreneurs and managers in much the same way. In the case of Indonesia, this shortage is generally characterized by clearly defined symptoms. There is a

general lack of efficiency in productive processes, a lack of initiative and organization in many industrial operations. Investors prefer investment in land and conspicuous consumption rather than in industries, and there is a lack of dynamicism, which results in the foregoing of investment opportunities.

Compared to countries such as Canada, the United States, and other countries in Western Europe, the shortage of technicians and managers is indeed phenomenal. Figures indicating this scarcity are not available for Indonesia. However, data have been published for other Asian countries which might be assumed to apply in the case of Indonesia. Whereas almost thirty per cent of the total economically active population in the United States belongs to the group of technicians, managers and related workers, the corresponding figure for India is only 1.9 per cent, for Pakistan 3.3 per cent, for Thailand 9.2 per cent, and for Burma 13.1 per cent.[110]

For some time in the future this problem of scarcity in technical and managerial ability will be experienced. This will most certainly slow down the rate of industrial growth of Indonesia. Technicians and managers cannot be

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[110]See Appendix B, Table XXI.

acquired overnight. Instead, long training and education periods are required, and adequate facilities to carry them out.

MARKETS

Despite the fact that Indonesia has a large population, the scope of the market for goods and services is limited due to an insufficient real demand for them. This indicates that there are other factors beside the total figure of the population, which determine the size and behavior of markets. First of all, the level of real income of the population. High real income corresponds to a large market potential and low real income to a small size of the markets. As has been shown, the Indonesian per capita income, although higher than that of certain asian countries, is still considerably low if compared to that of Western European and North American countries. Secondly, the size of the market is also dependent on the proportion of total expenditures which is spent on particular products. A large part of Indonesia's population still lives on a subsistence level. Therefore, any increase in real income will tend to be spent almost exclusively on food. Hence, the market for manufactured goods, which is associated with industrialization, will remain limited for quite some time. Finally, unlike Canada and the United

States, Indonesia lacks the technical and institutional facilities which are essential for the efficient and widespread operation of the markets. This includes facilities for wholesaling and handling, a network of trading banks, and other basic facilities such as transport and communications.

Apart from those factors just enumerated, there is another important factor, which tends to limit the size of the market, and which is unique to Indonesia and perhaps to many other under-developed countries. This is the problem of segregated markets which are not linked up with each other. Instead, they form subsidiary subsistence economies or more or less self-contained village societies, and cannot, therefore, be expected to form part of the general market of the country. The United Nations sums up the impact of this problem as follows:

> This insulation of a portion of the population.... affects economic growth in general but is particularly inimical to the development of secondary industry. It inhibits the flow of labour into occupations requiring industrial skills; it keeps off the market a significant proportion of the country's potential purchasers of industrial products.[111]

It is hoped that as economic development gets under

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[111] United Nations. Processes and Problems of Industrialization in Under-developed Countries. New York: United Nations Publication, 1955, p. 13.

way, real incomes will increase, and markets will expand. However, this expansion is not likely to be cumulative, unless productivity continues to increase.[112]

CAPITAL

The scarcity of capital severely limits industrialization in Indonesia. To a large extent the process of industrialization depends upon the country's ability to save and to invest. The progress of industrialization depends, therefore, on the rate by which savings and investments are increased. As has been pointed out (page 84), the amount of annual savings and investments in most under-developed countries, including Indonesia, are quite small. Personal savings amount to one per cent or less of gross national product, as compared with four to six per cent in advanced countries, while annual net investment is in the order of five per cent of national income, as compared to at least fifteen per cent for countries in Western Europe and North America. In view of this fact, the process of industrialization may be defined as the process of increasing the rate of net capital formation from five per cent to about fifteen per cent.[113]

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[112] United Nations, Economic Bulletin for Asia and the Far East, vol. IX, No. 3, December 1958, p. 60.

[113] Ibid., p. 53.

In the case of Indonesia, it was expected that at the end of the first Five Year Development Plan, the rate of net investment would have increased from five per cent to 7.3 per cent.[114] However, it is doubtful that, with the numerous difficulties encountered during the execution of the Plan,[115] even this low rate was achieved.

The present rate of net investment is certainly far below the level where increased standard of living for the masses could be achieved, taking into account the rate of growth of population. Thus, more capital is required than is presently available. This requires either the mobilization of domestic savings, the seeking of foreign loans, or the attraction of foreign capital. The decision as to which to apply is indeed a vital one.

PROBLEMS AND PROSPECTS

In the previous sections an attempt was made to survey and appraise Indonesia's economic structure and its location factors in connection with the process of industrial development. The analysis reveals that Indonesia's economy is capable of great industrial expansion. With its favorable geographical location, its fertile soil, and its abundant

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[114] Ibid., p. 19

[115] See for example Biro Perantjang Negara (State Planning Bureau), op. cit., pp. 1-15.

untapped resources, Indonesia is potentially an important industrial nation. Yet, up to the present time Indonesia's economy is still largely agricultural, and will perhaps remain so for several decades to come.

The need for industrialization cannot be denied. It is needed to reduce excessive dependence on the export of primary products, and, at the same time, to increase national income and raise the over-all standard of living. Considering the generally small extent of industrialization today in relation to the broad range of natural resources, the scope for industrial expansion in Indonesia is still very large, and the outlook promising.

Industrialization is, however, confronted by a series of obstacles. Among the major limiting factors are lack of capital, lack of basic facilities, lack of managerial skill, low income and low productivity.

Thus, the main problem is whether or not conditions in the future will be sufficiently favorable for new domestic industries to develop within the country. To find the answer a further analysis is necessary of Indonesia's present industrial location in relation to the possibility of attracting new industries. As a guidance, the list and sequence of location factors as discussed in Chapter III will be used.

Transportation

The availability of an adequate and effective transportation network is far from being realized in present-day Indonesia. Unless this can be achieved in the not too distant future, any sizable investment for the establishment of new industries cannot be expected. The system of transportation in Java, Madura, and Bali is reasonably adequate, but the transportation network in the outer islands is definitely inadequate. Road and railroad development in the outer islands must, therefore, obtain preference in future plans, since it is in those islands with most of the untapped resources that new industries can be expected to develop.

Another important aspect of transportation, which at the present time is rather neglected, is the inter-island and coastal shipping. Its further development is unquestionably vital in order to achieve an effective and efficient distribution of goods among the islands.

Raw Materials

An abundance of untapped natural resources is available for development in Indonesia. However, because of the inadequacy of almost all other important location factors such as transportation, markets, capital, managerial skill, etc., the presence of these resources does not have

a strong attracting force for the location and development of new industries. The greatest obstacle is perhaps the fact that such a development requires a larger initial capital than the average Indonesian businessman is willing or able to invest. It is therefore essential that the government should initiate the development of the extractive type of industries. The most promising seems to be the development of an aluminum plant in Sumatra, and a steel plant in Kalimantan, which are expected to be in operation within the next five years. At that time, new small-scale industries may develop which will utilize aluminum and steel as raw materials.

Markets

With its large population, Indonesia has a large potential market. However, with the low level of income of the people and inadequate technical and institutional facilities, the establishment of new industries will progress slowly. The most rapid development has been experienced by the food industries. This is understandable considering the fact that, because a large part of the Indonesian population still lives on a subsistence level, any increase in real income tends to be spent entirely on food. The manufacturing of industrial goods will be small because of the insufficient demand for them.

Labor

Labor is one factor which at the present time is seriously restricting industrial growth. The large supply of labor and low wage rates are perhaps conducive to the establishment of new industries. However, these favorable factors tend to be offset by other factors, such as low productivity, and the general lack of skilled and supervisory personnel. To improve the situation, more training and better educational facilities must be established.

Power

Power is still one of the most critical location factors in Indonesia. The acute shortage is seriously hurting the industrial sector of the economy. With the expected additional installed capacity within the next five years, new industries may be expected to emerge as the result of it. Since the largest power projects will be undertaken in Sumatra and West Java, new industries will be attracted to locate within these areas.

Taxation

There is a uniform tax system in Indonesia, administered by the central government. For this reason, taxation will perhaps never become a factor of consideration in the selection of a plant location. However, the generally high

taxes on business income will undoubtedly restrain initiative to the establishment of new enterprises.

Capital and Entrepreneurship

Owing to the small amounts of domestic savings generated, scarcity of capital is a serious limiting factor in the development of new industries. In its anxiety to create an entrepreneurial class, the government has been extending loans, special credits, import and marketing arrangements, and other preferences to would-be Indonesian businessmen. However, these practices have, in general, not worked out as anticipated, since in many cases these "artificial" entrepreneurs have not sufficient business and managing experience to make use of these privileges.

What the government seems to forget is the fact that there is in Indonesia a broad sector of the economy composed of petty traders, shopkeepers, craftsmen, and small-scale industrialists, whose entrepreneurial potentialities cannot be ignored. However, because of the existence of a maze of state control, these people tend to eke out an existence by highly speculative and essentially illegal ventures.

Management

The lack of supervisory and managerial skill has led to a general inefficiency in almost all organizations,

in the governmental sector perhaps more so than in the private industrial sector.

During the last few years the Institute for Economic and Social Research of the University of Indonesia has examined government practices in assisting new industries. Its reports repeatedly underscore the mismanagement of the government administrative apparatus.[116]

In the private industrial sector, the situation is not as serious because many of the more competent managers are more willing to work for private companies because of higher salaries paid.

The main problem confronting entrepreneurs wanting to initiate a new enterprise is the lack of managerial personnel. This is in striking contrast to the situation in industrially advanced countries, where the problem is not so much the availability, but rather the quality of management personnel.

Climate

The generally hot climate of most areas in Indonesia is certainly not conducive to efficient production. Labor in the more inland regions, where temperatures are much milder, tends to be more productive.

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[116]"The Government's Program on Industries," Ekonomi dan Keuangan Indonesia, vol. 7, 1954, pp. 702-736. Quoted in J. M. van der Kroef, "Indonesia's Economic Future," Pacific Affairs, vol. XXXII, No. 1, March, 1959, pp. 46-72.

However, most of the commercial activities are carried out in the large coastal cities, although temperatures in these areas may sometimes run to an intolerable point. Prospective entrepreneurs generally prefer locations in coastal cities above those in the more inland regions.

Attitudes

The attitude of the government toward private industries is often deplorable. On the one hand, the government is encouraging the development of private enterprises, but at the same time, it is favoring its own undertakings by special protective measures. This has led to clashes between government agencies and private enterprises in the same line of economic endeavour.

It is clear that the preceding problems are not singular but rather they are interrelated issues. They are also an integral part of the main economic problems, which will be discussed in the following section.

Basic Economic Problems

The Population Problem. As was pointed out, the present transmigration policy does not greatly relieve the pressure of population in the densely populated areas. It was estimated that if the present rate of population growth, which is about 1.5 per cent annually, continues,

Java would have a total population of 116 millions in the year 2000. However, when 20,000 families could be emigrated annually, the population would only rise to seventy-four million.[117]

Such a large-scale movement of people would seem prohibitive in view of the enormous cost involved and the difficulties of resettlement. Nevertheless, this is the minimum level that is required to make emigration effective.

The population problem has not only created pressures on available resources, but it has also created a situation where in agriculture the maximum output per man has been reached, and where in fact decreasing returns has started to set in. This has resulted in a "disguised unemployment" problem, i.e., people could be shifted either into industry or into other occupations without causing a drop in agricultural production. This seems to point to rapid industrialization as the key solution. However, where industrialization has penetrated the economy in a given area, it has caused a rapid increase in population of that area. This has been especially the case in larger towns and cities where housing and other hygienic facilities have not been able to keep pace with this abnormal growth.

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[117]Cited in J. M. van der Kroef, Indonesia in the modern world. (Bandung, Indonesia: Masa Baru, Ltd., 1956), p. 70.

These are only some of the aspects connected with the population problem and there are undoubtedly many more. It is the opinion of the writer that the government must take this problem more seriously than it has in the past. Unless industrialization and large-scale transmigration go hand in hand, the full benefits of industrialization will never be reaped.

The "vicious circle" Problem.[118] Indonesia, like other under-developed countries, is primarily agricultural. It has this agricultural economic structure because this structure corresponds to its low-productivity and to the attitudes associated herewith.

At low levels of productivity a large part of the population produces just a little more than enough to feed and clothe itself. The small portion remaining is exported in exchange for basic-need goods.

Because of the low level of real incomes, there is a low demand for manufactured goods, and thus also for workers in manufacturing. The problem of small market is aggravated because of the lack of technical and institutional facilities. They, in turn, are limited in their growth because of a lack of basic facilities, of which transportation is most important.

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[118] See Economic Bulletin for Asia and the Far East, vol. IX, No. 3, December, 1958, pp. 4-8.

Thus, the low level of productivity and the non-industrialized structure of employment form a low equilibrium level. Added to this the continued increase in population and the likelihood of decreasing returns in agriculture, a "vicious circle" is thereby created.

The essential condition to breaking this trap is increased productivity. For Indonesia, with about seventy-five per cent of the population engaged in agriculture, this means an increase in agricultural productivity. And this can be done. Rice cultivation is a good example. The yield per acre is about 1200 to 1500 pounds in 1955 as compared to 3500 pounds in Japan.[119] In this case, fertilizers and other mechanical aids will be of great help, but what is needed most is hard work.

The Problem of Balanced Economy. At the present time, Indonesia's economy is still dependent on a relatively small number of export goods, which are highly sensitive to price fluctuations in the world market. For this reason, it is vital that Indonesia should aim for a balanced economic growth, i.e., a well balanced development of the production of foodstuffs and agricultural exports and of industrialization. A balanced programme

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[119]Institute of International Finance, The Economic Position of Indonesia, I.I.F. Bulletin, New York, 1955.

of industrialization is also needed to deal with other factors which limit the desired rate of industrial expansion. This includes the shortage in management, skilled labor, and the improvement of basic utilities such as power and transport. With Indonesia's great variety of available resources, this kind of development program can certainly be carried out. However, a balanced development program would require large capital investment, which cannot be easily obtained in Indonesia today. Until large amounts of capital can be mobilized, Indonesia may well remain an agricultural country.

The Problem of Capital Formation. Closely related to the problem of balanced economic growth is that of capital formation. Industrial development cannot be sustained unless Indonesia has adequate capital. Such capital can be acquired in three ways. One way is by means of domestic savings. However, the total amount from the three sources, namely, personal, business, and government, are very small indeed. There is no evidence as yet that domestic savings will improve considerably in the near future. With a low level of income, the propensity to save is equally low. A second way to obtain capital is by seeking foreign loans. This policy, however, cannot go on indefinitely. Foreign loans have come in continuously since the postwar period, although data are not available to show the exact amount. However, it was reported that

interest payments in 1959 on foreign and internal long-term loans amounted to 190 million rupiahs, while the total instalment payment for the same year amounted to 272 million rupiahs.[120]

Present economic conditions certainly do not allow these figures to be increased. Extensive foreign loans without a corresponding increase in industrial productivity will certainly result in economic and monetary collapse.

The third and more realistic way to acquire capital at the present time is through foreign investment. The rate of industrial progress is not at all adequate to improve the standard of living markedly without an inflow of capital from abroad. Unfortunately, there is no clear consensus among Indonesian leaders of such necessity. There are, among them, those who do not realize that foreign enterprises are indispensable for the economy. In so far they do not realize it, they are willing to accept the prosperity decline resulting from this attitude. This opposition would seem to originate from the revolutionary period, when anything foreign was considered undesirable. This group would perhaps change their attitude if it were better informed of the position and function of foreign capital in the present-day economy of

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[120]Times of Indonesia, August 30, 1958. Quoted in J. M. van der Kroef, "Indonesia's Economic Future," Pacific Affairs, vol. XXII, No. 1, March, 1959, pp. 46-72.

Indonesia. On the further extreme, there are, of course, the communist leaders, who would denounce outrightly any inflow of foreign investment without providing any explanation.

One needs only to be realistic in order to be of the opinion that foreign know-how and business experience must be employed in the present economic development of Indonesia. This process must be continued until a sufficient number of people have been developed with sufficient training and knowledge to perform these functions, and, if necessary, until adequate domestic capital can be generated to buy out the foreign interests.

The present political and economic situation are far from being favorable for foreign capital to come in. A bill concerning private foreign investments was passed in 1958. It is rather unfortunate that the wording of the bill leaves too much to the matter of interpretation, beside the fact that its nature is ambivalent. Whereas it recognizes the necessity of foreign capital for Indonesia's economic development, it requires rather complicated and difficult conditions which foreign capital must fulfill.

Foreign capital is allowed to operate in the fields of production except for the following enterprises: (a) railways, (b) telecommunications, (c) National shipping and aviation, (d) generation of electric power, (e) irri-

gation and water supply, (f) manufacture of arms and ammunition, (g) generation of atomic energy, (h) mining of vital minerals. Enterprises usually undertaken by Indonesian nationals are also closed to foreign capital. The kinds of enterprises belonging to this category are to be determined by the Foreign Investment Council, composed of several cabinet ministers. Yet, no clear line of responsibility has been defined between this council and other government agencies concerned with economic development. However, the Council is entrusted with very broad powers. For example, it determines the number of foreign personnel that may be employed in each foreign enterprise, stipulates the training and employment of Indonesian nationals, and supervises its implementation.

Other obstacles which are often mentioned by potential foreign investors are: the risk of confiscation or expropriation, discriminatory law enforcement, restriction on remittance of profits and repatriation of capital, inadequacy of basic facilities, etc.

CHAPTER VI

CONCLUSION

The industrial development which has taken place in the United States as well as in Indonesia upholds several of the concepts of industrial location as exposed in the location theories by Roscher, Ross, Weber, and others.

In the first place, nearly all the economists recognized the importance of certain location factors which they considered as fundamental in the location of industries. Secondly, each of these writers placed his emphasis on different location factors. For example, Roscher mentioned raw materials, labor, and capital; Weber considered transportation as a major factor; others such as Ross regarded the presence of natural deposits as most significant.

All these points were clearly verified by the result of the empirical studies, conducted in the United States, some of which are included in Chapter IV.

In the Indonesian scene the importance of some basic factors such as raw materials, labor, and market is also recognized and demonstrated in Chapter V, although no actual empirical studies have ever been made.

Some of the basic hypotheses such as that of Ross and Roscher, which stress the importance of raw materials

source when there is a great loss of weight during the production process, Weber's rule of "material index," explains to a large extent the establishment of certain industries in the United States as well as in Indonesia.

In analyzing the relative importance of the location factors in relation to industrial development, it was found that these factors do not occupy the same position of importance in Indonesia as they do in the United States. This may be explained partly by the difference in form of government, partly by the difference in the stage of industrialization, and partly by certain other factors. For example, whereas taxation has become increasingly important in the location of American industries, it would perhaps never become a factor in the case of Indonesia because of the less autonomous position of Indonesian provinces and therefore uniform tax policy. Power has been a factor in the location of the early American industries, but it has ceased to be of major importance today because of the abundant supply. On the other hand, Indonesia is still struggling with an acute power shortage, so that its availability will remain of prime importance in the location of industries there. Other examples could be cited, but this is a sufficient indication of the difference in relative importance of the location factors in the United States and in Indonesia.

The special reference to Indonesia has been of great

value in evaluating the potentialities of Indonesia as an industrial nation. With its abundance of natural resources, including raw materials, fuel sources, and undeveloped water power, Indonesia may become an important economic power in the future. However, this promise still lies far in the future. The survey on the present industrial location factors indicates a general lack in the factors of production, and in the basic utilities and facilities. This problem is associated with the low stage of industrialization which is experienced by Indonesia at the present time. There are, however, other more basic economic problems, which require immediate attention, if a rapid and adequate rate of industrial growth is to be achieved. Among these are the population problem, the problem of "vicious circle," the problem of balanced economic growth, and last but not least, the problem of capital formation. Many of these problems can perhaps be solved easily, others may require a great deal of planning and thinking. Yet, no problem is insolvable. It may be more than difficult, but it can be done; it is a matter of "never say die."

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A P P E N D I X A

APPENDIX A

The following list represents Conway's 700 Plant Location Factors, which are divided into ten major headings. Each of these major headings has many sub-headings, as shown. Under each of these sub-headings there is a list of sub-subheads, which are not included in this appendix.

PLANT LOCATION FACTORS

1. Markets

    Market Trends
    Retail Sales
    Income
    Competition
    Industrial Markets
    Regional Comparisons
    Areas
    Consumer Characteristics
    Population

2. Labor

    Commuting Factors
    Employee Performance in Area
    Relocation
    Testing Techniques
    Labor Legislation
    Union Activity
    Personnel Policies
    Unemployment
    Labor Potential
    Scientific Manpower
    Vocational Training
    Labor Force Inventory
    Labor Surveys or Registration
    Interview Other Employees
    Sources of Data
    Unavailable Personnel

3. Materials and Services

   Major Raw Materials
   Routine Supplies
   General Services
   Technical Services

4. Transportation

   Location Economies
   Rail Transportation--General
   Rail Service at each site
   Motor Transportation
   Water Transportation
   Commercial Air Service
   Private Aircraft Facilities
   Mail, Parcel Post, and Express
   Communications
   Special Services

5. Government and Legislation

   Government Administration in Area
   State Legislation
   State Taxes
   Local Taxes
   Total Tax Bill
   Future Taxes
   Industrial Dispersal

6. Financing

   Analyze Requirements
   Sources of Funds
   Credit Standing
   Terms of Loans
   Special Inducements

7. Water and Waste Disposal

   Basic Water Sources
   Municipal Water Systems
   Ground Water--Wells
   Surface Water--Streams and Lakes
   Chemical Analysis
   Drainage
   Stream Pollution--Waste Disposal
   Sewage Disposal Systems
   Garbage and Trash Disposal

8. Power and Fuel

Select Basic Energy Source
Check each utility or supplier
Electric Power
Coal, Oil, Fossil Fuels
Gas

9. Community Characteristics

Overall Community Planning
Planning and Zoning
Industrial Zoning
Air Pollution
Weather--General
Weather--Specific Check-points
Housing
Civic Organizations
Political Atmosphere
Law Enforcement
Social Attitudes
Business Meeting Facilities
Health and Medical Programs
Schools
Churches
Cultural and Recreational Facilities
Spectator Sports
News Media
Representation in Congress
Streets
Fire Protection
Amenities and Intangibles
Existing Industries

10. Individual Sites

General Requirements
Types of Sites
Intangible Considerations
Survey Methods
Legal Check-Points
Maps
Soil Characteristics for Foundation
Cost of Land

A P P E N D I X B

STATISTICAL TABLES

TABLE I

NUMBER OF TRANSMIGRANTS, 1938-1958

Year	Number of Persons
1938	33,399
1939	44,694
1940	52,208
1951	2,864
1952	17,507
1953	39,427
1954	30,192
1955	21,389
1956	24,350
1957	23,230
1958	26,419

Source: Central Bureau of Statistics

TABLE II

PERCENTAGE OF VALUE OF PRINCIPAL EXPORT PRODUCTS TO TOTAL EXPORT VALUE

	1938	1956	1957	1958
Rubber	22.6	39.0	36.6	34.6
Petroleum & Petroleum products	23.5	27.6	31.7	37.0
Tin and tin ore	4.8	6.9	5.8	4.8
Copra	5.6	4.2	4.2	2.2
Tea	8.2	3.2	3.1	3.3
Coffee	2.0	3.2	3.1	2.4
Manufactured sugar	6.5	1.9	1.8	1.0
Tobacco in leaves	5.6	3.1	3.5	3.9
Palm oil	2.4	3.0	2.7	3.1
Pepper	1.2	1.0	0.9	0.7
Hard cordage fibres	1.3	0.7	0.5	0.5
Tapioca products	1.3	0.1	0.1	0.1
Kapok fibres	0.9	0.3	0.1	0.1
Cinchona bark	1.2	--	0.1	0.1
Other products	12.9	5.8	5.8	6.2

Source: Central Bureau of Statistics

TABLE III

RICE PRODUCTION AND IMPORTS, 1953-1958

(1000 tons)

Year	Production	Imports
1953	7,031	371.5
1954	7,530	261.0
1955	7,216	127.8
1956	7,309	763.2
1957	7,443	563.4
1958	7,613	681.8

Source: Central Bureau of Statistics

TABLE IV

GROSS NATIONAL PRODUCT AND NET NATIONAL INCOME

(Based on 1955 prices, in Rp. milliard)

	1953	1954	1955	1956	1957	1958
G.N.P. at market prices	121.0	128.5	127.9	134.5	144.7	126.8
Net National Income	109.1	116.7	118.9	124.5	134.5	117.1

Source: State Planning Bureau

TABLE V

PER CENT FLUCTUATIONS IN NATIONAL INCOME

Year	Amount of change in Rp. milliard	Per Cent
1953	+ 6.8	+ 6.6
1954	+ 7.6	+ 7.0
1955	+ 2.2	+ 1.9
1956	+ 5.6	+ 4.7
1957	+ 10.0	+ 8.0
1958	- 17.4	- 12.9

Source: State Planning Bureau

TABLE VI

PERCENTAGE CONTRIBUTION OF THE AGRICULTURAL AND NON-AGRICULTURAL SECTORS TO NATIONAL INCOME 1954-1958

Sector	1954	1955	1956	1957	1958
Agriculture	58.0	56.0	55.0	52.6	56.0
Non-Agriculture	42.0	44.0	45.0	47.4	44.0

Source: State Planning Bureau
NOTE: The deviation in 1958 was due to a drop in industrial production caused by lack of imported raw materials.

TABLE VII

NUMBER OF ESTABLISHMENTS AND NUMBER OF PERSONS EMPLOYED IN THE MANUFACTURING INDUSTRY AT THE END OF THE YEAR 1957

Major group of Industries	Number of Establishments	Number of Persons
Food manufacturing industries, except beverage industries	22,222	53,987
Beverage industries	320	7,213
Tobacco manufactures	635	91,593
Manufacturing of textiles	755	72,319
Manufacturing of wearing apparel and made-up textile goods	2,432	45,467
Wood manufactures	378	12,254
Furniture and fixtures industries	378	8,561
Manufacturing of paper and paper products	64	3,594
Printing industries	521	24,990
Manufacturing of leather and leather products	409	11,964
Manufacture of rubber products	356	21,519
Manufacture of chemicals and chemical products	532	31,165
Manufacture of nonmetallic mineral products	360	18,157
Manufacture of metal products	385	15,619
Manufacturing and repairing of machinery, except electrical	162	7,928
Manufacturing and repair of electrical machinery, apparatus, etc.	34	3,119
Manufacturing of transport equipment	440	20,673
Miscellaneous manufacturing	478	15,081
TOTAL	10,861	465,203

Source: Central Bureau of Statistics

TABLE VIII

MINERAL PRODUCTION
(In metric tons)

Year	Tin in Ore	Coal	Bauxite	Manganese Ore
1938	27,735	1,456,647	245,354	9,687
1939	38,342	1,780,632	230,668	12,074
1940	44,033	2,009,422	275,221	11,569
1951	31,482	867,716	642,316	--
1952	35,564	968,939	343,754	8,918
1953	34,363	897,331	149,552	21,997
1954	36,435	899,864	173,239	20,238
1955	33,901	813,667	263,675	39,064
1956	30,536	828,239	303,300	107,827
1957	28,166	717,287	241,467	53,831
1958	23,572	603,432	343,904	44,370

Source: Central Bureau of Statistics,
Bureau of Mines, Ministry of Industry.

TABLE IX

PETROLEUM AND EARTH GAS PRODUCTION
(In metric tons)

Year	Crude Petroleum	Earth gas
1938	7,398,144	1,227,594
1939	7,948,694	1,263,254
1940	7,938,993	1,308,800
1951	8,092,717	1,013,497
1952	8,523,395	1,379,186
1953	10,225,321	1,762,707
1954	10,775,223	2,041,418
1955	11,730,342	2,461,892
1956	12,730,160	2,638,570
1957	15,468,437	2,798,480
1958	16,109,614	2,693,218

Source: Central Bureau of Statistics

TABLE X

NATURAL RESOURCES OF SELECTED COUNTRIES

COUNTRY	POPULATION IN 1956 (x1000)	COAL RESERVES (Million tons)	WATER POWER		IRON ORE		PER CAPITA BASIS		
							WATER POWER		
			Potential capacity (thousand kw)	Existing capacity (thousand kw)	Million Tons	Coal Reserves (Tons)	Potential capacity (kw)	Existing capacity (kw)	Iron Ore Tons
BURMA	19,856	265	20,000	6.9	2	13	1.01	--	0.1
CEYLON	8,929	51	550	31.3	4	6	0.06	--	0.4
INDIA	387,350	67,702	35,000	1,061.4	21,000	175	0.09	--	54.2
INDONESIA	84,000	2,500	2,860	135.1	12	30	0.03	--	0.1
JAPAN	90,000	20,948	22,534	9,602.0	64	233	0.25	0.11	0.7
PAKISTAN	83,603	168	10,400	62.7	60	2	0.12	--	0.7
PHILIPPINES	22,265	42	2,267	159.4	30	2	0.07	--	1.3
FRANCE	43,648	8,700	--	2,720.0	6,560	199	--	0.06	150.3
UNITED KINGDOM	51,208	173,900	1,128	431.0	3,760	3,396	0.02	0.01	73.4
UNITED STATES	168,174	1,723,000	109,500	23,100.0	6,900	10,245	0.65	0.14	41.0

Source: United Nations

TABLE XI

RUBBER PRODUCTION, 1935-'39 AVERAGE AND 1948-'55

Period	Estate	Production smallholder	Total
1935-39 average	186,850	167,513	354,363
1948	101,743	330,606	432,349
1949	169,145	263,851	432,996
1950	175,127	521,345	696,472
1951	222,534	591,872	814,406
1952	294,468	456,026	750,494
1953	304,215	390,335	694,550
1954	282,526	456,144	738,670
1955	261,345	472,441	733,786

Source: Rubber Statistical Bulletin (U. S. Department of Commerce)

TABLE XII

PRODUCTION AND EXPORTS OF TIN

(long tons)

Year	Production of tin in concentrates	Exports	
		Tin in conc.	Tin metal
1938	29,728	13,699	7,207
1953	33,822	32,732	224
1954	35,861	33,940	994
1955	33,368	31,768	196
1956	30,053	31,159	716
1957	27,723	27,375	84
1958	23,244	18,346	...

Source: International Tin Council Statistical Bulletin (Bank Indonesia Report)

TABLE XIII

PRODUCTION OF LUMBER, 1950-1958
(In 1000 cubic meters)

Year	Production
1950	1,195
1951	1,241
1952	1,667
1953	1,554
1954	1,605
1955	1,702
1956	1,738
1957	1,749
1958	2,206

Source: Central Bureau of Statistics

TABLE XIV

CAPACITY AND OUTPUT OF PUBLIC ELECTRIC POWER PLANTS

Year	Generators Number			Capacity Number		Total electricity generated 1000 kwh
		Hydro	Thermo	Hydro	Thermo	
1938	108		272	173,021		314,200
1939	115		272	178,625		347,700
1940	115		285	180,816		380,500
1953	121	46	286	106,832	98,361	718,513
1954	125	45	306	102,887	111,854	795,672
1955	131	53	331	133,274	108,871	863,433
1956	133	59	345	126,030	129,920	894,427
1957	128	61	363	130,699	135,488	983,349

Source: Central Bureau of Statistics

TABLE XV

POWER DEVELOPMENT PROJECTS

Territory and Place	Expected Completion Year	Capacity to be Installed (kw)	Type
West Java			
1. Djatiluhur	1963	150,000	Hydro
2. Tjikalong	1959	12,000	Hydro
3. Karet	1958	12,000	Diesel
4. Parakan	1958	7,500	Hydro
5. Gambir	1962	10,400	Steam
Central Java			
1. Semarang	1962	25,000	Steam
2. Timo	1962	12,000	Hydro
3. Tegal	1959	1,000	Diesel
4. Jogjakarta	1959	3,000	Diesel
East Java			
1. Surabaja	1962	50,000	Steam
2. Golang	1959	2,700	Hydro
3. Ngebel	1961	2,250	Hydro
4. Patjitan	1960	200	Diesel
Atjeh			
1. Kutaradja	1959	400	Diesel
North Sumatra			
1. Asahan	1965	150,000	Hydro
2. Eastern Sumatra	1959	6,000	Diesel
3. Tapanuli	1959	1,000	Diesel
Central & West Sumatra			
1. Bukittinggi	1959	2,200	Diesel
Riau			
1. Pakan Baru	1959	600	Diesel
South Sumatra			
1. Tes	1959	18,000	Hydro
2. Tandjung Karang	1959	1,000	Diesel
Sunda Islands			
1. Combined	1958-1960	1,825	Diesel
Maluku			
1. Ambon	1958	750	Diesel
Sulawesi			
1. Tonsea Lama	1959	4,500	Hydro
2. Pare-pare	1959	550	Diesel
Kalimantan			
1. Balikpapan	1959	1,000	Diesel

Source: Central Bureau of Statistics

TABLE XVI

NUMBER OF MOTOR VEHICLES, 1951 & 1958

Type	1951	1958
Passenger cars	31,046	73,533
Buses	7,643	9,090
Trucks	21,649	44,843
Motorcycles	7,663	105,101
TOTAL	68,001	232,567

Source: Indonesian Motor Club
(Central Bureau of Statistics)

TABLE XVII

NUMBER OF ROLLING STOCK

At end of year	Locomotives	Carriages	Wagons
1937	1,277	3,615	27,150
1938	1,273	3,600	27,247
1939	1,263	3,553	27,201
1951	940	2,627	22,083
1952	1,004	2,741	23,560
1953	1,045	2,813	23,282
1954	1,063	3,024	23,925
1955	1,065	3,041	23,127
1956	1,066	3,033	23,169
1957	1,093	3,085	23,386
1958	1,125	3,136	22,988

Source: Central Bureau of Statistics

TABLE XVIII

MINIMUM DAILY WAGES IN VARIOUS INDUSTRIES IN JAVA
(in Rp.)

	1956	Beginning of 1957	1958
Estate Agriculture	4.25-4.80	4.25- 4.80	5.30-
Food & beverages	4.00-4.50	4.00- 5.00	7.75
Mining	6.70	8.00	....
Tobacco industry	4.50	4.50- 5.00	8.60
Sugar & rice factories	4.50-6.25	5.00- 6.50	8.35-12.58
Chemical industry	4.50-6.00	4.50- 6.00	6.25- 8.00
Leather industry	....	....	9.75
Furniture industry	3.50-4.50	4.00- 6.00	12.00
Textile industry	4.00-5.00	4.00- 5.75	11.80
Transport Companies	....	....	14.16
Metallurgic industry	5.50-6.25	5.75- 6.50	12.71
Ship building	....	....	....
Coconut-oil industry	7.00	7.00-10.00	8.50
Ice factories	4.50-6.75	6.25- 7.75	9.50

Source: Labor Control Service
(Bank Indonesia Report)

TABLE XIX

NUMBER OF DISPUTES AND EMPLOYED WORKERS

Year	Number of disputes	Number of employed workers (x1000)
1954	2,963	2,304.7
1955	3,697	3,488.7
1956	3,896	3,111.9
1957	4,131	5,057.5
1958	3,350	2,975.9

Source: Ministry of Labour
(Central Bureau of Statistics)

TABLE XX

WORK STOPPAGES AND LOCK-OUTS

Year	Number of stoppages and lock-outs	Number of workers involved	Total working hours lost
1952	349	132,963	878,911
1953	280	419,580	4,812,090
1954	319	157,582	2,385,730
1955	469	238,872	4,097,803
1956	505	340,203	6,968,931
1957	151	62,024	863,257
1958	55	13,578	98,060

Source: Ministry of Labour
(Bank Indonesia Report)

TABLE XXI

TECHNICAL, MANAGERIAL AND RELATED WORKERS AS PERCENTAGES OF TOTAL ECONOMICALLY ACTIVE POPULATION

Country and year	Professional, technical and related workers	Managerial, administrative, clerical and related workers	Total
Burma, 1953	3.6	9.5	13.1
India, 1951	1.6	0.3	1.9
Japan, 1950	4.6	10.5	15.1
Pakistan, 1951	1.0	2.3	3.3
Thailand, 1947	1.0	8.2	9.2
U. K., 1951	6.1	12.5	18.7
U. S., 1950	7.9	20.7	28.6

Source: United Nations