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Minsk, August 1968

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THE LOCATION OF INDUSTRY IN DEVELOPING COUNTRIES ✓

by

William Alonso
University of California, Berkeley

✓ The views and opinions expressed in this paper are those of the consultant and do not necessarily reflect the views of the Secretariat of UNIDO.



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SUMMARY

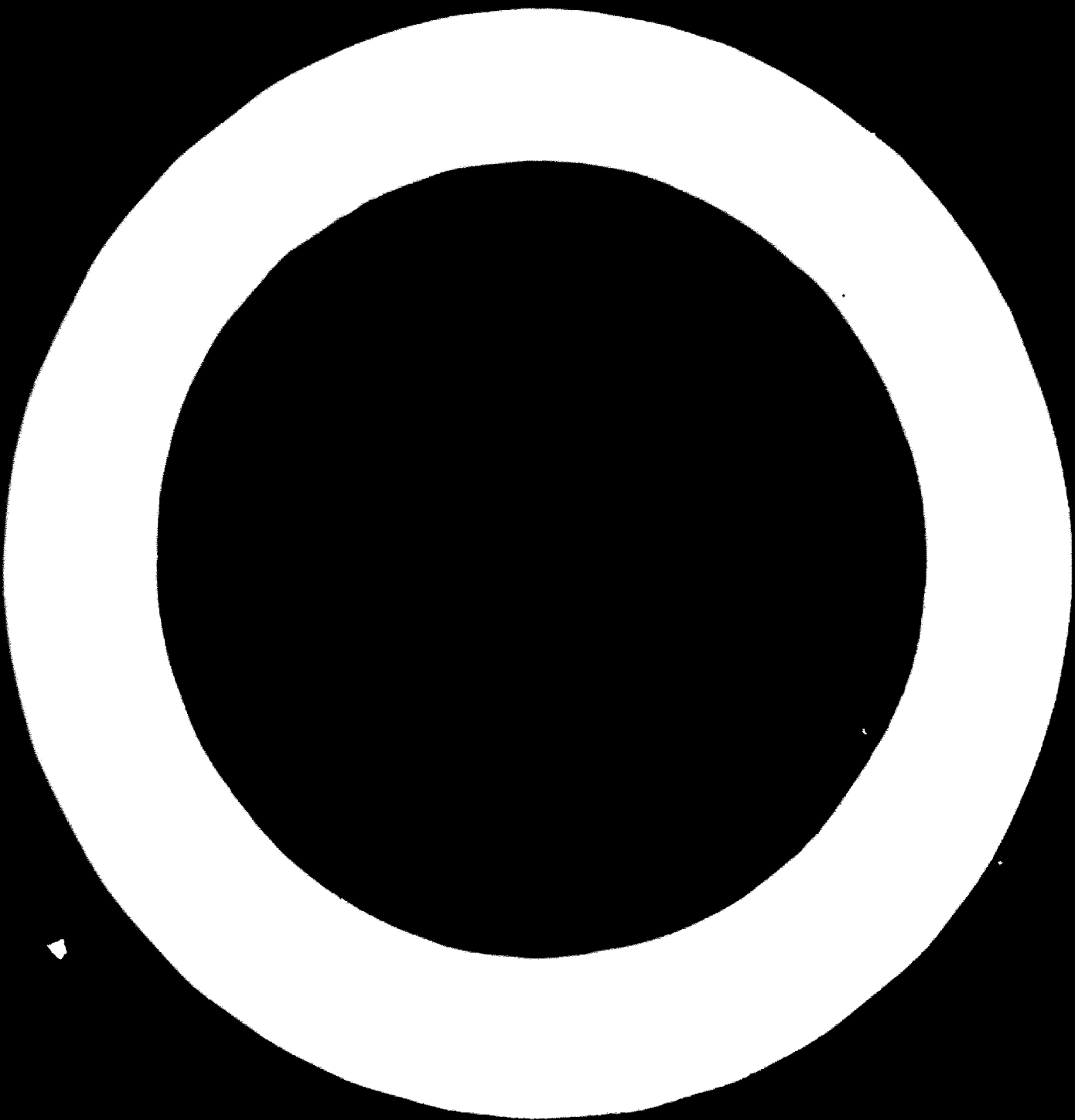
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Factors determining the location of an industry are discussed, principally as a choice between a major city and a hinterland location. The classical location theory is reviewed briefly. Within the terms of this theory, the objective of minimizing transportation costs is a poor substitute for a real objective, such as maximizing profits.

However, the assumptions of the classical location theory relating to unlimited managerial resources, full information, predictability of the future, and "all other things being equal" are unsuited to developing countries. After consideration of the form of the transportation network, attention is given to the consequences of distance as time, of the personal space preferences of a manager, of the lack of information about hinterland locations and the pressures for rapid development, and of some aspects of the labour force available at hinterland locations. A broad definition of external economies and consideration of the principles of multiples, massing of reserves, and bulk transactions relate these factors to city size, to the effects of the ease of communication, to national customs, and to the lack of standardization of procedures. These common considerations for the location of industry in developing countries are compared to those for young industries in developed countries. It is suggested that much of the apparent overconcentration of development in new nations is a functional aspect of the early stages of development.

Location of a government industry should not differ significantly from that of private industry if only one project at a time is considered and calculations are based on money costs. It is suggested that directives to project managers to examine alternative locations and to use lower rates of interest for capital and lower rates of discount for returns might result in more hinterland locations. Furthermore some considerations are outlined for evaluation of location in terms of economic costs in the framework of cost-benefit analysis. It is not clear whether these considerations will alter the net balance of locations away from principal centres, although they may change the location of some industries. Reference is made to the public objective of interregional equalization as distinct from that of aggregate national growth.

Finally, regional policy per se is considered as a location factor and a substitute for and generator of information as well as a useful device for conserving and stretching scarce technical manpower. Regional policy may also influence the logic of location decisions by the use of considerations of longer-run effects and the economic macro-geography of development.

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I. INTRODUCTION

1. The greater part of the human race lives in developing countries. These countries present an extraordinary variety of situations and conditions, many levels of development and modes of life. Hence, much of what is said about the location of industry in such countries must be couched in conditional terms. Some of the considerations which will be set forth in this paper might appear almost offensively ludicrous to one whose country is already on the road to development, but I believe they will be readily understood by many whose countries are in the initial stages of industrial progress. The differences, that can be observed, however, are only differences of degree, and the factors discussed seem to play an important part in all countries, including the developed ones.
2. The analysis that follows will be mostly based on a highly simplified alternative for the choice of a location: the large city or the hinterland. In view of the immense variety of industries, resources, and conditions which might be considered, it would be hopeless to site too many cases and examples. I have therefore focussed on this particular point, because it seems the most important one both for experts trying to understand the changing spatial structure of developing countries, and for those called upon to choose the proper locations. From the point of view of the businessman or the project analyst, the choice actually lies between two or three locations, one or two of which will be indicated on account of the existence of raw materials, sources of power, a very localized and specialized market, or other such factors; while the other location will almost always be one of the larger cities in the country - and in many cases, there is only one large city. In most countries, moreover, the paramount issue of territorial planning is the possible overdevelopment of the major cities to the detriment of the rest of the country.
3. This polarity is the spatial manifestation of a dual economy, and, in many cases, the major cities bear to their hinterland the same relation as developed countries bear to undeveloped ones. Though much of the literature on "obstacles to development" usually poses these problems at the national level, they exist almost unchanged at the regional level. Those countries, therefore, which are endeavouring to develop their backward areas within the framework of national economic development are faced with countless obstacles - those that present themselves at the national level and those that exist at the regional level.

4. In the earliest stages of development, regional planning and applied industrial location often take little account of the realities of the problems raised by location or of the true dimensions of the policy issues. Again, there are excellent studies of developing economies which treat the question of location superficially. One can frequently find, in the same study on the subject, contradictory statements, namely, that continued concentration in the cities increases national polarization and income disparities but that this same concentration itself is uneconomic and leads to a slowing down of national growth. It is unlikely that both of these can be simultaneously true. It is sometimes asserted also, always without proof, that cities of 5,000, 25,000, 250,000, or some other number of inhabitants are large enough to make external economies possible. Considerable stress will be laid on such economies in the course of our study, but the truth is that there is no reliable knowledge of relevant urban sizes. Finally, perhaps the most common error is the gratuitous statement that industry is or should be located at places where transportation costs are reduced to a minimum. Except in special circumstances, this is true neither in theory nor in practice.

5. This paper presents only a brief and non-technical review of the abstract theory of industrial location in Section II. Section III deals with other factors of location which are usually neglected in the abstract theory, and then proceeds to examine the question from the point of view of the businessman or the project director. Section IV discusses some problems concerning the evaluation of locations from the point of view of the national interest, and Section V suggests a number of considerations regarding regional planning as a factor in location. These last two sections only sketch some of the dimensions of the problem, since neither theory nor practice is sufficiently advanced to permit a conclusive summary. On the other hand, a number of important issues are not discussed. Among these are the priorities to be attributed to agricultural and industrial development and the links between the two, the question of infrastructure and directly productive investment. Nor are industrial estates or growth centres explicitly treated. The former have been discussed extensively in many United Nations publications, and the latter, which is closely related to it, is as yet only a way of thinking about problems rather than a documented technique of development.

III. BRIEF REVIEW OF THE CLASSICAL LOCATION THEORY

6. The formal theory of the location of industry originated in Germany in the nineteenth century, and remains to this day a classical theory in that it presupposes economic rationality, completeness of information and a static situation, and ignores the complexities of the broader framework of country and region. It is therefore ill-suited to the conditions of developing countries. Most contemporary studies on the location of industry in developing countries do not deal with the subject as such, but make passing references to particular aspects of location within the discussion of economic development in general. Thus, many writings touch upon the overall geographic structure of a country, upon urban and regional policies (for instance, industrial parks, poles of growth, urban decentralization), or upon transportation planning.
7. This paper will try to amalgamate many of these scattered ideas on the forces that determine the choice of an industrial location in developing countries. Although, as has been mentioned, the classical location theory is ill-suited to developing countries, it will be useful to make a brief non-technical review of it at this point by way of introduction. Furthermore, the theory is interesting because its deceptive straightforwardness moulds the thinking of many practitioners and experts in the field of development, mainly because of the half-truth that the rational location for an industry is that which minimizes transportation costs.
8. The classical problem dealt with in the literature on the subject is that of choosing a location for setting up a factory. Those who try to solve this problem assume that the sources of materials, the location and size of markets, the necessary quantities of the several materials per unit of product, and the relevant transportation rates are all known. When the problem is stated in these terms, everything but transportation costs is held to be constant, and it is therefore considered that the best location is naturally that which minimizes transportation costs. We shall see later on that other factors do not remain constant and that this objective is subject to strong qualifications. Let us accept however, for the time being, the classical formulation.
9. Consider the costs of assembling materials and distributing the product of a manufacturing plant at each possible location. These costs will vary from one

location to another, and, taken together, they would describe over the national territory a fairly smooth surface of transportation costs, shaped like a bowl. The lowest point of that surface must fall within the polygon formed by drawing lines joining the locations of markets and materials, or at one of the vertices of the polygon. The point of least transportation costs may be the lowest point on that surface, but the surface is likely to have pits at each material or market location. This is because locating at such points will avoid the terminal costs of loading or unloading, insurance, shipment, etc. of a material by locating the industry at its source, or again the same costs relating to the product itself by locating it at the market. These pits may be lower than the bottom of the bowl, and may thus represent locations of lower transportation costs.

10. There is another type of location where savings of this type are possible, namely, at ports and other points where there is trans-shipment or break-of-bulk. It is often advantageous to process materials at the time when they are to be taken, say, out of trucks to be loaded on a ship. This, of course, is one of the principal reasons for the development of port locations as industrial centres. In the terms we have been using, port locations often represent deep pits on the surface of transportation costs.

11. The classical theory recognizes that transportation costs are not usually the only factors to be considered. Certain locations may have lower wage rates, preferential tax treatment, or some other advantage that lowers the costs of manufacturing from the businessman's point of view. The savings per unit of product may be subtracted from the height of the transport surface at that point, and create another pit which must be compared with the others.

12. In short, this simplest formulation of the theory amounts to no more than a systematic consideration of all possible locations, calculating transportation and production costs at each location, and choosing the lowest. It must be noted that it is an engineering rather than a true economic model, at least in this simple form. It does not take into account economic considerations such as factor substitution, the elasticity of demand, economies of scale, or the consequences of alternative pricing policies. Full consideration of all these would lead us to a complex mathematical analysis,^{1/} and their effects can only be touched upon here.

^{1/} The interested reader is referred to William Alonso, "A Reformulation of Classical Location Theory and its Relation to Rent Theory", Papers of the Regional Science Association, Vol. XIX, 1967.

13. Since diversity of location will result in differences in the delivered prices of the materials, many manufacturing processes will adjust their factor proportions. For instance, a steel-making plant at a location distant from a source of coal will find coal relatively more expensive on account of its additional transportation costs and will probably choose a production process that uses relatively less coal and more of some other product. Thus, the classical theory studies only substitutions as between transportation inputs, whereas in reality there often exist possibilities of substitution between transportation and other inputs. The objective of minimizing transportation costs must be broadened so as to include the minimizing of total costs, and this only if we take total revenues as being fixed.

14. Total revenues, however, are not fixed if the quantity to be sold varies with the price. If the product is sold at different prices in different markets because of differences in delivery costs or for other reasons, the profitability of the enterprise will in general be greater if it is located near those markets which are sensitive to price variations. Thus a large market which has an unvarying rate of sales will exert a lesser force of attraction than a smaller one, in which slight reductions in delivered price result in large variations in the quantity sold. The quantity sold at each market may thus vary from location to location, and also with the pricing policy adopted. This point is very important, for the true objective of most economic activity is to increase profits as much as possible, not to reduce costs to a minimum. The reduction of transportation costs is only a very limited objective in the overall pattern, and a firm will normally be willing to spend more in order to make more. Otherwise, to take an extreme instance, transportation costs would be minimized by not producing at all.

15. It must be recognized, however, that the classical problem of adapting production to a predetermined quantity and price may be more suited to conditions of scarcity, imperfect articulation of the pricing system, and socialized production such as are commonly found in developing countries. It may be argued that, in those cases, the problem is to engineer production rather than to identify demand, in contrast to the free-market situation of affluent economies. But such an argument, and the objections to it, lead to rather difficult and as yet poorly defined areas of economics. A simpler and more forcible argument for a location

which minimizes transportation costs is that it makes the analysis simpler, requires less technical manpower which is limited, and is likely to be less time-consuming; thus the project may get underway more quickly at a location which is satisfactory, even if it is not the best in terms of profitability, contribution to the national product, or some other more fundamental objective. It may be noted that different objectives will sometimes result in the choice of different locations. This will be discussed in Sections IV and V.

16. According to the theory which has been presented, the location of the firm may be viewed as responding to pulls from markets or materials. In the simplest case, where all quantities are fixed and only transportation costs vary, the pull of a source of material is equal to the weight of that material per unit of product multiplied by its transportation rate. The pull of a market is equal to the fraction of total production sold there, multiplied by the weight of the product, multiplied by the transportation rate. If we allow substitution among production factors, the pull of a material is weighted by the sum of cross-elasticities between this factor and the others. In certain methods of pricing, the pull of a market is weighted by the price elasticity of the demand at that market. But, setting such complexities aside, we may imagine these various pulls operating on the location: the optimal location will be at the point where these forces balance each other and an equilibrium is achieved.

17. This simple physical analogue of the forces of location is quite instructive. The force that pulls towards a location is called the ideal weight.^{1/} Where one ideal weight is large in relation to the others, it pulls the location of the plant towards it, and the industry is said to be oriented towards it. Thus, processes that lose weight, such as the reduction of ores, result in a material-orientation. On the other hand, processes that increase in ideal weight tend to be market-oriented. The increase in ideal weight may, as in the case of beer and ink, be due to the addition of a universally available ingredient (water), or, as in the case of boxes and automobiles, to the increase in bulk which increases the freight per mile, or again, as in the case of newspapers and baked goods, to the high perishability of the product which requires rapid and expensive transportation.

^{1/} Actually, the ideal weight is the name of the magnitude of the force (excluding direction) in the simple case. No general name exists for the more complex directed force.

18. Even these rudimentary considerations begin to shed light on the question as to whether industry will be attracted to resources. Thus, iron ore has a low ideal weight in relation to coal and to the other factors that go into iron and steel, and the higher the grade of the ore, the less likely it is to attract industry since it is easier to move it. Oil has an ideal weight nearly equal to that of its first stage products, and therefore the petrochemical industry may be located either at the source, or at the market, or at some intermediate location which is convenient because of transportation, availability of funds, political safety, or any other convenient reason. Generally speaking, it may be said that most physical resources attract little industry. Their first processing does not add much to their value and is seldom labour-intensive, and later transformations are likely to be oriented to other locational pulls. On the other hand, coal is weight-losing in most of its uses, and electricity is expensive to move over long distances. Hence their ideal weights are high, and they may attract industry.

19. In comparison with the industries of developed countries, most of the industries in developing countries are simple, in that they require relatively few raw materials. Thus, the steel industry will confine itself to the manufacture of the basic types rather than to that of more specialized alloys. At the same time, the markets for the products will be concentrated in a few locations, in particular the large cities or, in the case of foreign markets, the ports of export will serve as the terminals within the national territory. A complex process that uses materials obtained from many primary sources and secondary producers, and which produces a wide line of goods which sell in a large number of markets is subject to many locational pulls, and may often be located almost anywhere, since an increase in distance to one market or material is likely to be compensated by a smaller distance to another. In other words, the bowl of the transportation surface for processes using many materials and yielding several products is likely to be rather flat. By contrast, if the locations of markets and materials are few, the transportation surface is likely to have a very distinct low point, and it is likely, therefore, that there will be a much more definite optimal location in the case of developing countries. This tendency is strengthened by the fact that the ratio of the value of materials to the value of the final product is far higher in developing countries, that is, the value added in

the production process being lower the location of the plant is more likely to be determined by differences in transportation costs. We shall see, however, that a host of other factors in developing countries reverse this tendency by favouring the location of industry in the capital cities.

III. LOCATION FROM THE POINT OF VIEW OF THE INDUSTRIAL ENTERPRISE OR PROJECT IN DEVELOPING COUNTRIES

20. In this section we shall deal primarily with the industrial enterprise, although almost all of the criteria discussed will also apply to governmental industrial projects if they are viewed only as projects rather than as forming part of a general policy of national spatial development. Subsequent sections will deal with changes in some of the factors involved when viewed from the national point of view. The criteria to be presented here will apply particularly to enterprises which are both owned and operated by an individual or a family, as often happens in developing countries. Some of the factors discussed, such as the personal space preferences of managers and technicians, play a less important part when the enterprise is operated by persons or entities other than the owners, whether the state itself or some larger corporation, or a group of shareholders.

21. Furthermore, we shall deal here with firms which may be said to be "located", that is to say, firms whose location has been chosen deliberately. I will have little to say about what may be called "spontaneous" industry, that is, industry whose location is due to the fact that the place of residence of the man who started it happens to be there, or is due to the latter's ability to see or to create opportunities. Although, in a great many countries, both developed and developing, there are whole regions or cities in which new industries spring up from local sources, little seems to be known about the reasons for this abundant growth. Much of the fundamental work belongs to an earlier generation of economists. Among present day students interested in this phenomenon, Everett Hagen holds an important place.^{1/} In general the conditions that bring about such a ferment appear to arise from a certain state of tension or restlessness, a dissatisfaction with things as they are or the fear of some imminent change, which cause certain groups of individuals to look for fresh opportunities and new ways of approach. Racial or religious minorities, uprooted sections of the farm population, and members of a threatened landed aristocracy have all, on occasion, played an entrepreneurial role. Yet it is most difficult to generalize about

^{1/} See, for instance, Planning Economic Development, Homewood, Ill.:
R. D. Irwin, 1963.

the spatial incidence of such spontaneous industrialization, and we know no way of planning it. It must be noted, however, that if spontaneous industrialization is successful, it is likely to lead in time to the rise of professional management and to the separation of management from ownership. As the scale of operations increases, decisions regarding location will be taken more deliberately, especially as regards branch plants, and what has started as a "spontaneous" industry may become a located one.

22. In this paper we are dealing with differences in regard to the problem of location as between developed and developing countries. It will be seen that, in general, the principal differences are due to the amount of available information, which involves an element of uncertainty, the knowledge of opportunities, technical and managerial capacity and supply, and other factors. In a broader sense, it can also involve the movement of goods as well as of ideas. The classical location theory, by assuming perfect information and predictability, and unlimited managerial and technical manpower, ignores the strongest factors which operate in developing countries. Moreover, it is for the most part static and assumes in fact that things happen in an instant. We shall see that time plays a crucial role in developing countries.

23. We shall begin by examining the effects of the spatial structure of developing countries on transportation costs, and then discuss a number of vital but neglected factors.

The transportation network and the concentration of markets

24. The transportation networks of developing countries reflect their economic history. The traditional role of these countries as exporters of primary products resulted in the creation of transportation networks which resemble drainage systems converging toward the coastline the ports became the major cities and served as trans-shipment points not only for the exports, but also for the import of finished goods from abroad, which were distributed from these points of entry.

Hence, the transportation network is typically shaped like a fan or a tree.^{1/}
In developed countries, by contrast, it represents a fuller lattice, which, by

^{1/} See P. Haggett, Locational Analysis in Human Geography, New York: St. Martin's Press, 1966, and his discussion of the works of Taaffe and Kansky. The most detailed and thorough documentation is in B.J.L. Berry, Essays on Commodity Flows and the Spatial Structure of the Indian Economy, Research Paper No. 111, Dept. of Geography, University of Chicago, 1966.

offering more nodes or points of confluence, permit a more even distribution of locations. A glance at world maps of population concentration shows a striking pattern of coastal cities ringing the developing continents, while the hearts of the continents are virtually empty. In some cases, a navigable river permits the development of a city further inland, but this is in fact due to a lucky hazard that links the continent to the sea. If, instead of concentration of population, the concentrations of industry, income, education, or other forms of economic development are examined, the existence of such a ring can be seen even more clearly.

25. The consequence of such coastal concentrations and fan-shaped movement systems is that the point most accessible to the country as a whole is not its geographical centre, but some point on the edge, which is the functional centre of the country in terms of economic distances. It may be noted that the physical excentricity of these functional centres results in longer average distances between points in a country of a given size; on the other hand, the extreme concentrations of economic activities that characterize these countries reduce the distances that are effectively traversed.

26. One of the consequences of this strong directional veining of the national territory is that, in the preliminary analysis of location, distances must be considered in terms of specific routes, while in developed countries they may be taken in a more abstract way. In a developed country, situated in Europe and North America, for instance, one can be more or less certain that the effective distance between any two points on the map will not exceed by more than 20 per cent the distance by air; in developing countries, two relatively neighbouring locations may not have a connecting road, and may be joined only at some distant major city. The technical elaboration of this concept is beyond the scope of this paper, but the point is that the problem of location in developing countries will involve either more difficult geometric transformations of physical space into economic space than is the case in developed countries, or a more specific and detailed (and therefore more demanding) analysis in the preliminary stages of planning.

27. The large coastal cities are thus the more central locations for the distribution of goods to the population at large, a factor which is of primary

importance for industries producing consumer goods if the scale of their market is country-wide.^{1/} The large coastal cities or principal nodes will also be the most central points for industries that depend on one type of material obtained from dispersed sources, or which combine various materials from different sources. To this must be added, of course, the fact that these points also serve as ports for the import of some of the materials, components, or equipment, or the export of some of the manufactured product. The concentration of demand at that point is often preponderant, both because income is always geographically more concentrated than population and because manufactured products are essentially income-elastic, so that demand will be more concentrated than income. Similarly, industrial demand for producer goods will be essentially concentrated at these points.

28. It follows from the above that transportation-oriented industries will often find that these coastal nodes are the most advantageous points from the point of view of location. It is our view, however, that the minimizing of transport inputs plays a less important role in the location of industry in developing countries than in the developed ones. External causes often serve as more powerful magnets than transportation factors to attract industry to the large cities. This does not mean, of course, that there are not many industries whose location is determined by the classical location factors associated with transportation costs. Of these factors, one of the most typical is first processing of materials, which, being weight-reducing, makes it important to locate the industry at the source of the material. Among such processes, we may mention the earlier processes of metal refining, cotton ginning, bacon curing, seed crushing, sugar refining, sawmilling, rice milling, cement and brick making.^{2/}

^{1/} On the other hand, consumer industries which can operate effectively on a small scale can and should be distributed more widely over the national territory.

^{2/} P.S. Florence, Economics and Sociology of Industry, London: C.A. Watts & Co., 1964, p. 151.

Distance as time

29. Often, time rather than cost is the primary factor when considering distance. This is well known in the case of industries which deal with perishable commodities, such as certain foods or newspapers. There are, however, other factors in developing countries which make time more important for industry than is usually the case in developed countries.

30. The time consumed in simple shipments can be surprisingly long. It often happens that whole weeks are spent in moving commodities or materials over relatively short distances, with days wasted in confusion, breakdowns, layovers, unavailability of carriers, labyrinthine paper work and authorizations, occasionally washed-out roads or tracks, and a thousand other contingencies that defy the imagination. Sometimes, after weeks of waiting for an order, it is discovered that it has been misplaced and that the shipment has not left. Or the shipment itself may be lost, in the sense that it has arrived at some place and no one has been notified of the fact. The probability of these occurrences will vary greatly from country to country, but it may be said, in general, that in developing countries shipments take longer on the average to arrive, and that there is greater uncertainty as to the time of arrival.

31. Under these conditions, the time consumed in transportation is likely to be an important consideration for many industries. At distant locations, it will be necessary to have substantially larger inventories of materials in order to ensure continuity of production, and to have large inventories of the product at the markets to ensure prompt and predictable deliveries. Even the inventory of spare parts for the production machinery will have to be greater. This important item has been estimated at about 20 per cent of total machinery and equipment investment in developing countries.^{1/}

32. All these delays, then, require considerably larger investments of capital for inventories at distant locations, because of the necessity of having:
(i) larger inventories to cover the longer lead times involved in the length of normal trips; and (ii) larger inventories to cover the possibilities of unforeseen delays. The additional capital costs, in view of the high interest rates

^{1/} H. Bryce, Industrial Development, New York: McGraw-Hill, 1960, p. 125.

that prevail in these countries, can easily exceed savings in transportation costs as such. The first type of cost, involving lead times, is unavoidable, especially in the absence of complex and sophisticated inventory techniques. The second type, due to uncertainty, is avoidable only at the probable cost of idle production lines in case of failure of materials or spare parts, or of the dissatisfaction of customers and unfilled orders if the product cannot be delivered.

Personal space preferences of managers and technicians

33. This factor, perhaps because it is so human, seldom receives adequate recognition, yet it may be in some ways the most powerful one in the choice of a location. Managers and technicians belong to certain social classes, such as the aristocracy or an emerging upper-middle class, and have usually received a relatively good education; they therefore expect living conditions which can be enjoyed only in the principal cities. Restaurants, cinemas, clubs, interesting friends and well-dressed people, fashionable shops, bookstores, television, and a sense of being at a place where things are happening - all these are felt to be necessary by the majority of managers and technicians and the overwhelming majority of their wives. To be away from the big city is often regarded as equivalent to an exile. Family links, which are of great importance in many developing societies, will often be another anchor tying a man to the big city, unless he or his wife happens to have a family at the new location.^{1/}

34. Aside from these ties to the large city, which a manager or technician will regard as his home because he has probably spent many years as a student in it even if he was not born there, serious problems of personal and family adjustment are likely to arise at the new location. These may be due to ethnic or religious differences, the existence of a different dialect, or of a local aristocracy to which he will be an outsider, as well as to differences in customs, and food. It may be affirmed that on the whole the family's adjustment will be

^{1/} This phenomenon is not limited to developing countries. A recent survey by the Wall Street Journal (Feb. 23, 1966) found that this issue was of great importance in American industry, and determined location to a considerable extent.

more difficult on account of its feeling of superiority towards its new environment, which it will, in all likelihood, regard not merely as different, but also as provincial and old-fashioned.

35. To persuade managers and technicians to leave the large cities very often substantial inducements including higher salaries, company-provided houses and automobiles, lengthy vacations and paid trips, must be offered. Even then, men of high qualifications will often not be obtainable, for they have ample opportunities in the cities. In developing countries, where the novelty of situations and the lack of an institutional matrix call for the highest degree of resourcefulness, energy, and inventiveness in these positions, a second-rate man can be far more costly in terms of lost efficiency and missed opportunities than any differential in transportation costs. More will be said about the special calls on management and technical staff in emerging industries in a later section. It seems clear, however, that these personal preferences will play a greater role if the enterprise is owned and managed by an individual or a family than if it has a more abstract ownership, as is the case with government projects or publicly held private corporations, in which management is a professional career, and where the decisions regarding the location of plants are usually taken by people who will not have to live at those locations.^{1/}

The spatial distribution of information and the cost of time in decisions relating to location

36. A common feature of developing countries is that it is often difficult or impossible to obtain reliable information about possible hinterland locations. Not only may it be hard to find out what transport facilities and schedules exist and what supporting services and facilities are available, but it may be

^{1/} See A. Lauterbach, "Managerial Attitudes and Economic Development", Kyklos, XV:2, 1962. While making similar although non-locational observations, Lauterbach observes that industrial enterprises of powerful families in Latin America are often associated with their agricultural background and holdings. Thus, they tend to develop canneries, sugar refineries, coffee roasting, meat freezing, wool and cotton mills. Both the economics of location and the space preferences of some of these families may often favour hinterland locations.

difficult to obtain information about such possibly important features as the availability of water, local woods, clays or other materials and their properties. Local variations may necessitate the redesign of equipment and processes, often involving scientific investigations which may be lengthy and not necessarily successful. It may often happen that something that had been taken for granted is not available, and that the firm will be put to the expense and waste of energy of having to undertake the necessary activities in order to supply itself. The things that may be missing are too varied to be exhaustively listed here. The enterprise may be forced to become its own trucking and shipping firm, a warehouser of office supplies and a repairshop of office equipment, a real estate management concern and general storehouse for some of its employees, or again it may have to be its own jobber for certain materials and components, etc. These, of course, are the opposite of external economies, and may be termed diseconomies due to forced internalization. Several countries which have attempted to adopt industrial decentralization policies have discovered that large firms can adapt themselves more successfully to the conditions prevailing in small cities and distant locations. Their size affords them economies of scale for internalizing these externalities. Below we shall discuss other factors, such as the predictability of demand and stability of production processes as they affect a firm's ability to adapt itself to a hinterland location.

37. There is a particular point which deserves to be examined here, although it might be left to the end. Besides classical factors such as lower transport costs or localized advantages, one of the principal reasons that militate in favour of locating industry in the hinterland is simply equity, which aims at minimizing differences in income and employment between the various regions. However, the experience acquired in both developed and developing countries indicate that frequently much of the labour needed for a new enterprise must also be brought into a backward region, because the local population lacks the necessary skills. In such cases, except at the most superficial statistical level, the goal of interregional equity is not reached, since the newly employed are not, except post facto, residents of the region. The local population may receive no benefit except for multiplier effects, which will be small because of sparse intraregional sectoral linkages, and which may in fact reduce local welfare by causing sharp sectoral imbalances in a region with low productive adaptability.

In other words, the resulting increases in demand for food, construction materials, and the like, may raise the price of these items for the local population.

38. The most common advantages of distant locations may lie in lower transport costs, lower rents, lower wages and the existence of a labour force which is less set in its ways, as well as in fewer costs of congestion. In contrast to these will be disadvantages such as the risk of costs due to uncertainty as to local conditions, and the costs of internalizing functions which would normally be external and for which the firm may lack the necessary facilities. These costs will be largely unknown at the time of choosing the location, and, in any rational decision they will be evaluated according to probabilities. Since, in the last analysis, profits represent the difference between costs and revenues, greater uncertainty as to the upper limit of costs will require a larger margin for safety, especially since revenue is usually more predictable from the price of competitive products. The known advantages of the distant location must therefore be very large to offset the probable, but unknown, disadvantages.

39. The very high output-capital ratio and rates of interest which often prevail in developing countries constitute yet another force that attracts industry toward the known environment of the large city. Even if it were possible to obtain all the necessary information about a distant site so that all uncertainty could be removed, it would probably take months or even years to do so, and that would involve a considerable delay in getting started. When returns on capital and entrepreneurship are very high, such a delay may be quite costly in terms of lost production. Thus, the choice will often be made with good reason in favour of the opportunities that are known to exist in developed localities, even if it is recognized that another locality might presumably be better if there were time enough to look into it. Vigorous action and quick decision can be preferable to careful consideration of all possibilities, if finding the best solution is likely to cause delays and if satisfactory alternatives can be rapidly found.

40. To revert to the matter of labour costs in the perspective of time, it must be noted that lower cost but less-skilled labour is usually an advantage only in the relatively long run. In the first years, as the labour force is being trained, one may expect it to be inefficient not only because of lack of specific skills, but also for lack of industrialized attitudes, which, although fundamentally subtle, may manifest themselves in such expensive forms as high rates

of absenteeism, tardiness, turnover, spoilage and poor maintenance of equipment. In view of the very short-range financial planning which is characteristic of developing countries, a delay of a very few years in reaping the benefits of low wages is likely to rob such a location factor of all interest. On the other hand as will be discussed later, public policy, which must often be based on longer-range planning prospects, and which must take into account a number of things other than the balance sheet of a project, may regard the creation of modern attitudes among the population as important as the physical production of goods.

External economies

41. These economies, which are among the most important determinants of location in developing countries, are the most difficult to assess. They have not been systematically classified, nor are there any sharp tools for their analysis or the measurement of their effects. There is an ample descriptive literature, but it is essentially limited to the developed countries. We shall see, however, that certain aspects of the matter are of particular importance for developing countries. Although they are hard to measure, they must not be underestimated. There is considerable evidence that, in many cases, they can more than compensate for higher costs of transport, labour, or other factors of production from the point of view of the firm or the project. From the point of view of national regional development policy, an understanding of what external economies consist of probably contains the answer to the crucial questions of whether the principal cities are too large, of how big secondary growth centres must be to enjoy self-sustaining growth, and of what types of industries lend themselves to a policy of decentralization and at what stage of their evolution. These policy issues will be mentioned in greater detail in a later section.

42. We may begin by a classic definition^{2/}, which points to three elements in

1/ Although these phenomena are commonplace and familiar in developing countries it is interesting that some of the most precise documentation refers to a developed country. See W.F. Luttrell, Factory Location and Industrial Movement, London: National Institute of Economic and Social Research, 1962.

2/ E.M. Hoover, The Location of Economic Activity, New York: McGraw-Hill, 1948, pp. 120-121. Hoover refers this to P.S. Florence, The Logic of Industrial Organization, London: Kegan, Paul, Trench, Trubner & Co., 1933.

external economies - multiples, massing of reserves, and bulk transactions. These are developments of the concepts which had been applied to the problem of the efficient size of enterprises. In the case of the enterprise, the concept of multiples implies that, since machinery is designed to operate at certain capacities, the minimum efficient size for an enterprise is that which ensures that no piece of equipment is under-utilized. By way of illustration, imagine a three-step process. If the machine of step B accommodates the output of three machines of step A, and the machine of step C accommodates the output of two machines of step B, the minimum efficient size of a plant would consist of six machines of step A, two machines of step B, and one machine of step C.

43. The same logic applies to a city. A certain minimum size is required for the efficient use of an airport, a transport system, or other forms of infrastructure. Smaller sizes will mean overcapacity, and therefore greater unit cost. On the other hand, what is perhaps more important, certain sizes must be reached to justify the setting up of specialized supporting services, such as specialized shippers and jobbers, financial agencies, trade publications, repair services, specialized printing, consulting services, equipment leasing, advanced education facilities, and laboratories. It should be noted that the principle of multiples, in its full sense, may result in higher productivity not only by preventing idle capacity, but also by permitting firms to specialize more narrowly and thus increase productivity. A firm could print its catalogues at a printshop which is especially set up and experienced in that type of work; it could seek advice from a lawyer who is particularly qualified to handle the issues at hand; it could get its machines repaired by men who know them well and have the proper tools, and so forth.

44. The principle of the massing of reserves is an actuarial principle. Imagine, for instance, that there are five firms, each of which plans to use ten units of a material, but each of which, because of the possibility of spoilage or unexpected orders, considers that there is an even chance that it will need two additional units. If these firms are separated in space, each must have twelve units of material for that level of risk, and among them the five will need sixty units. This constitutes a reserve of ten units or 20 per cent. On the other hand, if all five are close together and use a common supplier or have an understanding to assist each other, only four and one-half units or 9 per cent of the material will be needed as a reserve for the same level of risk.^{1/} The same logic would apply to the advantages of

^{1/} This is based on the independence of each firm's need for extra material.

larger pools of skilled labour, of larger markets for the product, and of larger or more numerous suppliers of the factors of production, repair and other services.

45. While the principle of multiples refers to the definite advantages of particular combinations, the principle of the massing of reserves deals with the probabilistic advantages of sheer size. It is based on the fact that uncertainty, when spread over large numbers, is more predictable and therefore involves less risk. Looked at another way, large numbers permit much greater flexibility and adaptability to changing and often unforeseeable circumstances, because more opportunities are open. For instance, if a firm changes its production process and thereby finds itself with a new waste product on hand, a firm in a large and varied aggregate will be far more likely to be able to make use of it than one in a smaller city, and the waste product will become a byproduct. The reverse holds true if the new process calls for some new input.

46. The third element in this formulation is the principle of bulk transactions. In the case of the firm, this principle is based on the fact that buying or shipping in larger quantities usually results in lower unit prices. In the case of the city, the size of operations may result in lower rates and more frequent and convenient service for large-scale transfer and terminal facilities. The same may apply to other public and commercial services, mainly because fixed costs may decline per unit and because more efficient processes can be used with the increase in the scale of operations. It is frequently suggested, however, that many functions in large cities operate under diminishing returns, principally because of congestion, either internal to the function or among functions. This point has not been settled by empirical research, and constitutes the principal bone of contention between those who argue for and those who argue against big cities. We shall have more to say about this later.

47. The principle of bulk transactions has a less equivocal aspect than that which has been mentioned with respect to the principle of multiples. A very

large scale of operations permits specialization and increased productivity. That is to say, the very large number of events and transactions make it possible to handle a wide variety of needs in a standardized and therefore more efficient and less costly manner. Once again, we have in mind specialized shippers, repairmen, professionals, and subcontractors. This does not contradict our argument below that the large city is particularly hospitable to the unstandardized producer. The reason for this is that the unstandardized producer has greater need for supporting services and associated activities. It is more likely that he will find these in the large cities; moreover, in large cities they will be more specialized and standardized, and therefore easier to use.

48. The subtle but enormous importance of face to face relations is not sufficiently recognized in the above formulation of external economies. Yet, in developing countries, these personal contacts are of crucial importance for many reasons. To name but the most obvious factors, developing countries have poorer communications systems, telephones are scarcer and less dependable, mail is slower and may fail to arrive, and air connections are rarer. Consequently, distance between persons is a more formidable barrier to communication than elsewhere, and this leads to the spatial concentration of those who must do business together.

49. Social forces, however, may exert an even stronger force toward spatial concentration. This is because, in developing countries, most messages are less impersonal and standardized than in the developed ones. For instance, in developed countries much information is transmitted by trade journals, catalogues, government publications, and other means. At the same time, contracts, terms of financing and details of payment and delivery, specification of the product, and a thousand other forms of contact tend to follow established forms. In developing countries, communications depend far more on things said by word of mouth, procedures are far less standardized, and call for discussion and negotiation. These circumstances make it necessary for people to get together. Moreover, the rituals of social contact when two-way communication is necessary are more elaborate. In many countries, considerable time must be devoted to expressions of mutual respect, and no hurry must be shown to get to the substance of the meeting. Even the substance of the conversation must be treated in a subtle and indirect manner,

which often baffles those used to procedures followed in developed countries. There are ways of saying yes which mean no, price and time estimates which mean something else, gentle probings, and subtle hints. An order blank, a long-distance telephone call, a cable or a business letter are instruments which are too blunt and lack sensitivity to these complicated attitudes.

50. Mechanical problems of communication and the customary modes of contact are not the only forces of this type which draw firms towards the city. The social and institutional matrix of communication and information also exert pulls. Personal relations play a more frequent and more pervasive role in human contacts of all types, including business contacts. In developed countries, contacts are more segmented into well-defined roles, which are limited to the issues at hand.^{1/} In developing countries, it is more often important to cultivate sources and to establish a community of attitudes or class positions. Information on new developments becomes available at irregular intervals, and channels must be kept open to be certain of being informed. Since the information is unpredictable, and often takes the form of rumours or confidential reports, it is important to be in contact with many people, and to see them even when no particular business is at hand. Conditions in developing countries change frequently and unpredictably, regulations are modified, ministries are reorganized, and the relative costs and availability of production factors and financing change suddenly. To be in the centre of influence, decision, and information is therefore often of vital importance. On account of the heavy bureaucratic maze of government permits and licences, papers must be personally carried from one official's desk to another. This is not only because rules and procedures are often confused or even contradictory, or because favourable interpretations, favours, and often corruption are needed to grease many an overbureaucratized machine, but also because the low standards of professional competence of many government officials below the very top levels make it likely that papers will get lost on some desk or dusty file in the depths of some ministry.

^{1/} This, of course, is a matter of degree. For instance, even in developed countries, salesmanship is very often pursued by warming the personal aspects of relations in the sharing of meals or leisure.

51. We have argued that the fluidity of the situation, the lack of standardization of procedures, and the personalization of contacts strongly attract businessmen or enterprises toward the city. This attraction is magnified by the scarcity of entrepreneurs and managers. In most firms, one or a few individuals exercise all the responsibilities of management, including general management, marketing, finance, purchasing, production, and long and short-range planning. For the reasons discussed, the management functions are attracted towards the city, and they draw the production functions with them. The advantages of flexibility, adaptability, and the conservation and efficient use of the scarce time of management are likely to eliminate any advantage of a few percentage points in transportation, labour, or other cost factor at some alternative location.

52. It is enlightening to note the similarities between the situation that exists in developing countries and that of new industries in developed countries.^{1/} New industries spend their early years in the large cities for reasons which are very much similar to those which we have been discussing. Neither production nor demand is standardized, and situations change rapidly. Ownership, management, and technical functions are exercised by one or a few individuals. The instability of demand and frequent changes in technology or the cost or availability of production factors put a premium on contacts and adaptability. Investment per worker is low, since larger commitments can only be judiciously undertaken when the situation and the processes are stable and predictable enough to justify with safety extended runs of identical items. In the early stages of the industry, it is vital to have access to common services and inventories outside the firm, to sources of finance, and to complementary producers; in short, these new industries are oriented to external economies. With time, demand becomes more predictable, production processes and product lines are stabilized, the various functions of management become professionalized, specialized, and distinct, and this greater stability makes it possible for the firm to routinize and internalize some of the services and steps of production which were previously done outside; in short, the firm becomes a more self-contained system. At this stage, the industry often

^{1/} See R. Vernon, Metropolis 1985, New York, Doubleday Anchor, 1963, and R.M. Lichtenberg, One Tenth of a Nation, Cambridge, Harvard University Press, 1960.

moves out of the large city to localities which may offer advantages in the cost of transportation, labour, or some other factor. Even the work of innovation often becomes institutionalized in research sections staffed by professionals who work systematically toward definite objectives. This activity may be quite free from locational constraints, if not from locational preferences. Very often, too, since the professionalization (depersonalization) of roles and the routinization of communications permit control of production, deliveries, etc. by standard messages, branch plants are established which operate apart from the head office.

53. In a newly-industrializing country, most industries will be in the position of "new industries". Even well established and standardized industries in developed countries may be expected to pass through an extended period of adaptation as management, technicians, and skilled workers learn their business, as production methods are adapted to local conditions, and as demand becomes more specific. The most commonly noted of these adaptations arises from the differences in relative costs of factor prices in developing countries. In particular, labour will be less expensive, and capital more expensive, and technology may often have to make the difficult adaptation to a more labour-intensive process. During this period of adaptation the city will naturally be the most hospitable place for the development of the new industry. As the industry matures, it will show a greater tendency to seek other locations, although it may be detained by the factors, already noted, of poor communications, traditions of direct personal contact, etc.

54. Countries which are starting on the road towards industrialization will, by definition, have a larger proportion of "new industry", and this will contribute to an apparent over-urbanization or excessive concentration. As the country develops and industry is established on a larger basis, new industries which seek the external facilities of the city will constitute a smaller proportion and industry as a whole will become more decentralized. At the same time, as the country advances toward economic development, one may expect changes which will facilitate such relative decentralization. Thus, the quality of the infrastructure and of the information about local conditions will become more even across the whole territory, and the population will be more adapted to modern conditions of production as a result of increasing literacy and the acquisition of habits

more suited to the required roles. A sectoral shift may be expected in the structure of the national economy, with a typical relative shift from the predominance of raw materials for export and of easily-produced consumption goods to a more significant level of processing of materials within the national territory itself, and ultimately to greater production of intermediate and capital goods. To the extent that the productive structure has the effect of diminishing imports of intermediate and consumer goods and that exports of materials decrease in relative importance, the great cities will lose some of their attractive power as ports. On the other hand, nationally-produced intermediate goods are likely to find both their materials and their markets within the large existing concentrations, and therefore to be very much oriented towards the existing centres of production. Furthermore, the national market for these products will be probably relatively small, so that production runs will be typically short and tailored to the particular order. As we have discussed above, such a dependence on close contacts and on external conditions will lead to the concentration of these industries in the existing centres.^{1/}

^{1/} A dissenting view on this point appears in P. Hauser (ed.), Urbanization in Latin America, UNESCO, Belgium, 1961. It is argued there that producer goods and capital goods tend to choose production sites close to the necessary raw materials; this view seems to disregard not only the great pull of the market, but also the fact that most of the inputs into these activities are themselves manufactures rather than "raw materials".

IV. THE LOCATION OF INDUSTRY FROM THE POINT OF VIEW OF PUBLIC POLICY

55. Most of the considerations outlined in the preceding pages apply with equal force to projects in which the decision regarding location rests with the government as well as private enterprises. Thus, it has been suggested that managers tend to overestimate the profitability of the centre as compared with the hinterland because they lack objective knowledge about conditions in the periphery, because of the relative ease with which new investment can be made at the centre, because of a strong preference for the metropolitan environment, and because of lack of interest in the periphery per se.^{1/} In this paper, taking a very similar list of considerations, we have argued that such behaviour by entrepreneurs is quite realistic, on the basis of a probabilistic logic which discounts the unproven advantages of the hinterland in proportion to their uncertainty and the delays in their realization. Economic models that assume the possibility of obtaining full information are unsuited to the conditions prevailing in developing countries, for the lack of information should not be treated as an accidental factor. In point of fact, the lack of information is one of the structural aspects of underdevelopment. The compiling of the necessary data requires the existence of records, a paper culture, a sophisticated and technically competent bureaucracy, and sufficient demand for information from government and private decision-makers and technical staff to justify the heavy investments necessary to gather and store the required information. These conditions are not met in developing countries.

56. In developing countries, where the economic base is small and precarious, the appropriate strategy is one of production rather than innovation.^{2/} One of the profound disadvantages of underdevelopment is that, since resources are few, enterprises where the probability of failure is very high must be avoided, if safe though less profitable alternatives are open. One of the advantages of the larger size of developed countries is that it permits them to assume the risks of innovation, since enough experiments are undertaken to guarantee that the failures

^{1/}A. Hirschman, The Strategy of Economic Development, New Haven, Yale University Press, 1958, p.185.

^{2/} Bryce, op. cit.

will be more than compensated by the successes. In this same sense, the choice of a hinterland location in a developing country may be regarded as an innovation. Only a country whose economy has become sufficiently large and secure can afford the risk of failure. Similarly, large firms consisting of several plants are those most likely to accept such a risk.

57. The same logic applies to decisions relating to location taken by a governmental agency entrusted with one or a few projects. Rational programming at the level of the individual agency will lead to decisions which are virtually indistinguishable from those of private enterprises. It is only when agency programming is influenced by considerations of national policy that these decisions may vary. The following pages will sketch some of the problems and techniques of linking national policies and agency programmes.

58. In many countries, the government is engaged in a large number of enterprises and, by comparison with the individual agency, may possess more of the advantages of size we have just mentioned, and thus be able to afford a more adventurous policy involving a few failures in return for greater overall benefits. The problem is how to transmit this overall strategy to the programming agency. One possibility is to require that agencies examine alternative locations before arriving at a decision. Such a policy is not without costs, in spite of its deceptive modesty. It may stretch very thin the technical resources of the operating agency, it may delay the initiation of projects, it may invite irrational decisions by stirring a hornets' nest of political pressures, and it may cost a surprising amount of money. Yet it may be indicated if there is reasonable expectation that enough advantages which would otherwise be neglected will be discovered to offset these costs.

59. The principal reason for this possible divergence between national policy and private or agency decisions is that the national government is, or should be, concerned with national profitability rather than with project profitability. That the costs of examining alternative locations may be excessive from the point of view of any one project, but a good investment if a large number of projects are considered, is only one of the many instances of the application of this principle. This is due to the fact that the national government is the representative of the nation, and, as such, should take into account the external effects

of actions, while the individual public project keeps its books in a manner quite similar to that of a private enterprise. The next few pages will indicate some of the principal ways in which a consideration of economic costs (as distinct from money costs) may be introduced into decisions regarding location taken by individual agencies.

60. The most general factor by which such decisions are influenced is the possible difference in the interest rate applied to capital costs and the discount rate applied to future profits. The appropriate rate which should be taken to calculate interest costs on public investment has been the subject of considerable recent discussion. The arguments are complex, and there is no unanimity on the proper rate to be adopted, but a large number of economists are of the opinion that the rate adopted should be substantially below that prevailing in the free market. Such a lower rate would naturally favour alternatives which need more capital in preference to alternatives which would be chosen by a free enterprise or by the government on the basis of higher rates. If an agency in charge of projects is directed to base its calculations on cheap capital, it might opt for distant locations, even though such locations might require larger investments in infrastructure. Similarly, a policy which made capital relatively cheaper would favour investment in plant and machinery, which, as we have argued, are more typical of standard-product industries with long production runs.

61. It has also been argued that the rate of discount to be applied to the future stream of income should be lower for public projects than that applied (often only implicitly) by private entrepreneurs. Among the arguments in favour of this proposition is that of the permanence of institutions and the society they represent, as compared with the shorter and more uncertain lives of individuals and private concerns. If public agencies are directed to apply a low rate of discount to future earnings, they will be less influenced by the delays involved in reaping the benefits of distant locations. As has been mentioned, these delays may be due to the length of time necessary to develop the labour force, or to a lengthy period of adaptation of production processes to local conditions, or again to the time it takes to establish efficient regular procedures of communication with suppliers and customers.

62. These three simple directives from a central planning agency to operating agencies might alter the decisions in regard to location for some projects, and it may be conjectured that they would favour hinterland locations to a greater degree. On the other hand, it must be recognized that, in reality, many developing countries are politically unstable, and that a particular government, or certain officials in a government, may want to obtain even quicker results than private entrepreneurs. In such cases, they will adopt a very high discount rate, and favour projects with very quick returns. They will shun distant locations because the exploration of alternatives would delay the project and because projects built near the centres of population enjoy greater publicity. Whether or not such considerations are valid, they are certainly present in many cases, and no technical means exist to evaluate the relative value of political stability.

63. That being so, the decisions to explore alternatives, to adopt a low rate of interest, and to employ a low rate of discount are only the first steps in the assessment of economic costs and benefits which reflect the national interest, as opposed to the assessment of money costs and benefits which characterizes private and most public project accounting. Other steps can also be taken, some of which are relatively simple. For instance, if one of the inputs is subject to a government tax, its economic cost would be obtained by deducting the tax from the purchase price;^{1/} conversely, if one of the inputs is subsidized, the cost of the subsidy should be added to the price. The general principle is that taxes and subsidies are transfer payments and should be eliminated from the money costs so as to arrive at the economic costs. The cost of land (exclusive of improvements) presents a particularly difficult theoretical and practical problem in this respect. The purchase or leasing of land for a project is, of course, a money cost, but in so far as the transfer of money only transfers the asset (land) from one holder to another, it is not an economic cost, and should not be counted among the economic costs. But it may also be argued that the price of land represents the costs of opportunities which are lost by excluding some alternative use for that land; if that view is taken, land costs should be taken into account.

^{1/} In some cases the tax may in fact be a charge for services or facilities. In such cases, the tax should not be deducted.

Thirdly, it may be argued that the price of land, particularly if it has been unoccupied or little used, is some measure of its productivity in the use for which it is intended (say, as a location differential rent), and should therefore be counted as a benefit rather than as a cost. The matter is far from clear, and the present writer would be inclined to disregard idle land either as a cost or as a benefit from the public point of view. Land which is in use should be treated as a cost to the extent of its advantage over an alternative location and the costs of transferring it.

64. The techniques of cost-benefit calculation are only now being evolved in the developed countries, and their adaptation to the developing ones is beset with new difficulties. There are practical reasons for this, such as the scarcity of technical personnel who know how to employ them, but there are also fundamental theoretical reasons. Two of these will be mentioned here.

65. The first is that the economic cost of an input is the marginal cost of producing and delivering it. For reasons of economic theory and of procedure, if not of empirical observation, it is commonly assumed in the developed countries that the price of an input is the marginal cost of production. This assumption, however, is far less sound when applied to a developing economy, where the pricing mechanisms are more capricious, the economy less integrated, and money a more uncertain medium (in part because of inflation). Thus, the assumption that price equals marginal cost is less tenable.

66. The second reason is based on the small size of underdeveloped economies. The calculations of cost-benefit analysis may be regarded as a partial differential of a general equation for national income, in which the final net benefit is the net of the effects on the various sectors of the national income of introducing a change - the project, that is, it is a sum of marginal effects. In a developed economy, with a large national income, any one project will be small in its effects, and these marginal effects may be normally taken to be constant rates. But in a developing country, starting from a small economic base, a project is likely to be large and to have profound structural effects, affecting, for instance, prices and rates of output. Such considerations make the application of cost-benefit techniques in developing countries more difficult, but it may also be argued that the relative scarcity of capital makes them more necessary. When

using them, it is necessary to be more fully aware of their limitations and of the many important factors which do not enter into the calculations.

67. The calculation of marginal costs can be difficult, but the difficulty should not be exaggerated. For instance, if the transport system is under-utilized, the actual transport costs are likely to be lower than the freight charges, and an intelligent guess may be sufficient if an exact measurement is not possible. On the other hand, if the transport system is overloaded, the marginal costs may be far higher. A precise evaluation may be impossible, because it involves, for instance, the costs of congestion borne by others. It may be sufficient operationally, however, to use money costs increased by some very rough estimate, or to use only money costs and specify that they represent an underestimate.

68. Far more difficult is the evaluation of external effects. For instance, the location of a particular project in some particular locality may make it possible for other enterprises, either public or private, to come into existence, and this should be counted among the benefits. Naturally, the wages of labour which would otherwise remain unemployed should be counted as a benefit from the national point of view, but it may be more difficult to estimate the increase in economic activity caused by such an increase in demand. The use of a multiplier would be indicated, but it would be far less reliable than in a developed economy, because the response to increased demand may result in sharp price effects due to inflexibility on the supply side.

69. The problem of city size has been discussed by many, and is often one of the most important factors in location policy both in developed and developing countries. In general, most countries seem to think that their principal cities are excessively large, and they consequently adopt policies of decentralization, particularly as regards the manufacturing industry. There is no factual basis for this policy, for no one knows when a city becomes too large. Nonetheless, this is a matter of such profound concern to so many countries that some of its theoretical aspects will be discussed here. In general, it is based on a belief that certain sets of costs rise after cities have reached a certain size. Among the costs mentioned are those of traffic congestion, water and sewage disposal, shelter, policing, and some social costs. While it must be emphasized that there is no empirical evidence for the fact that costs rise in such cases, the argument,

in one of its most sophisticated forms, runs thus: any businessman or government agency, in moving into a congested centre, will pay only the prevailing or average costs for labour, food, transportation, utilities, etc. The addition of the new activity to the size of the city will change these costs only imperceptible for any user. The marginal costs however, that is to say, the addition to total costs due to the new arrival, will be much larger than the average costs. Thus, if costs are rising with the increase in the size of the city, new activities will continue to be attracted far beyond the point at which the increasing marginal costs make this a relative or even absolute loss from the point of view of the national economy. A cost-benefit analysis would use the marginal costs arising from the external diseconomies of congestion etc. in evaluating that location. If we knew what these costs were, the central planning agency might require operating agencies to use them in their calculation, and the government might charge the full costs to private businesses by some form of taxation.

70. It was pointed out, however, in an earlier section, that there are reasons to believe that productivity may also increase with the size of the city. Among the factors mentioned were the facility of communications and the availability of information, the availability of specialized services, the abundance of inter-industry linkages, and the principle of massed reserves. If productivity increases with urban size, then the project or the businessman will take into account only the effects of these externalities on his firm, which in a sense may be termed the average productivity. But the project will not take into account, under normal procedures, the external economies that it produces for the other activities. In other words, the symmetrical analysis should be performed on the benefit side as on the cost side, and the public agency should take into account the marginal effect on total production in the city. If productivity is rising with size, the marginal product will be considerably larger than the average product. We also lack reliable information as to whether productivity rises with urban size, but a great deal of corroborating evidence suggests that it does. The magnitudes involved in terms of per capita income, net regional income, value added per industrial worker, local government expenditures, and cost of living indices for those few countries in which they are available, suggest to the present writer that as far as large cities are concerned, the marginal product is far greater

than the marginal cost, and that consequently, anti-urbanization policies err with respect to the goal of national production, for they compare marginal cost with average product.

71. The external benefits of a hinterland location are even more elusive. The contribution of the project to the external economies relating to location must usually be estimated not for an existing centre of economic activity, but for a future one, to which the particular project will contribute. Clearly, if we find it difficult to evaluate the external effects in cities that exist, it will be even more difficult to do so in cases where the development is yet to come. This is particularly true if we believe that there is a minimum critical threshold or take-off size for a growth pole. Current models, whether simple multipliers or more complex input-output or money-flow models, which are used to calculate growth in a local economy as a result of new industry, might be called incremental growth models and do not lend themselves to the study or prediction of the quantum jump implied in the concept of critical size. Nor do other important considerations lend themselves easily to measurement. Three of these will be mentioned below.

(1) The project may contribute to the rise, in the less advanced parts of the country, of new attitudes, a new sense of awareness, and new patterns of behaviour better suited to economic advancement. In other words, a hinterland location may be viewed as an investment in human resources which may be of greater significance than the project which is located there.

(2) The location of a project in the hinterland will usually make the region more known, and help to integrate it into the information network of the more advanced sectors of economic activity. The increase of information will reduce the discount arising from uncertainty which is applied to other possible projects at that location. In so doing, it lowers the threshold at which local opportunities become attractive, and several new enterprises may become feasible.

(3) It was mentioned earlier that, in most developing countries, especially those with a colonial background, the most important centres of development have coastal cities. In some of these countries, a turning inward towards the "empty" hinterland, may acquire a particular significance as a symbolic act of national identification and thus create a new frontier challenging the enthusiasm and energy of the people.

72. In the above discussion we have focussed our attention on the goal of national economic growth, but many countries also want to move towards interregional equality of incomes, and are willing to sacrifice some measure of absolute growth to that purpose. A project may be located in a backward region in order to reach this objective even if project profitability (in terms of the internal accounts of the project) and national profitability (in terms of contribution to national economic growth) are greater in the city. There is, of course, no formula to study the trade-off between national growth and national equality, and the decision is ultimately a political one. It must be observed that, because the choice is a hard one, facts are all too often twisted to make it appear that in all cases both purposes are served simultaneously, whereas in all likelihood they are often at odds.

73. The objective of interregional equality has received relatively slight systematic consideration in the literature on the subject.^{1/} It is a particularly difficult subject to discuss in non-technical terms, because measures of equity tend to be more technical and far more dependent on the geographical definition of regions than those of national growth. Furthermore, since the population is usually free to move from one region to another, it is necessary that a clear distinction be maintained between the geographic unit and the people involved. Thus, as has been mentioned earlier, a project in a backward region which must bring in labour from outside may well raise the per capita income of the region but lower the welfare of the original inhabitants if it introduces shortages or higher prices. Similarly, a project located outside a region, by draining off some of the surplus labour, may in fact raise the per capita incomes of both those who leave the region and those who remain behind. Moreover, a policy of developing growth centres in backward regions may or may not decrease the inequality of incomes between regions, but increase them within regions. It is unclear in many cases whether the objective is to decrease inequality of income distribution for the national population as a whole, with the region serving as an instrumental concept for the guiding of policy, or whether the regions are viewed as organic

^{1/} A good review of some of the issues and much of the literature is available in T. Reiner, "Sub-national and National Planning: Decision Criteria", Papers of the Regional Science Association, XIV, 1965.

entities, so that the equalizing of incomes between regions is itself the objective. A full discussion of these issues is clearly beyond the scope of this paper and is unavailable elsewhere. Only a few observations will be made here.

74. Under conditions of mixed economies, some of the most common devices to induce industry to choose hinterland locations appear to be lower rates of interest, government loans or insurance of capital investment, or direct investment by the government. It should be noted that there is a certain irony in the use of these inducements, for they will operate most strongly for industries which are capital-intensive, and, if technical substitution is possible, will encourage them to substitute capital for labour since they make capital cheaper. Such industries will tend to rely on skilled labour, which will often be brought in from outside the region, and will usually be large-scale industries which, as has been discussed, tend to be more self-contained and therefore less likely to promote local growth because of the sparseness of local linkages. Only recently have a few countries, such as the United Kingdom and the Federal Republic of Germany, begun to experiment with similar inducements to attract labour-intensive industries. In so far as the reasons for encouraging such locations are to put local surplus labour to work and to discourage migration to the cities, it would seem reasonable to try to attract industries for which the labour factor is preponderant.

75. The costs of such subsidies, or of direct investment in infrastructure, or of government services to attract industry to poor regions, should be attributed to the goal of equalization, in cases where, in the absence of such inducements, the industry would have come into existence elsewhere in the country. They would be the costs of making what may be termed a geographic transfer payment, and they would pertain to redistribution rather than to national production. The benefits that are derived from the industry should not be counted in the national profitability calculus of cost-benefit. They pertain to regional profitability, which is as distinct from national profitability as is project profitability. Only if the locational inducements cause industry which would not otherwise have come into existence to be created within the national territory do regional and national benefit calculations coincide, and even then secondary effects may differ at these levels if the location of industry shifts secondary activity from one region to

another. It may be noted that the common confusion between equalizing and national production objectives is due to the assumption that regional benefits are identical with national benefits, and to the fact that the possibility that we are taking from one region to give to another is often ignored.

76. None of this must be interpreted as a disparagement of the equity goal as a valid criterion for the location of industry from the point of view of public policy. The point we are stressing is that the analysis with respect to that goal is too often poorly handled.

V. REGIONAL POLICY AS A LOCATION FACTOR

77. Regional policy is not commonly regarded as a location factor in its own right. It is rather viewed as the basis of particular programmes and actions which modify other factors. Thus, capital may be made cheaper in certain locations by preferential rates, or the disadvantages of a distant location may be mitigated by a subsidized transport rate, or, in more extreme cases, certain locations may be forbidden and others made mandatory by governmental decree. Regional policy in itself may, however, operate as a location factor in developing countries over and above particular government actions to modify the other location factors.

78. Much of the above discussion was based on the fact that the conditions assumed by the classical location do not apply to the conditions prevailing in developing countries. Among the divergences are the following: (a) there is a general scarcity of information in developing countries, and an even greater scarcity in the less developed areas of those countries; (b) in a country in the process of development, the modern economic base will be comparatively small; changes are therefore likely to be relatively swift and radical, so that there will be more structural fluidity and the traditional assumption implied by the statement "all other things being equal" will be less valid; (c) the shortage of entrepreneurial, managerial, and technical personnel both in and out of government is one of the principal factors impeding development.

79. On account of these departures from the world of classical economics, the very existence of a regional policy may affect the location of some projects. For instance, an announced and publicized decision to develop some provincial centre may call the entrepreneur's attention to that centre as a possible location independently of the concrete steps taken to develop it, whereas if no centre were designated by the government, the entrepreneur would not know what location to choose in the provinces and would be more likely to settle in the principal cities. If there is a certain amount of confidence in the constancy and efficacy of government action, the general statement of regional policy serves to reduce uncertainty in the analysis of the project with respect to the structural changes that may be expected in the economic picture of the country, and thus lower the discount applied to expected returns to allow for uncertainty.

Of course, since regional plans normally are at the same time collections of information about the regions, they will also serve to increase available knowledge about those regions. Thus the regional plan will play a role in reducing uncertainty as to present conditions and future structural changes.

80. This suggested effect of a regional plan is in some ways similar to the French concept of indicative planning; when diverse activities have common interests, it is sometimes sufficient to indicate a common goal, without it being necessary to issue commands or offer special inducements. Imagine several projects that are about to be undertaken, some by the government and others by private concerns. In the absence of a plan, some of the projects will be located in the principal city, and some here and there in the interior. The designation of a locality as a growth locality may bring to the notice of several of these the opportunity of coming together and taking advantage of mutually induced external benefits.

81. It must be understood, however, that the benefits that may be thus derived from the plan do not absolve the government from its responsibility for taking concrete action, or from the need to study and take into account the complementarity of the needs of the participating activities, including government investment in infrastructure.^{1/}

^{1/} Among regional planners, balanced regional growth usually means that all regions grow at the same rates, or that the slower regions grow faster to catch up with the more developed ones. It has recently been pointed out that the "big-push" sectorally-balanced growth strategies of Rosenstein-Rodan and others, which stress the complementarity of certain sectors, is likely to result in sharp differences in regional rates of growth, with an emphasis on the more developed centres, thus leading towards greater regional inequality, and "unbalanced" regional growth. See W. F. Ilchman and R. C. Bhargava, "Balanced Thought and Economic Growth", Economic Development and Cultural Change, July 1966. In the terms developed above, balanced sectoral growth is oriented to the goal of national growth, and balanced regional growth to the goal of equalization.

82. The establishment of a regional plan meant to play an indicative role raises a number of problems. The plan itself will be drawn up in an atmosphere of uncertainty as to what is possible or even desirable, and will probably have to be frequently revised as more is learned about actual conditions and opportunities. The success of the plan's indicative function, however, depends to a large extent on the confidence which the participators have in its stability and the government's commitment to reach the specified objectives. If these objectives change frequently, the utility of the plan as an instrument to reduce uncertainty will be nullified.

83. The shortage of entrepreneurs, managers and technicians limits the national capacity to collect and evaluate information. The recommendations usually made that, in each case, decisions regarding location be taken after a careful examination of a multitude of variables is not realistic. Alfred North Whitehead has observed: "It is a profoundly erroneous truism, repeated by all copy-books and by eminent people when they are making speeches, that we should cultivate the habit of thinking of what we are doing. The precise opposite is the case. Civilization advances by extending the number of important operations which we can perform without thinking about them. Operations of thought are like cavalry charges in a battle - they are strictly limited in number, they require fresh horses, and must only be made at decisive moments". Thus, one of the principal functions of regional planning may be that of economizing scarce project planning energy. This is achieved by indicating probable decisions for certain classes of projects and precluding other decisions. The plan may indicate what types of industry may be decentralized, and what types should continue to be concentrated; it may indicate the most suitable locations for industries with certain characteristics; it may ensure rates of return on locations that suit certain general objectives, etc. Mention has already been made of indicated rates of interest and discount which might be made to apply to public projects. Similarly, shadow prices ^{1/} or techniques for calculating them may be indicated for some commonly used inputs, so that these do not have to be recalculated by each project which undertakes a cost-benefit analysis. Moreover, a certain amount of information can be provided and distributed, including projections of basic variables for general use.

^{1/} Economic costs when they differ from money costs.

84. The use of regional planning with a view to economizing managerial and technical resources presents two aspects. The first is the production and distribution of information which can be used by more than one project. The second is the ability to take a comprehensive view of the evolving spatial structure of the national economy in the process of development. Indeed, an examination of the overall picture may reveal patterns which are not discernible in the individual projects. Such a study, for instance, may provide information regarding the advantages or disadvantages of certain types of locations for certain types of industries, or a long-term perspective of the growth of particular localities, such as the growth of secondary centres in the interior of the country, or aggregative projections of traffic volume on certain arteries, indicating that saturation may be expected within a certain period. In the long range view of the economic macro-geography of a developing country, it is certain that there will be fundamental structural changes, although there will normally be considerable uncertainty about the precise form of those changes. Project analysis, however, tends to work with a constant structural matrix, while focussing in greater detail on the specifics of the action being considered and using short-run curves. But the rapid changes in the economic-geographic matrix as a result of the development process make the use of short-run curves and partial analysis less valuable for developing countries than for developed ones.

85. If technical resources were not limited, both the aggregative macro-geographic and the detailed project studies should be carried out in full. But since there are many limitations, the aggregative analysis can usefully replace the detailed analysis to a certain extent only, and the use of both methods will be more fruitful than the exclusive application of either one of them. For if only detailed project analyses are carried out, their joint effects and their long range consequences will not be anticipated, and important opportunities will be missed for lack of awareness of larger trends. On the other hand, if only a general analysis is made, many projects may have disastrous results for having overlooked important details, or, what is just as important, the country may find itself with general policies which may be excellent, but without concrete programmes or specific projects to give substance to those policies.^{1/}

^{1/} This vital point is documented in A. Waterston, Development Planning: Lessons of Experience, Johns Hopkins Press, Baltimore, 1965.

In short, the lack of information in specific cases, the lack of technical personnel, and the rapidity of change in developing countries make the application of rules of thumb, general guidelines and policy all the more necessary.

86. Although profound changes are certain to take place in the economic structure of a country, our present knowledge is too tenuous to permit anything but guessing as to the nature of these changes. Such conjectures are, of course, necessary, but because of new information and the fact that any plan for the future involves both an element of judgment and opinion, regional plans tend to be unstable. It must be re-emphasized that frequent changes will reduce the importance of regional policy as a substitute for information, by undermining the confidence of project planners in the validity of their forecasts. At the same time, as new and more detailed information becomes available, new possibilities will present themselves. Thus, there is a certain contradiction between the function of the plan as a stabilizing element in an excessively fluid situation, and the logical necessity of continued planning, feedback, and revision in the light of increasing understanding. There is no easy way to solve this problem.^{1/}

87. It may also be noted that, since regional plans both produce and replace information on the national economic situation, they play a more important role as a location factor for mature industries than for industries that are getting under way. As the latter are still uncertain about processes, relations to complementary activities, and other factors which call for adaptability rather than predictability, they will continue to favour the principal cities. It may thus be said that the influence of regional policy per se as a location factor will be strongest in the middle stages of economic take-off, after the beginnings but before maturity, when the patterns have become clearer and information is no longer difficult to obtain.

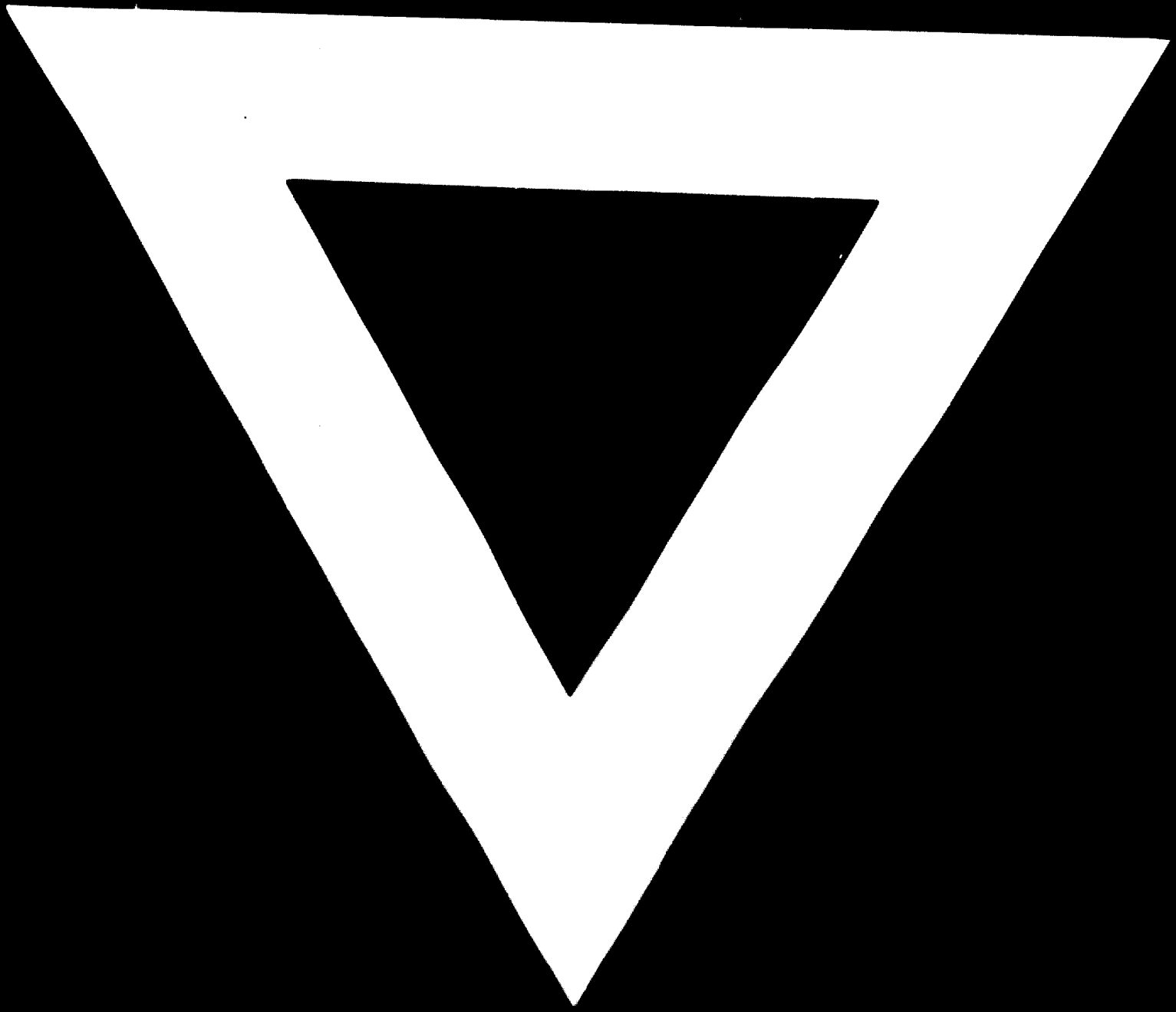
^{1/} A particularly interesting discussion of the relation of scientific knowledge and the exigencies of the actual situation in regional planning may be found in J. R. P. Friedmann & W. Stohr, "The Uses of Regional Science: Policy Planning in Chile," Papers of the Regional Science Association, Vol XX, 1967.

88. In conclusion, two general points must be made in regard to regional policy as a factor to be taken into account in the location of industry. The first is that, in geographic terms, economic development may be viewed as a process of national economic integration. This means eliminating irrationalities in the production and exchange of goods and services throughout the country, overcoming ignorance, prejudice and inertia, and facilitating the means of exchange between different parts of the country.^{1/} In this respect, it is necessary to take into account not only the benefits to be derived from any project in terms of production, or even the external effects of the project, as such, but its modernizing influence on the local population and the important role it has to play in integrating the particular region in which it is located as well as its human and natural resources into the larger fabric of the modern nation which is trying to come into existence. Needless to say, there are no quantitative or other scientific methods to evaluate the trade-off between economic efficiency of a project and its long range effect in the making of a modern nation.

89. A final observation may be made on regional planning. In most countries, regional planning is done by the executive branch of the government, while budgetary and sometimes substantive approval is given by the parliament. The executive branch is mainly divided into sectoral or functional divisions, such as ministries. The legislative branch, almost without exception, represents territorial divisions. Technical planning services usually form part of the executive branch and most national plans have thus far been sectoral plans, more or less formally representable in an input-output or some other social accounts table. The emergence of national regional planning in the last few years presents a formidable problem: from the technical point of view, planning is the responsibility of the executive branch, but in as much as it involves territorial decisions capable of promoting or hindering growth, it is of immediate concern to individual legislators. It is clear, therefore, that regional planning, in contrast to sectoral planning, will always be disrupted or enriched by local preferences, whatever the views of professional experts may be.

^{1/} See B. Balassa, The Theory of Economic Integration, R. D. Irwin, New York, 1961, and J. R. P. Friedmann, Regional Development Policy, Cambridge, MIT Press, 1966.





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