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INDUSTRIAL LOCATION PLANNING

Presented by the Executive Director
of the United Nations Industrial Development Organization

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We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche.

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Introduction

1. The problems of correctly planning the location of industry includes, in a sense, the problem of regional development within a country. Decisions on the geographic location of industrial activity are instrumental, in most cases, in determining the pattern of growth of the various regions of a country. Thus, the special emphasis placed on industrial location is due, first, to the major role of industry in promoting regional economic development and, second, to the greater possibilities of influencing the location of industry than of agriculture or services.

2. The criteria set forth in economic works on industrial location must be re-interpreted and revised if they are to be applicable to industrial location planning in developing countries. This is necessary for two main reasons. First, the theory and practical criteria of location have been elaborated in developed countries, and for their economies; problems of location are of relatively recent concern to most developing countries. Partly, as a consequence of this situation, most of the writings on the subject are directed at finding solutions to location problems in terms of the commercial profitability of the individual firm; the location to which the individual enterprise will on balance be attracted is also the location which maximizes the enterprise's commercial profitability. To the extent that the maximization of commercial profitability (whether of a private or public project) corresponds also to the maximum social profitability of the project, one can expect that location decisions made on the basis of the principle of commercial profitability will be optimal also from the social point of view. It is well known, however, that in most developing countries, the conditions which provide for such an identity of results do not apply. It is outside the scope of the present paper to discuss this point in detail.^{1/} It is sufficient to note three important reasons why location criteria based on considerations of commercial profitability will generally yield different solutions than criteria based

^{1/} The divergence between commercial and social profitability is discussed, for example, by S. Marglin, Public Investment Criteria - Benefit Cost Analysis for Planned Economic Growth, Allen & Unwin (1967).

on social profitability will produce. These reasons are:

- (a) The multiplicity of planning objectives at any given time.
- (b) The fact that commercial profitability cannot take into consideration the costs and benefits accruing outside the project itself.
- (c) The fact that while location decisions on a commercial profitability basis must take into account many important variables as given, location decisions on a social profitability basis can take into account the possibility that the decisions will affect the very variables which govern them in the first place.

Second, the lack of commonly acceptable location criteria is partly due to the disagreement, among researchers and planners alike, on fundamental issues and principles. Moreover, policy-making in this field is very often hampered by an involuntary mixing of totally different viewpoints; by lack of agreement on the meaning of even the most basic terms; and by failure to specify hidden value judgements. As L.G. West puts it:

"Most would agree, at least, that a case for planning for 'regional balance' made out according to strict economic logic has so far been hindered by blurred criteria and vague definition of terms. Greater precision is crucial to any serious and unbiased consideration of the subject."^{2/}

And Rodwin concludes that:

"The regional development goals, like the other goals in the national development plan, need to be spelled out, enlarged, dramatized, made more visible."^{3/}

3. It is essential to note that completely different solutions may be in order if the location criterion is based on national objectives rather than if it is based on regional objectives. This also holds true with respect to the time period selected: efficient short-run policy prescriptions may actually be harmful from the point of view of long-run aims. In this context, the basic distinction between a "static" approach (concerned mainly with the efficiency of the existing location pattern) and a "dynamic" approach (concerned with changing the

^{2/} West, L.G., "Regional Planning: Fact and Fallacy", Lloyds Bank Review (April 1966), p.33.

^{3/} Rodwin, Lloyd, "Choosing Regions for Development", in: Friedmann, J., and J. Alonso, eds., Regional Development and Planning, Massachusetts Institute of Technology Press, Cambridge (United States) (1964).

existing pattern) should constantly be kept in mind. For example, the transportation network cannot be substantially altered in the very short run, but this could be an essential planning variable in the context of long-term development. These observations are worth mentioning because in no other field of economic development are they so often disregarded, with serious consequences.

4. The identification and definition of the basic issues depend, of course, on the objectives to be achieved: what is a main issue from one point of view may be quite irrelevant from another. An attempt should be made to view regional location planning from one angle at a time. Thus, if one begins by looking at regional location problems in developing countries from the viewpoint of national economic growth, one should avoid needlessly confusing the analysis with such elements as, for example, the political repercussions of crowded urban housing or the social costs of agricultural under-development. Such elements, while undoubtedly of great weight in a different context, should be brought into play only after the economic conclusions have been reached, in order to qualify and realistically adapt these conclusions to the complex socio-economic environment. Of course, this does not in the least imply a necessary subordination of social or political elements to economic elements in the context of industrial location planning, since the reverse is also true. If the planners have a socio-political outlook and objectives in solving regional location problems, they should consider economic objectives only after they have reached solutions which are feasible within such an outlook. However, irrespective of the nature of the non-economic objectives, knowledge of the economic factors involved and of the cost of neglecting them must form an essential part of any location decision; the desired non-economic results should be brought about by the most economical programmes.

5. Several criteria, which are legitimate in the context of their own assumptions and of the goals they are designed to pursue, can be applied to problems of location planning. An important criterion concerns national integration, which is especially significant for the larger (and newer) developing countries. According to this criterion, location decisions are evaluated on the basis of their effects towards bringing the various regions of the economy into closer touch and communication with one another. Another criterion is that of political stability, which often implies allocation of industrial investment in some proportion to the political pressures of the various regions. Another is the criterion of economic

efficiency, namely, to evaluate location decisions on the basis of their influence on the efficiency of the allocation of actual resources. The most relevant economic criterion for developing countries is that of economic growth, i.e., the contribution of location decisions to the economic growth of the nation or of its regions separately considered. It has been stated that "...it is clear that sub-national areas cannot themselves make progress if the nation as a whole should stagnate: sustained national economic growth must always be a first consideration in regional investment choices"^{4/}. With this in mind, a long-run, national growth point of view will be taken in this paper, and the main issues in terms of their contribution to this goal will be examined. Accordingly, the conclusions reached below must be qualified by appropriate social and political considerations, and be weighed against the priority of non-economic objectives.

6. If the overriding planning objective is national economic growth, then clearly the regional growth targets and, therefore, regional location decisions are merely instruments to achieve the national objective. Therefore, the first basic distinction to be made is between location planning as a way to industrialize a region and as an instrument of national growth. Similarly, urban planning can be viewed either as a way to improve regional and national planning, or as a means of optimum city development for the city's own aims.^{5/}

^{4/} Friedmann and Alonso, op.cit., Introduction, p.5.

^{5/} The subdivision of the problem in practice will depend, of course, on how a "region" is defined. The intricacies of such a definition cannot be dealt with here, and "regions" will be considered as those which, for planning purposes, are treated by their Government as such. However, as Vining states ("Delimitation of Economic Areas", American Statistical Association Journal, March 1953), economic space is conceptually and virtually a continuum; and the definition of "region" depends on the nature of the problem at hand, many such definitions being possible and valid at different times and for different purposes.

I. FACTORS OF INDUSTRIAL LOCATION

A. The Main Location Factors

7. Since the economic process is concerned with organizing, directing, and combining the factors of production - land, labour and capital - concern with the proper location of industry should begin with analysis of the role of these factors of production.

Factor endowments

8. Land: Land, of course, is crucial to any consideration of location. First of all, it provides the site for plants. Sites vary in value, not only because of their location with respect to the other factors of production, but also because of intrinsic differences, e.g. fertility. In terms of industrial location, the topography is also important; fairly flat land makes it easier to construct a transport network and many types of production require flat sites of substantial size on which to erect modern plants with an efficient flow of production.

9. In a broader context, "land" is defined as including the raw materials - metals and minerals, forest products, agricultural products - that are used in producing manufactured goods. "Land" also provides fuel and energy for industrial production. Where these materials are bulky and costly to transport, industries requiring relatively large amounts will tend to locate near the sources of supply. Natural resources are not evenly distributed over any given terrain, and regions rich in resources that are vital to industrialization have an advantage in the effort to become more highly developed. The undertaking of geological surveys, however, sometimes results in the discovery of hitherto unknown natural resources and the subsequent development of a region. Land may also be important in terms of the water supply and climatic conditions. Deserts do not become economically developed regions unless irrigation projects provide them with sufficient water supplies. Some manufacturing processes require large amounts of water, and its supply becomes a principal determinant of location. For other industries, climate may be a location factor (e.g., the aircraft industry, which needs a good climate in order to test new airplanes).

10. Finally, apart from all these considerations, the suitability of any piece of land for location of industry is affected by the rental which, in turn, depends on the demand for that land. All the previously-mentioned considerations, of course, affect the demand for a piece of land. If the potential user must compete with other potential users, the price of the land will be bid upwards. Thus, land in built-up and thriving areas tends to command a higher price than in peripheral areas, and to become the preserve of undertakings which can afford to pay higher rents.
11. Labour: Location of industry is also conditioned by the available supply of labour. In the absence of other compelling location factors, industries are attracted to cities because they offer large labour markets from which to draw a sufficient number of workers. This is of a particular importance to enterprises characterized by uncertainty of production schedules, as they must be able to hire additional workers on short notice.
12. For some industries - primarily those whose products are made by relatively unskilled workers and which are highly competitive in regard to price - labour cost differentials become a significant influence on location. These generally more labour-intensive industries, in which labour costs comprise a significant part of the total cost of production, also tend to have low transport costs, (e.g. textiles and apparel). Their tendency, therefore, is to seek locations offering sources of cheap labour supply. Since almost all regions in developing countries have abundant supplies of unskilled labour, such industries have a wide freedom of choice of location. Such industries, therefore, are readily amenable to policies designed to increase industrialization in lagging regions (see paragraphs 85-88). The fact that less developed regions also have a lower wage structure^{6/} is an added inducement to such industries to locate there. Poland has followed a national development policy of locating more capital-intensive investments in already industrialized areas and more labour-intensive ones in under-developed territories in order to achieve two goals simultaneously: (a) obtaining the highest yield from investments; and (b) improving the situation of under-developed

^{6/} Narayan, H.L., "The Indian Labour Market and Its Impact on the Pattern of Regional Wage Differentials", Indian Economic Review, February 1958.

regions through the creation of jobs.^{7/}

13. Since skills are not evenly distributed within nations, industries requiring skilled workers tend to concentrate where they are most available. Thus, certain types of production requiring machinists and tool and die makers, such as machinery manufacture, have been attracted to automobile production centres, such as Detroit in the United States and Birmingham in England, because those regions have pools of such skilled labour. On the other hand, a dearth of skilled and educated manpower may make a region unattractive for the location of industry. Possibilities of overcoming shortages of skilled personnel include training programmes and policies designed to induce mobility of skilled manpower.

14. According to economic theory, the factors of production are supposed to be mobile and thus, in the long run, labour cost differentials and imbalances in the supply of skilled labour should be eliminated. Workers should migrate from low-wage to high-wage areas and industry should be attracted to low-wage areas, bidding up the price of labour there. The fact that wage and skill differentials persist is attributable to differentials in birth rates among regions and impediments to labour mobility. A significant body of writing on labour mobility has accumulated, and the findings indicate that age (older), home ownership, children in school, friends and relatives in the home area, and a liking for one's own community all militate against geographic labour mobility.

15. In the developed nations, mobility has been greatest among the more highly skilled workers, particularly at the technical, professional and managerial levels. This may not be true for developing nations, however, because the amenities offered by a few urban centres keep people of talent tied to them. Since skilled personnel are relatively scarcer and exhibit greater reluctance to move from major urban areas, the availability of technical and professional skills and, to a lesser degree, of operative skills, can become a significant factor of

^{7/} Wróbel, Andrzy, and Stanislaw M. Zawadzki, "Location Policy and the Regional Efficiency of Investments", in: City and Regional Planning in Poland, Jack C. Fisher, editor, (Ithaca: Cornell University Press, 1966), p.437.

industrial location in developing countries.^{8/}

16. A "classic" question in location is whether to move industry to people, or people to industry. The case for migration of people rests on the assumption that retardation of a region's growth is due to its being an uneconomic location, emigration, therefore, permits taking advantage of superior productive possibilities in other regions. The case for moving industry to where the people are is based on the claim that planned reductions of population through emigration are most difficult to achieve and require more social overhead investment, e.g. housing, than would be the case in bringing the industry to where the people are. The only real test of subsidizing a movement of industry to the people is that applied to "infant industry" arguments for a protective tariff: Can the subsidy be temporary?^{9/}

17. Capital: The third factor of production - capital - also plays a role in the location of industry because in private enterprise economies, access to capital markets is not the same in all locations and costs of financing vary geographically. Although capital is the most mobile of the factors of production, its mobility may depend on knowledge of the probability distribution of returns.^{10/} Local banks know their own areas and the businesses there, but their familiarity with conditions decreases as the distance from their home territory increases, the less the banks know about potential customers, the less willing they are to extend loans to them. This may help to explain the lack of development in the regions most distant from centres of economic activity. In centrally planned economies, or where public investment is involved in market and mixed economies, capital is more mobile and, consequently, less of a location determinant.

^{8/} Schiavo-Campo, Salvatore, "Wages, Skills and Regional Location of Industries: The Case of Mexico", in: Annals of the Second Inter-American Congress on Regional Planning, Escritorio de Pesquisa Economica Aplicada, Rio de Janeiro, 1967.

^{9/} Hoover, Edgar M., The Location of Economic Activity (New York McGraw-Hill, (1948), p.276 in the 1963 edition.

^{10/} Chinitz, Benjamin, "Contrasts in Agglomeration: New York and Pittsburgh", Papers and Proceedings, American Economic Review, May, 1961.

18. The attitudes of commercial banks, moreover, seem to be conditioned by the industrial traditions of a region. In small-scale, highly competitive industries, such as apparel, firms do a large amount of business in relation to their initial capitalization, turning over their capital seven or eight times a year. Credit is necessary as a permanent feature of such industries, and the commercial banks in regions where clothing manufacture is concentrated tend to be more liberal in their credit policies than those located elsewhere. Apparently, banks that have experience in catering to apparel manufacturers operate on the insurance principle of making money on customers on the average, instead of on each borrower. As a result, new ventures in such an industry find an additional reason to locate where the industry is already concentrated.

19. Other factors: There are additional factors to be considered with respect to location of industry. A region may grow for historical reasons: industry started there and growth begets further growth. The original reason for location of the industry may have been accidental: the early developers may have lived there; or it may have been economically rational: an industrial complex may have arisen in a port city at a river junction, and even though river traffic is no longer of consequence, the advantages of the early development continue to attract new industries.

20. The writings on urbanization indicate that the social and cultural amenities - theatres, concerts, museums, schools etc. - provided in major cities tend to draw people and industry to them. Many economic activities, moreover, depend on quick delivery or face-to-face contact between producers and customers, between manufacturers and suppliers of their intermediate products, and between manufacturers and those who provide business services, e.g. accountants, lawyers, designers, advertising agencies and management consultants. A recent study of the New York metropolitan area has described the "Manhattan luncheon table" as a "provider of ideas" far more valuable as a cost-saver to some types of pursuits than the lower costs of labour, space or transportation in other locations would be.^{11/} The role of the city as a generator of economic activity prevails universally.

^{11/} Hoover, Edgar M. and Raymond Vernon, Anatomy of a Metropolis (Cambridge: Harvard University Press, 1959).

21. In market economies, entrepreneurship also plays a role in the location of industry. Entrepreneurship, like capital, is theoretically supposed to be mobile, but firms may locate in particular places because their owners prefer to live there. One of the reasons found for the concentration of Greece's industry in the Athens area was that management is localized there. The immobility of management was due, in turn, to the social life that Athens offered, as well as the identity in a less developed nation of entrepreneurship and management.^{12/} Furthermore, for various historic, economic and cultural reasons, one area may produce more entrepreneurs and generate more capital to be used intra-regionally than another does. This often is particularly the case in developing nations which tend to suffer from shortages of entrepreneurship and savings.

22. Finally, Government policy itself becomes a location factor. Places differ in their attractiveness to industry because of differences in tax burdens, zoning regulations, labour and social welfare laws, political stability and a host of other Government-related factors. In centrally planned economies, the role of Government policy with respect to location of industry is, of course, crucial but in private enterprise and mixed economies, Governments also have adopted policies designed to influence the pattern of spatial distribution of economic activities. Yugoslavia is putting 2 per cent of its national income into a fund for the faster development of its under-developed republics and provinces, and utilizing such measures as lower rates of interest.^{13/} That nation has had success in speeding up industrialization in the more backward areas, partly equalizing income levels. Government decisions, whether based on political motivation or economic criteria, thus assume extreme importance in the location of industry. In recent decades, the great stress on regional development is indicative of this, and there are examples of the growth of particular regions because of governmental actions, e.g. Ankara in Turkey, the trans-Ural (Western Siberia) region in the Soviet Union, and the Tennessee Valley in the United States.

^{12/} Coutsoumaris, George, The Morphology of Greek Industry (Athens: Centre of Economic Research, 1963), pp.136-137.

^{13/} Economic Review, Belgrade, Yugoslavia, April 1966.

Transport

23. The question of location is essentially one of movement of goods and services and, consequently, transport is a key element in determination of the proper location of industry. Nations are not composed of isolated regions; the very concept of nationhood implies that the various elements, including geographic areas, are somehow tied together. Similarly, the industries of a national economy are interrelated - the products of one are the inputs of a second, and so on. Location of industry, therefore, depends on a reliable transportation network that links plants with their suppliers and customers.

24. A denser network of transport routes permits less roundabout transfer and increases the number of points to be considered as possible production locations.^{14/} Thus, an inaccessible place suddenly becomes accessible and attractive for the location of industry when a railroad or highway is extended to it. In actual practice, the sequence of development of the area may be just the opposite: the starting of economic activity, such as mining, at a location induces the extension of the railroad or highway to it.

25. The choice of the medium for a particular transfer of goods depends on availability, as well as technological and cost considerations. On any given type of transfer agency, costs of transfer generally increase less than in proportion to distance, and markedly less in the transfer media which require heavy investment in terminal facilities and for which pickup and delivery are costly. For short distances, truck shipment is usually the cheapest but for longer hauls, shipment by railroad becomes cheaper. For very long hauls, water transport, if a water route is available, is the cheapest means. For shipments requiring speed, and where the terrain or plant growth have made surface lines difficult to construct, e.g. the Andes mountains in South America or jungle areas of Africa, shipment by air is the most advantageous.

26. Since industry requires both raw materials and markets, the choice of location, other things being equal, can be at the raw material site, at the market, or some place between, depending on where transport costs are minimized. Elaborate attempts have been made to classify industries as raw materials-oriented

^{14/} Hoover, op.cit., p.18.

or market-oriented, depending on whether the raw material or the finished product is the more expensive to carry. When the finished product embodies comparatively little of the weight of the raw materials employed in its manufacture (weight-losing processing industries), the industry will tend to be located near the source of the raw materials,^{15/} e.g. paper mills, sugar refineries and fruit canneries. When the finished product is more bulky, more fragile, or more perishable than its raw materials, production is more likely to take place near the point of consumption, e.g. bakeries (see also paragraph 63).

27. A major problem in classifying industries according to their location orientation is the fact that in a growing economy, the situation is constantly changing. Even if the orientation of the industry remains the same, discoveries of new sources (or depletion of old sources) of raw materials and migration of population may shift the industry's actual location. Beyond that, technological changes - in modes of transportation, methods of manufacture, and development of new products and markets - may alter the location orientation of an industry. Sheet glass production, for instance, has been cited as being raw materials-oriented, because the coal used in heating glass furnaces is not incorporated in the weight of the finished products.^{16/} Yet, in the United States, the substitution of natural gas for coal as the glass industry's prime fuel, and the proliferation in recent years of pipelines which can carry natural gas relatively cheaply to distant plants has led to a closer location alignment of the industry with its markets.^{17/} Indeed, there is a general trend away from raw materials-orientation to market and urbanization economies-orientation in highly developed nations.^{18/} Finally, the very process of economic growth often alters location orientation: expansion of the market for a product may lead to larger-scale production which includes economies of scale and factor substitution or the development of agglomeration economies as large industrial centres come into being. These economies will be examined next.

^{15/} Robinson, E.A.G., The Structure of Competitive Industry, (originally published in 1931 as one of The Cambridge Economic Handbooks and reissued by the University of Chicago Press, 1958), p. 128-131.

^{16/} Ibid.

^{17/} Pittsburgh Regional Planning Association, Region in Transition, University of Pittsburgh Press (1963), pp.312-332.

^{18/} Lichtenberg, Robert M., One-Tenth of a Nation, Harvard University Press (1960), pp.129-137.

Agglomeration economies

28. The agglomeration factors have been classified as scale economies, localization economies and urbanization economies. Increasing returns to scale mean that production costs per unit of output decrease as production levels increase. Localization economies refer to those realized when plants of like character are concentrated in an area, and urbanization economies relate to those realized when unlike plants are concentrated. These urbanization-regionalization economies have been called spatial-juxtaposition economies.^{19/}

29. Economies of scale: The economic axiom that the division of labour is limited by the extent of the market has relevance to the location of industry. The early history of industrial growth in England, where the Industrial Revolution first took place, showed small-scale industry giving way to larger industry as the size of the market grew. An industry which started as a small-scale and geographically decentralized one, e.g. the custom-order bootmaker in every hamlet, gradually became concentrated because of economies of scale, e.g. the shoe factory serving a large region. The large volume of production of the factory enabled it to produce at a marginal cost which, when combined with the cost of transporting finished goods to the market, was below that of the decentralized smaller-scale producers, even though the latter enjoyed lower transport costs to local markets. Economies of scale, and consequent concentration of production at a given point, continued as technological innovation reduced the costs per unit of output.

30. The discussion of scale economies has been extended beyond the single activity to the location analysis of industrial complexes. Taking account of factor and product substitution (based on different relative prices), and of the fact that changes in scale may also involve process change and thus influence factor proportions and the internal structure of an industrial complex, recommendations were made concerning the specific type of petrochemical complex best suited for Puerto Rico.^{20/}

^{19/} Isard, Walter, Location and Space Economy, Massachusetts Institute of Technology Press, Cambridge, and John Wiley and Sons, Inc., New York, 1956.

^{20/} Isard, Walter, and Thomas Vietoriz, "Industrial Complex Analysis and Regional Development with Particular Reference to Puerto Rico", Papers and Proceedings of the Regional Science Association, 1955.

31. Localization economies. Industries can achieve external economies by concentrating in one area. Apparel manufacture is an excellent example of such localization economies; in virtually all countries, production by many small firms is concentrated in a few large urban centres, where the manufacturers have common access to a pool of specialized labour, accessibility to buyers, and the use of diverse specialized services catering to the industry. In fashion industries, the fact that a particular place (usually the nation's leading city) becomes "the market", attracting the buyers from retail outlets, makes it virtually essential for firms to locate there. In such industries, however, it is often possible to separate the production from the marketing process, thus, the manufacturing may be conducted at locations which offer other advantages, such as cheap labour.^{21/}

32. Inter-industry and urbanization economies. Inter-industry and urbanization economies also accrue to firms concentrated in one centre. Plants located in major urban centres are able to purchase and sell intermediate products among themselves, to utilize the services of research laboratories and universities, and to benefit from proximity to governmental offices in order to reduce uncertainty and speed up procedures for licensing, and so on. The cost of needed infrastructure, often prohibitive for any given industry, may be tolerable if spread over several industries. Co-existence of many diverse activities in the same geographic area may lead to the spreading of a generalized "industrial mentality", as well as the creation of transferable operative skills. The existence of auxiliary industries and services in an area will often prove to be instrumental in making a new industry profitable. Substantial reductions in manufacturing costs, and an all-round rationalization in production practices and management, may result from vertical integration of production.

33. Agglomeration economies assume their greatest relevance when viewed dynamically. The location of a new industry may generate the growth in that region of suppliers of inputs ("backward linkages") and/or constitute the basis for the rise of industries that utilize its products ("forward linkages"). The concept of the industrial complex is one that seeks to locate a group of activities that are so interrelated.

^{21/} Helfgott, Roy B., "Women's and Children's Apparel", in: Made in New York: Case Studies in Metropolitan Manufacturing, Max Hall, ed. (Cambridge: Harvard University Press, 1959).

34. Agglomeration diseconomies: There are agglomeration diseconomies, as well as economies. The former stem from increases in living costs and wages, in the costs of local materials produced under conditions of diminishing returns, in delays and other costs of transportation, and in land values and rents. Traffic congestion in the large metropolitan centres is an obvious example of such diseconomies. Some contend, moreover, that concentration of industry continues to take place in large centres because the diseconomies appear as higher infrastructural costs and are not properly allocated to the cost structures of the individual establishments. It has been argued, for instance, that in India it would be preferable to disperse industry to the towns rather than to concentrate it in metropolitan areas, on the grounds that such a policy would require less migration of labour and lower infrastructural costs and, at the same time, would ensure greater political stability.^{22/} Others, however, hold that the importance of agglomeration diseconomies, including social as well as private costs, is grossly exaggerated. Even if urban costs rise after a certain point, productivity may rise even faster (by reason of external economies or economies of scale) and "big cities may yield a greater net return per worker or inhabitant than smaller ones."^{23/}

^{22/} Lewis, John P., Quiet Crisis in India (New York: Brookings Institution, 1962), chap. 7: "The Role of the Town in Industrial Location."

^{23/} Alonso, William, "Location, Primacy and Regional Economic Development", in: Annals of the Second Inter-American Congress on Regional Planning, op.cit.

E. Empirical research with regard to Developing Countries

Research findings

35. Some empirical research has been conducted with respect to questions of regional development in developing nations. Hirschman,^{24/} Singer,^{25/} and others have written on the problems of lagging regions in Brazil, Venezuela and elsewhere. Much of the empirical research in regional development has focused on the nurturing of growth poles ("pôles de croissance"^{26/}). Thus, in an examination of Turkey's efforts to disperse industrial development, the conclusion is reached that area development efforts are most effective when made on a selective, concentrated basis in peripheral regions of high growth potential, rather than being scattered widely over the country.^{27/}

36. A recent Organisation for Economic Co-operation and Development (OECD) conference on regional planning in Greece, Israel, Portugal, Spain, Turkey and Yugoslavia brought forth the view that most countries believe that "the first concern of development policy must be to promote a vigorous economic expansion for the nation as a whole", and that this tended to come from the thrust of industrial activity in the more advanced regions. "Interference with this process, therefore, in the interests of specially unfavoured regions will inevitably obstruct the attainment of national growth targets."^{28/} Yet, most of these countries had embarked on regional development actions in order to correct some of the glaring interregional inequalities. However, in Turkey regional development was being

^{24/} Hirschman, A.O., Journeys Toward Progress (New York: Twentieth Century Fund, 1963), Chapter 1, "Brazil's North-east."

^{25/} Singer, H.I., International Development: Growth and Change (New York: McGraw-Hill Book Company, 1964), part 6, "Problems and Experience: North-east Brazil".

^{26/} Perroux, Francois, "Note sur la Notion de Pôle de Croissance", in: Matériaux pour une analyse de la Croissance Economique, Cahiers de l'Institut de Science Economique Appliquée, Série D., No.8, 1955.

^{27/} Rivkin, Malcolm D., Area Development for National Growth: The Turkish Precedent (New York: Praeger, 1965).

^{28/} Organisation for Economic Co-operation and Development, Regional Development and Accelerated Growth, December 1965, p.12.

identified with national development policy, and based on considerations of efficiency rather than welfare. Similarly, in Spain, regional development sought to exploit the industrial possibilities of the most promising growth points, and Greece, too, indicated that its way to regional development no longer lies in the special nurturing of the under-privileged areas.^{29/}

37. Aside from regional problems, the question of location of industry in developing countries has received scant attention. In a discussion of industrial location in Pakistan, a policy for decentralizing industry in East Pakistan in order to allow for "human as well as economic considerations" was advocated.^{30/} A number of studies of industrial location have been conducted in India.^{31/} One Indian study is very critical of location criteria based solely on minimizing private costs, contending that if total costs, including social costs, were used as the criteria for location decision-making, there would be less of a tendency to concentrate only in "strong" regions, and there would be a better equilibrium between the interests of the public and private sectors.^{32/} Yet, the study cautions against stress on development of weak regions first, because such a policy would retard the rate of economic growth. "Therefore, it seems most profitable that the regional development programmes should be made on the basis of economic criteria, that is to say, investment must be made in those areas where it is calculated that the maximum return will be yielded."^{33/}

^{29/} Ibid, p.16, 17..

^{30/} Hussain, A.F..., Human and Social Impact of Technological Change in Pakistan (Oxford University Press, 1956).

^{31/} Among the studies that have been conducted in India are: Chaudhuri, M.R., Indian Industries: Development and Location, (1962), which describes the development of a number of industries; Mehta, M.L., Structure of Indian Industries, (1961), which explores the size, location and integration of industrial units in seven industries; and Pant, Y.L., A Study in Industrial Location, (1957), which contains special reference to Uttar Pradesh. For Indian regional development efforts, Saldevin, G.B., Industrial Growth in South India: Case Studies in Economic Development (Glencoe: Free Press, 1959).

^{32/} Sinha, Samir K., The National Costs Approach for the Balanced Regional Economic Development of India, Rotterdam, 1965.

^{33/} Ibid, p. 140.

Location and regional development problems

38. While developing nations should be cognizant of the importance of location criteria, they also should understand that there may be limitations in applying such criteria to their situations. First of all, there will be times when location decisions are made on the basis of motivations other than economic optimization. For political reasons, perhaps in order to foster national unity, a new plant may be built in a particular region, even though it is economically not the best place for it; that is, it will yield a smaller return than it would have in a different location. The nation, however, should at least be aware of the economic costs involved, and exercise extreme care that the location decision does not seriously retard its economic development, for if it does, neither economic nor political aims will be realized.

39. More important, the bulk of theoretical and empirical work on location relates to the situations in the more developed countries. Since infra-structure generally is poorly developed and markets are restricted in size in lesser developed nations, the location choice usually is severely limited and industry tends to become concentrated at those few points which offer agglomeration economies. The resulting geographic polarization of the economy leads to great disparities in regional incomes. Some fear that unless this tendency is counteracted, the regions of a nation in which development first occurs will continue to grow more rapidly, leaving the others further and further behind.^{34/} Therefore, a strategy of location that has been advocated is that of "balanced" regional development. A contrary strategy of economic development has been advocated in which efforts would be concentrated in the more promising and dynamic metropolitan centres, with development "spilling over" to other regions.^{35/} according to Hirschman.

^{34/} Myrdal, Gunnar, Rich Lands and Poor: The Road to World Prosperity (New York: Harper, 1957).

^{35/} Hirschman, Albert O., The Strategy of Economic Development (New Haven: Yale University Press, 1958), pp. 183, 184.

"Whatever the reason, there can be little doubt that an economy, to lift itself to higher income levels, must and will first develop within itself one or several regional centres of economic strength. This need for the emergence of "growing points" or "growth poles" in the course of the development process means that international and inter-regional inequality of growth is an inevitable concomitant and condition of growth itself.

"Thus, in the geographical sense, growth is necessarily unbalanced".

40. The role of Government planning in developing nations, particularly in connexion with the regional allocation of public investment, is crucial. Decisions on where to invest, as well as in what types of projects, can determine the success or failure of industrial ventures; and in almost all countries, regional growth has been subordinated to the overriding goal of national economic development. For Poland, it was reported that:^{36/}

"AMONG post-war economic development policies in Poland, national economic growth had first priority, while the development of separate geographical regions was subordinate to the general strategy of economic development. Actual development experience has shown, however, that rapid development, industrialization in particular, is the best way of solving regional problems as well as national ones."

Given the shortage of capital that plagues developing countries, a geographically wide dispersal of public investment, particularly of the infra-structure type, may prove of little value to any industry or region, whereas a massing of capital-intensive public investment in one or two places at a time may induce further investment and growth at those locations. The latter policy may be particularly effective when undertaken in regions where development is already under way. Based on experience in Mexico, it has been concluded that in order to maximize development of human resources, which is essential to economic advance, developing nations may have to concentrate their educational investment in the more advanced regions because they offer the greatest returns. "The path to greater regional equality may indeed lead at first to the encouragement of greater inequalities."^{37/}

^{36/} Hajestka, Józef, "Comments on Economic Planning in Poland", in: Fisher, op.cit. p.427.

^{37/} Myers, Charles N., Education and National Development in Mexico, (Princeton: Industrial Relations Section, Princeton University, 1965), p.147.

Too often, however, there is a shying away from such a policy on the ground that it would only serve to help those who are best able to help themselves, while ignoring the plight of the lagging regions of the country. In the same vein, it has been pointed out to the Indian Planning Commission that:^{38/}

" It is a paradoxical but inevitable fact that in order to accelerate the future development of retarded regions, the growth of industrially more advanced areas must be encouraged. If the latter is stifled by insufficient investment, the over-all capacity to save will be diminished and the advancement of retarded areas will be delayed even longer."

41. Implicit in this approach of giving a higher priority to the urgent demands of growing regions for public investment than to any pattern of "balanced" regional development is the idea that special attention should not be paid to depressed areas until the nation has reached a stage of sustained growth. In a recent study of Venezuela, for instance, the view is advocated that a nation should adopt a national policy for regional development once a sustained high rate of national economic growth has been attained.^{39/} This is necessary because industrialization, which is at first concentrated in one or two central areas, does not automatically spread to the periphery as development progresses. The major goal of regional policy must be the achievement of that spatial structure of the economy which, at any point in time, is judged to be satisfactory for promoting and sustaining economic growth. In Venezuela, which serves as a prototype of the centre-periphery model, the focal point of the new regional development policy became the Guayana, a resource frontier. The regional development strategy suggested for Venezuela would be to concentrate public infra-structure investment in metropolitan regions and development corridors, strengthen the core regions of the periphery, encourage outward migration from declining areas, and reduce the rate of urbanization by drawing the mountain people to agricultural frontier communities.

^{38/} Lefebvre, Louis, "Regional Allocation of Resources in India", in Paul Rosenstein-Rodan, Pricing and Fiscal Policies: A Study in Method, and reprinted in Friedmann and Alonso, op.cit., p.645.

^{39/} Friedmann, John, Regional Development Policy: A Case Study of Venezuela, (Cambridge: Massachusetts Institute of Technology Press, 1966).

42 Other economic policies also affect the location of industry. Subsidization of manufacturing in particular locations will, of course, bring plants to those places which they would not otherwise attract. Such a policy can be justified as a means of encouraging economic growth in particular areas if the subsidy is only temporary, after which these regions are made to stand on their own. If the subsidy must be made permanent, this indicates that the choice of location was an uneconomic one.

43. Artificial prices can act as disguised forms of subsidy. This is particularly true with respect to freight rates, which can result in discouraging growth in some areas or inducing the establishment of manufacturing facilities in uneconomic locations and a consequent waste of resources. It has been claimed, for instance, that Indian railway rates discourage grain milling "in the producing areas where it logically should take place since the commodity loses weight and bulk in processing."^{40/}

44. Finally, there is some empirical evidence that, as briefly discussed earlier (see paragraph 27), the very process of development has tremendous impact on location criteria. Location theory accepts transport facilities as given, but as the transport network improves and markets grow and spread, many industries tend to locate closer to their markets. The expansion of transport facilities means that formerly inaccessible regions are now open to economic growth. The growth of markets, moreover, reduces the importance of external economies, since these can now be internalized, and production need no longer be tied solely to the few points offering agglomeration economies. But, in practice, the existence of economies of scale brings to an end widely decentralized location of production, because the large plant can serve a large market area. There is evidence from the highly developed nations that, as economic development continues, beyond a certain point there is a renewed interregional decentralization trend, because of the growth of demand in more and more regions of the country up to the point necessary to provide sufficient markets for plants of efficient size.^{41/}

^{40/} Lefebvre, op.cit., p.647. Lefebvre also lists other examples of what he considers economic waste in India as a result of uneconomic locations caused by distorted prices.

^{41/} Perloff, H.S., E.S. Dunn, E.E. Lampard and J.F. Muth, Regions, Resources and Economic Growth, Resources for the Future (1960) and Region in Transition, op.cit., p.332.

II. PLANNING THE REGIONAL LOCATION OF INDUSTRIAL ACTIVITY

45. The principal points already discussed can now be integrated together with some additional considerations, in order to formulate a broadly consistent framework for industrial location planning in developing countries. From the viewpoint of national economic growth, the problems of planning the regional location of industry can be thought of as having two main components: planning the over-all pattern of geographic distribution of industry, and planning the location of individual industries or projects.^{42/} It should be noted that these components are interdependent and must be planned simultaneously. Very serious difficulties and resources can arise if an industry is selected for investment before it is known whether there exists in the country a location which is, according to the criteria, profitable from a national point of view. One cannot either draw up a national production plan, i.e., a list of items to be produced without knowing as to where they are to be produced. Conversely, it may happen that what seems to be a generally promising region does not have, nor will it have in the future, a comparative advantage for any industry that is feasible for the country as a whole. For example, it would be absurd either to decide on steel investment without having ascertained the conditions of steel production in various regions within the country, or to decide on developing a given region (for objectives of national growth), before determining which industries, if any, can profitably be located there. After these two basic decisions have been (simultaneously) made, their implementation will depend on the same elements which determined the decisions themselves. For example, the location of an industry whose profitability depends on the availability of relatively low-cost labour will tend to be greatly influenced by policy measures tending to keep wages in the selected area from rising more rapidly than the national average; location of an industry heavily dependent on borrowing will partly be determined by policies to keep interest rates low in the region which

^{42/} Another very important element, which is not discussed here, is the correct time sequence for the projects whose location is to be decided. Conversely, a correct location pattern will depend also on the feasible time sequence of investments.

it is desired to develop, and so on. However, keeping in mind the above-mentioned necessity for simultaneous analysis of these two basic components of a national location plan, it is useful to discuss them separately, as if they were independent of each other.

A. Planning the Over-all Pattern of Geographic Distribution
of Industrial Activity

46. As has been pointed out in chapter I, the choice of optimum geographic pattern will generally depend on the level of development and on the characteristics of the country concerned. No hard-and-fast criteria can be applied to this choice, except to note that "as long as....regions have differing advantages and disadvantages for production, differences in regional growth must be seen as part of the total system, just as are economic specialization and division of labour".^{43/} However, it is possible to present some generally valid considerations, based on existing writings and on the general experience of developing countries.

47. The two main approaches to development strategy are recognized as being the "balanced growth" and the "unbalanced growth" approaches. While the controversy over these two is in large measure only an apparent one, the two strategies stress different elements in the process of development. Since their conclusions also have relevance to the spatial aspect of industrial investment, it is worth-while to summarize the two approaches briefly.

In one version, the "balanced growth" approach maintains that simultaneous investment in a large number of different industries is required to create an effective demand capable of absorbing the production of each industry.

"Therefore, it is argued, to make development possible it is necessary to start, at one and the same time, [italics in the original] a large number of new industries which will be each other's clients through the purchases of their workers, employees and owners."^{44/}

^{43/} Perloff, H.S. and V.W. Dodds, How a Region Grows, New York, March 1963, p.137.

^{44/} A.O. Hirschman, op.cit., p.51.

A second version of the "balanced growth" approach stresses the existence of external economies, which tend to be incorrectly estimated by private investors, working on the principle of maximizing the commercial profitability of their own firm, individually considered.

"...if ten projects could be undertaken jointly...any one of them would be more profitable than the same project undertaken in isolation."^{45/}

The conclusion reached is that a "big push" must be made and that investment must be planned in a centralized and "balanced" fashion, over "a large number of projects of varying size that dovetail with each other."^{46/}

48. It is quite clear that, whether one stresses technical interdependence of projects (on the production side) or demand interdependence (on the market side), the "balanced growth" notion does not at all imply "balanced" (i.e. even) regional growth. On the contrary, the greater the potential interrelatedness of the new projects is, the closer together these projects should be located, and the greater the geographic concentration of industrial investment should be.

49. The "unbalanced growth" approach to economic development recognizes the interdependence of economic activities, but adds the all-important qualification that, since decision-making capability is the principal scarce resource in developing countries, a "balanced growth" path is likely to be unfeasible and utopian. It is therefore proposed to take advantage of the stimuli provided by sequential investment decisions (rather than simultaneous ones) and to follow an "unbalanced growth" path, thus maximizing induced investment and economizing on decision-making capability. In this fashion, the interdependence of economic activities is best exploited, and the degree of external economies maximized, by an optimal intertemporal sequence.

50. Once again, there is little in the "unbalanced growth" strategy that suggests a dispersed location pattern of new investment. In addition to the advisability of geographically concentrating new plants so that externalities may be fully

^{45/} Ibid, p.55.

^{46/} Ibid, p.51.

exploited, the stress on scarcity of decision-making capability implies that interaction of ideas and personal contacts among decision-makers in industry are useful in inducing investment and that, other things being equal, industrialists should be in close proximity to one another.

51. Both of these economic development strategies thus lead to the conclusion that a geographically concentrated pattern of location is preferable to a dispersed pattern,^{47/} until a degree of spatial concentration and economic development is reached at which external diseconomies set in and decision-makers become plentiful. This degree of concentration and economic development is clearly far in the future for most developing countries. This paper has already referred to a generalized hypothesis connecting national economic development to regional growth, commonly associated with the names of Hirschman and Myrdal.^{48/} In the early stages of development, the existence of external economies and of scale economies leads to "polarization" and to increasing differences in regional incomes; after a considerable degree of industrialization has been achieved, however, certain "spread effects" come into operation, reduce geographic concentration and lessen regional income differences. A fundamental question that remains to be answered by economists and planners alike is that of determining "at what level" of industrialization an attempt to decentralize industry becomes beneficial in order to achieve further national growth.

^{47/} M.A. Rahman ("Regional Allocation of Investment", in: Friedmann and Alonso, op.cit.) qualifies this conclusion by noting that concentration of investment in the less productive region may maximize national growth if the less productive region has a higher rate of saving relative to its capital/output ratio (relationship which he calls the "internal rate of growth" of income, and which is analogous to the Galenson-Leibenstein "reinvestment quotient"). This leads to a generalization: a policy of regional "balance" may be the less inefficient (from a national growth viewpoint), the more unequally distributed are incomes within the less developed region relative to incomes within the more developed one, if the traditional saving function can be assumed to correspond to reality. The conditions necessary for the validity of the Rahman conclusion are, however, practically so restrictive that this case may be considered as rare.

^{48/} Hirschman, op.cit., chap. X; Myrdal, op.cit. Some empirical evidence in favour of this hypothesis has recently been presented by J.G. Williamson ("Regional Inequality and the Process of National Development..." Economic Development and Cultural Change, July, 1956) and S. El Shaks (Development, Primacy and the Structure of Cities, doctoral dissertation, Harvard University, 1965).

52. So far, the discussion has been conducted in terms of "strategy", i.e., in terms of the pattern of industrial location which "should" emerge in developing countries for maximum national growth. It remains to be seen whether industry will in fact tend to concentrate spontaneously or whether a policy effort is necessary to counteract tendencies to dispersal. The initial geographic concentration of industrial activity is not only the logical consequence of either of the two major development "strategies", but also the natural result of a number of technical, economic and social forces. Although these have been discussed previously, they are sketched below to show clearly the cumulative impact of their implications, progressing from the plant level through the industry level to the inter-activity level, for the geographic concentration of industry.

53. (a) Economies of scale: Modern technology generates, for many industries, the well-known phenomenon of a reduction in unit costs with increases in output. Empirical evidence shows that, for most industries, economies of scale do operate, i.e. that costs are lower, and labour productivity higher, in larger plants. Thus, many industrial enterprises, in order to maximize their efficiency, will find it necessary to operate through large plants. It has also been shown that, relative to domestic market size (which is typically small in developing countries), the optimal size of plant will in most cases be so large that the domestic market will be able to absorb the output of only a very few plants in each industry.^{49/} These plants must be located somewhere; other things being equal, the fewer the plants feasible for a given market, the greater will be the geographic concentration of the industry. Economies of scale provide one obvious reason why the geographic concentration of each industry is likely to be considerable: Maximization of efficiency at the plant level. Naturally, scale economies do not have the same importance for all industries; some industries can operate efficiently with relatively smaller plants. The more scale economies do apply, however, the greater the geographic concentration effect.

54. (b) Localization economies: In addition, maximization of efficiency at the industry level requires the exploitation of localization economies, which often

^{49/} Merhav, M., Technological Dependence, Monopoly and Growth (Permagon Press Oxford, 1967).

arise when various plants of the same industry cluster together. Thus, plants are likely to be fewer in number and clustered together, and it is likely that, in developing countries, most industries will be highly concentrated geographically. Still, it is conceivable that each industry could be concentrated in a different region, thus leading to some kind of a regional "balance".

55. (c) Inter-industry external economies: However, the existence of inter-industry external economies (i.e., cost reductions in one industry following increases in the output of a different industry) also makes it efficient for different industries to cluster together.

56. (d) Urbanization economies: When, in addition to the above-mentioned forces, one considers the existence of urbanization economies and the powerful attraction of cities (for the amenities provided and access to Government and culture), it is hard to escape the conclusion that the tendency towards spatial concentration will be so strong in most developing countries that only an out-and-out policy effort may succeed in lessening such a tendency. The previous discussion of the desirability of a geographically concentrated pattern for maximum national economic growth suggests that such an effort is likely to be extremely costly for national economies at low stages of development.^{50/}

57. The tendency towards spatial concentration will be further enhanced by the existence of an infra-structural and transportation network, which will tend to accentuate the tendency by a gravitation of industries towards the central point(s) of the network. As Alonso points out,^{51/} in most developing countries the transport network typically does not cover the whole national territory, but extends rather like a tree with branches converging on the great port cities. Given this type of network, minimization of transport costs will, for many industries, make the advantages of concentration even greater. Regardless of the fact that the

^{50/} It should also be pointed out that there are historical examples where such a large-scale effort was attempted, with very limited results. The Italian South and the Brazilian Northeast are cases in point (see, for example: Chenery, H.B., "Development Policies for Southern Italy", Quarterly Journal of Economics, November 1962).

^{51/} Alonso, op.cit., p.9.

present form of the transport system and the infra-structure often is partly an inheritance from past colonial patterns, many developing countries are now faced, for better or worse, with a given economic framework which it would be extremely difficult to alter. The concentration of investment follows, in a developing country, from the concentration of opportunities; the latter partly originates from the concentration of past capital investment, a major factor in determining new opportunities.^{52/}

58. The size of the country naturally has an important bearing on this question; a larger domestic market will be able to support the efficient operation of a larger number of plants for a given industry, thus making it possible under certain conditions to satisfy, in part, the regional demands for industrial investment. Further, a larger country is more likely to have a greater number of metropolitan centres, in different regions, which will make possible the exploitation of external economies in a larger number of industrial growth centres, since no single urban area completely dominates the economic landscape of the country. Thus, while the economic forces leading towards concentration are just as strong in a large country as in a small one, a large country may be better able to satisfy regional pressures for greater dispersal of industry, and still maintain a nearly optimal location pattern. It should be noted, however, that in a large country, regional pressures for industry dispersal will normally be greater also.

59. A related aspect of the problem, (in fact, the same problem viewed in a different geographic dimension) is the question of the costs and benefits of urbanization in developing countries. Most of the considerations brought forward earlier apply also to the controversy as to the level of urbanization at which "urban concentration" ("good") becomes "urban congestion" ("bad"). It has been pointed out that, while "most developing countries are of the opinion that they suffer from gigantism of their principal cities"^{53/} (a phenomenon commonly called "primacy"), a simple comparison shows that what is considered as a city of dominant size in a small developing country is often termed a middle-size town in a larger developing country, and the size of the town is viewed as perfectly normal. The

^{52/} Ward, B., Problems of Greek Regional Development, Research Monograph Series 4, Centre of Economic Research, Athens (1961), p.57.

^{53/} Alonso, op.cit., p.1.

economic argument against urban congestion is based on an assumption that costs rise after the city reaches a certain size. However, first, there is some evidence that urban costs begin to rise only at very large city sizes, such as few developing countries have, and, second, even if costs do rise at relatively small city sizes, urban benefits may be rising at a faster rate.^{54/}

60. As has been shown in chapter I, the conclusions deriving from the above considerations are, by and large, those that are implied in a large part of the relevant published material on the subject. These conclusions are, of course, subject to modifications and qualifications to bring them into accord with the multiplicity of planning objectives and the existence of goals other than national growth (see the discussion in chap. III). However, any location planner, whatever his viewpoint and concrete planning objective, must start with a realization of the two basic considerations on the question of planning the over-all pattern of geographic distribution of industry:

- (a) In the absence of Government policy, there will prevail in most developing countries a strong tendency for industry to concentrate in a small number of "central" places (often only one), with a resulting widening of regional income differences as economic development proceeds;
- (b) This tendency is, in most cases, beneficial for economic growth of the country as a whole, and should, on economic grounds, not be opposed, but rather favoured (up to the point of diminishing returns) by conscious policy measures for the purpose of raising even more the growth potential of the area(s) of agglomeration and of eliminating the inevitable bottlenecks caused by industrial concentration.

61. These considerations do not amount to a passive Government attitude concerning industrial location. On the contrary, they imply a careful planning, on a dynamic basis, of the facilities, input availabilities and costs, transport and communication channels, and all other factors necessary for maximum national

^{54/} Ibid., p.7; also see: United Nations, Centre for Housing, Building and Planning, Economic Aspects of Urbanization, discussion paper prepared for the United National Inter-regional Seminar on Development Policies and Planning in Relation to Urbanization (Pittsburgh, October-November 1966), mimeographed.

growth impact of the naturally concentrated location pattern.^{55/} To the extent that the central authorities are able to influence location decisions, their economic choice of over-all location pattern lies not between a "centralized" and a "dispersed" pattern, but between alternative "centralized" patterns. It is worth-while to point out the fact that "although it is hard to find clear examples of modern countries enjoying not only 'balanced' growth but also a high rate of national growth instances of rapid national growth and regional 'unbalance' are many.^{56/} "

B. Planning the Location of Individual Industries and Projects

62. Within the approach of long-run national growth, there are three main economic criteria for planning the location of individual industries and projects, and all three are complementary. The first criterion is the general one that regional plans and the location of individual projects must be consistent with the over-all geographic distribution pattern that has been decided upon, and that short-run plans and individual location decisions must be in keeping with the long-run objectives. The second criterion requires the minimization of aggregate transport costs on raw materials and on finished products. The third prescribes the maximization of the external economies deriving from inter-industry proximity, and calls for joint location programming for interrelated industries.

63. Consistency between aggregate location plans and location of individual projects: First, this criterion notes that regional planning is an inseparable part of the formulation and implementation of each national economic plan, and one of its important aspects. Second, the criterion requires operational connexion and consistency between location plans and the actual decisions on the location of individual projects. Finally, the criterion requires that plans and decisions be made in such a way as to give the greatest possible consideration to the autonomous changes that are expected to take place in the economy in the near future, as well as changes due to the influence of the plan and of the decisions themselves.

^{55/} This conclusion parallels on presented in: Economic Aspects of Urbanization, op.cit.

^{56/} West, op.cit., p.45.

64. Mainly, this criterion implies that location planning must be viewed as a dynamic process, and that location advantages or disadvantages of regions must be weighted by the extent and the likelihood of their foreseeable changes. Thus, plans within a given time horizon must be consistent with plans within any other time horizon, and planning at any geographic level must dovetail with planning at any other level. Regional planning must be integrated with national plans, even if what is desired is development of the region, on penalty of committing serious errors which will damage effectiveness of the plan in achieving the regional objectives themselves. Conversely, "...where adequate regional economic development plans and programs are lacking, the likelihood of success of national economic development programs is decreased and the overall gains from national investment reduced. Hence the nation suffers, and, since each region is part of the nation, in general the region suffers too.^{57/}" It is outside the scope of this paper to discuss in detail the possible methods for achieving consistency between plans at different geographic levels and at different points in time and concrete location decisions for individual projects; suffice it to point out that adequate implementation and follow-up are as necessary a part of location planning as they are of production planning.

65. Minimization of aggregate transport costs: This criterion views the efficiency of location decisions in terms of minimizing the total economic distance between the enterprise and its input sources and markets. Being the principal criterion of traditional location theory, which is concerned with defining the conditions for optimal location of the individual firm (see paragraph 2), a considerable body of writing has dealt with it and adequate methodology has been evolved. The transport cost-minimization criterion is equivalent to the "comparative cost criterion" if the latter is correctly understood to include the demand side as well as the supply side of the problem. Briefly, the "location attraction" of any factor of production (i.e. the "weight" that regional availability of the factor has on the determination of the location of the enterprise) is directly

^{57/} Isard, W. and T. Reiner, Analytic Techniques for National and Regional Planning, paper presented at the First Latin American Conference on Regional Science, Caracas, November 1962.

proportional to the relative use of the factor in the production process and to the cost of procuring and transporting it,^{58/} and inversely proportional to the possibility of substituting other factors for it. Thus, for example, the location attraction of a needed raw material is directly related to the incidence of the cost of the raw material on total production cost and to the cost of transporting it (these two elements will determine the cost resulting from location of the enterprise away from the source of the raw material), and inversely related to the substitutability of other inputs for the raw material in question (with given relative factor prices). The location attraction of the market can be similarly measured by the incidence of transport costs on the product out of the value of the product, as this incidence measures the relative cost resulting from location of the enterprise away from its markets. On the basis of this criterion, the optimal location of the industry will be one which minimizes the sum total of transport costs on all inputs and on the product. Clearly, for long-run location optimality, the relevant transport costs are the ones projected for the planning period and thus include the effects of all foreseeable changes.

66. Maximization of inter-industry economies: It should first be pointed out that proximity to other industries is a location factor in so far as these other industries may constitute a market for the output of the industry which is to be located, or may be a source of the inputs needed by it. This aspect, however, is already included under the criterion of transport cost minimization and can be dealt with in the same manner; the saving in transport cost on the product or on the inputs does not directly depend on whether production is destined for an intermediate market or for final consumption, or on whether the inputs are raw materials or intermediates. Proximity to related industries is, however, a significant location factor in its own right because of the possibility of reaping external economies deriving from (technical or economic) inter-industry relations. The main economies can be classified under the following categories:

^{58/} For production factors such as labour or capital, it is more proper to discuss in terms of transfer costs (which include non-monetary elements) rather than transport costs. For example, the location attraction of regional availability of workers with certain types of skills will depend, among other things, on the cost of inducing those workers to migrate to alternative locations, including such indirect elements as the cost of creating amenities and providing housing and social benefits elsewhere.

- (a) Better utilization of by-products.
- (b) Cost saving resulting from scale economies in the production of inputs (economies which are "internal" to the input-producing industries but external to the industry under consideration).
- (c) Sharing of indivisible factors (such as computer facilities and process-oriented technical research).
- (d) General decrease in production uncertainty (easier quality control on inputs, improved predictability of delivery dates, and the like).^{59/}

The last category, which is the least easily quantifiable, may often be of paramount importance. Some inter-industry economies will result from simple geographic proximity of the interrelated industries; others will require for their exploitation the operation of a fully integrated industrial complex. At any rate, the profitability and growth possibilities of an individual industry depend partly on its location near auxiliary industries and services, and industries which use its output. These considerations lead to the third criterion: locating industries in such a way as to exploit inter-industry economies to the fullest extent, through joint location programming of related activities.

C. Methodology of Industrial Location Planning

Location Analysis of Industry Groups

67. The location factors which have been briefly discussed in the previous paragraphs can now be broken down into somewhat finer categories. The main location factors can then be classified as: availability of raw materials; availability of unskilled labour; availability of skilled labour; availability of capital; availability of intermediate inputs; markets; inter-industry economies; and urbanization economies. These factors do not, of course, affect all industries to the same degree, but will exercise a different location attraction according to their influence on the profitability of the industry.

^{59/} Hoover, E.M., op.cit., describes a further advantage of proximity of different industries: fuller utilization of labour groups suitable for different kinds of tasks through creation of a wider range of job opportunities.

68. For some industries, a single factor will be determinant in the choice of location, while in other industries location forces may balance themselves out to some extent. For a practical choice between alternative locations, one clearly needs detailed industry and regional studies: "There is no short-cutting individual industry studies when one wants to understand regional economic growth.^{60/}" However, it is clearly impractical to carry out detailed studies for each individual industry which might be feasible for a country. Thus, a classification of broad industry groups by location orientation is useful for location planning at the macro-economic level, and can provide the planner with a useful preliminary sieve to screen the general industrial categories within which specific location studies are worth conducting.

69. One observes that the degree of inter-industry economies goes hand-in-hand with the availability of intermediate inputs. "Related-industry orientation" can then be classified under "intermediate-inputs orientation." Thus, one possible classification of industries according to their location orientation is the following:^{61/}

(a) raw materials-oriented	industries	
(b) capital-oriented	"	
(c) unskilled labour-oriented	"	
(d) skilled labour-oriented	"	} (one dominant location factor).
(e) intermediate inputs-oriented	"	
(f) market-oriented	"	
(g) urban-oriented	"	
(h) "footloose"	"	

70. Various types of indices can be elaborated to quantify approximately the importance of the location factors separately considered, for example: the importance of raw materials can be quantified by their cost (at the source) relative to total production cost, times the freight rate on raw materials; that of skilled labour, by the ratio between wages paid to skilled workers and the total payroll;

^{60/} Perloff and Dodds, op.cit., p.120.

^{61/} Scale economies can be considered as either a reinforcing or an offsetting factor, rather than a factor of location in the proper sense.

that of inter-industry economies, by the ratio of the cost of intermediate inputs to total cost and by the ratio of intermediate to total demand; that of markets, by the ratio of physical output to the value of that output, times the average freight rate on the finished product (the inverse of the familiar value/freight ratio). The indicators used in any particular case will depend on the purposes of the study and on data availability.^{62/} It should also be noted that the over-all location orientation of an industry is the resultant of the interplay of all location forces, which should therefore be measured simultaneously and with reference to the same base quantity, in order to assess the relative weight of each.

71. Beyond a certain level of national income, the process of development may lead to greater freedom in location choices for each individual industry. First, transportation becomes cheaper all around, and local markets grow, which results in narrowing down the cost differentials between alternative locations and, at the same time, widening the range of feasible locations. Concerning the location attraction of markets, there are two main reasons why it generally tends to increase for most industries (if unit transport costs remain constant or change in the same proportion for inputs and for products). First, many countries develop by furthering domestic processing of raw materials; value added will then rise for many industries, and the relative cost of raw materials will decrease. This will tend to reduce the location attraction of raw materials sources and may correspondingly stimulate market-orientation. Second, much technological progress is of the raw materials-saving type, and raw materials requirements per unit of output will tend to fall over time.^{63/} Again, raw materials will tend to decrease in importance as a location factor, and market-orientation will tend to increase.

^{62/} The measurement of the location attraction of urban areas presents, of course the greatest difficulties, since there is as yet no evidence as to costs and benefits of urban infra-structure for different industries, and no way to quantify at all the intangible advantages of urban agglomeration.

^{63/} This development may be partly offset by the fact that technological progress often improves the quality of the products, thus lowering the freight/value ratio and, on this account, reducing the location attraction of markets.

72. These developments have a two-fold result: first, location preferences of the individual industries become less strong, because of the reductions in cost differentials between alternative locations; second, the range of choices of location increases, since transport cost reductions and the growth of local markets bring into the feasible range a number of areas which otherwise would not even be considered as worthy of analysis. However, it is of the utmost importance to point out that, while the strength of the individual industry's location tendency may somewhat decrease with economic development, the orientation of most industries leans more and more towards markets and central places, as a result of the factors already discussed. In other words, while location "freedom" becomes greater for individual industries as economic development proceeds, markets and urban areas at the same time increase in importance as location factors, so that industry as a whole will be more strongly oriented towards urban areas than before. Thus, the greater freedom in location choice does not mean that location becomes a matter of indifference, but simply that location preferences become weaker as a result of narrowing down the cost differentials between alternative areas. Weaker location preferences mean that relatively less policy effort will be required, other things being equal, in order to induce the industry to locate where desired by the planning authorities, since the cost gap to be filled by public action is smaller. It can therefore be assumed that location policy generally is likely to be more successful in developed than in developing countries, since industries have weaker location orientation; also, location policy will be more effective if an industry is oriented towards local markets (as in the case, for example, of perishable products).

73. As an indication of the relative geographic dispersion of a number of selected industries in some countries (meaning greater "footlooseness" or stronger local market-orientation, or both), Table 1 has been prepared (see Annex). It gives the "localization coefficients" (a measure of geographic concentration^{64/}), for selected industries in four countries, and the ranking of those industries

^{64/} Described and discussed, together with other coefficients, in: Isard, W., Methods of Regional Analysis (M.I.T. Press, 1965), the basic reference source for location and regional planning methodology. The localization coefficient was developed by P. Sargant Florence in 1948.

according to the size of the coefficients. High coefficients imply greater geographic concentration, and high ranks mean greater concentration relative to the other industries in the same country. The dissimilarity between the four countries in terms of geographic position and of their level of development, the serious data difficulties encountered, the manipulations required to make the data and classifications comparable, and the ever-present difficulty of different output-mixes within the same industry classification, would lead one to expect that whatever similarity may exist among industries regarding their relative geographic concentration will not be shown by mere statistical analysis at an aggregate level. As shown by the statistical tests used, however, the similarity among industries in different countries concerning their location orientation is remarkable. In other words, an industry which is relatively the most concentrated geographically in one country is likely to be the most concentrated one in another country, despite vast differences between countries and classifications.

74. The planning implication of such a result is clearly that industrial location planners in a given developing country can rely on the experiences and analytical results obtained by other developing countries to a much greater extent than is commonly thought, since relative geographic dispersion can be taken as approximately the same for the same industry in different countries. It can be seen from Table 1 that the relatively more dispersed industries are: manufacture of bakery products, soft drinks and carbonated water, grain mill products, wearing apparel, furniture and fixtures. It is also shown that the more concentrated industries are: manufacture of motor vehicles, canning and preserving of fish and seafood, and manufacture of paints-varnishes-lacquers. If other things are equal (a big "if"), location policy is likely to be more successful (i.e. less of an incentive will be required) if directed to influence the location of the more dispersed industries, rather than the location of the more concentrated industries.

Regional Analysis

75. While industry location analysis can show the relative influence that the various location factors have on the resulting location orientation of the industry, regional analysis assesses the availability of these factors in a region. It is, so to speak, the reverse side of the same coin: location analysis is carried out at the industry level, and regional analysis at the region level, in order to

match what the industry needs with what the region has to offer. Together, they constitute "comparative cost analysis". Regional analysis thus consists of determining which factors of location the regions possess and of assessing how much of each factor they possess, including all foreseeable changes during the planning period, and taking into account differences in quality of factors. The nature of the principal location factors has already been discussed. The study of a region's potential for attracting industry will thus consist of carrying out:

- (a) Natural resource surveys, including geological surveys, land characteristics, water resources, climate and such variables as good hydroelectric sites (in order to assess the availability of raw materials, and consequently their cost).
- (b) Manpower surveys, including a study of population characteristics and of employment (in order to assess the size and skill composition of the labour force, in addition to determination of the prevailing wage levels for different occupations).
- (c) Studies on the structure of existing industry in the region (in order to determine what intermediate inputs and markets for intermediates are available and what inter-industry economies can be potentially exploited).
- (d) A study of regional income and its distribution (in order to estimate purchasing power in the region and thus, indirectly, the market for any given industry. It is even better on principle to conduct, in advance, detailed studies on the size of the regional market for specific products, but this procedure is likely to be wasteful).
- (e) A survey of the transportation network and freight rate system (in order to quantify the region's advantages for different industries, as they are determined in the previous steps (i) through (iv)).
- (f) A survey of urban areas in the region and of the facilities available there, including a study of the existing infra-structure (in order to form some idea of the degree of urbanization economies potentially exploitable).
- (g) A survey of institutional variables such as local legislation, credit facilities and fiscal practices (in order to check whether there are institutionally-derived obstacles to the attraction of industry).

76. It is obvious that each of the above studies is a massive and expensive task to undertake, especially for developing countries, where the necessary data are not available even at the national level. The cost of such studies should therefore be carefully estimated and, in view of a developing country's scarcity of the skills and resources necessary to carry them out with acceptable results, each step of the over-all analytical set-up should be carried out only if there is reasonable assurance that the benefits expected, in terms of greater reliability

of results and thus of greater rationality of the location policy decision, outweigh the costs involved.

Other planning tools

77. A promising technique is industrial complex analysis, which aims at determining the optimum combination of plants of different industries and the optimum degree of technical and economic integration among them. Analytical tools to assess the over-all economic impact of a new industry on a region are the regional multiplier (conceptually similar to the Keynesian national income multiplier), inter-regional linear programming, and regional input-output. These techniques are extensively discussed in other sources,^{65/} and cannot be examined here in detail. It should be pointed out, however, that owing to their complexity, to data limitations, and to the sophisticated planning and programming skills required, the usefulness of these techniques (with the exception of industrial complex analysis) for developing countries can be seriously questioned, in view of the modest improvements they achieve.^{66/}

A concrete example

78. Suppose that a developing country has, or will have, a comparative advantage in the production of ammonia fertilizers, and that this industry has a high potential for growth and for inducing the development of other industries. The planning authority decides therefore to include an ammonia fertilizer plant of optimal capacity in the national plan for new manufacturing investment. The Government must then decide in which area, among those which offer an actual or potential comparative advantage from the nation's point of view, to locate the new plant, having as the objective the achievement of the maximum impact on long-run national economic growth.

^{65/} Isard, Methods of Regional Analysis, op.cit.

^{66/} See, for example, the application of regional input-output methods to Argentina (Brodersohn, M., "Inter-regional Input-Output Analysis", paper presented to the Second Inter-American Congress on Regional Planning, Rio de Janeiro, August 1966), which has yielded minimal improvements over a number of extremely simple indicators in predicting regional production.

79. The first criterion, discussed previously (see paragraphs 63 and 64), requires that the new plant must itself fit into the over-all plan, that it must be located in consistence with the over-all geographic pattern planned, and that the choice of location must be based on prospects of future competitiveness, rather than on merely static conditions of production. The second criterion, (see paragraph 65) implies that the new plant should be located where the sum total of transport costs is at a minimum; by combining a cost study of ammonia fertilizer production with analysis on the regional level and a study of the freight cost structure, the number of feasible locations can be narrowed down considerably. However, even if a single location can be found that minimizes transport costs under any conditions, the process is far from being over: comparative cost studies are only a first step, although a basic one, to enable the planning authorities to make a preliminary selection of possible locations. The third criterion (see paragraph 66) must now come into play: the efficiency and growth of the planned fertilizer factory depend, in a large measure, on its proximity to refineries and to other related industries, on the supply side, and, on the demand side, on its proximity to users of its output; industrial complex analysis may then help in determining which of the lowest transport-cost locations thus far selected offers the highest degree of inter-industry economies and the best possibility of vertical integration.

80. However, the solution has not yet been reached, for the final choice of location will depend also on the possibility of reaping external economies derived from urban agglomeration; the central authority is no more interested in the efficient location of the industrial complex per se than it was interested in choosing, in isolation, the best location for the fertilizer plant. The final objective is to maximize the impact of the location decision on the growth of the national economy as a whole, and the final choice can be made only after the advantages and disadvantages of urban agglomeration have been assessed (social cost-benefit analysis can be usefully applied for this purpose) and weighed against the results of the previous criteria. It should be noted that this planning procedure is correct, regardless of whether the economic system is a centrally-planned, a market or a mixed economy. If the system is centrally planned, the Government will of course want to know where to locate the new project. If it is a market economy,

the central authority will need to know towards which location to influence the private firms. The policy measures, of course, will be of a different nature and degree of directness, but the basic economic problem remains the same, and the variables which govern the impact of location decisions on economic growth generally operate in the same direction and to the same degree.

III. THE PROBLEM OF DEPRESSED AREAS

81. So far in this paper industrial location problems have been looked at purely from the point of view of long-run national economic growth. Consistent with the premise that economic solutions must be qualified by non-economic considerations, if they are to be relevant to the real world, the economic criteria must be supplemented by a criterion of compatibility between the set of location decisions taken on the basis of the economic criteria outlined above and the (social or political) necessity to bring relief to depressed regions. In view of the multiplicity of planning objectives and the diverse nature of Government goals, some considerations as to how to pursue these goals must effectively, and at least cost to the national economy, must be introduced.

82. It should again be emphasized that, for most developing countries, policies to relieve the plight of depressed regions are justifiable on social or political grounds, and not on economic grounds. As has been seen, from the viewpoint of national economic growth, there exists no such thing as a "problem" of depressed regions, but only a problem of defining an optimal distribution of industrial activity (albeit in dynamic terms), which carries with it the inevitable corollary that some areas will lag behind others. Indeed, only if each and every factor influencing the national economic profitability of the geographic pattern were evenly distributed across all regions could one identify regional income disparities as a national economic problem. The point that natural resources, manpower etc., are unequally distributed throughout the national territory need hardly be elaborated. If one cannot expect from a region, even in the very long run, economic returns which are at least as large as the subsidies provided in the short run, relieving the plight of the region cannot be viewed as a national economic objective. To recognize from the outset the non-economic nature of the "problem of depressed areas" is to reduce the national economic cost of solving it, and may even accomplish more in terms of the non-economic objectives themselves.

83. From a social viewpoint^{67/}, a "region" is obviously people, not land, and

^{67/} Political objectives of regional development cannot be discussed here. However, some of the considerations that follow are also applicable if the objective is national integration, political stability and the like (see paragraph 5).

policies to benefit the region are really aimed at helping the population which happens to live there. Thus, one alternative to "regional development" is to facilitate the movement of population towards the richer areas, where greater opportunities exist (see paragraph 14). This solution needs to be complemented by selective programmes of training and by the provision of additional facilities (housing, hospitals, etc.) in the more developed regions. Often much greater social welfare results could be achieved by eliminating urban slums and providing basic facilities for the immigrants than by investing in directly productive activities in the depressed regions.^{68/} Increasing the regional mobility of labour (and population) can only, of course, be a partial solution, since a considerable part of the population will decide to remain in the depressed area; the people should not, of course, be penalized for their decision to stay where they are. Consequently, there is still considerable scope for regional development programmes.

84. Regional development efforts need not, of course, be based on industrialization of the depressed regions. On the contrary, given the leading role of industry in national economic development, and the consequent necessity to locate it (or let it locate) where its efficiency and potentiality for growth are at the maximum, a strong case can be made for attempting to relieve the plight of depressed regions first by stimulation of non-industrial activity. As Lefebvre puts it:

^{68/} Edwin Cannan criticizes attempts at limiting population movements by attributing these attempts to feudal-like attitudes of the planners and to an inbred resistance to change: "...the aim of Planning is to be, not as we might reasonably expect, to redistribute the population on the best scientific principles, but to keep people where they were born. In this it seems to have a close resemblance to the Feudal System..." ("Review of Ministry of Labour Reports of Investigations into the Industrial Conditions in Certain Depressed Areas", Economica, February 1935, p.103). It should be pointed out, however, that in some countries, population movements are impeded by ethnic and cultural differences between the population of the depressed areas and that of the rest of the country. In this case, the criterion of political stability might require limitation of population movements and maximum effort to develop the depressed region, at least in the short run, until greater homogeneity is achieved.

"Investments undertaken with the purpose of bringing relief to retarded areas should be based on low-cost rural labour and locally-available materials....In addition to local irrigation, land reclamation, reforestation...public works which increase communication and mobility should be emphasized."^{69/} [Italics ours]

85. A goal of regional development policies might be to raise per capita income of depressed regions to the national average (one of the meanings of "regional balance"). Another goal might be an equal rate of growth for all regions, so that the initial regional income differentials will remain relatively (though not absolutely) constant through time (another meaning of "regional balance"). The arguments presented earlier, however, should make it clear that an attempt to achieve either goal (especially raising per capita income of depressed regions to the national average) is likely to be unsuccessful in most developing countries and to be very costly, and may, if successful, destroy the country's chances for sustained economic growth. A more reasonable and feasible goal is pursued by many developing countries, namely, raising per capita income and total employment in the depressed regions to a socially-acceptable absolute minimum. It may be possible to achieve this latter goal through regional industrialization, if national industrial development programmes prove to be insufficient, and provided that regional industrialization is selective in the direction of the smaller-scale, more labour-intensive industries. First, such industries are those which maximize employment; and second, they are also relatively more sensitive to location policy inducements.

86. Concerning the first point, industries in which smaller plants predominate are the more labour-intensive ones, meaning that more labour can be employed per unit of output, or per unit of investment. Thus, investment in industries where small-scale plants are the rule will bring to the depressed region a greater increase in employment than if large-scale plants were located there. With regard to the second point, owing to the very fact of their small size, a greater number

69/ Op.cit., p.646. A word of caution should be added: pushing any single development instrument too far may cause inefficiency and waste without substantially benefitting the region. For example, Chenery (op.cit.) concludes that the heavy concentration of public investment in infra-structure has not resulted in substantial improvement of the economy of southern Italy.

of small plants is feasible and the employment benefits can be spread throughout the depressed region rather than pinpointed on a tiny part of it; thus, the flexibility of location policy is greater. Finally, empirical evidence shows that industries where small-scale plants predominate are oriented towards local markets, and are consequently more suitable to be dispersed.

87. In his study of location patterns in the United States and the United Kingdom,^{70/} P. Sargent Florence found that small-scale industries are relatively much less concentrated geographically than large-scale industries. This also seems to be true in developing countries; Table 2 in the Annex shows the rankings of selected industries by size of localization coefficient, wages-output ratio, (a measure of labour intensity) and capital-labour ratio (a measure of capital intensity). One notices a significant negative correlation between the ranking by localization coefficient and the ranking by wages-output ratio, meaning that the most geographically concentrated industries are, by and large, the least labour-intensive ones. This finding becomes more reliable when supported by additional evidence: an almost perfect positive correlation between ranking by localization and ranking by capital-labour ratio, showing that the most geographically concentrated industries tend to be the most capital-intensive ones. It appears then that the degree of geographic concentration is generally smaller in developing countries for the more labour-intensive industries, where smaller-scale plants predominate.

88. Recalling the earlier considerations (see paragraph 72) to the effect that a greater tendency of an industry to geographic dispersion is tantamount to a greater likelihood of success of location policy for a given outlay of funds (or, conversely, that the same policy results can be achieved at lower cost), the conclusion is clear: if the policy criterion is to increase employment in depressed areas, then labour-intensive, small-scale industries can achieve the socially-desirable objective of short-run employment maximization in the depressed region(s) at least cost to the national economy.

^{70/} P.S. Florence, Investment, Location and Size of Plant, Cambridge University Press (1948).

89. To summarize, a programme of regional development that would be least detrimental to national economic growth and most beneficial for the welfare of the population of depressed regions should be based on the following three sets of measures, in the order given:

- (a) Measures tending to selectively increase inter-regional labour mobility;
- (b) Measures tending to improve the agricultural and infra-structural environment in the depressed regions;
- (c) Measures tending to attract to the depressed regions the more labour-intensive industries.

Concluding remarks

90. Despite the shortcomings of existing location criteria when applied to developing nations, such criteria provide at least a first approximation towards the solution of crucial problems of the location of industry within a programme of industrial development. Although the criteria must be adjusted to the situation of the individual developing nation, they offer some general policy guidelines.

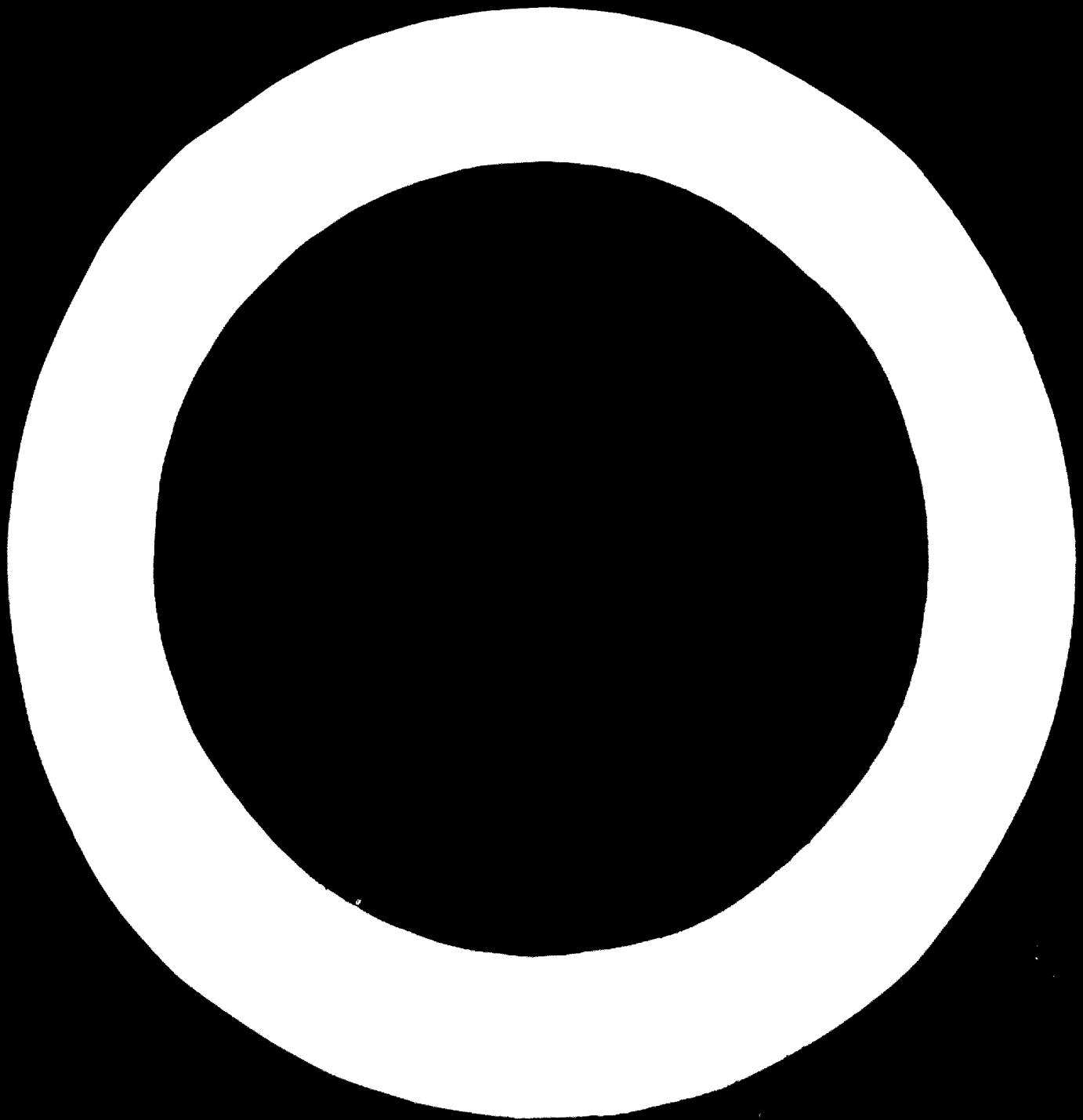
Thus, the proposal that nations seek "balanced" regional development can be analyzed to determine whether such a policy would result in locating industries incorrectly, that is, ignoring the comparative advantages of particular regions and not maximizing the opportunities for future growth of the nation's economy.

91. Similarly, the questions of dispersion versus concentration of industrial activity and smaller-town versus metropolitan-centred location can be judged in terms of comparing the economies of spatial juxtaposition and the diseconomies of agglomeration. Because of the existence of scale economies, external economies, and the attractions of urban life, there is a very strong tendency for industries to agglomerate in a few centres. Moreover, such agglomeration usually has beneficial results and advances the objective of national economic growth. Planners in developing nations, therefore, should plan for more orderly urban development to accommodate industrial expansion.

92. Excessive concern with policy goals such as prevention of the occurrence of "congested" areas can be dangerous; given critical shortages of capital, markets, managerial talent and skilled manpower, the choice often may not be between further development in region A versus new development in region B, but between further development in A or nothing. This is particularly true for smaller developing nations, in which the size of the domestic market and technical factors limit, for many industries, the number of plants of efficient size that can operate profitably. Attempts to invest in a larger number of smaller plants scattered in different regions can be very costly and can seriously endanger the country's chances for sustained growth.

93. In practice, therefore, location analysis must be supplemented by regional analysis, for decisions to undertake industrial activities in an area can become the basis for generation of further growth in the area. Regional economic analysis can enable planners to identify the most promising areas for the location of

industry in order to achieve maximum multiplier effects. Regional development, however, must be co-ordinated with national planning to ensure that both are working towards the same goals of achieving the most productive uses of scarce resources and maximizing potentials for future growth.



ANNEX

Table 1

Ranking of industries by size of localization coefficient
(Colombia, Mexico, Philippines, Spain; various recent years^{a/})

Industry	C o u n t r y										
	I.S.I.C. Code	Abbreviated title	Colombia		Mexico		Philippines		Spain		"Best"
			L.C. (1)	Rank (2)	L.C. (3)	Rank (4)	L.C. (5)	Rank (6)	L.C. (7)	Rank (9)	Rank (9)
203 - Fruit canning			.740	4	.652	12	.870	10	.696	3	5
204 - Fish canning			.912	2	.878	1	.824	14	.711	2	2
205 - Grain mill products			.360	18	.318	21	.616	20	.267	14	19
206 - Bakery products			.251	21	.385	19	.496	21	.094	21	21
207 - Sugar manuf. & refining			.872	3	.673	10	.815	16	.715	1	6
208 - Confectionery products			.548	10	.729	4	.838	13	.252	16	12
212 - Wine			.484	12	.682	8	.893	5.5	.542	10	9
214 - Soft drinks			.277	20	.324	20	.812	17	.161	20	20
220 - Tobacco			.458	14	.765	3	.888	8	.571	9	8
231 - Textiles - spinning & weaving			.506	11	.428	17	.870	11	.586	8	13.5
232 - Knitting mills			.573	8	.684	7	.893	5.5	.674	4	4
241 - Footwear			.424	16	.620	14	.857	12	.662	5	13.5
243 - Wearing apparel			.318	19	.639	13	.796	18	.171	18	18
260 - Furniture & fixtures			.402	17	.670	11	.787	19	.260	15	17
272 - Pulp & paper articles			.562	9	.698	5.5	.893	5.5	.532	11	7
280 - Printing & publishing			.457	15	.698	5.5	.871	9	.406	13	11
291 - Leather tanneries			.578	7	.567	16	.977	1	.499	12	10
313 - Paints & varnishes			.581	6	.674	9	.940	2	.592	7	3
331 - Structural clay products			.460	13	.607	15	.917	3	.167	19	15
383 - Motor vehicles - manuf.			.604	5	.772	2	.893	5.5	.604	6	1
384 - Motor vehicles - repair			.944	1	.407	18	.822	15	.208	17	16

Source: Calculated from data in the Censuses of Manufacturing of Colombia, Mexico, Philippines, Spain for the most recent year available.

^{a/} Foot-note on following page.

a/ Foot-note from preceding page.

Kendall's coefficient of concordance among the four ranks is: $W = 0.589$, significant at the 0.01 level ($F^* = 4.3$; $F_{.99} = 2.2$). The rank similarity would be even greater if the large discrepancies due obviously to differences in output-mixes had been eliminated from the calculations (e.g. ISIC 384). The Censuses of Manufacturing of 66 countries have been examined: only the four included here could be considered "developing", and had data on 3-digit ISIC industries broken down by a large enough number of regions. Similarly, the selection of industries was mainly based on data availability; in addition, an attempt was made to avoid the least-homogeneous industry groups (e.g. "miscellaneous chemical products", "metal products", and the like). It is worth pointing out that the rank correlation coefficients (Spearman) between pairs of ranks are also statistically significant. Column (9) indicates the "best" rank in the statistical sense: it is the inverse ranking of the sum of ranks, and is the best approximation to the "true" rank for the whole group. Finally, little significance can be attached to the absolute size of the localization coefficients, because of the fact that their size changes according to the number of regions used for the calculations.

Table 2

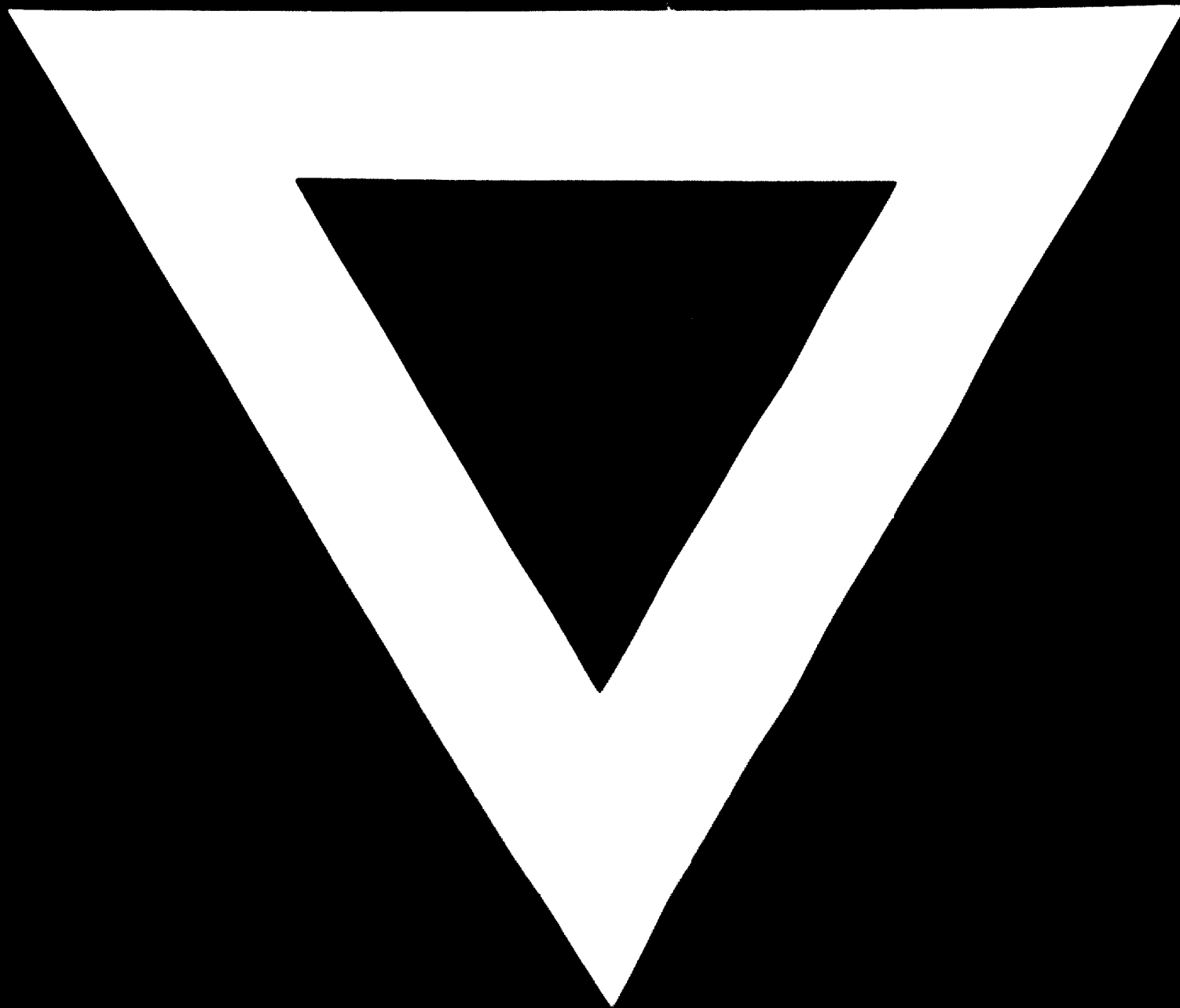
Ranking of selected industries by size of localization coefficients, capital-labour ratios, and wages-output ratios.

"Best" rankings for groups of countries^{a/}

<u>Industry</u>		<u>I n d e x</u>			
<u>I.S.I.C. Code</u>	<u>Abbreviated title</u>	<u>Localization Coefficient</u>	<u>Wages/Output Ratio</u>	<u>Capital/Labour Ratio</u>	<u>Localization Coefficient</u>
		(1)	(2)	(3)	(4)
203	- Fruit canning	2	8	2	1
207	- Sugar Manuf. & refining	3	10		
212	- Wine	6	6		
214	- Soft drinks	11	5		
220	- Tobacco	5	11	1	2
241	- Footwear	8	3	5	4
243	- Wearing apparel	10	4	6	6
260	- Furniture & fixtures	9	2	4	5
272	- Pulp & paper articles	4	9		
280	- Printing & publishing	7	1	3	3
383	- Motor vehicles - manuf.	1	7		

Source: Calculated from data in the Censuses of Manufacturing of the countries considered, for the most recent years available, and table I.

^{a/} Spearman's coefficient of correlation between ranks (1) and (2) is: $R = -0.655$; due to the difficulties in testing the significance of the coefficient when $8 < N < 25$, it is impossible to specify the significance level. However, we note that for $N = 8$ $R_{.91} = 0.64$, and the concordance may be considered significant, albeit not at a very high level. Between ranks (3) and (4) the coefficient is: $R = 0.886$, significant at the 0.03 level. Rankings (1) and (4) are "best" rankings for: Colombia, Mexico, Spain, Philippines (see note to table I); ranking (2) is "best" ranking for: Brazil, Colombia, Mexico, Pakistan, Philippines; ranking (3) is only for Mexico; and the capital-labour ratio is defined by the book value of fixed assets divided by total employee compensation. The differences in the countries of the samples, as well as the lower number of industries in ranking (3) are due to varying data availability: for example, data on which to calculate capital-labour ratios at this level of disaggregation were available only in the Mexican Manufacturing Census; for Brazil there were data on the wages-output ratio, but data on a regional basis were not adequate for calculating localization coefficients; and similar limitations.



6. 10. 71

