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THE ROLE OF INDUSTRIAL ESTATES, AREAS AND ZONES IN PROVIDING AN INDUSTRIAL BASE IN URBAN AND REGIONAL DEVELOPMENT PLANS

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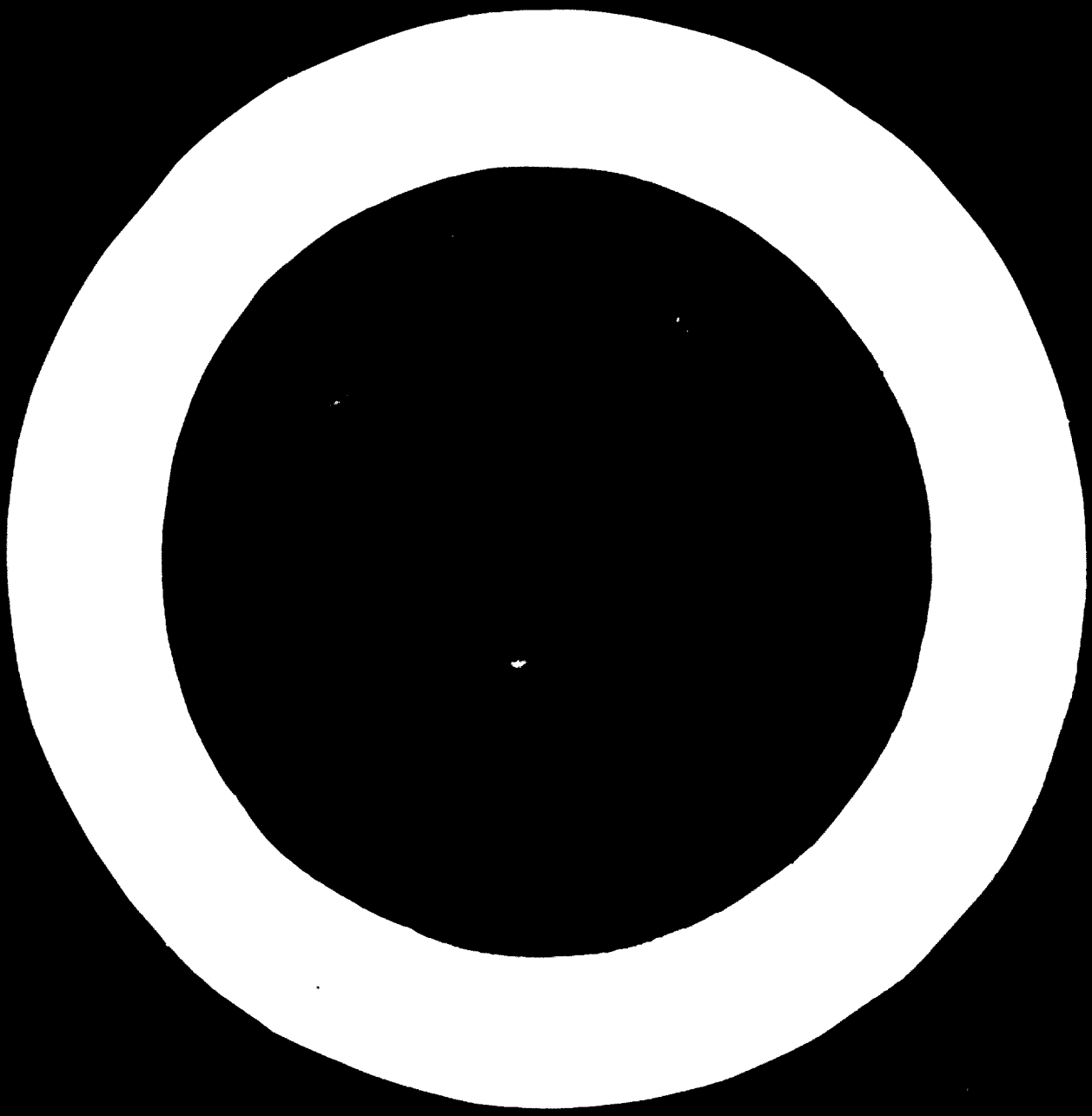

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INTRODUCTION

This paper has been prepared at the request of the United Nations. Its purpose is to examine the role of industrial estates, areas and zones in connexion with urban and regional development planning, and more specifically their role as a tool for planned industrial location and development. Although experiences in all countries are evaluated, emphasis is placed on conditions prevailing in the developing nations.

Industrial estates, industrial zones and other methods of land and facilities' development for industry are not new. In countries such as Great Britain, Italy, and the United States, initial steps in this direction were taken in the early part of the twentieth century. However, since the end of World War II, and in proportion to the growing speed of technological change, industrial growth, and urbanization, the use of industrial parks and similar devices has increased at an extraordinary rate in such countries as the United Kingdom, the United States, Canada and the Netherlands. It has spread to many other European countries such as France, Sweden, Denmark, and Switzerland. In the Soviet Union industrial zoning as part of new industrial town development has been practiced for many years. In the developing countries, especially India and Puerto Rico, industrial development programmes are making increasing use of industrial estates as a tool for assisting in the development of small industries, in implementing regional policies of industrial decentralization and as an incentive to attract foreign investments. Yet, considering the advantages that industrial estates can offer, it is surprising that not more developing countries have made use of this tool on a larger scale.

A number of studies on industrial estates have already been published.[1/] In the international field, the United Nations has been a pioneer in promoting knowledge about industrial estates through a series of excellent

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* Footnotes will be found at the end of this paper.

This paper was prepared by Mr. Anatole A. Solow, Associate Professor of Urban and Regional Planning, Graduate School of Public and International Affairs, University of Pittsburgh, Pittsburgh, Pennsylvania.

comprehensive publications[2] and through the holding of regional seminars in the Far East and in Africa. Not only did the Seminar on Industrial Estates in the ECAFE Region provide guidance in the form of a series of recommendations, but it assembled the most comprehensive collection of case studies, surveys, and data on industrial estate programmes undertaken in the countries of that region and in some industrial countries of other regions.[3]

Until now, attention has been focused principally on the industrial promotion function of estates and on their physical design rather than on their role in connexion with urban and regional development planning. We shall attempt here to synthesize the most important aspects of industrial estates, areas and zones as seen from the vantage point of urban and regional development policy, keeping, of course, in mind that their principal purpose, especially in developing countries, is to advance the process of industrialization.

Thus, industrial estates form part of two systems: they have to be considered simultaneously as elements of urban and regional planning and as elements of economic and industrial development. The understanding of these relationships is fundamental and they will be discussed in greater detail in the following chapter.

The thesis of this paper is that industrial estates, areas and zones can make a significant contribution, but only as one of many co-ordinated elements of urban and regional planning, in providing an industrial base for development and in guiding industrial location. The role which they can play depends entirely on a combination of factors which must be considered jointly and inseparably, namely:

a. The broad framework of <u>national economic and industrial development policies</u>;

b. The general goals of urban and regional development policies;

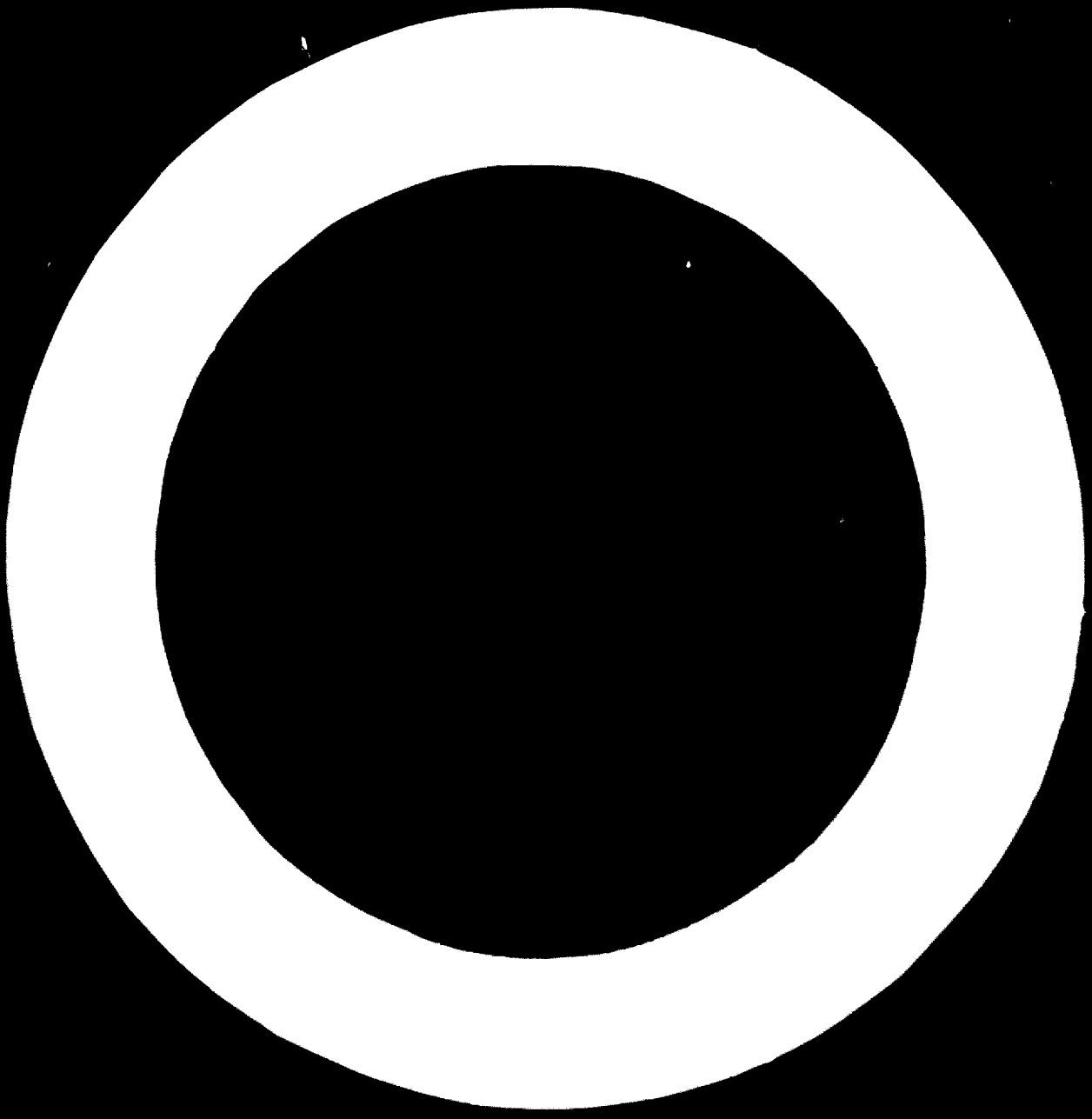
c. The specific objectives which are intended tc be achieved by industrial estates;

d. The constraints imposed by the characteristics of the urbanization process and of urban areas and the criteria of urban and regional planning;

e. The types of industries to be served and their characteristics in terms of locational, land, facilities and service requirements;

f. The types, characteristics and requirements of industrial estates to be established;

g. The supplementary and accompanying urban planning measures to be taken in conjunction with the establishment of industrial estates.



I. INDUSTRIAL ESTATES, AREAS AND ZONES AS ELEMENTS OF URBAN AND REGIONAL PLANNING IN THE CONTEXT OF NATIONAL ECONOMIC DEVELOPMENT

1. Characteristics of Industrial Estates, Areas and Zones

An industrial estate[4] is generally defined as a device whereby on a large suitable tract of land, and under a single or unified development and management, there are provided on a rental, lease or sales basis, for the establishment and operation of individual industries, sites, serviced by streets and utilities, including often, but not always, industrial buildings, and a range of common services, whose variety depends on the needs of the industries and on the management decisions of the estate. The management operation, especially in developing countries desiring to promote industrial growth, may consist of a variety of aids to industries, such as initial financing, subsidies, common services, publicity and promotion, and technical assistance in the production and marketing processes.[5] One other characteristic is worth mentioning, which is that industrial estates select the industries to be admitted to the estate in accordance with certain criteria, and subsequently maintain certain controls to assure harmonious development and to prevent nuisances or other negative effects of individual industries. Thus, and this is fundamental, the term industrial estate refers simultaneously to three aspects: the physical facilities (land, buildings, streets, utilities); the common services which are provided; and the institutional mechanism of development and continuing management and operation of the estate.

Within this broad definition there are a great many types of industrial estates. The size of the estate, its location, the nature of common services, the amount of direct or indirect subsidies or inducements to be provided, the types of industries to be admitted, the controls to be enforced, whether buildings are to be put up and what kind, and many other characteristics will all depend on the purposes which the industrial estate programme is intended to accomplish. Different types of industrial estates are described by the United Nations as follows:

> "An industrial estate can be the centre of an "industrial city" or of an "area of industrial development," or a modest cluster of small industries and handicrafts in a rural locality. It may be a landscaped "park" or a utilitarian "tract". It may be zoned for heavy or light industries, or both, or reserved for certain specific industries or ancillary enterprises working as subcontractors for large concerns. It may offer improved sites, custom-built factories, or general-purpose factories, or any combination of these features. It may provide a variety of services affording economy and convenience to the industrial occupants."6/

An industrial area[7] is a piece of land purchased by a developer, whether private or public, and subdivided into improved industrial building lots, usually of varying size, which are sold, or, in some cases, leased to individual companies or industrialists desirous to set up their industries. An industrial area or subdivision can be defined essentially as a real estate operation.

Industrial zones are merely areas of land or parts of the city which have been designated or zoned officially for industrial use.[8] Such official zoning is essentially regulatory in nature and usually implies certain controls over land use, type of industry, density, and other requirements. Such zones may already be occupied fully or partly by existing industries, they may consist of vacant land which may be improved or unimproved, and there may be other uses such as residence or commerce present or permitted in industrial zones.

All three devices - industrial estates, areas and zones - exert varying degrees of influence over location of industry, and provide varying degrees of developmental stimuli, but there exist fundamental differences. The distinction between industrial estates and industrial areas is that in the first case there is not only an initial developmental function of providing land, building, utilities and services, but the estate manages the operation on a continuing basis and provides additional services which act as incentives to the establishment of industries. In

the second case, the initial development function is limited to the subdivision and improvement of land, and the operation terminates with the sale of industrial lots. If the sale is made at cost or on a limited profit basis, industrial areas can be considered as a limited aid to industries. In the third case, namely that of industrial zones, there is no developmental function and the action is merely regulatory, stating where industrial location may or may not take place.

Thus, the selection of each of the above devices or a specific mix of them will depend, at least in part, on the degree of incentives considered necessary to assist industrial development, small industries usually requiring more help than large ones, and to induce industry to establish itself in locations which it would not seek on its own, such as in smaller towns, whereas industry is likely to be spontaneously attracted to the large metropolitan areas.

Whereas industrial zoning always implies governmental regulation, in several countries industrial estates and areas are established also by private enterprise, motivated by profits. Since we are here concerned with the promotion of industrialization and with guiding industrial location in the interest of economic and social development, we shall consider industrial estates and areas as tools of governmental policy rather than as private enterprise undertakings.

Industrial estates, areas and zones are intended to influence, through regulations or through positive developmental measures, locational and investment decisions of industrial entrepreneurs, for whom the determining motive is profitability and efficiency. Consequently, one of the principal criteria for using these devices, and of the tests of their efficiency is whether they will satisfy the demand and need of the customer, in this case the industrial entrepreneur.

2. Contribution to Goals of National, Regional and Urban Development

Much has already been written on the benefits which may be derived from industrial estates, and the limitations which should be taken into account have also been pointed out.2/

Many advantages can be obtained by the public sector as well as the private entrepreneur from a combination of such devices as industrial estates, areas and zones. They permit advance acquisition or reservation of suitable land for industry, concentration of development in suitable locations and on suitable sites, large-scale unified development of industrial land, services and facilities, co-ordination with other elements of urban development, continuing management and technical support operation, combination with fiscal and other incentives, and some controls over unplanned haphazard industrial location.

In summary, experience both in developed and some developing countries shows that if properly used, industrial estates, and to a lesser degree industrial areas and zones, can, in conjunction with other measures to promote industrialization and guide industrial location, contribute substantially to the following commonly enunciated goals of urban and regional planning, and of national economic and industrial development:

A. Contribution to goals of economic and industrial development

1. Promote more rapid industrialization of the country.
2. Increase industrial employment nationally and locally, in specific communities.
3. Achieve a more balanced regional distribution of employment and production, and consequently, a more balanced regional growth.
4. Attract private industrial investment, both internal and external.

5. Promote the development of small national industries.

6. Bring industries and industrial employment to rural areas.

7. Induce structural changes in production and employment, especially diversification.

8. Encourage more effective use of resources through the development of large-scale industrial complexes, including diversified industries of all sizes, centred on major projects such as ports and airports, railroad and highway junction points, power plants, oil refineries, steel mills, chemical plants.

9. Improve product quality and increase productivity.

10. Train labour and increase its productivity.

11. Achieve economies in public infrastructure investment (minimize cost).

12. Reduce cost or capital investment to the industrialist.

13. Eliminate delays for the industrialist in obtaining suitable site, utilities and buildings.

B. Contribution to goals of urban and regional development planning

1. Promote decentralization; prevent or check excessive concentration or growth of single urban areas, especially large metropolitan areas.

2. Increase the economic, productive and employment base of urban communities.

3. Regulate the inflow of industry and guide its orderly location within the metropolitan area.

4. Strengthen the economic base of small and medium-sized towns.

5. Provide an industrial base for New Towns.

6. Preserve the most suitable urban land for industrial use.

7. Provide a more healthful and attractive urban environment.

8. Minimize journey to work and reduce load on transport system.

9. Maximize efficient land use and land utilization.

10. Integrate urban marginal population into productive industrial system.

11. Reduce costs of land and land development.

12. Provide sites to relocate industries displaced by urban renewal projects.

13. Protect residential and other non-industrial uses from nuisances created by industry.

14. Achieve economies in the provision of urban services and utilities.

3. Industrial Estates and Sub-systems of Urban and Regional Planning and of Industrial and Economic Development

From the viewpoint of urban development planning, industrial estates, areas and zones are part of a larger set of measures to guide industrial location and to provide land and urban infrastructure facilities for industry. The totality of these measures constitutes the industrial land and facility plan, which in turn is one of several elements of a comprehensive urban development plan. Such other elements are: a transportation plan, a plan for utilities and services, such as water supply, sewage disposal, and electric power; a housing and residential development plan, and so on. It is only when all of these sector plans for the urban or metropolitan area are properly integrated with each other in terms of space, relationship and timing of execution, that the industrial sector will fully benefit from suitable urban facilities.

With regard to regional planning, industrial estates should be considered within a much broader framework of a comprehensive and many-faceted programme to implement policies for decentralization, balanced growth of geographic

areas, or the development of specific resource regions. Such policies will deal with manpower resources, markets, transportation and communication systems, power networks, industrial linkages, and many other aspects.

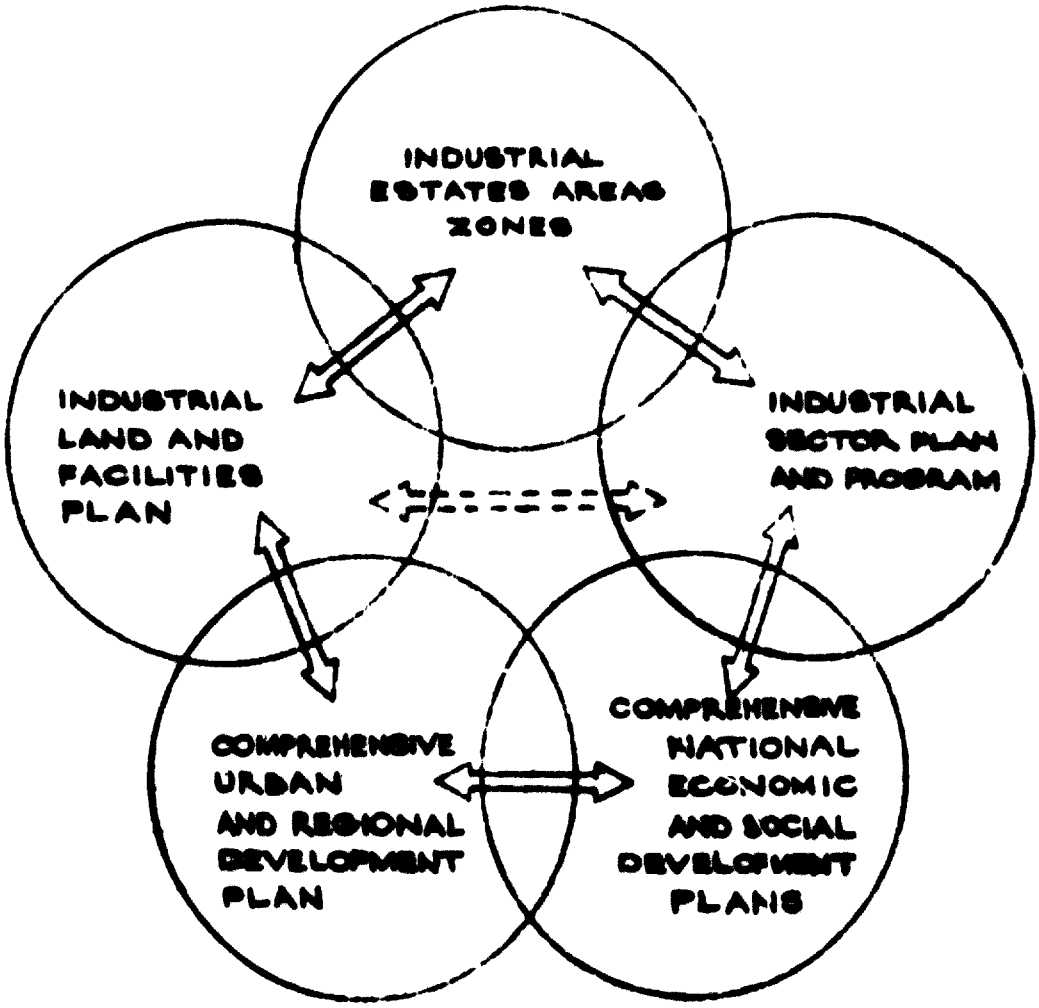
In relation to national economic development, industrial estates are but one of many elements and tools of a plan and programme for the industrial sector, which together with other sector programmes form the national economic development plan. Other elements of the industrial sector plan are tax, labour and tariff policies, technical assistance, manpower development, development lending facilities and many other incentives, which together exert positive or negative influences on industrial growth. The industrial sector plan together with other sector programmes such as public works, agriculture, transportation and so on form, in turn, the national economic development plan.

Thus, industrial estates, areas and zones can be considered as sub-systems of urban and regional planning and, at the same time, as sub-systems of economic and industrial development planning. This dual relationship is shown on the attached diagram.

4. Evaluation of Industrial Estates in Terms of Goals for Urban, Regional and National Development

The importance of looking at industrial estates in this way becomes apparent, since the relative advantages of industrial estates and other devices will depend to a great extent on whether they are considered in relation to urban and regional planning objectives, or in relation to national economic development goals. While, as pointed out in other sections of this paper, the broad goal of industrialization is generally a joint objective of both urban planning and economic development, the goals and priorities of the two systems are not always fully compatible and may require reconciliation as regards specific decisions about industrial estates and other aspects of industrial location.

DIAGRAM SHOWING INDUSTRIAL ESTATES, AREAS AND ZONES AS SUBSYSTEMS OF URBAN AND REGIONAL PLANNING AND OF INDUSTRIAL AND ECONOMIC DEVELOPMENT



For example, according to the national economic development plan of a country, the highest priority goal might be the attraction of foreign capital investment into new industries. On the other hand, a high order goal for the efficient and orderly growth of the urban areas and for the economies of the transportation system may be the reduction of the journey-to-work, that is, the lowering of transportation costs and distances between residences and places of work. To what extent and under what conditions does an industrial estate contribute to either of these goals? Is one form of industrial land development better suited than another? In the first case, an industrial development agency might well select a site for an industrial estate in a location which is suitable to attract industrialists because of the external economies and other immediate advantages it offers, but which may well create additional problems or costs to the urban community in terms of traffic and transportation problems, location of workers, housing and so on. In one instance, the governments of five developing countries would have liked to limit further growth of the capital cities through decentralization to other urban areas. But a feasibility study of industrial estates made by a group of experts concluded that in order to attract external industrial investment, which was also a high priority goal of the governments, the location at least of the first industrial estate should be within the metropolitan area of each capital city.10/

Another conflict between goals may arise when local municipal governments compete with each other for industries without regard to national or regional location policies, resulting often in waste in infrastructure investment and transportation problems. Examples of this may be found frequently in the large metropolitan areas consisting of many independent political subdivisions.

The conclusions to be drawn from these considerations are:

1. That industrial estates, areas and zones can contribute to the achievement of a variety of goals.

2. That industrial estates, areas and zones must be evaluated in terms of their contribution to achieve specific goals of urban and regional planning and of national economic development and industrialization.

3. That in each case the goals and priorities of both the urban and regional as well as economic and industrial policies must be explicitly stated and carefully examined in defining the role of industrial estates, areas and zones.

4. That there is need to co-ordinate most closely industrialization and urbanization policies in order to maximize the role which industrial estates can play in both economic and urban development programmes.

5. Criteria for Examining the Role of Industrial Estates, Areas and Zones

If industrial estates are to be evaluated in terms of their contribution to the attainment of a specific goal or set of goals, some of the following more specific criteria need to be applied:

(a) does an industrial estate contribute to the goal better than some other urban planning solution or form of investment;

(b) if so, what type of industrial estate and under what conditions;

(c) is the cost or expenditure commensurate with the benefits or desired results;

(d) does the industrial estate produce any undesirable or negative by-products;

(e) what external conditions must be satisfied so that an industrial estate contributes effectively to the accomplishment of the goal and so that negative by-products be avoided;

(f) does the industrial estate satisfy the needs and demands of the industrial entrepreneurs for whom it is intended.

Unfortunately, these important questions can only be answered on a speculative and general basis, as there is little empirical and factual survey data available to evaluate the performance of industrial estates and the effectiveness of such programmes undertaken in different countries.

Most of the literature on this subject is hortatory in nature, proposes guidelines, standards and criteria, but evaluates only in the most general terms the consequences of industrial estates programmes and their successes or failures.[11] Much could be gained if governments evaluated their industrial estate programmes and if a comparative analysis of country programmes were undertaken on the basis of this and other material.

II. LAND AND FACILITIES FOR INDUSTRY: A NEGLECTED PROBLEM

1. Industrialization as a Joint Goal of Urban Planning and Economic Development

It has been recognized by now that, with few exceptions, in developing countries the rate of industrialization is lagging behind the rate of urbanization, and that the economically active population is growing faster, especially in the large cities, than the number of jobs, particularly industrial jobs, that is being created. It is true that new industries, especially footloose or market-oriented industries, are also attracted in increasing numbers to the larger urban areas for many well-known reasons, but new industrial jobs are lagging far behind the population explosion concentrated in a few metropolitan areas.[12] At the same time smaller towns are stagnating or losing population, because new industries do not settle there, and, consequently, new industrial jobs to absorb or attract the labour force are non-existent.

The economic base of urban areas depends principally on the provision of industrial employment in reasonable proportion to the population, since each industrial job supports additional numbers of jobs in services.[13] Naturally, the magnitude of such multipliers will depend on many factors and will vary from country to country, city to city, and industry to industry.

In addition to employment, a new industry brings many other benefits to a community. An increase in per capita income can be expected not only due to the wages paid, but also as a result of industry's purchases in the

community and the general stimulus to commercial and service establishments. Increased tax revenues can also be expected. Thus, the provision of additional industrial jobs, and especially, the attraction of "export" type industries through a programme or industrialization, becomes a major goal not only of national economic development, but of urban development planning, especially at the local level.

2. The Importance of Land and Urban Infrastructure Facilities for Industrial Development

From the point of view of the industrialist, as well as in terms of the development of the urban area, one of the most important components in facilitating the establishment of industries is an adequate supply of land of suitable quality and quantity, properly located, adequately serviced by transportation systems and utilities, reasonably priced and readily obtainable for industrial use. Land that meets all those qualifications is called prime industrial land. There is much demand for it and there is preciously little of it in most urban areas.[14/]

The industrially developed countries, and especially their urban communities, have, for some time now, recognized that suitable land and physical facilities for industry are essential inducements to attract industrial growth, and such concepts as industrial estates, industrial zoning, and comprehensive planning of land and physical facilities for industry, have become an accepted part of urban and regional planning.

In some countries such as the United Kingdom, the control over industrial location and the provision of industrial estates in new towns constitute policy at the national level. In the Soviet Union a similar situation prevails. In the United States, industrial land and facility planning is carried on by planning offices of local government often in an endeavour to compete with each other for the attraction of industry.

In practically all developing countries industrialization programmes are being pushed vigorously, and various types of financial and economic incentives such as tax exemptions, import duty reduction, technical assistance are being provided. But only recently, and only in a limited number of cases, has it been recognized by governments, that the provision of land and physical facilities, especially the establishment of industrial estates, is an important factor, in combination with other economic and financial incentives - to attract private capital investment in industrialization and to facilitate the establishment of industries.

Puerto Rico has been notable in including the consideration of land and facilities in its over-all industrial promotion programme to attract capital from the United States. India has established and implemented a national policy of industrial estates with the goal of promoting small local industries in rural and small urban areas. A number of other Asian countries have started to pay increasing attention to industrial land and facilities in urban areas.[15/] In Latin America an increasing number of feasibility studies for industrial estates have been made[16/] and in African countries interest in industrial estate development is growing.[17/]

But in spite of these laudable efforts, it is safe to state that not nearly enough attention is being paid to the problems of land and facilities for industrial development in the rapidly growing urban areas of developing countries. One of the reasons for this may be that these efforts, and especially the establishment of industrial estates, have been in the hands of special national or sometimes local agencies, directly responsible for industrial development programmes. Yet these same agencies have had little control over land use planning and other developmental aspects of urban areas, such as the over-all provision of economic and social infrastructure, which is essential in order to attract and facilitate industrial development. On the other hand, in most cases,

the authorities actually responsible for urban planning, whether at the local or national level, have done very little from the over-all urban development point-of-view to assist industrial development through any form of industrial land and facility planning and the provision of an adequate and properly located supply of industrial land. In many instances urban planning agencies are altogether non-existent or where they do exist their programmes are ineffective. It would seem, that, especially in most developing countries, the national governments have given little priority to the planning of the over-all development of urban areas, and that local municipalities have not had adequate powers and resources to cope with their urban development problems. The United Nations has succinctly defined this problem by stating that: "urban and regional planning considerations have so far played a very small role not only in the industrial estate projects but even in the large-scale industrialization programmes of a number of less developed countries."[18/]

3. Existing Problems

In consequence, the problem of industrial land has been greatly neglected and many unfavourable physical, social and economic conditions are developing in connexion with the establishment of industries in urban areas. The following generalizations can be supported by many specific examples:

1. The supply or availability of prime industrial land is usually limited, especially in cities of developing countries which have severely limited provision of utilities and services.

2. This limited supply of good industrial land, if now specifically preserved for industry - and mostly it is not - is being whittled away by other competing uses which may be of lesser importance for economic development than industry.

3. As a consequence, industry is forced to pay exorbitant prices for land, and uses up its precious capital for that purpose, remaining with insufficient working capital.

4. Moreover, industries are forced to select locations haphazardly wherever they can find them, thereby creating numerous problems for themselves and for the urban area.

5. The haphazard dispersal of industries in the metropolitan area forces the municipalities to extend highways, water supplies and other urban infrastructure in an uneconomic way, thereby creating excessive financial burdens in the public sector at a time when economies and efficiency should be of the essence.

6. Uncontrolled location of nuisance producing industries affects adversely the adjacent areas, and may depress property values.

7. On the other hand, by excessive separation of industry from residences, an additional burden is put on the already inadequate transportation system, and congestion of traffic is magnified.

8. Lack of urbanistic controls encourages the formation of slums around newly established industries.

9. Sometimes industries use land which should be reserved for other uses from the community's point of view.

4. The Requirements of Industry with Regard to Location, Land and Infrastructure

One of the most critical factors in the effective use of such tools as industrial estates is a thorough understanding of the requirements of different types of industry with regard to location, land and infrastructure. We are dealing here with the demand factor. The location decisions of industries have been studied a great deal, and research is being carried on constantly. As a result, various models for industrial location decisions have been developed at the regional and local level. Yet, in practice, many mistakes have been committed in the location of industrial estates and other facilities for attracting industries, and many failures could have been avoided by a more realistic understanding of the factors which influence industrial location decisions and other requirements for successful industrial establishment.

Bredo draws particular attention to the dangers of poor site selection which does not take properly into account the requirements and desires of the industrialist, and he cites specific cases of mislocation of industrial estates.[19]

Industrial location requirements are constantly changing as a result of (a) technological changes in transportation, production, and management; (b) economic, social and behavioural changes in terms of consumer markets; and (c) other forces which reorient the location choices of new industries, or which force relocation decisions of existing industries due to locational, site, physical or structural and functional obsolescence.[20]

Changes in transportation systems are playing a particularly significant role in the location of industrial estates. Increasing preference is shown for proximity to highways as against railroads, especially at interchanges (entrances and exits) to freeways. Air transportation for certain types of goods, and especially for passengers, is becoming an increasingly significant factor in location, at least in the United States where there are some 35,000 private planes owned by American businesses. Industrial estates are being set up in combination with airstrips - and they are sometimes called airports - so that executives may be spared the time-consuming and bothersome trip to and from public airports. About 200 such complexes are being planned or built.[21] Such industrial airport sites are particularly attractive to manufacturers of light, high-value products, and to research and development firms. Thus, industrial estates are being developed next to major airports, such as the one in Shannon, Ireland.[22] Smaller cities in the United States bypassed by the transcontinental jet, utilize the airport as a way to attract new light industry. La Crosse, Wisconsin, is an example where a hundred-acre park is being built next to the municipal airport.[23]

An analysis of the location of, and demand for, industrial land must consider for each type of industry two aspects: (1) macro-decision:

the desired location within the country and region; and (2) micro-decision: what specific site to choose within the generally selected area. Both are, of course, interrelated.

With regard to macro-decisions, (1) it can be expected that major industries connected with processing of agricultural products and raw materials will continue to locate in a dispersed fashion close to the sources of raw material. (2) Industries such as apparel, textile goods, leather and leather goods, plastics, rubber goods, and certain other articles, especially export goods, have characteristics which do not require plant locations at sources of raw materials or major markets, but rather at locations which show strong transportation linkages, especially highway and port locations (railroads are becoming increasingly less important, except for bulk and heavy weight products, such as agricultural and other commodities). (3) Certain other industry groups appear to be tied to locations in or near major urban areas: food products, furniture, printing and publishing, metal products, scientific instruments, research and development, and some stone, clay and glass industries. Some of those require a skilled and diversified labour market, some require inter-industry and service linkages, and some are consumer market oriented, all of those conditions to be found only in large and rapidly growing urban areas. (4) Finally, there are industrial complexes which depend heavily on inter-industry linkages, such as petro-chemical, steel, heavy machinery, and automobile manufacturing complexes.

The general trend due to technological changes in production, transportation and communication seems to be towards a more flexible pattern of industrial location, so that more and more footloose industries that are not definitely tied to specific location advantages, have increasing locational choices, given an adequate transportation and communication network.

Yet, why is it that many footloose industries which could locate in any urban community choose to move to the major metropolitan centres? One reason,

of course, is that the smaller urban communities often lack such utilities as electric power, water and other infrastructure facilities essential for an industry. But even where those are present, survey after survey has shown that industrialists often prefer to move to a large metropolitan area. They are attracted by the totality of urban conditions, facilities and services, and especially by satisfactory living conditions in terms of many alternative choices within the urban area for the managerial and technical personnel and their families: cultural, educational, health, recreation facilities, shopping, banking, professional services, adequate housing, to mention only a few. In fact, when these conditions are present in their totality, individual negative factors such as higher cost of land are often overlooked. Thus, other economic and technical conditions being equal, and within limits of cost-benefit analysis, there are these other considerations, often of a non-economic nature, influencing locational decisions.

For example, in an analysis of Ciudad Guyana in Venezuela, Lloyd Rodwin states:

> "Still another implication was the need to set a fairly high priority on the provision of facilities which would attract key managerial staff as well as skilled professionals and workers. The calculus of cost and benefits could not be precisely formulated at the time. But the weight of opinion was that good schools, well designed neighborhoods, improved communication, recreation and shopping facilities and an attractive urban setting would help to reduce labour turnover..."24/

A United States manufacturing executive declared: "...when checking a locality for possible plant sites, management has an eye as much on the quality of parks and school maintenance and on how effectively peak-hour traffic conditions are handled as on markets for its products."25/

The United Nations Seminar on Industrial Estates in Asia summarized the importance of social overhead in location decisions as follows:

> "In selecting the location, account had to be taken of the availability of housing, public transportation, schools, hospitals, etc., and of the prospective increased demand for such facilities resulting from the occupation of the estate. The Seminar considered that the availability of a minimum of social as well as economic overhead facilities was in most cases a prerequisite for the establishment of an estate in a given location. Demand for most of them would increase from the earliest stages as a result of the rise in employment and income induced by industrialization."26/

Once a region or urban area has been selected, factors which influence, at the micro level, the siting decisions in connexion with the establishment of a new industry are the availability of a sufficient quantity of prime industrial land, and the possibility to take advantage of external economies. The desire is usually to locate as close to the urban centre or a sub-centre as possible, to benefit from such external services as banks, post offices, and other service facilities provided, of course, that these benefits are not outweighed by such disadvantages as excessively high cost of land, traffic congestion, lack of parking and so on.

A survey of a growing metropolitan area in a developing country showed that not a single firm wanted to relocate further out than 7.5 miles from the boundary of the city, and, in fact, as many firms wanted to relocate closer in as wanted to move further out. All firms wanted to relocate within 25 minutes driving time from downtown.27/ According to a survey of Managua, the capital of Nicaragua, with a population of about 250,000, the large majority of industries established or relocated during the 5 years previous to the survey, were within 7.5 miles from the centre of the city, and the majority of industrialists interviewed indicated a preference of 3-5 km. from the center, giving as principal reason the lack of transportation, especially for office personnel, and of housing for the employees beyond these distances.28/

The same survey noted that the majority of workers walked to work, used bicycles or buses. But there was a problem for office employees, especially female. Practically none of them had private cars and refused to take public buses which they considered unsafe and uncomfortable. Industrial establishments located too far had the additional cost of providing their own transportation for such employees. In situations of this kind, of course, it is most likely that industrial estates could provide their own transportation for several industries at lower costs than individual industries. Thus, while in more developed countries larger ownership of automobiles and increased mobility permits more extensive decentralization of industries within a metropolitan area, and the distance between place of employment and employee residence is less important, in developing countries proximity to workers housing or adequate public transportation become critical factors in site selection and limit the locational choices of some industries.

Sometimes, a pleasant environment for the factory will be sought and paid for, but in other instances, especially where initial capital is limited, amenities are overlooked and operations are started modestly on a shoestring basis and in locations which provide no luxuries but only bare essentials for the minimum amount of investment and operating cost. This is particularly true of small local industries and should be taken into consideration where the goal of industrial estates is to promote small-scale industries. While these industries often operate in highly deficient quarters, and while their efficiency and productivity could be increased through larger and better physical facilities, such as can be provided by industrial estates, it has been pointed out that these advantages might be off-set by the tendency of industrial estates to provide facilities on too luxurious or too lavish a scale, at a cost which represents either an excessive load on small individuals, or an unreasonably high subsidy by the government providing such facilities.[29/]

Other factors being equal, the initial cost of land and its improvement in terms of access roads and utilities is, of course, an important consideration for the industrialist. In a survey of industrial establishments in Managua, the initial low cost of land was given as the most frequent reason for selection of site, closeness to highways and transportation ranked second, and adequate space, proximity to markets and compliance with zoning ranked third.[30]

Sometimes industrialists have also been willing to pay premium prices for location which provide visual advertising value. Thus, it was found frequently that in spite of high land costs industries preferred to locate at interchanges and in ribbon form along major highways, often at those leading from the city to the airport. Surveys indicate that the reason for this has been not only accessibility but, the desire for visibility.

It is generally claimed that by virtue of economy of scale, industrial estates should be in a position to offer comparable land at costs lower than those obtained through individual negotiations and purchase. Few comparative studies are available to substantiate this claim. Studies in the United States indicated that land in privately developed industrial estates actually sells at a higher price than comparable land individually sold. This is compensated for the purchaser by the time gained in moving into a ready-made situation. The previously cited study in Managua estimated that the unsubsidized cost of developed land in the proposed industrial estate would be quite competitive or even lower than similar land sold in the open market, quite aside from the other advantages offered by the estate . Naturally, costs of land in industrial estates may be lowered through direct and indirect subsidies in order to make it attractive to the industrialist, but there are obvious limitations on the use of subsidies in capital short countries, and the costs would have to be carefully verified against benefits.

The amount of land or size of lot desired will vary from industry to industry, and no universal standards can be set. Some industrialists long established in central urban areas will accept considerable congestion. However, in buying industrial sites on the outskirts of cities in the less congested areas, whether to establish a new industry or to move an old one from a central and congested location, it has been found in several cases that more land was purchased than needed for possible future expansion, and this was attributed to speculative tendencies to keep land for further resale at higher prices.[31]

Space consumption by industry, usually measured in terms of employee density per acre, tends upwards. Based on an analysis of recent trends, an expert recommended a land area standard for new industry of 30 to 50 acres per 1,000 employees or twice as high as used at present by older plants in a city in the United States.[32]

At least two studies of metropolitan areas in the United States have established a close relation between acres of industrial site area, coverage, distance from centre of the city and other factors. Generally, these studies showed that the highest employee density was found in factories located within 5 miles of the business centre of the city, and that industries in sub-urban areas tended to occupy larger amounts of land per employee.[33]

It may perhaps appear that inasmuch as this is not a treatise on the location of industry, we have dwelt too long on the demand factors, but since industrial estates and areas are supposed to meet the locational and site requirements of industrialists through the supply of land and facilities, it is most important to pay the greatest attention to the demand aspect in order to insure the advantages of industrial estate programmes.

III. THE ROLE OF INDUSTRIAL COST TAGS IN CONNEXION WITH REGIONAL DEVELOPMENT AND INDUSTRIAL LOCATION POLICIES

1. Goals and Objectives of Regional Development Policies

In those cases where governments have established policies for regional development - and as yet they are on the whole in a minority - the goals underlying such policies are both of a social and economic nature, as has been stated for Puerto Rico: "The goal of our government is to achieve a uniform economic and social development in the entire island."[34/] From the economic point of view, such goals desire to minimize development and operational costs, and to maximize productivity and the utilization of resources, whether these be natural or human. Thus, for example, the economic argument made in favour of decentralization has been that the cost of urban infrastructure and other costs of urban development are excessive in large metropolitan areas.[35/] Another economic justification for giving priority to the development of certain regions has been the desire to exploit the richness of their natural resources. Still, a further economic rationale has been the need to integrate lagging and leading regions of the country and sectors of the economy in order to achieve a balanced economy.[36/]

From the social viewpoint, the goals pretend to obtain as wide and as balanced a geographic distribution of development benefits as possible. Thus, it is claimed that housing and living conditions for the masses of low income urban families are relatively worse in large urban areas than in smaller ones, or at least that these negative conditions can be easier corrected in smaller than in larger urban areas.[37/] Also, that unless development is brought to stagnating or backward areas, the standard of living of the inhabitants of those regions will decline and people will migrate to the large metropolitan centres.

More specifically, a review of a number of cases indicates that governments that have, in connexion with their national development and industrialization programmes, adopted regional policies, have done so for one or more of the following reasons:

(a) to prevent continued concentration of population and capital investment in single already large urban areas;

(b) to promote decentralization of economic activity and to encourage the growth of small towns;

(c) to achieve a more balanced geographic distribution of development;

(d) to achieve, for political and social reasons, as wide a geographic distribution of development benefits as possible;

(e) to develop natural resources and their regions;

(f) to develop and interconnect outposts for defence reasons;

(g) to industrialize the countryside;

(h) to integrate rural and urban economies;

(i) to stabilize or reverse the decline of regions which have started to go down hill;

(j) to obtain a pattern of development which will have the lowest socio-economic costs.

In order to achieve these goals and to implement regional policies, the location of sources of employment, especially industrial employment, becomes of paramount importance, as this is the principal way to provide a sound economic base for the sustained growth of different regions and urban areas. Thus, the establishment and implementation of policies governing the location of industries are the essential underpinnings for achieving the goals of regional development.

It has been pointed out in previous sections that the trend of individual decision-making, both on the part of individual households and on the part of investors in industrial establishments is to concentrate in already large and rapidly growing urban areas and to leave undeveloped, stagnant and declining regions. Consequently, the above policies imply essentially an attempt by governmental action to reverse, halt, or at least control what appears to be a spontaneous trend.

Experience has amply shown that such fundamental trends based on individual desires, decisions and actions cannot be changed by mere control measures, but can only be counteracted - if at all - by positive governmental action. Such action usually necessitates public investments such as industrial estates or some other forms of subsidy or incentive, which result - at least temporarily - in direct or indirect costs to the government. Usually the combination of these measures is costly, considering especially the limited resources of developing countries.

In addition to the necessity of maintaining a reasonable balance between costs and benefits, it is essential for the governments and their public agencies to select those patterns of regional development and those measures, including industrial estates, which will lead to the desired end, and which, for a minimum cost, will give maximum results toward implementing regional policies.

Within this framework, experience to date has shown that industrial estates can be a most useful tool in implementing regional development and industrial location policies, provided they are used (a) as integral part of comprehensive regional development plans and national urbanization policies; (b) in conjunction with many other measures as part of a total regional development programme; (c) within an efficient time sequence of allocation.

2. Industrial Estates in Relation to Alternative Patterns of Regional Development

The type of industrial estates and other measures of physical and land planning to be used depends on the pattern of regional development, and on the spatial distribution of industrial development that is desired, and, of course, on the types of industries to be accommodated. But all these considerations go hand-in-hand. For example, an industrial estate in the proximity of a new steel mill, or in connexion with a petrochemical complex, perhaps situated in a relatively undeveloped area, will be quite

different from one that proposes to encourage the growth of small industries in existing small urban communities. Again, an industrial estate in connexion with a new port development may show quite different characteristics from one that is to attract new industries to medium-sized cities, which are intended to act as growth poles for stagnant agricultural regions.

Consequently, the development of an industrial estate programme should be closely related to the specific regional development alternatives and in fact, should be preceded by an analysis and evaluation of various regional and spatial development patterns.

The process of developing such alternatives must take into account the distribution of industrial job opportunities at two levels: regional and local. Analysis at the regional level will consider such aspects as unique qualities for industrial development that may exist between different parts of the country, the physiography and natural resource base, the man-created potential for development in terms of physical facilities, the socio-economic aspects of population, income, etc.

The local level involves a more detailed look at specific, existing urban concentrations, locational points and sites within the chosen region, to determine their relative advantages. In terms of industrial estates this local level becomes particularly meaningful: "For only when job locations are defined for local areas can program decisions be made on factory space, industrial land, and community facilities and services."38/

In addition to the social, political and economic goals previously discussed, the range of possible patterns of industrial location flows logically from the considerations enumerated above, and must especially take into account the realities and constraints of already existing patterns and trends of development, and of mobility of labour, management and capital. This essentially involves an evaluation of the prospects for, and the degree to which, current trends in the location of manufacturing employment can be changed, and what resources are available to do so.

The principal alternative spatial forms of regional development and guided industrial location consistent with the previously cited goals are:

1. Widest possible dispersal to all or as many as possible already existing small and medium-sized urban communities.
2. Concentration of development in a limited number of major centres or development areas, which already provide an impetus to growth. Or where, if additional concentrated external impetus is provided, not only in the urban area but in the urban region serviced by it, growth is likely to take place (the growth pole theory).
3. At significant transportation points such as at ports, airports, or in certain especially favorable locations along major highways.
4. In connexion with development of natural resources, such as coal, steel, oil, etc.
5. Through the establishment of new towns. (This may be related to items 2, 3 and 4 above).

The two alternatives, widest possible dispersal of many small development inputs, including industrial estates, vs. concentration in a limited number of locations, is discussed by the United Nations under the heading of "Intensive or Extensive Industrialization Policies and Programmes Related to the Establishment of Industrial Estates."[39/] While the advantages and drawbacks of each alternative are pointed out and illustrated by examples, no definite conclusion is drawn by the United Nations study.

Obviously no hard and fast rule can be established, and each case has to be considered on its own merits. This author leans to the view that the theory of concentrating efforts on a limited number of "regional growth poles" is gaining support, and that it has particular applicability to the successful establishment of industrial estates.

The desire to distribute developmental benefits evenly and widely to as many small urban areas as possible is sometimes politically and sometimes socially motivated. Yet unless, in addition to the establishment of industrial estates, adequate and multiple resources can be made available to bring many small urban areas, which are stagnating, to the "take-off" point, the danger of failures will be ever present.

India has developed and tried to implement, what is perhaps the most ambitious programme of industrial decentralization, to villages and small towns. This programme has been quite successful in stimulating and assisting the development of small industries through the use of industrial estates. However, according to a number of observers, the success of trying to induce industrial development in rural areas or in small towns of 20,000 to 50,000 population, as has been attempted in India, seems questionable, unless these are satellites of a larger metropolitan centre, which can offer the necessary environment for industrial growth.[40] While generalizations should be viewed with caution, the population figure of 100,000 to 200,000 has been mentioned as a size below which cities are unable to supply the many desirable features which in combination stimulate industrial growth.[41] Or as Harris has put it: "The viability of industrial growth is directly correlated with the size of the city or with the size of an adjacent metropolitan center, inversely correlated with the distance from a large center, and positively correlated with the size and self-contained character of the industrial establishment."[42]

The case for using industrial estates in connexion with large-scale industrial expansion in development regions, which have a predetermined minimum size and growth potential, is well made in a review of Italian experience.[43] In Puerto Rico, the initial policy of providing industrial buildings in many stagnating small communities in the hope of attracting industry did not meet with complete success, because these communities lacked over-all services and amenities. The policy was subsequently modified to concentrate comprehensive developmental efforts, including industrial estates, together with other accompanying measures, on a limited number of selected urban nuclei, which showed growth potential.[44]

A comprehensive study of Central America evaluated the feasibility and location of industrial estates, and concluded that only in the capital cities of the five countries was the infrastructure base adequate to support a full-scale industrial estate.[45]

In a study of industrial land, facilities, and estates in Nicaragua, in which the author co-operated with local agencies, the following conclusions were drawn: "It is recommended that for industries that require proximity to urban areas rather than to sources of raw materials, there be followed a policy of concentration in a few selected cities rather than a dispersal. This means that with limited resources at hand, priority should be given to improving utilities, roads, services and industrial land in those cities which are attracting industries because they already have some of these facilities."[46]

The success of the industrial estate programme in the city of Queretaro, Mexico, is attributed to the careful selection of that city as an industrial regional growth pole.[47]

A recent study made for the United Nations by "Resources for the Future," strongly supports this growth pole theory whereby "development policies may be focused on providing the most promising regional center with the endowment of well-designed physical facilities, basic institutions, and economic assets to expedite its performance of the growth pole function, not only to provide a benevolent economic environment for new industry but to create an environment for living which will be attractive to the professional, managerial and technical personnel... Thus, the government may adopt policies of inducing the location in the regional center of new industries by developing well-planned industrial estates..."[48]

Due to technological changes in production and transportation, the effect of regional and national transportation networks and terminal facilities, such as ports and airports, upon industrial locational patterns is gaining in importance, and, within broad locational policies, will influence the specific location of industrial estates perhaps more than most other factors. A relatively recent study in Puerto Rico came to the conclusion that transportation linkages, especially highways and terminal

facilities, and in particular, ports are the fundamental criteria for a logical pattern of decentralization. Four alternative patterns closely related to highway transportation systems and linkages were evaluated.[49]

In the United States, the Interstate Freeway system is exerting a strong influence on the location of industries and industrial estates, especially at interchanges within metropolitan urban regions.[50]

The above discussion of regional locational patterns is not intended to define a single pattern but rather to draw attention to the importance of determining alternative patterns as a precondition to selecting the types of industrial estate programmes that may be suitable in each case.

3. The Contribution of Industrial Estates to Regional Development Programmes

In most cases where governments have adopted specific policies of decentralization, as for example, in the United Kingdom or Puerto Rico, or of developing an industrial base in smaller towns or rural areas, as in India, or of trying to attract industries and employment to deteriorating regions as in Italy or the United Kingdom, they have made use of industrial estates as a tool of such regional policies in conjunction with other programme elements.

In promoting a decentralization policy of strengthening smaller urban areas and providing them with an adequate industrial base, the advantages of industrial estates can be considered from the point of view of (1) the industrialist or industry; (2) the agency implementing the regional decentralization policy; (3) the local community. With regard to the industrialist, two objectives for strengthening the industrial base of the community must be included: (a) attracting industrialists and investment of capital from outside the urban community and (b) mobilizing local capital and the local entrepreneurship (which usually will be of a small-scale industry type) together with the development or expansion of local industries.

From the point of view of broad regional decentralization and industrialization policies, and in relation to specific spatial patterns of industrial location as discussed in the previous section, the use of industrial estates appears to offer the following advantages:

1. With regard to small urban areas, the cost of raw land per se is usually relatively low, and this does not present a problem to a prospective industrialist. But on the other hand, developed and well-serviced land is usually very limited or non-existent, since small towns usually lack in urban infrastructure facilities. By concentrating development of utilities and services in a single developmental industrial area, substantial economies of scale can be obtained in providing public utilities, access roads, communication systems and other urban infrastructure, cheaper than if furnished by either the government, the municipality or the industrialist acting independently in dispersed isolated locations. Thus, not only better facilities can be provided to attract industry, but economies are likely to result both for the urban community and for the industrialist.

2. By bringing together, by means of an industrial estate, in a single place, within immediate proximity of each other, a large number of industries, preferably of an interrelated character, it becomes possible for them to benefit from a common pool of managers, supervisors, skilled workers, services and also the exchange of goods. The isolation of individually located industries, which is particularly marked in smaller urban areas, would thus be overcome through location in an industrial estate. This would be particularly applicable to small-scale industries.

3. As has been indicated previously, special incentives to industry must be provided to locate in smaller towns, which find it difficult, if not impossible, to compete in attractiveness with the larger urban areas. An industrial estate by itself can, of course, not make up for all the deficiencies of small urban areas, nor will it be a sufficient

attraction without other complementary inducements, but an industrial estate can provide such special benefits as a number of joint services, facilities, subsidies in terms of promotion and technical assistance which are not only cheaper to provide where industries are concentrated in an estate, but which often could not be provided to dispersed locations. This advantage applies both to the development of small local industries and to the attraction of industries from outside. Of course, it will also depend on the amount of subsidy the promotional agency is willing to provide.

4. The industrial estate appears to be a suitable and relatively economic form of providing a packaged deal of ready-made "turn-key" facilities into which the industrialist can move without wasting time, effort and money, on a search of land, negotiating for utility connexions, clearing the title and so on.

5. From the point of view of the urban community, the concentration of industries in an industrial estate, especially if its location is suitably selected in relation to other land uses and to transportation facilities, presents a number of advantages. With the certain knowledge that industries will be located in that specific place, the community can plan the development of the urban area to be harmonious with the location of the industrial estate, and can provide social overhead facilities at lower costs.

6. From the point of view of encouraging the development or expansion of local industries and entrepreneurship of the small urban community, the inherent advantages of an industrial estate enable a number of small-scale units to have the benefits of common services and other facilities, such as a good site, electricity, water, etc., which they could not normally obtain by themselves.

Policies to decentralize industry to smaller towns imply, in effect, efforts to counteract the natural trend of concentration in the big metropolitan urban areas. It means offering to a potential new industry which is faced with a location decision, inducements which can compete with the attraction of the big urban area. Or it may mean providing inducements and facilities for local entrepreneurial talent to establish new or expand existing industries within the smaller urban areas. Aside from such other measures as tax exemptions, subsidies and the like, the use of industrial estates has proved to be an effective tool. Since, by its nature, it is a dynamic development instrument which encompasses many positive elements, it is certainly much more effective in connexion with decentralization programmes than the use of industrial areas or industrial zones.

The role of industrial estates in regional decentralization is perhaps best summarized in an Argentine study:

> "Industrial estates are an excellent means to stimulate industrial decentralization, provided that they are established in carefully chosen centers on the basis of their potential ability to act as economic nuclei and to extend their influence and penetrate into the less developed regions. The establishment of industrial estates in such key points could give a great impetus to the development of small and medium-sized industries in less privileged regions. This could become the most efficient program at the disposal of governments, at all levels, for the orderly and economical promotion of industrial development." 51/

4. Conditions Essential to the Success of Industrial Estates in Regional Development Programmes

The previous sections as well as an evaluation of case histories, studies and literature to date, suggest very strongly that, in addition to factors affecting directly the feasibility of establishing an industrial estate, such as availability of a suitable site and immediate services, a

number of broad conditions must be met to ensure the success of industrial estates in connexion with regional development programmes, such as regional and local infrastructure, co-ordination of sector programmes, timing of development measures, supplementary incentives and aids to industry, institutional considerations. Some of these have already been mentioned but will be summarized here again.

1. First and foremost it is essential to spell out explicitly the goals of the regional programme, to adopt official policies of regional development, urbanization and industrialization and to translate these into alternative spatial patterns and development programmes selecting the most suitable alternatives. All of the above, of course, based on adequate studies and surveys.

2. It is essential to co-ordinate industrial estate projects and other types of industrialization programmes with over-all development programmes for a region. Thus, the United Nations states:

> "Finally, it appears that, while investment in infrastructure facilities is not per se an inducement in regard to location and establishment of industry, programmes for setting up industrial estates can be fully effective only when integrated with basic development plans."52/

3. An effective regional infrastructure system is essential, including transportation, especially highway, air (and, in some instances, rail and water), and communication systems including telephone, telegraph, radio and postal service. These linkages are essential to connect resource areas with markets, agricultural areas with metropolitan centres, inaccessible and outlying regions with the mainstream of economic, social and political activity. Similarly, the availability or possibility of development of energy sources, water supply and disposal systems are necessary elements.

4. A completely co-ordinated and ample programme is necessary for the provision of supporting social overhead services within the urban community where the industrial estate is to be located.

What is meant here are such items as housing, good schools, medical and hospital facilities, police and fire protection, recreational facilities and other amenities and urban services of good quality. This, of course, is seldom found in smaller urban communities, and the costs as well as the local managerial initiative to provide such facilities and services must be carefully weighed.

Such facilities or services are particularly important where outside industries are to be attracted to smaller urban communities, and they have been found particularly useful as an inducement for managerial and technical personnel. Very large companies have, of course, the resources to provide at least a minimum of such facilities to their key personnel and skilled workers.

In the past, this has been done in so-called company towns. But lately management has recognized the problems that such situations create, and integration with the local community is the order of the day. This, of course, requires that the locality provide such facilities, - sometimes assisted by the companies.

Social overhead services may be much less important in the case where the objective of the industrial estate is to mobilize local capital and entrepreneurship, especially of small-scale industries. But in that case it must be ascertained that the local entrepreneurship is available and will take advantage of the facilities of an industrial estate.

5. To attract industries to isolated locations and small towns, industrial estates will generally need to provide more services, inducements and common facilities, and usually at a higher subsidy than in large urban areas, to compensate for the absence of many such facilities in the community.

6. In industrial estates which intend to develop small industries and to mobilise local entrepreneurship in small communities, not only a series of common services have to be provided, but there is need for additional technical assistance and education in management, marketing, etc., especially for small-scale industries. India has, of course, emphasized this aspect, and is perhaps the only country which has attempted to do so on a large national scale.

7. Additional subsidies such as tax exemptions, differential rates and so on may also be required, at least as an initial measure.

8. Assurance must be obtained that the necessary resources for public investment and other incentives will be available over an adequate period of time, and that all elements of the over-all programme and of the establishment of the industrial estate itself be developed in suitable time sequence.

9. The execution of such an integrated programme according to a comprehensive plan will be the responsibility of many governmental agencies. In addition to the industrial development agency which may handle the industrial estate and other elements of the industrial development programme, the local urban municipality will be involved in specific projects as well as in over-all services, as will be such relatively independent agencies as state or national highway departments, water and sewer authorities, housing agencies, electric power companies, air transport authorities, and many more. In the case of large private companies, their participation will also be an important element. Adequate institutional co-ordination and implementation becomes the key to success, and the difficulties should not be underrated. The importance of obtaining firm advance committments for essential facilities required by an industrial estate is well illustrated by the following statement:

> "Action by a dozen agencies is often required to bring water, sewers, storm drainage, gas, electricity, telephones, fire protection, access roads, and rail trackage to the property. Excessive costs and long delays can occur if firm agreements are not made at the outset as to specifically what services will be provided, by whom, when, and at what cost (if any) to the developer. Verbal assurances of "full co-operation" often overlook the time involved in policy decisions, appropriations, and construction scheduling." 53/

Only seldom is the agency in charge of preparing the regional plan and the local urban plans also the one responsible for development and execution, although this may be the case when special regional development or new town agencies are set up; but even there a number of additional agencies will be involved. In some instances "development regions or areas" are officially designated requiring co-operation of all agencies, with principal responsibility assigned to an existing or new agency. Here again, numerous problems of co-ordination, co-operation, programming and timing must be overcome. Sometimes financial inducements from a central or regional agency are used to encourage co-operation of other agencies. This is not the place to expand on this subject, but it is certainly vital to resolve these public managerial problems, if industrial estates are to be successful and to fulfill their role in regional development programmes.

IV. INDUSTRIAL ESTATES AND THE PROVISION OF INDUSTRIAL LAND AND FACILITIES IN CONNEXION WITH COMPREHENSIVE PLANNING OF URBAN AREAS

Having considered the contribution of industrial estates and related measures within the framework of broad policies for urbanization, regional development, decentralization and industrial location, we turn to a more detailed analysis in relation to the planning of the individual urban area.

It was pointed out in Chapter I that the provision of suitably located land of adequate quality and quantity for industrial use, together with the required economic and social infra-structure facilities, should be considered as one of the most important elements of every comprehensive urban development plan. This applies equally to guiding the renewal and expansion of existing urban areas and to the planning of new towns. In all cases, the fundamental criteria are:

(1) to provide an adequate economic and industrial base for the urban community;

(2) from the urban planning viewpoint, to ensure that the best possible land, together with the necessary services and utilities, will be provided for industrial use, and that it will be available at reasonable costs and at a time when it is needed;

(3) to accomplish this in such a manner as to minimize social costs and other possible negative effects of industry upon the urban community (such as traffic congestion, encroachment on other uses, etc.);

(4) to do this in such a way as to plan for continuing growth and change, taking into account especially factors of change.

Translated into a planning process this requires determining, (a) the economic base of the urban community; (b) the demand and supply aspects of land and facilities for industry; and (c) the most effective means including industrial estates, areas, zones, and other measures of ensuring an adequate supply of suitable land in relation to estimated demand, taking, of course, into account all other goals and developmental requirements of the urban area in question, and applying these measures within the framework of comprehensive urban development plan.

1. The Supply of Industrial Land Within the Urban Area

Chapter I discussed the demand for industrial land in terms of the requirements of different types of industries. Determining the supply of suitable land within the urban area to meet this demand is the next most important step to be undertaken as part of the comprehensive urban planning process.

The amount of land occupied or needed by industry is a relatively small proportion of the total land area in use.[54] But the supply of prime or suitable industrial land [55] is rather limited, since only small portions of the urban area will meet the exacting specifications required by industry. Some land may not be topographically suitable, since industry requires relatively flat land.[56] Some land may not have the soil and sub-soil characteristics needed for factory construction - it may be in flood zones. Other sites may not be close enough to transportation or adequately serviced by utilities. Some land areas may be eminently suited for industry, but are wholly or partly occupied by other uses, or are in blighted neighbourhoods, so that large enough sites to meet the needs of individual, large modern industries, or of industrial estates accommodating an agglomeration of interrelated small industries, cannot be obtained without lengthy negotiations for land assembly, excessive costs of clearance and renewal. This is particularly true in close-in locations especially desired by some industries. On the other hand, more outlying sites, that may be otherwise suitable, may be considered by the industrialist to be too far from downtown facilities and from housing. Existing vacant land desired by industry may be actually more suitable for other uses from the community's point of view. In other words, from the over-all urban planning point of view it should perhaps be better reserved for recreational, residential or commercial use. Finally, and that is a frequent case in the metropolitan urban areas of developing countries, land speculation drives prices of vacant land suitable for industry beyond the economic limits of sound capital investment. And some land may be altogether withheld from the market for very long periods of time.

Thus, the many factors which are involved lead to a shrinkage of the effective amount of suitable industrial land to a point where it can and does become a critical commodity.[57] This problem becomes much aggravated if we look

towards the future. The demand for industrial land is on the increase, not only because of the increasing number of industries, but because of larger land requirements for industry. At the same time, as urban growth continues to proceed at an accelerated pace, more and more vacant land is absorbed by various non-industrial uses, and it is absorbed in an inefficient helter-skelter way, so that the most desirable industrial sites become unavailable, especially in close-in locations, and industry is forced to scatter and disperse on sites that are not fully suitable or economical, either for the industry or for the community.

2. The Role of Industrial Estates, Areas and Zones in Insuring an Adequate Supply of Industrial Land

It can be readily seen that it becomes of fundamental importance to determine the available supply of suitable industrial land, to relate it not only to the direct requirements of industry but to the developmental needs of the urban area as a whole, according to a comprehensive long-range plan, to find the means to preserve suitable industrial land, and to make it available to industry as and when needed, and thereby to promote industrialization and, at the same time, to influence the most suitable location of industry in relation to the urban area as a whole and its individual elements. It is in this light that a further examination is made of the merits and limitations of industrial estates, areas and zones.

3. Merits and Limitations of Industrial Zones

Industrial zoning is one of the earliest means of controlling the location of industries within urban areas, and its usefulness under certain conditions is unquestionable. However, experience with industrial zones has shown serious limitations in their use as a tool to guide industrial location to the right places, to reserve the most suitable land for future industrial use, and to stimulate the growth of the industrial sector and the establishment of new industries, all of which is of particular importance in developing countries. The action of designating industrial zones without taking further developmental steps is merely regulatory. It says where industrial location may or may not take place. But this does not ensure in any way that industrial location will actually take place in a desired or desirable way.

> "The use of zoning as a method of implementing a desirable pattern of industrial development is limited by the fact that the zoning of land for industrial purposes does not of itself stimulate such development. However, land controls of this type can be effectively used to prevent industrial expansion in areas which do not conform to the desired future pattern and also to ensure that high standards of development are followed where industrial uses are permitted."[58]

Originally, industrial zoning developed as a negative control, that is, to ensure that industries, especially those producing hazards and nuisances, would be kept away from residential areas. Zoning was based on the concept that industry, especially heavy industry, is the least desirable land use, and that other uses must be protected from it. This attitude grew out of the early days of industrialization in a free enterprise system in the now developed countries, where, in contrast to the developing countries today, industry sprang up in urban areas by itself, so to speak, without the government having to promote industrial development, and so the local community had to take measures to protect itself against the undesirable by-products of the industrial processes. "Communities perceived industry as an undesirable land use, zoned ill-suited land for industrial use, paid little attention to technological advances making it a non-offensive neighbour. The greater fault was in the lack of appreciation for the role of industry."[59] Not only was poor land assigned to industrial use and good land withheld, but non-industrial uses were permitted to industrial zones, so that large tracts of land were broken up by sale of lots for commercial establishments and housing, making it difficult for industries or industrial estates to obtain lots of sufficient size.

Naturally, there is little advantage in the transfer of such negative aspects of industrial zoning to urban areas of developing countries, where the principal goal is to increase industrial growth. In recent years, the negative attitude expressed in industrial zoning has been replaced by a positive approach. New trends in zoning thought recognize that industry "is a legitimate land use... and is entitled to protection against encroachment." [60] It also recognized that industry requires land with specially

suitable characteristics, and that such land should be reserved for industry. However, even where such land is assigned to exclusive industrial use through zoning, there is no guarantee that it can and will be used by industry, or that it will be kept in reserve until needed for industrial use. A recent study of industrial land in the Pittsburgh area (United States), concluded that "zoning, while remaining an important land use control, cannot be expected to accomplish the long-range reservation of industrial land."[61/]

On the one hand, zoning limits the amount of land available for industry. It thereby creates a monopolistic situation, and if such land is in private ownership, there is no compulsion to sell it. Especially in rapidly growing urban areas of developing countries, where the real estate market is highly speculative for a number of well-known reasons, land that is zoned for industry is often either offered at prices that are so high as to represent an obstacle for industrialization, or it is entirely withheld from the market precisely at critical times when it is needed to facilitate the industrialization process.

On the other hand, there may not be sufficient industrial demand at given times for vacant land so zoned, and, at the same time, there may be pressures to use that land for other purposes which often leads to a change in zoning designation, so that land suitable for industry is whittled away. At least this is so according to United States experience. "It is considered very doubtful that any privately-owned lands can be retained as a restrictive industrial zone for more than several years. The (city planning or zoning) commission or the courts are almost certain to recognize hardship in such a case." [62/] There is no doubt that similar pressures to modify industrial zones will develop in many other countries unless extremely strong legal protection of land use zoning exists, and in most developing countries it does not.

There is one other limitation of industrial zones. In a number of countries zoning, which means public control of land use without acquisition or compensation, is considered as unconstitutional, and as illegally affecting private property rights. While limitations on uses of land that directly

and visibly create public health and accident hazards are generally accepted, such limitations imposed by zoning controls, as the withholding of vacant land from non-industrial uses, because it may be in the interest of the community to have this land available at some future day for industrial purposes, is not accepted as a legitimate use of governmental power without compensation to the land owner.

In many instances excessive amounts of land are zoned for industrial use. In such cases zoning as a locational guidance device loses its value, except in a very broad and general way, and it encourages attempts to convert parts of the industrial zones to other uses on a spot and haphazard basis.

A detailed study of industrial zones in Managua, Nicaragua, where the first zoning ordinance in Central America was quite successfully introduced, illustrates a number of problems that arise in connexion with industrial zoning. For example, of the 800 hectares zoned for heavy and light industry, only 53.8 per cent was net vacant usable land, providing large enough lots for typical modern industries. The other two-thirds of the land were made up of land already in industrial use (9.2 per cent), land in non-industrial uses and in lots too small for industry (19.2 per cent), unusable land due to topography and other factors (14.2 per cent) and land in streets (23.6 per cent). On the basis of estimated demand, it was considered that the amount of available land would be adequate for future industrial development, provided that it would be dedicated exclusively to industrial use. However, in spite of this apparently ample supply, actual availability was limited by excessive prices: "Frequently the asking price is higher than the prices which industrialists are willing to pay. This is due, in large part, to the fact, that industrial location is limited by zoning, that the amount of vacant land serviced by good access roads and utilities is limited, and that it is held by a few land owners who are not anxious to sell, and who put speculative values on their land." 63/

Large tracts of undeveloped land may be zoned for industrial use, but this does not mean that industrial zones will actually be developed in the form of a land pattern suitable and efficient for industrial needs, or that public

services, utilities and transportation will be available at the right time, unless industrial zoning is accompanied by additional positive developmental actions taken by the government.

Often industrial zones are established by urban planning agencies without adequate consultation with industrial development agencies, and without fully understanding the needs and requirements of industry.

In the past, too rigid zoning has led to a segregation of all industrial uses from residences to a point where the journey to work has become a real problem. This, as will be shown later, is a particularly important factor in the location of industrial estates, and particularly so in less developed countries.

It has been recognized that due to changed technologies and improved site planning, many industries have lost their nuisance effect, and that the old classifications have to be replaced by the concept of performance zoning, which attempts to substitute quantitative measurements of the possible noxious effects of an industry for the classification of industries considered a priori to be noxious. 64/

There is still one further drawback to the use of industrial zones, and that is the inelasticity of regulatory controls. Once they are officially adopted as statutory requirements, it is a slow and painful process to adapt them to changing conditions. If industrial zones are used as a tool it is essential to ensure mandatory periodic revisions - say at intervals of every five to ten years.

Finally, the mere fact that land is reserved for industrial use by means of industrial zones does in no way make it any easier for the prospective industrialist to select and evaluate the most suitable site, negotiate its purchase, obtain clear title, secure utilities and services, all of which is time consuming and adds to the costs, and may well discourage an industrial investor to go ahead with his plans.

In spite of these limitations, the determination, and official and legal designation, of zones within the urban area suitable and permissible for industrial use, is a first and essential step in the process of urban industrial

land planning, and it should be used to a much larger extent in the planning of urban areas in developing countries than has been done until now.

Such an approach will determine the over-all supply of industrial land, in terms of quantity, quality, location and the absorption rate in relation to the demand factor; it will provide a framework for relating industrial zones within the urban area to all other land uses and elements of an urban development plan such as transportation and utilities; it will protect other land uses from the intrusion of undesirable industrial effects; and it will segregate, where necessary, especially noxious industries.

The reservation of industrial zones through regulative control is the least costly method, as compared to industrial areas and estates, which require the investment and immobilization of large capitals over long periods of time, a problem for capital-short countries where many needs compete for scarce capital resources.

However, in using industrial zones as a tool, the most modern principles of industrial zoning should be applied and should be adapted to the local conditions and specific goals contemplated. Moreover, it should be recognized that industrial zones are only the first step which must be accompanied by other more positive developmental measures.

4. Industrial Areas and the Development of the Industrial Land Bank Concept

Obviously the acquisition of suitable tracts of land, their improvement through provision of utilities, and the subdivision into industrial lots ready for sale or lease, is a much more affirmative developmental measure than the mere industrial zoning of land. Consequently, it is bound to exert a stronger influence on attracting industry, and will provide a much more definite means for reserving vacant land for future industrial use. We are talking here, of course, of a programme undertaken by public or quasi-public agencies with the specific goal to serve the interests of the community and to facilitate the establishment of industries, rather than by private developers for speculative motives.

Under an industrial area development programme there can be one or more of the following advantages:

(a) By purchasing a large piece of land, it may be obtained at a lower unit price.

(b) Economies of scale are likely to lead to lower development costs per unit.

(c) A more efficient design can be obtained resulting in better land utilization and economies in utility layouts and installations.

(d) Economies achieved through (b) and (c) above can either be passed on to the industrialist in terms of lower costs or may be ploughed back into more attractive landscaping, and other higher quality environmental improvements.

(e) A more harmonious, unified and appealing environment can be established which may have an attraction for industry.

(f) Unsuitable land uses and undesirable industrial establishments canbe kept out since control over sales of land is maintained.

(g) As against servicing industries in dispersed locations, there may be savings in public expenditures for main utility lines, access roads, fire protection, and other urban infra-structure, for industries grouped in single locations. This may also lead to better quality public services.

(h) Land can be acquired under normal market conditions, thus saving the costs of inflated land values when development is imminent. Provided that the operation is run on a non-profit or, at least, non-speculative basis, substantial economies in land costs can be passed on to the industrialist.

(i) Immediately available land can be provided to the industrialist, so that he need not waste time and money on extensive search for a site, title clearances, site and utility improvements.

(j) Interim use of land is possible until actually converted to industry.

However, there are also a number of limitations and problems to be considered:

(a) An industrial area or subdivision will usually require a substantially large piece of land all in a single location to make the operation worthwhile. Such large pieces of vacant land may be difficult to obtain or assemble, especially in close-in urban locations, unless condemnation powers, such as in urban renewal procedures in the United States, can be used for assembling the many small parcels into which land has usually been subdivided, or it may be necessary to search for land in more outlying locations, which may not be immediately attractive to industrialists.

(b) Considerable initial capital investment is required on a quasi-speculative basis, and even with careful market analysis a substantial risk is involved due to factors beyond immediate control, and the risk is greatly increased because all the investment is concentrated in a single spot. This limits the choice for industries. What if transportation or other conditions change and other sites become more attractive to industry?

(c) Usually the development of industrial areas in developing countries would be undertaken by public or quasi-public agencies specifically established for that purpose. Unless these co-operate closely with the agencies charged with planning and development of the urban area to insure that the selected sites fit in with over-all development plans, there is danger that complementary developmental measures and priorities will not be adequately co-ordinated. For example, a large new industrial area may require workers housing nearby, the extension of highways, water lines, and other facilities.

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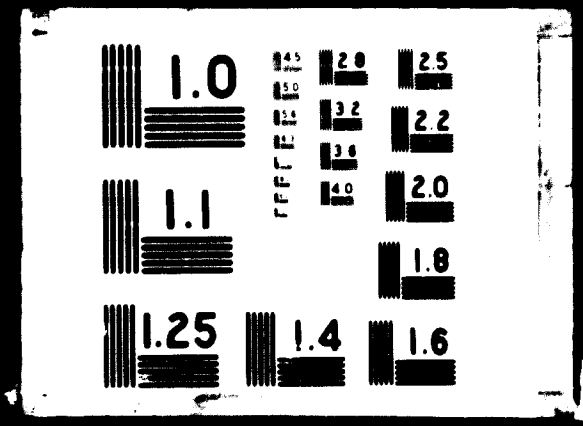

(d) There is also a danger that unless effective zoning exists to protect the surroundings, and most often it does not, undesirable and blight conditions may develop in the vicinity of the industrial area, in fact, as often happens, attracted by the new industrial area itself.

(e) Since industrial area programmes, as defined here, are limited to development and sale of land only, they may not be adequate for small industries, which may require additional financial and technical assistance in terms of factory buildings, services, etc., such as only an industrial estate can provide.

Some of the limitations of industrial areas described above have led to a more flexible concept to ensure that suitable land will be positively reserved in growing and constantly changing urban areas, and made available for industrial growth when and where needed. This concept is the use of an industrial land bank system, which consists of the acquisition, reservation and immediate or future development, subdivision and sale or lease of land in various locations for industrial uses. Ideally this would be done according to a comprehensive plan. The system would be operated by a public or quasi-public agency, probably an industrial development agency working in close co-operation with the urban planning agency.

A land bank would have advantages over an industrial area programme in that it would be much more flexible by being able to acquire parcels of land of different sizes and qualities in different locations, and by offering a wide choice of industrial sites from raw land to completely developed industrial lots. In fact, an industrial area programme could easily be incorporated and expanded into a land bank programme. As a result of such a flexible programme of diversified supply to meet diversified demand there would be less likelihood that land would sit idle, as compared to an industrial area where all sites are in the same location.

The City of Pittsburgh in the United States is one of the first to apply successfully the concept of the industrial land bank. A Land Reserve Fund of U.S. $4.0 million was jointly established by the City of Pittsburgh and the Urban Redevelopment Authority in 1964. To date, the fund has been utilized to acquire land in the right-of-way of a proposed development, to acquire property for an in-city industrial estate, and to purchase land adjacent to a renewal area so as to accommodate the expansion of industrial plants.[65]

Armed with adequate initial capital to be used on a revolving basis, and condemnation powers supported by adequate legislation to obtain co-operation from other public and private agencies, and effectively administered, an industrial land bank could be a significant tool for implementing industrial development and location policies in urban areas.

An industrial land bank is nothing more than a specific form of the general concept of advance public land acquisition as a tool of urban development which, of course, is not new. Sweden has long used this practice with success. But advance acquisition for the specific purpose of industrial development may be more acceptable in developing countries bent on industrialization, than public land acquisition for other purposes which may meet with stronger opposition.

5. Industrial Estates

The industrial estate is a logical extension of the industrial area concept. It offers all the advantages of the latter, which have been enumerated in the previous section. But by going beyond the mere provision of suitably developed and serviced land, an industrial estate offers additionally such things as industrial buildings, a variety of common facilities and services, continuing management, financial assistance and other inducements. It would seem reasonable to assume that by providing all or some of these additional advantages, a positive influence will be

exerted over the location of industries which is considerably stronger than the offering of land in industrial areas, and an additional stimulus for industrial development would thus be provided. However, since the cost of providing such additional benefits is, of course, substantially higher than the provision of developed land without buildings or services, at least two questions arise:

(a) Under what circumstances and for what purposes is it necessary or desirable to provide these additional benefits to the industry, and what are the benefits, as compared to the costs, to the urban or national community in doing so.

(b) If it is decided that such additional facilities are necessary, should they be concentrated in a single spot - the industrial estate - or should they be provided by means of a more flexible system to various industrialists locating in different parts of the urban area.

For example, if long-term credit facilities for new industrial buildings are considered necessary, would it be better to provide them without necessarily requiring the industrialist to locate in the industrial estate? Or, if some form of technical or management assistance is needed in connexion with stimulating the small local entrepreneur, could this not be provided as a service to individual small industries regardless of where these are located? The industrial estate is often advocated as an "incubator" of small new industries. But the success of small rising industries has often been attributed to the dynamic drive of the entrepreneur, starting off in a very modest and economical physical setting, (in lofts, in old sheds, in temporary or disused structures), rather than in a fancy and costly physical setting such as is frequently offered by the industrial estate, which, unless heavily subsidized, will put an additional, and often excessive, financial burden on the industrialist, especially in developing countries.

As compared to other methods, industrial estates would offer particular advantages and should be seriously considered as a tool under the following conditions:

(a) Where the grouping of industries in a single location is an advantage because of the interrelated nature of the industries.

(b) Because it would be more economical for either the community, the industrial development agency or the industrialist to provide facilities and services in a single location rather than in dispersed locations.

(c) Because of economies of scale in initial construction or in subsequent management.

(d) Only when a careful market analysis has been made to determine that there is likely to be enough demand for filling the industrial estate over a determined period of time.

(e) Only when suitable location has been determined for the industrial estate to ensure that it will be attractive to industries.

(f) Only if it is considered that the additional incentives provided by an industrial estate as compared to an industrial area, are really essential to attract or stimulate industrial development.

(g) Only when the construction of an industrial estate is fully co-ordinated with other, external measures, such as provision of access, main utility lines, etc. which are most often not under the direct control of the agency handling the industrial estate.

(h) Where comprehensive and detailed project plans and feasibility studies for the industrial estate have been made, and where adequate initial resources and good continuing management have been ensured.

One thing is certain, and that is that an industrial estate, just like a large-scale housing project, requires a relatively large piece of

land in a suitable location, which is especially difficult to obtain in the large or rapidly growing urban areas, and that by virtue of its size, it will exert a considerable influence over the surrounding area. The dangers represented by uncontrolled growth of slums, springing up on vacant land around industrial estates, are strongly emphasized by the United Nations.[66] Consequently, adequate provisions must be made at an early stage in the urban land use and development plan to reserve in the right locations sites of adequate size for projected industrial estates, to anticipate the impact of such major industrial installations upon all other elements of a community, and to control development of areas adjacent to industrial estates. In this respect, the urban planning agency, where it exists, must work closely with the agency undertaking an industrial estate programme.

6. Application to Existing Urban Areas

A number of practical experiences as well as numerous studies indicate that, in existing urban areas, industrial estates, areas and zones can be successfully though differently applied, (a) in programmes for renewal of central areas of large cities; (b) to guide and control the expansion of large metropolitan areas and the decongestion of city centres; (c) to strengthen the industrial-economic base of small and medium-sized towns.

In spite of the efforts at decentralization, all indications are that large metropolitan areas will continue to attract more people and industries, and that urban areas will spread and expand with a movement from the centre to the periphery. At the same time, there is a constant process of obsolescence of industrial plants, occurring especially within the central core, which is accompanied by renewal efforts and relocation in the suburban areas. Although the basic trends are similar, there are enormous variations in specific characteristics between cities in different countries and at different stages of development. Whatever these differences, it is essential to view industrial estates, areas and zones as part of a total metropolitan urban planning process for renewal and development.

In the more developed countries, a large number of industrial plants and facilities, built many years ago in the central portions of cities, have often become so obsolete, that the demand for complete renewal accompanied by relocation in the suburban areas becomes substantial.

This situation is illustrated by the following description of Scotland:

> "Much of our industry is housed in accommodations which date from the boom that took place in the last quarter of the 19th century. Already there are signs that these old and obsolescent factory buildings are becoming increasingly difficult to let, despite their low rentals. Congested sites, buildings with comparatively small clear floor areas, floor loading limitations, poor loading and unloading facilities, lack of parking and traffic congestion all contribute to the unattractiveness of these old industrial areas.
>
> Much of this type of accommodation will have to be demolished through our renewal programmes, displacing in the process large numbers of industrial concerns. Many of these can and should be located away from the central area but nevertheless many can justify relocation near the centre and large-scale industrial projects will be required to relocate them." 67/

As an example of the scale and importance of industrial renewal, the same report describes one typical area in Glasgow as follows:

> "Through the rundown of a number of large concerns in an important industrial complex within the City, concerns which numbered their employees by the thousands, large areas of derelict and obsolescent industrial premises resulted for which no future use could be foreseen. As a result, they formed the nucleus of a very depressed area extending to over 1,000 acres and

> containing nearly 40,000 people - an area of unemployment, industrial dereliction, poor housing, old communications and a general lack of amenity. The whole area has been declared a renewal project by the Corporation of Glasgow, and a joint team of staff from the Planning Department and the University of Glasgow (Department of Social and Economic Research) with offices in the area are working together to prepare a total renewal programme to convert the area into an economic growth point."

The changing functions of the central city also force consideration of industrial relocation, and in more developed countries capital resources, both private and public, make urban renewal projects on a large scale possible. Moreover, space demands for highways, parking, slum clearance projects, and other non-industrial uses often force the displacement of industrial establishments, in the public interest. In most cases, relocation takes place in the suburban rings within the same metropolitan area.

In some countries, such as the United States, where politically independent municipalities within a single metropolitan area compete with each other for local real estate tax revenue, the central city makes every effort through improved access and transportation, urban renewal, and the use of industrial estates to retain industry, and the outlying areas make similar efforts to attract industry.

While such competition is obviously not in the best interest of efficient development of the entire metropolitan area as a unit, it has been a powerful incentive to use industrial estates in connexion with industrial renewal and relocation programmes within the boundaries of central cities. For example, Providence, Rhode Island, United States, in developing one of the first in-city industrial renewal projects, argued that:

> "Rapidly developing local firms were leaving cramped congested quarters in Providence for outlying sites large enough to allow for expansion as well as parking, landscaping, and other amenities. If the city failed to provide in-town land suitable for local plant facilities, valuable tax revenues would be forfeited along with departing industries and jobs. As a start in solving the problem it was decided to develop a planned industrial park inside the city limits." 68/

In 1956, a 60-acre slum area in the City of Providence was converted into the West River Industrial Park. By 1959 thirteen local firms had relocated in the industrial park and employed more people at their new location than at their old one.

In a similar way a study of Utica, New York, United States, stated:

> "The principal objective of industrial renewal is the provision of an adequate physical structure within which industry can efficiently operate without interfering with the prerogatives of private management in the process. We must make certain that each industrial establishment has a place in which it can afford to go before it is dislocated. This goal may require that one facility be built before another one is torn down. It may demand the extension of public financial aids, the granting of moving expenses to facilitate essential but costly shifts, and even the public construction of facilities in instances where private enterprise is unable to organize or finance a desirable undertaking.
>
> "Ideally, an industrial renewal program would begin by encouraging movement to new industrial parks and continue with the establishment of new or rehabilitated industrial concentrations in the central core. Renewal of the core would demand a coordinated effort which brought residential and commercial development into phase with industrial development." 69/

In developing countries, capital scarcity and relative newness of industrial establishments limits the scope of urban renewal activities and the amount of relocation that is possible, so that the emphasis in urban development programmes will be on how to accommodate the location of new industries rather than the relocation of existing ones. Nevertheless, in cities of developing countries, too, there are industrial relocation problems, often as a result of major highway and public works programmes, and because existing plants outgrow their present quarters as they need space for expansion. However, industrial renewal, industrial zoning and the possible use of industrial parks in central urban areas of developing countries must take into account their special characteristics and needs, and, in particular, should be so handled as to preserve the advantages of centrally located small industries and workshops. These establishments provide substantial employment in their present location which does not require a daily journey to work and does not tax the usually inadequate public transportation system. These small industrial establishments, operating within very modest physical facilities, will absorb labour and will, for many years, contribute significantly to the industrial base of urban areas. Consequently, industrial estates as part of urban renewal projects should adapt their programmes specifically to the needs of the displaced small industries.[70/] This will not be easy, for in urban renewal projects where centrally located land is much in demand, there will often be the temptation to serve large modern industries and to let the displaced small marginal establishments fend for themselves. Industrial zoning can also be helpful if it is applied in such a manner as to permit the preservation of industrial establishments within downtown residential and commercial areas, provided they are neither obnoxious nor a danger to public health.

However, it is obvious that within the total metropolitan area, especially in less developed countries, industrial renewal within the central city will be, due to scarcity of land, congestion, high costs and capital shortages, less significant quantitatively than industrial development on vacant land in the expanding periphery of the urban area. It is here that a combination of industrial zones, areas, estates and land banks as part of a comprehensive development plan for the entire metropolitan area becomes of fundamental importance. In this context the use of industrial estates becomes a significant and practical tool to guide industrial development to desired locations in the metropolitan area, to achieve economies in public services, to save on land development costs, and to utilize efficiently scarce land resources.

In some instances, effective use of industrial estates can be and has been made in converting such areas as abandoned airfields, military camps, reclaimed land, to industrial use in an orderly, economical and efficient manner. An interesting example of this type has been the Kwun Tong industrial estate in Hong Kong, built on 87 acres of reclaimed land which was formerly a refuse dump.[71]

Since metropolitan areas attract industry anyhow at the expense of other smaller urban areas, the question has been raised whether in developing countries, it is necessary or advisable to offer the additional inducement of industrial estates, which represent an expensive capital outlay by the public sector, and whether as a matter of locational policy, it would not be more advisable to invest in industrial estates in smaller urban areas to attract industry and merely to guide the location of industry within the metropolitan area by means of industrial zoning.

No hard and fast rule can be made, and decisions will have to be made in each case, depending on the policies of regional location and the goals of the industrial development plan, which were discussed in previous sections.

The main consideration is that enough problems are created by the dynamics of industrial land use in metropolitan areas to warrant a strong programme, which will exploit the advantages and benefits of industrial zones, areas, estates and land banks as an integral part of the urban development planning process.

In smaller towns the problem of industrial land, both with regard to scarcity and cost, is much less acute than in the large centres, nor is the demand for industrial land appreciable. What is usually inadequate is the urban economic and social infrastructure. For these reasons, industrial estates are naturally more suitable than industrial zones or areas, especially as incentives to industrial development of smaller towns. However, they will be effective only if they form part of a comprehensive and simultaneous development programme for all mutually reinforcing aspects of the community.

7. Application to the Planning of New Towns

The role of industrial estates is particularly significant in connexion with the development of new towns, but it will vary with the purpose and type of the new town to be established. For example, new towns may be satellites within a metropolitan area, or they may be independent self-contained cities. They may be dormitory towns or they could include a significant industrial employment base. They may be built on virgin land from scratch like Brasilia, or they may be an expansion around an existing nucleus. They may be planned in connexion with major installations or natural resource development projects, such

as ports, hydroelectric dams, oil refineries, steel mills, mining, or they may be intended as national capital cities. Their purpose may be to take the "overspill" population of large metropolitan areas, as in England, or they may be proposed as centres of agricultural regions in connexion with colonization, irrigation or other types of regional development programmes.

Provided that the specific industrial base and other characteristics of each type of new town are taken properly into account in the planning of industrial estates, areas and zones, the combined use of these elements is not only a suitable but an essential component in providing a sound economic and industrial base for a new town. Yet, a number of studies and reports indicate that not nearly enough attention has been given at the inception of most new town projects to the industrial base and the corresponding land and infrastructure facilities. This seems to have occurred with frequency in the construction of new capital cities. Thus, the United Nations Symposium on the Planning and Development of New Towns observed that:

> "Recent experience in the founding of capital cities indicates that unfavourable economic and social conditions prevail where a wide productive base is lacking,"

and recommends that:

> "The administrative, economic and political functions of a capital city should be supplemented by a diversified industrial and commercial base which could ensure a variety of employment for its population." 72/

A more detailed study made by Hardoy of the planning of three new capital cities, Canberra, Brasilia and Islamabad, states,

> "it is surprising how little importance the planners of the three cities attributed to the economics of the new capitals and of their areas of influence."

However, Hardoy goes on to say that,

> "Of the three cities studied, it is undoubtedly in Islamabad that the need for a more diversified economic base was most clearly appreciated. The industrial development of Islamabad was a matter to which its planners gave attention, specifying the form in which applications for industrial sites were to be submitted (to the Capital Development Authority), the size of the sites (from 2,000 square metres to forty hectares), and the manner in which the city's industrialization was to proceed." 73/

On the other hand, it is precisely the new town, where planning is possible from the start, that offers opportunities for creating an efficient and satisfying land use pattern, which is almost impossible to achieve in the environment of an existing urban area. As compared to the problems created by set land use and ownership patterns of an existing urban area, a new town offers unique opportunities:

1. the most suitable land can be reserved for industrial sites;
2. enough land for future expansion can be reserved at the outset;
3. land for industry can be sited in locations which will establish an efficient and proper relationship between industry and other land uses, especially housing and the central business areas of the town, and between industrial location and transportation facilities;
4. by integrating the functions of planning and development, the provision of public services and utilities can be fully co-ordinated with the construction of industrial estates;
5. timing of construction and execution can be related closely to the stages of over-all development of the new town;
6. financing of industrial estates can become an integral part of the over-all new town fiscal development programme, rather than an afterthought.

The first and most essential step will be, of course, the determination of the over-all industrial base for the new town: what types of industries, how much employment, and what time staging of development.

Based on such a programme for industrial development, the next step would be to allocate the necessary over-all amount of land and specific site areas for industrial use in appropriate locations in relation to other land uses and all other elements of the new town development plan. It is at this stage that the concept of industrial zones would be most applicable, by establishing clearly the zones for different industrial groupings within the new town plan.

Experience has generally shown that large-scale industries such as oil refineries, steel plants, and automobile factories, once they have made a location decision, have usually their own resources to acquire and develop their sites, buildings and other directly related industrial facilities, so that they do not require assistance or incentives in form of industrial estates. What is principally needed in such cases is an allocation of adequate land or sites in locations that are suitable both from the industry's and the community's viewpoint. For this purpose industrial zones will in most instances be adequate.

The next step in new town development will be, however, to provide these industries with the necessary external public services and urban infra-structure facilities such as access roads, communications, electric power, water supply, waste disposal, housing, community, and commercial facilities, although some of the larger industries may be in a position to provide their own power and water supply and even housing and community facilities for their workers. Naturally, since we are talking about complete new towns, it would appear almost self-evident that all of the above facilities would be planned ahead of time, and in a co-ordinated fashion, and would be provided ipso facto. This, however, is often not the case, or rather it is done in the plan but not followed up consistently enough in the execution. Thus, with regard to these external facilities and services, co-ordination and timing of development become the most important element.

It is for the grouping of medium-sized and smaller establishments that industrial estates in new towns offer particular advantages in terms of organized and readily available land, buildings and facilities and services. Moreover, there is hardly any doubt that in new towns where there exists an opportunity at the outset to provide such facilities concentrated in a limited number of selected locations rather than in a dispersed and haphazard pattern, substantial economies in development and operational costs can be obtained.

One of the most important components of a sound economic base for a new town, especially in the long run, is recognized to be a diversified mix of industries rather than reliance on a single type industry. This is so well recognized that it needs hardly to be mentioned. Nevertheless, it is an element which has been neglected in many instances. Reference has already been made to the limited economic base of new capital cities. Commenting on the location of India's large-scale industries in new and outlying towns, Britton Harris states:

> "Under alternative conditions, the very large industrial undertakings of the Union Government and the construction of new industrial townships for the production of steel and other basic industrial goods would provide an excellent umbrella for the further expansion of related industries, the training of an industrial labor force, and the growth of associated services and residential-service activities. Through wholly inappropriate planning, in my view, these new towns have essentially been zoned against further spontaneous industrial development." 74/

Similarly, this writer has observed the absence of any efforts to create a diversified industrial base in new or developing towns around new port installations and oil refineries in several Central American countries, such as Acajutla in El Salvador, Corinto in Nicaragua and Puerto Barrios in Guatemala.

The United Nations Symposium on the Planning and Development of New Towns attached the greatest importance to the need for industrial diversification of new towns, especially in developing countries:

> "Building planned new towns was often the only way to develop space-bound natural resources, such as iron and steel, coal and other resources (aluminium, oil, power plants, river valley projects, virgin lands and harbours). New towns constructed in developing countries seemed to be predominantly of this type... However, such resource development programmes often resulted in single activity towns, with their well-known economic and social dangers. The Symposium therefore recommended that measures for diversification of the economic and especially the industrial, base of such towns, be part of the planning at the earliest stages... The Symposium further affirmed that the need for a diversified economic base was imperative in towns of all types. This recommendation applied to the new capital cities as well as to new towns built to decongest metropolitan areas." 15/

For developing countries with a rapidly growing population and labour force consisting largely of unskilled workers, the advantages of a diversified mix of industries, both as to type and size, offer not only a better ability to adjust to changes in technology and industrial structure, and to cyclical or seasonal aspects of the market, but help to obtain a better balance between capital-intensive and labour-intensive industries. Another advantage of installing small industries where already large ones exist in new towns, is to utilize efficiently already established infra-structure.

The industrial estate becomes an important tool for assisting the new town to obtain a diversified industrial base, since the industrial estate lends itself particularly well to serving clusters of small and medium-sized industries of diversified, though possibly related, types, rather than the larger single-purpose industry. Thus, even where the principal impetus to a new town development comes from one or a few basic major industries, possibly related to natural resources, an industrial estate can and should be effectively used for groups of smaller industries to achieve diversification.

This was well recognized by the United Nations Symposium on the Planning and Development of New Towns which concluded that:

> "Small industries often required services and facilities which very large industries could, if necessary, supply on their own. Though industrial estates alone could not, in most cases, be the justification of a new town, they could help to stimulate small-scale enterprises and contribute to expanding diversified employment opportunities in industry as well as in related trades and services." 76/

An example of such an approach is seen in the planning of the New Town of Guayana in Venezuela as reported by Rodwin:

> ..."Although the heavy industries constitute the principal activities of the region, they were largely capital-intensive and did not furnish enough employment. Other economic activities were not only anticipated but had to be encouraged. One means was to provide attractive sites and facilities for light industrial areas." 77/

At least in two countries, the Soviet Union and the United Kingdom, the planning of industrial sites and the provision of industrial estates has been given particular importance as a factor in providing an industrial base for new towns. In the Soviet Union "most new towns are industrial centres and their layout is affected by the location and organization of industrial sites," and the advantages of efficiency and economy of grouping industrial sites into industrial estates in new towns are emphasized: "By instituting co-operation among enterprises, pooling storage facilities, and laying out access roads, service roads and blocks of industrial buildings and installations according to a rational scheme, the space taken up by industrial districts can be kept down and the land and civil engineering works can be used efficiently."78/

One of the principal objectives of the British new town programme has been to syphon off the overflow population from excessively large cities, such as London, and, consequently, a special effort has been made to provide an industrial employment base in the new towns. A recent survey of eight

industrial estates in new towns located in the general London region indicated that no less than 59.2 per cent of the firms in the sample regarded the facilities afforded by an estate layout and a modern factory as major advantages of their new location, and "many executives were enthusiastic about the advantages that stemmed from a location within a community of industrial enterprises, often with complementary manufacturers."[79]

One advantage of new towns is, that there are many less constraints than in existing urban areas, in determining and planning from the beginning the most suitable size, number and location of industrial estates in relation to residential, central business district and other land uses, in relation to the transportation system, and in relation to the over-all comprehensive development plan. Of particular importance here, and of particular applicability to developing countries where resources are limited, is the role which industrial estates can play in obtaining efficiency with regard to minimizing the journey to work, locating employment as close as possible to residential areas, and to business districts, and at the same time, preventing traffic jams in peak hours due to excessive concentration of industries in single spots.

It is interesting to note that these criteria have been, or are being, adopted equally by Great Britain and by the Soviet Union in their new town programmes, and that as a consequence, new theories are replacing old ones, abandoning the radical spatial separation between industry and residence, and leading to a closer integration between these two land uses.[80]

With regard to number and size of industrial estates, the previously cited survey of new towns in Great Britain concluded that "it is preferable that, rather than one very large industrial estate, there should be two or more medium-sized ones."

With regard to location it is recommended that the principal industrial estate "be within easy access of the town centre and the neighbourhoods," and that only those industrial estates which specifically accommodate industries which produce nuisances, and which are by far in the minority,[81] be located at some distance. Citing specific examples, the study states:

> "It is a distinct advantage of the industrial estate of Stevenage, that it is located within half a mile of the town centre, and in no way are the amenities impaired by the proximity of factories. Similarly, the centrality of the industrial estate at Welwyn Garden City has much to commend itself."82/

These recommendations are justified on the grounds that, (a) external economies will not increase beyond a certain size; 83/ (b) single large estates have experienced traffic problems due to excessive concentration of work people in one area; and (c) movement from residence to work can be facilitated by minimizing concentration of employment in a single estate. (d) Sites and facilities should be provided in new towns for all types of industries, but those producing nuisances should be separated.

Very similar principles have been adopted by planners in the Soviet Union regarding size, number and siting of industrial estates in new towns as indicated by the following statements:

> "Enterprises should be grouped together in industrial districts according to the nature of their output so that they can co-operate as closely as possible in the use of transport, engineering works, power and heat supply, and in the organization of building and storage. Health requirements should be strictly observed, and industries which do not emit offensive substances should be sited as close as possible to the residential area... A small town will usually have only one industrial district... Large towns have more than one, especially where industrial enterprises differ greatly in nuisance value, transport requirements, and so on. Multiple industrial zoning eases the transport problem for the labour force and cuts down the distance between job and home."84/

In the United States, where zoning has traditionally emphasized separation between industry and residences, the sentiment is changing, and the Planning Advisory Service of the American Society of Planning Officials

advocates a closer integration, listing specific conditions for compatibility between planned industrial districts and nearby residential areas, such as absence of unpleasant or harmful effects, elimination of industrial traffic on residential streets, provision of buffer strips, and so on.[85]

Planners in both Great Britain and Soviet Russia advocate, especially for small-scale, light industrial establishments, even a closer integration with residential and commercial uses, whereby light and service industries would be combined, in Great Britain, with shops and service industries in the neighbourhood centres of new towns,[86] and whereby integrated industrial - residential - recreational areas would form "integrated urban districts" to be incorporated into new town plans in the Soviet Union, in order "to bring the mass of the people close to their places of employment," and so as to make the town "a more convenient and comfortable place to live in."[87]

By virtue of being particularly suitable to small-scale industries, and of imposing an orderly and harmonious development pattern of industrial land, the industrial estate concept lends itself particularly well to promote such integrated development patterns, not only in new towns with a strong industrial base, but in connexion with planned large-scale housing developments, especially for workers' families or satellite communities within metropolitan urban areas. In this respect a similarity can be observed with the neighbourhood shopping centre concept. In fact, a new concept may be emerging here: the industrial - commercial estate as a nucleus for residential neighbourhood unit development.

FOOTNOTES

1. One of the most comprehensive studies of industrial estates has been made by William Bredo: Industrial Estates: Tool for Industrialization, Free Press, (Glencoe, Illinois, 1960)

   A comprehensive bibliography has been prepared by James A. Latta: Bibliography of Published Information on Planned Industrial Districts and Industrial Parks, Committee of 100, (Goldsboro, North Carolina, 1964)

2. United Nations, Department of Economic and Social Affairs, Establishment of Industrial Estates in Under-developed Countries, United Nations, (New York, N.Y., 1961, Sales No.: 60.II.B.4).

   United Nations, Department of Economic and Social Affairs, The Physical Planning of Industrial Estates, United Nations, (New York, N.Y., 1962, Sales No.: 62.II.B.4)

   "Report of the United Nations Seminar on Industrial Estates in the Region of the Economic Commission for Africa in United Nations Industrial Estates in Africa, (New York, N.Y., 1966, Sales No.: 66.II.B.2)

   United Nations, Industrial Estates: Policies, Plans and Progress - A Comparative Analysis of International Experience, United Nations, (New York, N.Y., 1966, Sales No.: 66.II.B.16)

3. United Nations, Department of Economic and Social Affairs, Industrial Estates in Asia and the Far East, United Nations, (New York, N.Y., 1962, Sales No.: 62.II.B.5)

4. Industrial estates are called industrial parks in the United States and sometimes the term "industrial district" is also used.

5. For a more detailed definition of industrial estate concepts, see Bredo, op.cit. and United Nations op.cit.

6. United Nations, Department of Economic and Social Affairs, Establishment of Industrial Estates in Under-developed Countries, United Nations, (New York, N.Y., 1961, p. 33)

7. Industrial areas are often referred to as industrial subdivisions, and, in the United States frequently are not distinguished from industrial parks.

8. There is frequent confusion about the term "industrial zone." As used in this paper, the term designates a piece of land or a district legally zoned for industrial use. In other instances the term is used merely to describe an area in which industry has located. In Italy, industrial zone is used to define a tract of land provided with infra-structure which may be located either in an "area of industrial development" which is a relatively large area of up to 25 km radius, including one or more population centres with a total of at least 200,000 people, or in an "industrial nucleus" which is a development area of smaller size. (See "Some Contro-

versial Questions Concerning Industrial Estates," in Industrial Estates in Asia and the Far East, United Nations Department of Economic and Social Affairs, New York, N.Y. 1962)

9. See especially Bredo op.cit and United Nations op.cit.

10. According to the Report of the Stanford Research Institute:

> "The governments of the five Central American republics have expressed varying degrees of interest in developing industrial parks. The locations proposed have generally not been selected by the governments because of industry demand; rather the principal government goal seems to be to use industrial parks as a means of decentralizing population and industry..." but
> "Analyses of the markets and industrial base of major cities in Central America, of existing and planned infra-structure, and of demand for space by industries lead to the conclusion that the most feasible locations for industrial parks ... are the capitals of the 5 Central American Republics." Keith Duke et al. An Industrial Park Development Program for Central America, Stanford Research Institute (Menlo Park, California, 1964) p. 129 and p. 7.

11. An interesting survey and evaluation of industrial estates in British New Towns is reported by Colin M. Brown in The Journal of the Town Planning Institute. Vol. 52, No.1, Jan. 1966, (London), pp. 15-18.

Some useful comparative data on industrial parks in the United States is found in Clark D. Rogers, Measurement of Industrial Land Consumption by Major Industry Classifications, Master's Thesis, University of Washington (Seattle, Washington, 1961)

United Nations, Department of Economic and Social Affairs, The Physical Planning of Industrial Estates, United Nations (New York, N.Y. 1962) illustrates the various aspects of this subject with examples of successes and limitations.

A good comparative analysis is made by the United Nations in Industrial Estates: Policies, Plans and Progress - A Comparative Analysis of International Experience, op.cit.

12. Catherine Bauer has characterized the situation in Asia as follows:

> "...many of the nations of Asia today have a larger urban population than is justified by their degree of industrialization or general economic development, as measured, for example, by the proportion of their population engaged in non-agricultural occupations. In terms of employment in productive industry, the gap (between Asian and Western countries) is still greater, as the high proportion of urban "service" jobs in Asia is a reflection of economic lag, not of progress as in the West." (The Optimum Pattern of Urbanisation Working paper for the United Nations Seminar on Regional Planning in Tokyo, 1958, p.7)

"In Latin America urban population increased by about 50 million during the last decade, from sixty-five and a half million to almost 96 million people, and is expected to increase by another forty-two million to a total of 138 million by 1970, or double that of 1950. This represents an annual growth of between 4 and 5 per cent as compared to a rural growth rate of only 1.5 per cent, and a total population growth of about 2.5 per cent to 3 per cent." (John P. Powelson and Anatole A. Solow, "Urban and Rural Development in Latin America." The Annals, Vol. 360, July, 1965, Philadelphia)

13. For example, a study by the United States Chamber of Commerce showed 174 additional persons employed for every 100 workers employed in a new plant. The DuPont Company showed that the multiplier effect of every new job in the chemical industry was 2.6. H. McKinley Conway, Jr. and Frank H. Stedman, Jr., Area Development, Vol. I., (Atlanta, Georgia, Conway Publications)

In another study a more conservative ratio of 0.4 secondary jobs for each primary job was used. (United States, Department of Commerce, Area Development Administration, "Industry Impact on Community Measured," Area Development Bulletin, Vol. VIII, No. 1, Jan. Feb., 1962. p.1) (Washington, D.C.)

14. See Chapter IV, Section 1, for a more detailed discussion of the supply of industrial land.

15. United Nations, Department of Economic and Social Affairs, Industrial Estates in Asia and the Far East, United Nations (New York, N.Y. 1962).

16. Fernando Castanos, P., Industrial Parks, Inter-American Planning Society, (Mexico, 1964)

Keith E. Duke and others, An Industrial Park Development Program for Central America, Stanford Research Institute, (Menlo Park, California, 1964)

National Urban Planning Office, Ministry of Development and Public Works, and Anatole A. Solow, Planning of Land and Physical Facilities for Industry and the Establishment of an Industrial Park, Nicaraguan-American Technical Cooperation Organization, (Managua, Nicaragua, 1961)

Roberto Risso Patrón, El Papel de los Parques Industriales en el Desarrollo Industrial de la Republica Argentina CAFADE, (Argentina, 1962)

17. "Report of the United Nations Seminar on Industrial Estates in the Region of the Economic Commission for Africa, in United Nations Industrial Estates in Africa (New York, N.Y., 1965)

Harry C. Adley, Monrovia Industrial Park, A Development Study, Atlanta, Georgia, 1964.

18. United Nations, Department of Economic and Social Affairs, The Physical Planning of Industrial Estates, United Nations (New York, N.Y., 1962) p. 5.

19. William Bredo, Industrial Estates: Tool for Industrialization, Free Press (Glencoe, Illinois, 1960), p.45.

20. Chester Rapkin, Industrial Renewal: Determining the Potential and Accelerating the Economy of the Utica Urban Area, Parts I and II, State of New York, Division of Housing and Community Renewal. (New York, N.Y., 1963) p.27.

21. Time, a weekly news maganize, 10 December 1965.

22. Development of the Estate near Shannon Airport, started in 1959. Nine firms were in production by 1962 and employed over 1,000 persons. A new town was being planned west of the industrial estate. P.D. McGovern, "Planning and Promotion at Shannon," Ekistics, Vol. 13, no. 79, May, 1962, pp. 361-362 (Athens).

23. Time, a weekly news magazine, 10 December 1965.

24. Dr. Lloyd Rodwin, Urban Planning in Developing Countries, United States, Department of Housing and Urban Development, (Washington, D.C., 1965), p. 14.

25. United States, Department of Commerce, Area Development Administration, "Variety of Areas Adaptable to Use as Industrial Parks," Area Development Bulletin, Vol. VII, No. 3, May, June, 1961, p.5 (Washington, D.C.).

26. United Nations, Department of Economic and Social Affairs, Industrial Estates in Asia and the Far East, United Nations, New York, N.Y., 1962 p. 29.

27. James Latta, Bibliography of Published Information on Planning Industrial Districts and Industrial Parks, Committee of 100, (Goldsboro, N.C., 1964) p. 27.

28. National Urban Planning Office, Ministry of Development and Public Works, and Anatole A. Solow, op. cit., p. 53.

29. This is particularly emphasized in a paper by the International Labour Organisation which discusses comprehensively to what extent labour and management in small industries may be affected by industrial estates. (See International Labour Office, Aspects of Labour and Management on Industrial Estates with Special Reference to Small Industries in Asian Countries, in United Nations, Industrial Estates in Asia and the Far East, op. cit. p. 61.

30. National Urban Planning, Ministry of Development and Public Works, and Anatole A. Solow, op.cit. p. 55.

31. Ibid, p. 49.

32. Chester Rapkin, op.cit.

33. Dorothy A. Muncy, "Space for Industry: An Analysis of Site Location Requirements for Modern Manufacture," Urban Land Institute Technical Bulletin, no. 23, Urban Land Institute, (Washington, D.C. 1954).

Clark D. Rogers, op. cit.

34. Dr. Rafael Pico and Miss Letitia Lopez McCormick, Planning and Regional Development of Puerto Rico, Inter-American Planning Society, (Mexico, 1964), p.23.

35. See, for example, the economic arguments made in favour of decentralization by Catherine Bauer in "Economic Development and Urban Living Conditions," India's Urban Future, ed. Roy Turner, University of California Press, (Berkeley, California, 1962).

36. Higgins states, for example: "Economic development means eliminating the lagging sectors and taking full advantage of the leading sectors or "growing points," maximizing the "spread effects" of growth where it occurs and overcoming the tendency for productivity of "leading" and "lagging" sectors to pull farther and farther apart." Urbanization and Economic Development (unpublished), Center for Housing and Environmental Studies, Cornell University, (Ithaca, N.Y.).

37. See Catherine Bauer, "Urban Living Conditions, Overhead Costs, and the Development Pattern," in India's Urban Future, op. cit.

38. Adams, Howard and Greely, A Regional Model for Programming Industrial Development in Puerto Rico, prepared for the Puerto Rico Industrial Development Company, (Cambridge, Mass. 1962), p. 21.

39. United Nations, Department of Economic and Social Affairs, Establishment of Industrial Estates in Underdeveloped Countries, op. cit., p. 37-38.

40. Bredo states: "One would tend to agree with the Seminar on Rural Industrialization held in New Delhi in 1960 that cities of 20,000 to 50,000 population are probably too small to use as economic nuclei... It does not seem feasible to consider every district town or city as a potential focal point for industrial development." "Industrial Decentralization in India" in India's Urban Future, op.cit., p. 244.

The United Nations states: "Rural industrial estates... have thus far not been very successful in India, and current thinking emphasizes the development of selected small towns and semi-urban centres - which are the transport and market centres for surrounding rural areas - as growth centres." United Nations, Industrial Estates: Policies, Plans and Progress - A Comparative Analysis of International Experience, op. cit. p. 20.

41. After an exhaustive study Colin Clark reaches the conclusion that "...regions based on towns with populations of somewhere in the neighbourhood of 100,000 to 200,000 with probably a few larger towns should be able to meet their economic needs, and also be socially and politically better off." "The Location of Industries and Population," Ekistics, Vol. 19, no. 110, Jan. 1965, p. 55 (Athens).

Harris argues that "the prospects of establishing strong industrial nuclei are definitely enhanced if the program is based on cities with a population in the neighborhood of 100,000 or larger." In "Industrial Decentralization in India" in India's Urban Future, ed. Roy Turner, University of California Press, (Berkeley, Calif., 1962), p. 252.

42. Britton Harris, "Urban Centralization and Planned Development," Ibid., p. 268.

43. See, "Some Controversial Questions Concerning Industrial Estates" by Alessandro Molinari, in United Nations Industrial Estates in Asia and the Far East, op. cit., p.415.

44. In a review of Puerto Rico's regional development policy, Dr. Pico stated: "...the region was defined as a group of interrelated municipalities with a common city center around which their socio-economic activities revolve." Op.Cit., p. 15.

45. "From an examination of the minor elements of existing and planned infrastructure upon which industrial developments will depend, it is evident that industrial parks could most feasibly be located in the capital cities. In nearly all instances, transportation facilities are far better developed in the capitals than in smaller cities and the capital cities are better provided with water, power, telecommunications, and other services." Keith E. Duke, et al., An Industrial Park Development Program for Central America, Stanford Research Institute, (Menlo Park, Calif., 1964), p. 125.

46. National Urban Planning Office, Ministry of Development and Public Works, and Anatole A. Solow, op.cit., p. 18.

47. Fernando Castanos P., op.cit.

48. Resources for the Future staff, Design for a World-wide Study of Regional Development: A Report to the United Nations on a Proposed Research Training Program, (Washington, D. C., 1966), pp. 37-38.

49. Dr. Rafael Picó, op. cit., p. 22.

50. Clark D. Rogers, op.cit.

51. Roberto Risso Patrón, op. cit., p. 10.

52. United Nations Establishment of Industrial Estates in Under-developed Countries, op. cit. p. 32.

53. Stuart Parry Walsh, "Twelve Common Mistakes in Industrial Land Development," Urban Land, Vol. XXII, No. 6, June, 1963, pp. 1-4.

54. In the first 12 British New Towns the average amount of land in industrial areas was 12 per cent of the total town area or 6 acres per 1,000 persons. P.A. Stone, Financing the Construction of New Towns. United Nations, Bureau of Technical Assistance Operations and Bureau of Social Affairs, (New York, N.Y., 1964), p. 12 (mimeographed)

In 48 large United States cities the mean proportion of land devoted to industry was, 10.9 per cent of the developed urban area. John H. Niedercorn and Edward F. R. Hearle, Recent Land Use Trends in Forty-eight Large American Cities, Rand Corporation, (Santa Monica, California) Memorandum RM-3664, FF., p. 4.

55. For definition of "prime industrial land" see Chapter II, Section 4.

56. Due to technological trends, at least in the more developed countries, steeper land than used in the past, can be used effectively by industry. See, for example, the New Town, Don Mills in Canada.

57. For example, in an Industrial Planning Study of a major capital city in the Carribean (Trinidad) made by a United Nations team, it was calculated that the known industrial land reserves in the metropolitan area were only slightly more than half of the total estimated requirement over the period 1964-1984. T.J. Manickam and other, Industrial Planning Study - Trinidad and Tobago, United Nations, Bureau of Technical Assistance Operations, (New York, N.Y., 1964).

58. Adams, Howard and Greely, op. cit., p.4.

59. Philip Walter Michalowski, The Industrial Land Bank and the Public Interest, Master's Thesis, Graduate School of Public and International Affairs, University of Pittsburgh, 1965, p. 9.

60. United States National Industrial Zoning Committee, Principles of Industrial Zoning (Columbus, Ohio, 1951), p. 5.

61. Southwestern Pennsylvania Regional Planning Commission, A Regional Planning Study: Industrial Land, Pittsburgh, 1965, p. XXI.

62. Wisconsin Division of Industrial Development, Zoning Principles and Practices, (Madison, Wisconsin, University of Wisconsin, 1957), p. 25.

63. National Urban Planning Office, Ministry of Development and Public Works and Anatole A. Solow, op. cit., p. 61.

64. Dennis O'Harrow, Performance Standards in Industrial Zoning, National Industrial Zoning Commission, Columbus, Ohio, n.d.

65. Philip Walter Michalowski, op. cit., p. 58.

66. United Nations, The Physical Planning of Industrial Estates, op.cit., p. 4-5.

67. R. E. Nicoll, "The Challenge of Urban Renewal," Report of Proceedings Town and Country Planning Summer School, 1965, Town Planning Institute, (London, England, 1965), p. 56.

68. United States Department of Commerce, "Industry Impact on Community Measured," Area Development Bulletin, Vol. VIII, No. 1, Jan., Feb., 1962, p. 5.

69. Chester Rapkin, op.cit., p. 59.

70. Design and planning aspects of industrial estates and industrial buildings specifically intended for small-scale industry are described in United Nations The Physical Planning of Industrial Estates, op.cit., p. 25-45.

71. United Nations, Industrial Estates in Asia and the Far East, op.cit., p. 335.

72. United Nations, Bureau of Technical Assistance Operations, Report of the United Nations Symposium on the Planning and Development of New Towns, (New York, N.Y., 1966), Sales No.: 66.IV.3) p. 27 and 28 respectively.

73. Jorge E. Hardoy, The Planning of New Capital Cities, United Nations, Bureau of Technical Assistance Operations and Bureau of Social Affairs, (New York, N.Y., 1964), p. 17 and 19 respectively (mimeographed).

74. Britton Harris, op. cit., p. 274.

75. United Nations, Bureau of Technical Assistance Operations, op. cit., p. 6.

76. Ibid, p. 7.

77. Lloyd Rodwin, op. cit., p. 17.

78. N.V. Baranov, Building New Towns, United Nations, Bureau of Technical Assistance Operations and Bureau of Social Affairs, (New York, N.Y., May, 1964)(mimeographed).

79. Colin M. Brown, "Successful Features in the Planning of New Town Industrial Estates," Journal of the Town Planning Institute, Vol. 52, No. 1, p. 15.

80. The same principles apply equally to siting of industrial estates close to residential areas in existing urban areas of developing countries. A study by United Nations experts in Trinidad recommends, "Most important is the need to plan industrial and residential areas in close relationship to each other" and supports a distribution of industrial areas in different sectors of the urban area rather than in a single location in order to bring industry and residence closer together. T. J. Manickam, et al. op. cit.

81. The study states that "nine-tenths of the industry that has so far moved to the new towns has been light and clean."

82. Colin M. Brown, op. cit.,p. 17.

83. The same study states that "it is reasonable to assume that on an estate of say 200 acres, all the necessary facilities and services can be provided and that external economies are not likely to increase proportionately on larger estates."

84. N.V. Baranov, op. cit., p. 7.

85. Planning Advisory Service, "Planned Industrial District Zoning," Information Report, no. 120, A.S.P.O., March, 1959, p. 8.

86. Colin M. Brown, op. cit., p. 18.

87. N.V. Baranov, op. cit., p. 7.

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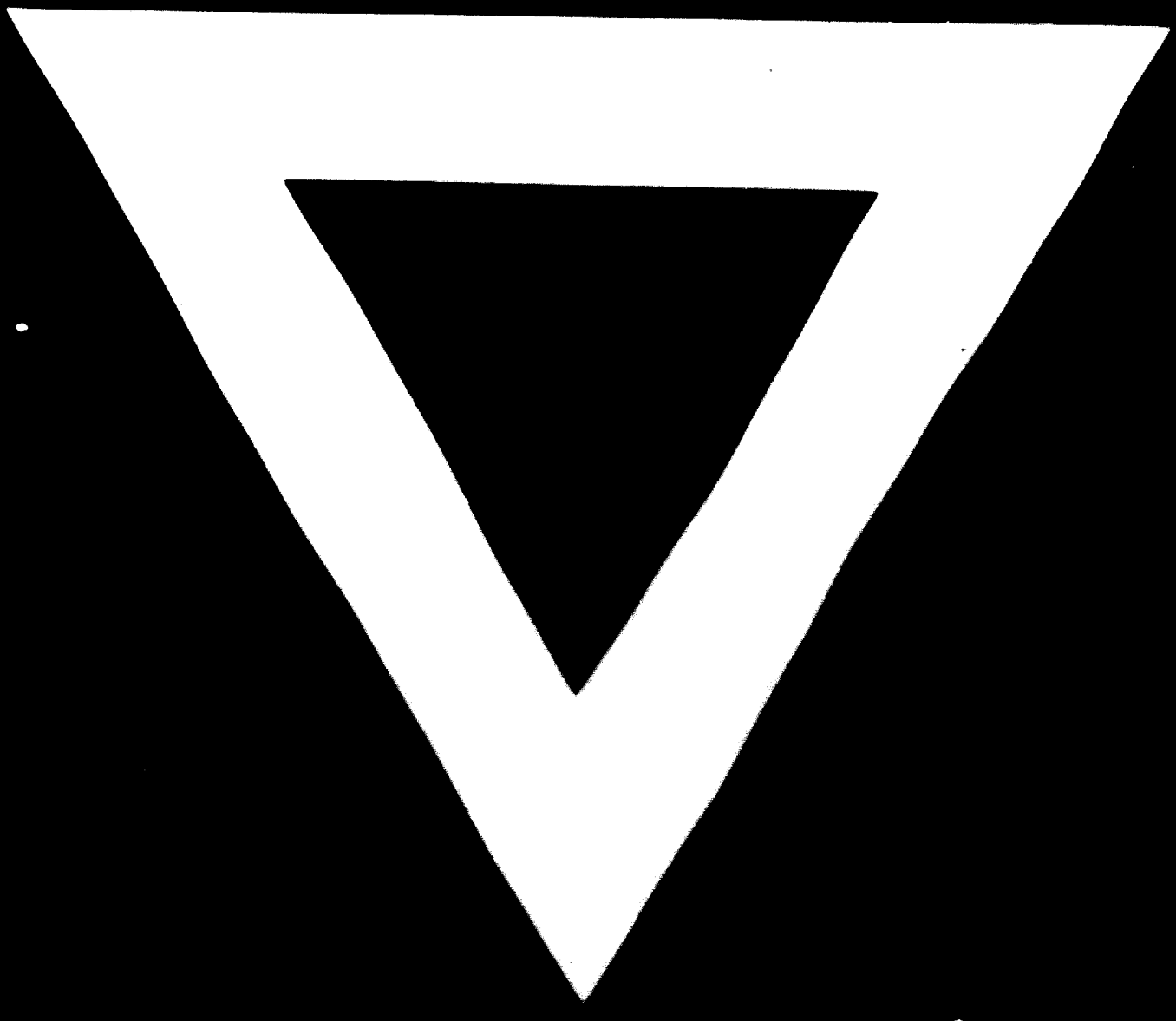

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