NEEDS AND RESOURCES OF METROPOLITAN POPULATIONS

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INTRODUCTION

The metropolization process can be understood as the structuration of social and economic patterns in one or more areas characterized by a strong centralization of activities, functions and relationships, as well as by a high degree of concentration of the population. Such conditions lead to the articulation of a subsystem within the economy and society of which they are a part. The multidimensionality of this process acquires specific features as a result of the historical development of each social formation.

The subsystem attributes exhibited by metropolitan entities reach outstanding expressions at the level of the needs of their populations, and of the resources required to satisfy them. Although in the relatively less developed countries the income available to the inhabitants of the metropolis is much higher than that available to the rest of the population in the respective country, the problems of organization and distribution usually reach such great proportions that affect the global economy and society.

Given that metropolis absorb resources coming in from other regions in order to meet the high social cost of urbanization experimented by them, and, given that their economies appear closely articulated with that of foreign countries, they are usually regarded as constituting obstacles to development. On the other hand, because they constitute "viable" means to attain high levels of productive efficiency they can be regarded as advantageous means for the acceleration of economic growth. This apparent contradiction formulated by the metropolization process makes it necessary to think in terms of alternative modes of distribution of the population and of the activities within the national space.

The three aforementioned topics constitute the aim of this article, considering the Latin American metropolitan areas, and particularly the case of Santiago, Chile. It must be borne in mind that this work is a preliminary and summarized version of a much larger study. Due to lack of space available it became necessary to cut down on the number of quotations and on the statistical documentation of this article.

1. Dimensions of the Metropolization Process in the Context of Latin America

1.1 The Economic Dimension.[1/] In their origins, many of the current Latin American metropolitan areas were incorporated to the colonial economic space as real drainage enclaves linked to the colonial seats. This link condition in a system supported by monoproduction exports maintained and intensified itself for a long time until it became necessary to promote imports substitutes due to the rigidities of the international market. When the effort leading to imports substitution was started, the decisions pertaining to localization favoured those areas where there already existed an accumulation of capital, as well as demand and a basic infrastructure of commercialization and distribution. When the industrial sector was consolidated, the attraction of resources from the national periphery was accelerated through the sharpening of inequalities in the terms of exchange between the metropolitan productive apparatus and the rest of the country.

The concentration of a group of activities of an industrial type as well as of the concomitant services in the centre, enabled the emergence of a generating threshold of external economies of agglomeration. This situation has

1/ de Mattos, Carlos, "Algunas Consideraciones sobre la Movilidad Espacial de los Recursos en los Países Latinoamericanos", in EURE II, (6):31-42.

conferred the metropolitan areas relative advantages for the establishment of new activities which, in turn, determine a greater productivity of capital in the centre which secures a higher degree of investments rentability. Simultaneously, the efficiency of the intermediate financial systems increases, interjoined with the metropolis, to the point of intensifying the accumulation of capital in the big cities and of financing a great part of the investments made in them to endow them with infrastructure and services with resources coming from exports of primary sector products of the periphery regions.[2/]

In more recent times a change has occurred in the industrialization pattern of Latin America as a result of the growing external control of the local productive apparatus (through the sale of technological processes, the incorporation of new productive capitals or through the acquisition of activities which previously were in the hands of local producers). Thus, in this fashion, and under the shield of protectionist policies, the number of branches of multinational enterprises has been increasing which tend to assume an oligopolic character, displacing the less efficient small producers. This change has contributed to favour the metropolitan concentration (towards the end of the decade of the 60's, Sao Paulo generated 60 per cent of Brazil's industrial production, and Buenos Aires 70 per cent within Argentina).

During its initial stages, this particular industrialization model had a dynamic character insufflating a high rate of growth to the national economies. Having reached a certain production level, under the canons of a capital-intensive technology, several problems become apparent. On the one hand

2/ Furtado, Celso, Uma Politica de Desenvolvimento Econômico para o Nordeste. (Recife, SUDENE, 1967; 2a. ed.).

it is necessary to import raw materials and capital goods, and, at the same time, the industrial pattern has to confront the rigidity of the internal market, characterized by a low demand. This situation has given rise to unused capacities and restrictions of labour opportunities. On the other hand, the high production costs restricts the possibilities for exports. The fact that this modern productive apparatus was built on the basis of direct and indirect transferences of resources from other national economic spheres, particularly from the primary sector,[3/] can not be ignored, either.

1.2 The Socio-Organizational Dimension. The perspectives of diversified occupations and of improved monetary income offered by the metropolitan economy operate as incentives for migratory waves. Such absorption of human resources, often possessing certain qualifications, involves an effective weakening of the national periphery. This implies that the metropolitan centres not only grow at higher rates than the rest of the urban nuclei but it also means that its enlargement entails a qualitative enrichment[4/] as well.

Nevertheless, in the long term, the demographic increment tends to be higher than the occupational expansion rate which brings about various forms of unemployment and underemployment which tend to reach higher levels than the national averages (thus, in 1970, open unemployment reached a rate of 13.1 in Bogotá, while the figure for Colombia was of 7.5 per cent; the level of unemployment in Lima-Callao was 50 per cent higher than the mean for Perú and marginal employment in that metropoli represented nearly 30 per cent of the economically active population). Although the personal income estimates made by

3/ Mamalakis, Markos and Reynolds, Essays on the Chilean Economy (New Haven, Yale University Press, 1965).
4/ Elizaga, Juan C., Migraciones a las Areas Metropolitanas de América Latina (Santiago, CELADE, 1970).

CEPAL indicated that the metropolitan inhabitants have at their disposal greater monetary resources than those living in the rest of the national territories, it is nonetheless true that the current consumption structure in the great cities and the indexes of underemployment and unemployment reveal a picture of generalized poverty.[5/]

The poverty condition of vast sectors of the metropolitan populations is characterized by a wider framework of segregation and marginality. Two elements appear to operate as main responsible sources for this situation: On the one hand, the existence of limited access to the means of production as to allow for an adequate income in terms of its absolute level and regularity, and, on the other, the presence of various forms of discrimination which create obstacles to rising social mobility. Thus, the social sectors with greater income adopt consumption patterns of a conspicuous nature and have an access to the same literature, recreational activities, clothes, architectonic and residential designs as the metropolitan inhabitants in the relatively more advanced countries. On the other side, the lower income groups see their effective participation within the metropolitan structure blocked concentrating their efforts in life styles which could be classified as that of subsistence (in 1974, around 52 per cent of the population of Sao Paulo was undernourished and only 30 per cent of the houses had sewers. Hence, the metropoli reveals a process of progressive margination of the poor stratum who must bear all the weight of the congestion diseconomies and the environmental deterioration.

5/ CEPAL, "Distribución Comparada del Ingreso en Algunas Ciudades de América Latina y en los Países Respectivos", in Boletín Económico de América Latina, XVIII (I-2):13-44; Henry Kirsch, "El Empleo y el Aprovechamiento de los Recursos Humanos en América Latina", in Boletín Económico de América Latina, XVIII (I-2):45-87.

Although it is often argued that the problems of the great cities are product of their growth rate, actually they seem to respond more to the pattern with which the development benefits are allocated and to the style of costs distribution. The material provisions of the metropolis conceived as public services have, nevertheless, social uses conditioned by the individual ability to have access to them. Thus, the use of space and the provision of services become a means of transferring private costs towards the public sector. The decision about the employment of resources in public works, moreover, seems to be ruled by the investment recuperation capacity.

In brief, the rigidities of the income distribution, the unequal access opportunities to urban benefits and the unequal distribution of cost entailed by them, define the social-organizational pattern of the metropolization process.

1.3 The Spatial Dimension. The unequal and polarizing pattern exhibited by the distribution of the population and activities in the spatial sphere of the Latin American countries have converted one single area, or a few of them, in the great industrial centre and of services which absorbs, from the rest of the regions, resources and manpower. Many of the industries established, depend intensively from imports, are oriented to the concentrated demand in the great city, use relatively few natural resources and try to make maximum use of agglomeration economies resulting from the concentration. This process integrates the whole country around a central axe.[6/] Such spatial pattern is reconfirmed by the action of the State apparatus by centralizing its decision-making team and its investments in the metropolitan areas.

6/ Frenkel, Roberto, "Consideraciones Económicas del Proceso de Urbanización", en Alfonso Raposo, ed., La investigación en el Campo Urbano-Regional, (Santiago, DEPUR, 1972).

To the extent that the demographic and economic concentration increases, the metropolis tend to overflow the original physical and administrative limits and move on to occupy new areas in its region, turning itself into a process difficult to control as long as the mode of free circulation of capital and human resources is maintained. A tentacular structure is thus encouraged through which the agglomeration successively incorporates centres of its immediate periphery and occupies certain intermediate areas. On the other hand, the national urban system tends to concentrate around the metropoli which operates as a real commanding post defining unidirectional relations: the great city lends services and distributes manufactured products in exchange for the supply of raw materials and farming products.[7/]

The great spatial expansion of metropolitan areas is illustrated by cities like México City and Lima which doubled their surfaces in the last decade, or by the occupation of surrounding agricultural lands (Santiago de Chile absorbed more than 12,000 hectares of first class irrigated land in only 15 years).[8/] This rapid expansion has brought along problems of soil erosion, environmental pollution, slow and costly transport routes, and of widening the infrastructure network.

The metropolitan space is far from being used at its optimum capacity particularly as far as it concerns residential or industrial purposes. The low income groups, particularly, are forced to dedicate an important part of their time to commuting between their residential and employment places; this implies

7/ Faissol, Speridião, Tipologia de Cidades e Regionalizacão do Desenvolvimento Econômico: um Modelo de Organizacão Espacial do Brasil (Río de Janeiro, IBGE, 1971).

8/ Herrera, Ligia y Waldomiro Pecht, Crecimiento Urbano de América Latina (Santiago, CELADE-BID, 1976).

an indirect lengthening of their working hours or, in addition, an indirect lowering of their income. On the other hand, the domination and centralization forms emerging within the metropolis affect the institutional system of property and land commercialization. Thus, for example, various State agencies contribute to the deterioration of the urban structure each time that subsidized housing is built in peripheric grounds, bringing along high social costs in terms of the extension of services and transport networks as well as defining districts inhabited exclusively by low income groups.

1.4 Implications of the Metropolization Process. The process of metropolization is multidimensional since it affects various socio-structural areas. It corresponds to a historical transformation of urbanization which not only presupposes quantitative modifications (of scale) but also profound qualitative changes. The direction and intensity of the process, as well as its implications depend on the mode in which such transformation has taken place within each particular society. The condition of underdevelopment and of scarce autonomy manifested by the Latin American societies and economies have left an imprint in the metropolization process.

Latin America continues to export raw materials and to import technology and semi-elaborated products which are assembled in the great cities of each country. Although these finishing goods industries are located in the Latin American physical space, they are a part of the economic space of the central countries and are oriented by the capital, organization and technology of these countries. As a result of these conditions, the Latin American nations are experimenting the emergence of a central developing region and the subsistence of peripheric regions with scarce dynamism. Activities capable of providing a solid economic base, but insufficient to absorb all the labour

force surplus which comes to them, are being fixed in the metropolis; while all the other centres which make up the urban system reveal a weak economic base which makes them unable to satisfy the needs of their hypothetical areas of influence.[9/] Although the finishing industries located in the metropolis count with a certain market capable of keeping them in operation, their level of activities, given the restrictions of demand, is insufficient to induce the expansion of basic and intermediate industries which could lead towards economic integration within a model of self-sustained economic development. The population contingent arriving to the great cities is forced to complete for the few jobs generated by the industrialization process and this gives rise to a great marginal mass which finds it impossible to effectively incorporate themselves to the activities of production and consumption.

The historical experience, nevertheless, seems to show that the development process, supported by the indivisibility characteristic of modern technology, is not totally independent of the great concentrations. The external economies of agglomeration promote capital productivity increments which could hardly be obtained in the absence of such concentrations. However, throughout time the conglomerate acquires disproportional volumes in relation to the national context which carries along problems of highly costly solutions in terms of the reorganization of social life and conditioning for the efficient development of productive activities.[10/] Having transcended certain dimensional thresholds there begins to generate real external diseconomies which engage large quantities of investments. These requirements are expressed around resources which must be assigned to the abilitation of discongestion

9/ Travieso, Fernando y Alberto Urdaneta, "Marco de Referencia del Desarrollo Urbano de Venezuela", in Cuadernos de la Sociedad Venezolana de Planificación, 84-86:3-30.

10/ de Mattos, Carlos, op. cit.

outlets, implementation of rapid transit systems, the furnishing of drinking water, sewerage, electricity, communications, and to the design of mechanisms to allow for the elimination of residuals. As a result of these growing needs, the public sector is forced to allocate each time a more important portion of its resources to eliminate or to attenuate the effect of external diseconomies in the metropolis (between 35 per cent and 40 per cent of the Chilean public investment concentrates in the Santiago region and no less than 80 per cent of it is allocated to infrastructure and basic services).

2. Needs and Resources of the Metropolitan Populations

2.1 On the Identification of Needs and Resources. Needs can be defined as "the wish to have available enduring means adapted to the pursuance of a concrete goal".[11/] Needs arise from the limitations of these means and diminish in intensity when these become available. It is possible to assume the existence of a scale of needs when there are different priorities for the different goals pursued. Probably the first needs are those which allow the survival of an individual (food, housing, clothing). To the extent that the means to satisfy them become part of an institutional system, the form of granting them will be conditioned by a certain order within which individuals fulfill specific roles.

From the above it can be seen that the nature of the needs, and the means adopted to confront them, will be a function of the type of organizational environment in which the individuals find themselves. The great cities, as it could be seen when the multidimensionality of the metropolization process was described, entail productive socio-economic organizational structures with

11/ Vito, Francesco, Economía Política (Madrid, Ed. Tesoro, 1961, Libro II, Parte I): 233.

their own characteristics which grant them the quality of a subsystem within society and the economy of the countries. In consequence, it is possible to expect that the type of emerging needs in the metropolis should also possess certain peculiarities.

The attached outline (see figure 1) tends to identify three generating levels of demand and resources; they are: the demographic subsystem, the economic subsystem and the spatial subsystem. From the interactions presented by the attributes of each one of these subsystems it can be seen that needs are expressed in terms of land, construction needs, and networks. The magnitude and type of the elements required will vary according to the nature of the activity being carried out. When the scale of the human settlement, the size of the population, and the productive structure increases and diversifies, the requirements will not only increase quantitatively, but will also have a qualitative reordering.

Given that the forms of social organization of the Latin American metropolis are ruled by the market trends, it would be plausible to argue that the satisfaction of the individual and collective requirements will depend on the magnitude and distribution of the available income. Nevertheless, the collective character of the needs entails the participation of the State in the granting of some of the necessary means. Hence, many elements transferred to the productive sectors or individuals as "benefits" correspond in practical terms, to indirect forms of State subsidies. In effect, when the public sector has to confront the granting of land, constructions or infrastructure, it is assuming the responsibility of satisfying needs, and the (public) costs entailed by this action are not internalized by those who benefit by them.

Many of the needs are not satisfied, and a gap is produced between those who manage to attain their goals and those who are left to develop a strategy to meet essential requirements. Within the context of a market economy, the economic size of a metropoli is given by its true capacity to meet the needs, i.e., by the size of the groups who formulate a demand for which it is possible to find a solution. On the other hand, the volume of the needs is composed by the total sum of requirements of all those inhabiting the metropoli (demographic size). The difference between demographic size and economic size defines the potential demand and this is presented in terms of a present deficit and a future deficit. So, if the expansion of the metropolitan economic size (and, consequently, of real demand) is determined by the enlargement of the agglomeration economies, its extension originates "development" costs which do not follow a continuous function but give way to a succession of "jumps". The transposition of each growth threshold can imply a stage of agglomeration diseconomies (congestion, deterioration, overcrowding) that sharpens the established deficiencies and expands the potential demands. Moreover, the overcoming of such a threshold implies having to make decisions on opportunity costs each time that resources must be allocated to dispose of means to fulfill indirect productive goals in the relative long term.

It is important to point out, on the other hand, that the intervention of the public sector and of the institutional agencies in the absorption and allocation of resources suffers serious limitations which sharpen the already mentioned problems. The concentration of wealth in the modern sectors of the metropolitan economy has had repercussions in the system due to its limited administrative capacity.[12/] In order to maintain the public income level it

12/ Ortiz Mena, Antonio, "Exposición en el Simposio sobre Desarrollo Urbano organizado por el Banco Nacional de Habitación del Brasil", BID, in América Latina en Desarrollo (Washington, BID, 1975):335-349.

has become necessary to increase indirect taxes, which, being easier to control than those of a direct type, have regressive characteristics (by depressing the income of the poorest strata). On the other hand, the resources absorbed by local government (municipalities) are a function of the income level, of the value of real estate property and of the number of motor cars existing within each administrative territorial unit. This implies that areas with the greatest population and low income level give rise to lower taxes which, in turn, lead to a diminution of the relative value of the material endowments, generating deficits and decay. Thus, for example, the five wealthiest communities in Santiago, with around 40 per cent of the population, earn nearly 80 per cent of the municipal income from the agglomeration, whereas the five poorest boroughs have to face the needs of 33 per cent of the population with barely 10 per cent of the income.[13/] The direct results of these inequalities is the forming of socially homogeneous spaces, separated from each other within the urban structure (segregation) and the growing qualitative breach of the urbanistic environment in which the new social sectors settle themselves.

In brief, the needs of the metropolitan population are derived from the pattern assumed by its demographic, economic and spatial growth. These will become real demands when the attainment of means facilitates their satisfaction. The expansion of these needs not only corresponds to quantitative modifications, but also to a qualitative type of transformation that is adjusted in a discontinuous manner. The origin of resources to cover the costs derived from meeting such needs corresponds to the same sources which generate them but these are instrumentalized through the market and the State intervention.

13/ Trivelli, Pablo, Análisis de la Estructura Financiera del Municipio Chileno, (Santiago, CIDU, 1972); Enrique Bronne, "La Eficiencia de la ineficiencia", in EURE, III (5):63-88.

One of the crucial problems formulated by the needs of the metropolitan populations is derived from the role attached to the individual in the productive, consumption, exchange, and management spheres. These are the starting points for the materialization of the endowment of means in order to meet requirements. These considerations assume special significance when one bears in mind that the expansion rate of the available resources does not adjust to the growth rate of demands, leading to critical situations of inequalities, extreme poverty and deterioration in the quality of life.

2.2 Income Patterns and Consumption Structure. By the middle of 1960, between 15 per cent and 30 per cent of the total population in Chile, México and Venezuela was concentrated in metropolitan areas generating around 40 per cent of the total national product. These figures imply that the inhabitants of these areas had a greater per capita income (between one third and one and a half times) than the respective national average and even higher than the income earned by most people living in peripheral areas (the gross income per capita of Guanabara, the central sector of Río de Janeiro, was nearly six times greater than the average for the Northeast region of Brazil).[14/] In other words, if a similar population proportion is considered for each socio-economic stratum it is possible to appreciate that the metropolitan groups had an absolute available income far superior to that of their counterparts on a national scale; thus, the absolute income level of 20 per cent of the poorest population of Río de Janeiro, São Paulo and México City surpasses that of the groups placed above the mean in the respective national distributions. This unevenness reflects the different structures of production and employment existing in the country and in the metropolitan areas; in the latter ones

14/ CEPAL, op. cit.

there is a clear preponderance of the tertiary sector (between 55 per cent and 66 per cent of the total employment and of the product of the metropolitan areas vis-a-vis 23 per cent to 28 per cent in the countries) and a strong incidence of the secondary (which absorbs nearly 35 per cent of the metropolitan employment and only 22 per cent of the employment on a national scale).

Although the available estimates relating to income (see table 1) seem to indicate that the differences between socio-economic strata are lower at a metropolitan level than on a national scale, the bias produced by the degree of monetarization of the exchange pattern should be kept in mind. In effect, the preponderance of productive relations of a primary type in the rest of the countries (outside the metropolitan areas) suggests the existence of subsistence forms and of payments in kind rather than in cash. On the other hand, the nature of the services and infrastructure which define the needs of the metropolitan populations are profoundly different to those which appear in the other areas of the respective countries. From the above it can be seen that the differences between metropolitan socio-economic strata might be greater than what is shown by the income data. Some of the factors having an incidence in this differentiation are: the ownership of the productive resources, the training level of the labour force (the income of an illiterate head of family in Río de Janeiro was one sixth of that earned by another with higher education), the degree of technological-financial modernization of enterprises, and the organization level and political participation of the labour force.

The standard of living of the metropolitan populations tends to be higher than that of the rest of the respective countries. In general, one could expect that having a higher income available, the consumption capacity should

increase and diversify. On the other hand, the greater availability of means for obtaining credit in the metropolitan areas becomes an additional incentive to consumption. Besides, the great concentration of public services could be interpreted as a basis for the relative improvement of the standard of living. It has been possible to detect that the mean expenditure in the great cities is greater by one third or more than the national averages (Caracas in 1961 concentrated 40 per cent of the total commercial sales taking place in Venezuela) and is oriented to a lower extent to the non-durable consumer goods (these represented 74 per cent of the sales in Caracas and 82 per cent in the rest of the country, even though the absolute expenditure per capita was 2.6 times greater in the metropoli vis-a-vis the national average). Other indicators also point out to a better standard of living of the metropolitan populations (the educational levels are often double those of the country's average; and the same is true of the availability of electric energy).

The information already provided does not give, nevertheless, a picture sufficiently complete concerning the modality assumed by the consumption structure of the metropolitan populations. In effect, while 20 per cent of the population with the lowest income of Caracas and São Paulo allocate about 50 per cent of their resources alone to purchasing food, 5 per cent of the population with higher incomes, in the same metropolis, allocate less than one third of their available monetary resources to this particular item, however, in absolute terms, the expenditure of the latter in food is 10 times greater than that of the poorest stratum. On the other hand, the costs incurred by the satisfaction of some needs are often extremely high for the metropolitan inhabitants. The value of a square meter of land in Caracas is between 4 and 10 times higher than that of other important cities in Venezuela; something similar occurs with construction costs. The net effect of these speculative conditions

at the level of land purchase and housing is explained by the high proportion of people living in "ranchos" (92 per cent of those making up the poorest 50 per cent of the population in Caracas lived in below standard housing conditions). Another example of the contrasts exhibited by the consumption structure appears in terms of the supply of services: 5 per cent of the population with high incomes spend 42 times more than the poorest 20 per cent on items relating to health, education, recreation and personal care.[15/]

In order to provide a deeper perspective it is interesting to consider the expenditure composition of families in Lima, towards the end of the 60's (see table 2). More than the simple quantitative differences that can be appreciated between strata, is the outstanding qualitative composition of the expenditure pattern. Whilst the greater part of budgets pertaining to the lower stratum and those living in "pueblos jóvenes" are allocated to food, those in the higher income bracket basically invest in housing, clothing, and domestic appliances. Yet in spite of this, the expenditure on food made by the lower stratum is only one tenth of that made by the high income bracket. Thus, it does not seem strange to verify that only the groups within the high and middle income bracket have access to the land market and urban housing, and that the poor segments (53 per cent of the population) are relegated to low-cost state constructions, and, fundamentally, to "shanty towns" and "invasiones". Given these characteristics it becomes evident how the metropolitan growth is directly linked with the deterioration of the environment. This becomes even more apparent if it is considered that the greatest part of these

15/ CEPAL, op. cit.; CEPAL, "Algunos Problemas Regionales de América Latina Vinculados con la Metropolización", in Boletín Económico de América Latina, XVI (2): 199-229.

"popular urbanizations" lack the indispensable elements for the normal development of human existence: in the "barriadas" of Lima only 18 per cent of the houses had sewerage, barely 19 per cent had drinking water and 22 per cent had electricity.[16/]

The verification that income of the metropolitan population is higher than that registered on the national scale could lead to believe that their savings capacity would also be comparatively higher. Yet, the expenditure distribution and the orientation of credit to promote consumption seems to have a negative incidence on savings expectations. It has been possible to detect that the income threshold from which metropolitan families begin to save is equivalent to four or five times that of the families in rural areas and minor cities. Whilst around 80 per cent of the families in Caracas have a higher expenditure than income, the deficit would only affect 22 per cent of the rural families. In general, the total expenditure in Caracas is almost 17 per cent higher than the income, whereas in rural and small urban sectors there is a total income surplus which reaches nearly 10 per cent. On the other hand, only 3 per cent of the families in São Paulo manage to save, while this condition is fulfilled by nearly 70 per cent of the family groups of Belém do Pará.[17/] Thus, it is possible to assume that the main contribution to the total investment does not come from individuals living in the metropolis but from enterprises which, in any case, often re-invest their surpluses in the same places. ECLA has estimated that the gross savings of these enterprises would

16/ Etienne, Henry, "El Consumo Urbano y sus Expresiones en los Asentamientos Urbanos Populares", paper presented to the Seminario Proceso de Urbanización, Estructura Urbana y Dinámica Poblacional (Bogotá, PISPAL-CELADE, 1975; mimeo).
Rodríguez, Alfredo, "Oferta de Vivienda y Terrenos en Lima Metropolitana ...", in EURE, II (6): 83-99.

17/ CEPAL, op. cit.

reach 15 per cent of the product generated in the metropolitan centres, an amount equivalent to one third of the mean gross internal investment in Latin America during the last few years.

2.3 Metropolitan Growth and Deterioration. It has been pointed out that the deficiencies produced by the lack of satisfaction of needs constitutes a source of environmental deterioration. It is what is often called "poverty contamination". Along with this element there are other depressing agents of the metropolitan environment which could be regarded as external diseconomies. The notion of deterioration refers to a lack of adjustment between the full development of the individuals and the conditions presented by the environment to enable them the attainment of their goals. It implies, in consequence, a conflict situation between the external attributes and the individual's psychophysical structure.

To the extent that the demographic size of the metropolis increases, there is a trend to produce an adjustment of the housing conditions through a reduction of the standards which are considered as "acceptable". The high values of land and construction, by virtue of accentuated forms of speculation,[18/] promote a gradual decrease of space availability per person (apartment buildings replace large single-family housing units before the useful life of these expire). Moreover, the commercial functions and services displace the residential use of the land in the central areas and along the main circulation axes. Increasing proportions of the population must be housed in buildings built by the State in the periphery of cities giving rise to increments in the

18/ Land prices in Lima, for example, rose 3.5 times more than wages between 1940 and 1967; something similar took place with house rents; Alfredo Rodríguez, op. cit. Luis Lander, "Especulación en Tierras como Obstáculo para el Desarrollo Urbano" (Bogotá, PISPAL-ASCOFAME, 1976; mimeo.).

costs of people's movement and to additional investments in public works and services networks. But as public action can only satisfy a fraction of those who do not have access to the construction market, there is an increase in the growth of the "shanty towns" of various types characterized by overcrowding, unhygienic conditions and multiple inconveniences.[19/]

The physical expansion of the metropolis is accompanied by the omnipresence of various forms of suburbanization; the high classes resettle themselves looking continuously for better environmental conditions in areas endowed with complete furnishings;[20/] lower income sectors settle in unused land waiting for "urban valorization", erecting modest habitations devoid of services. Given the rate of this expansion it would not seem strange that nearly 38 per cent of Lima's surface lacks drinking water and sewerage.

The ordering of the urban structure gives rise to numerous congestion points. This constitutes, according to Wingo, one of the most dominant metropolitan outward forms and can be defined as the lack of adjustment between physical systems capacity and the imposed social demands.[21/] Nearly 60 per cent of the trips which take place within Santiago go through the central area producing an increment of the "smog" level, the saturation of circulation routes, and a growing lack of safety conditions for pedestrians and travellers. The increasing demand for public transport gives rise to substantial investments that the State has to face in extremely difficult circumstances. On the other hand, it has to find rapid transit solutions at very high costs

19/ Herrera, Ligia, La Concentración Urbana y la Dispersión de la Población Rural de América Latina: Su Incidencia en el Deterioro del Medio Humano (Santiago, CELADE, 1976).

20/ Amato, Peter, "Elitism and Settlement Patterns in the Latin American City", in Journal of the American Institute of Planners, XXXVI (2):96-105.

21/ Wingo, Lowdon, "The Quality of Life: Toward a Microeconomic Definition", in Urban Studies, 10:3-18.

(it has been estimated that the total cost of the underground train in México would amount to four billion dollars, an amount equivalent to the cost of the total duplication of buses in all underdeveloped countries; the initial stage of Santiago's metropolitan underground train meant an annual investment of nearly half per cent of the gross geographical product of Chile in 1974) and, on the other hand, urban road systems have to be built which require similar amounts of resources to those allocated to public works in the rest of the countries. The habilitation of descongestion routes, futhermore, often tends to create undesirable secondary social effects like the increment in the ownership and use of private motor cars which only contributes to a minimum growth of the transport system capacity (due consideration given to its scarce degree of employment) and can serve as an incentive to increase the trends towards segregation.

Industrial growth, added to a continuously increasing rate of motoring (in different metropolis there are records of an annual increment of the availability of motor cars which is higher than 10 per cent) and to the employment of different fuels, contribute to increase the levels of atmospheric contamination to above the tolerated margins. This type of pollution has noscive effects for health and prevents the full enjoyment of goods. Thus, the Pan American Health Office has identified various metropolis where the proportion of sedimentary dust, materials in suspension, and anhidric sulfurate, reach truly alarming levels (City of México, for example, had 17 times the value of reference in sedimentable dust and 3 times that of dust in suspension; risky situations can also be observed in São Paulo, Bogotá, Santiago and Buenos Aires).[22/]

22/ Herrera, Ligia, op. cit.

The accumulation of contaminated substances in water bodies (excreted wastes, solid and liquid waste) has given rise to the breaking up of the ecological equilibrium, since as the temperature increases there is considerable diminution of dissolved oxygen, the subsidiary type of the alimentary chain becomes predominant ("decomposers"), which is, responsible for the generation of unpleasant smells. This is what has happened, for example, to the Tietê River and with the great damn of Billings, in São Paulo, which means to take away from the population of that metropoli a scarce resource of recreation.[23/]

Pollution not only affects the atmosphere and the waters but also the land of the surrounding areas to the metropolitan centres. In effect, the use of sewerage water for irrigation has become a fairly common practice in sectors where vegetables are cultivated for sale in the urban market. But the impact of metropolitan growth on the land is even more considerable. To the extent that the built surface increases, the imparmeabilization of the soil accelerates and gives rise to surface drainage which produces occasional inundations of vast areas. Besides, the systematic elimination of the green surface in the perimeter of large cities leads to the inestability of the slopes and overloads the drainage system (situation which can be dramatically illustrated by the action of private "urbanizations" in the periphery of Caracas).

2.4 Needs of a Metropolitan Population in Expansion (The Case of Santiago, Chile). Santiago, the place of residence of a third of the total population of the country, has been chosen with the purpose of providing an image of the needs of the metropolitan population in a nation with relatively lower degree of development. Given that one of the problems exhibited by less developed

23/ Zulauf, Werner Eugenio, "Saneamiento Básico", SERFHAU, in Planejamento Metropolitano (Río de Janeiro, SERFHAU, 1974):166-171.

countries corresponds to the lack of suitable statistical background information, many of the estimates that will be presented below must be regarded as preliminary versions and subject to revisions which, in some cases, could be of significance. When making the calculations the following assumption was made: that the forces which have been operating throughout the last three decades before 1970 will continue to exert its influence during the next thirty years (i.e. until the year 2000). In other words, it is assumed that there are no Government plans and policies intended to alter the trends observed so far.[24/]

The methodology involved in making the extrapolations is fairly simple. The implicit current standards regarding the furnishing of services and the installed capacity for the performance of specific functions have been taken into account. On the basis of two essential parameters, population and territorial surface, a calculation has been made of the magnitude of fundamental works and investments within each of the selected categories. This implied a previous stage in which a diagnosis was made of the current situation. Thus, more than constructing an elaborated model about the quantitative and

24/ An important exception to this criterium of "constancy" is represented, in the case of housing (and to a lesser extent in commerce and public services), by the application of regulations pertaining to residential density. Various sectoral organisms of the State apparatus (CORMU-DPDU) believe it essential that future housing constructions should be contained within a land use pattern which can provide between 300 and 400 inhabitants per hectare. At the same time, an effort is being made to prevent the metropolitan expansion beyond the limits outlined by the Plan Intercomunal de Santiago (Plan Director del Area Metropolitana). These factors were taken into account in making the estimate calculations; nevertheless, an "eclectic position" was adopted which regards, at the same time, the eventual effects resulting from the maintenance of the trends registered between 1940 and 1970. Thus, base study for this article contemplated two extreme hypotheses (generalized high rise blocks versus generalization of extended low level buildings) which were rejected and an intermediate hypothesis was adopted in their place. This decision also affects the blue-print of circulation elements, though to a lesser extent.

qualitative expansion of the alleged needs of Santiago's population by the year 2000, an effort has been made to develop an elementary simulation excercise about the satisfaction of certain essential demands. Obviously, within a long term perspective the requirements of infrastructure (construction, public utility services) and of space become points of great importance. This is the reason why interest has been focused on these topics. The following discussion is necessarily brief, and emphasizes the (provisional) results arrived at; nevertheless, the tables included in the text could motivate more detailed reflections. Lastly, it must be pointed out that the analysis concentrates on the Gran Santiago, leaving the rest of the Metropolitan Region aside.

2.4.1 Housing. The total stock for 1970 included 615,876 housing units. Of these, 79.24 per cent (488,049) could be regarded as 'acceptable' ones from the point of view of their physical conditions, according to the Population and Housing Census.[25/] If overcrowding is taken into account[26/] the stock of residential units which could be regarded as "appropriate" is reduced to 64.50 per cent out of the total (397,369).[27/] In spite of the efforts made by the public sector and of the substantial investments made in housing, it

25/ It is necessary to point out that for the purposes of this study the houses regarded as "acceptable" were those houses or apartment buildings defined by the census bureau as "good", "acceptable" or "restorable"; other types of housing are therefore, omitted (i.e. slums, huts, etc.).

26/ Characterized according to a table of number of persons occupying a room, elaborated by Alfonso Raposo, from his research on housing policy in Chile (Santiago, DEPUR, 1976; personal information).

27/ The resulting deficit ("inappropriate" housing stock, amounting to 218,507 units) is greater than that calculated by the Departamento de Política de Vivienda del Ministerio de Vivienda y Urbanismo (MINVU). In effect, this organism estimates that the deficit of the Metropolitan Area for 1976 would be of 145,014 units. The National Planning Office (ODEPLAN) reported a deficit of 160,813 houses for 1974. It is likely that by not including the overcrowding effect the "official" figures, in practice, substimate the real requirements; for this reason, the values provided by Raposo have been adopted in this context.

is possible to appreciate the fact that the production system is not in condition to fully absorb the total deficit. The available information makes it possible to speculate that more than 60 per cent of the population finds itself prevented from acceding to "appropriate" housing, and to overcome this condition they would require a strong Government subsidy. Furthermore, the productive capacity of the sector confronts certain difficulties which have limited its expansion over the last decades.[28/] Although it is true that there are important fluctuations, particularly in terms of the number of houses "started", the quantity of units effectively "finished" (on an annual basis) has been rather constant. This situation becomes evident when the volume represented by the number of m^2 built is taken into consideration.

On the basis of the information collected it is possible to estimate that throughout the period 1970-2000 the housing production rate in Greater Santiago will reach an annual mean of 19,862 units of the "appropriate type" (i.e. with a useful life of 40-50 years). Within this quantity there are houses intended to replace those which were classified as "appropriate" in 1970 but that will become obsolete during the thirty-year period. It has been assumed in a very general way that 47.32 per cent of the stock which in 1970 was defined as "appropriate" would have to be renovated during this period (188,023 units). This would imply that the net gain would consist of 407,737 units which would provide a total of 805,106 "appropriate" houses by the year 2000. Yet, the requirements of the population will reach to 1,378,379 units.[29/] So that if an attempt is made only to maintain constant the

28/ Among the main obstacles the following should be mentioned: the difficulties of financement, deficiencies in the administrative apparatus at the management level, and limitations in the capacity to produce some material inputs.

29/ This quantity which could be interpreted as "potential demand" is obtained not only on the basis of population growth along the thirty-year period but also through the foreseen reduction of the size of homes.

proportion of deficit in housing registered in 1970, it would be necessary to build 83,945 additonal units. Even under these conditions the "inappropriate" stock would be magnified by a factor of 2.24.

With the purpose of studying the financial resources needed to meet the indicate housing requirements, an analysis was made of the existing types of housing in Santiago. This allowed the selection of three types which correspond to designs proposed by sectoral organisms of the State (the semi-detached house P-132; four-storey tenament building, C-1020; and, the residential tower of 21 storeys, T-21) and the representativeness of which has often been acknowledged.[30/] In addition, two types of luxury housing were also considered, accessible to 3 per cent of the population in the high income bracket. The building characteristics and use of the land by these types of constructions are shown in table 3 the last three lines of which include preliminary costs estimates carried out on the basis of various sources of information.[31/] A warning must be made that the total costs refer only to those of an instantaneous type (omitting maintenance and repairs), including the value of construction, habilitation of lands, internal circulation and interconnections of infrastructure (electricity, drinking water, and sewerage).

Table 4 shows in detail the eventual distribution of the (provisional) housing estimate for the year 2000 according to type. It can be seen that 39 per cent corresponds to high rise buildings, which triplicate the proportion

30/ Corporación de la Vivienda (CORVI), Sub-Depto. de Costos de Obra, "Oficio 405" of April 8, 1976; Corporación de Mejoramiento Urbano (CORMU), Sub-Departamento de Estudios Urbanos, "Informe al MINVU acerca del Plan Habitacional 1976". Juan Escudero and Jorge Martin, "Costos Incrementales del Crecimiento Urbano", in EURE III (11):101-112.

31/ CORVI, Plan Habitacional de 1963; CORVI, op. cit.; J. Escudero and J.Martin, op. cit.; José Guerra, Costos de la Vivienda Popular en Chile (thesis seminar, Esc. de Arquitectura, Univ. de Chile, 1966); Servicio de Vivienda y Urbanismo (SERVIU) del MINVU and the Secretaría Regional Metropolitana.

of this type of construction within the existing stock in Santiago in 1970. Nevertheless, the trends started in 1960 point towards a gradual loss of the relative importance of extended (low-density) constructions; in addition, the responsible organisms for housing and urban policies are promoting a more intensive use of land.[32/]

2.4.2 Provisions for Education and Health. To detect the needs in these two areas it was necessary, first, to calculate the existing capacity and to obtain the level of use made of the existing provisions. On the basis of this information, the implicit standards in them were obtained, which, then were compared with the optimum ones accepted by the corresponding authorities.Thus, it was possible to obtain a preliminary quantification of the deficiencies. The study was exclusively limited to the requirements of space and construction, omitting, due to lack of adequate background information, the conditions of interior functional habilitation and personnel staff.

According to several sources,[33/] it was possible to estimate the cost of construction per m^2 as US$ 133. On the basis of this information, the projected demand for the year 2000, and the reference standards, two sets of estimates were obtained (shown in table 5). The first one corresponds to the maintenance of the current levels, and the second one to the solving of the deficiencies on the basis of the same demand. For purposes of global investments, shown in the summary-table 7, it was opted for the first set of estimates.

32/ This is a very controversial topic. Although it goes beyond the limits of this article, it seems important to point out that some low level constructions such as the P-132, make possible relatively high densities. On the other hand, the relatively high buildings in a seismic country like Chile requires a more intensive use of scarce resources, such as steel and cement.

33/ Ministries of Education and Health, Educational and Hospital Establishments Building Companies, Architectural Bureau and Planning and Urban Bureau of the Ministry of Public Works.

It should be considered that for the extrapolation of the trends, no consideration was given to any possible increment in the proportion of the population benefiting from the medical-assistential services. Moreover, it is necessary to point out that in the field of education as well as health, the figures refer fundamentally to the public sector.[34/] On the other hand, given the background information presented, a replacement coefficient was calculated amounting to 35.51 per cent, which was applied to the estimated total costs.

Finally it is important to point out that initially an attempt was made to keep the proportion of the population benefiting from the educational services constant, but with the purpose of establishing a continuous rate of edification for educational purposes, it was decided to progressively widen slightly that relationship. As the population projection used is supported by the hypothesis of the gradual lowering of fertility and mortality levels, the demand for education in the basic and middle stages would increase at a decreasing rate; with the correction introduced it is possible to obtain a more homogeneous growth during the period 1970-2000. The available information on the university student population made it possible to make a projection which reveals a greater relative degree of confiability, although its proportion within the total population is slightly altered. The data pertaining to nursery education are necessarily speculative due to the great diversity of institutions connected with the provision of this service.

2.4.3 Commercial, Communitarian and Services Provisions. Numerous urban functions intended to satisfy various needs of the population are included here; they represent, moreover, the greater part of the metropolitan employment. As

34/ The information pertaining to the private sector is fragmentary.

Santiago is the seat of the national state apparatus, with a highly centralized political-administrative management, it is not surprising that it should concentrate 52 per cent of all Chilean constructions in public services, police, judiciary, etc. Altogether these activities covered in 1970 around 1,332,000 m^2 of constructions.[35/] Moreover, it is estimated that other type of provisions (firemen, cultural centres, and theater, religious buildings, power substations) represent nearly 800,000 m^2 of constructions. On the other hand, private edification, in terms of offices of various types, insurance agencies, financial centres, hotels, etc., includes some additional 240,000 m^2. Finally, the activities of whole sale and retail commerce, including storage, cover around 4,960,000 m^2 of constructions. In brief, these various functions represent nearly 7,332,000 m^2, out of which it is calculated that 20 per cent correspond to high rise edifications with an average of 2.5 storeys.

Should the relationship of space built per inhabitant (2.47 m^2) remain constant, the additional requirements for the year 2000 would reach slightly over 8,000,000 m^2. This preliminary estimate includes public sector edification needs on the assumption that construction will continue at the same rate of expansion as that verified in the decade of 1960-1970, which, in addition, would allow the level of provisions observed that last year to remain current. Due to the fact that commercial and financial sector trends indicate a preference for high rise buildings it is possible to hypothesize that the new structures to be built will be mostly included within this type of spatial solution.

35/ Ministerio de Obras Públicas (MOP), Memorias (various years), Plan Trienal de Inversiones (1977-1979); MOP, Dirección de Arquitectura y Dirección de Planeamiento (personal communications); MOP, Planificación y Programación (Santiago, MOP, 1976). It was not possible to obtain an estimate of the amount of constructions of a military type.

Given the variety of data with regard to construction costs for the private sector it has been decided to apply the established rate for public constructions (US$ 133 per m^2). The required investment due to replacements would be equivalent to 31.55 per cent of the cost of the new construction (see table 6).

2.4.4 Drinking Water, Sewerage, and Electricity (see table 6). To obtain estimate regarding the required size of investments in drinking water and sewerage for the year 2000 it was necessary to determine the magnitude of the deficiencies around 1970 and to detect the trends related to the provision of services for a period of around 15 years.[36/] Then, an extrapolation of the demand was made under the assumption that the relative levels of provisions would remain unchanged (in terms of houses served as well as in terms of the absolute magnitude of the supply per inhabitant).[37/] An estimate was made,

36/ Information provided by the Departamento de Estudios de la Empresa de Agua Potable de Santiago (EAPS) and the Dirección de Obras Sanitarias (DOS) del Ministerio de Obras Públicas (MOP). Additional background information was obtained from the following sources: Servicio Nacional de Obras Sanitarias (Comité de Desarrollo Institucional del SENDOS, Organización Regional del Servicio Nacional de Obras Sanitarias, Santiago, SENDOS, 1976-2nd. edition; Empresa Metropolitana de Agua Potable y Alcantarillado, Santiago, SENDOS, 1976), División de Servicios Sanitarios de la Corporación de Obras Urbanas (COU), División de Recursos Hidráulicos of the Corporación de Fomento de la Producción (CORFO), Dirección General de Aguas del MOP (Oficina Proyecto Río de la Unidad, Abastecimiento de Agua Potable del Gran Santiago, Santiago, OPRU, 1972), the Instituto de Investigaciones Geológicas de CORFO (Hidrogeología de la Cuenca de Santiago, Santiago, CORFO/IIG, 1970), EAPS. (Informe BID, 1961), Servicio de Agua Potable El Canelo, Empresa de Agua Potable Lo Castillo, Empresa Municipal de Agua Potable de Maipú, Direcciones de Obras Municipales of some of the 17 communes making up the Greater Santiago.

37/ It was possible to detect that the drinking water service allowed the supply, with a mean consumption of 356 litres per person a day, of 90.04 per cent of the 1970 population. The greater part of the provision comes from the Maipo River and from underground sources; the relevant works for securing an adequate supply from these sources required substantial investments during the period 1955-1970 but it is expected that they will continue operating without having to make additional investments, after the year 2000. It is probable, nevertheless, that once the size of the population goes beyond the 8 or 10 million inhabitants it may become necessary to turn to other supply sources. Regarding sewerage, the drainage works associated with road works (the costs of which are added to the investments in this area) have been excluded, and it is assumed that a level of services which amounts to approximately 56.4 per cent of the population will be maintained.

in a preliminary fashion, of the furnishing costs for each house, ignoring the values corresponding to their individual services interconnections (which are regarded as part of the habilitation of land for housing). The figures thus calculated have been used as coefficients to determine the total investment required.

It should be noted that according to the sources consulted, Santiago will reach by around 1980 a size threshold which will make the construction of new filter and sewage plants imperative, in addition to a third drinking water aqueduct. These works will assure a standard identical to the one existing in 1970. Likewise, due to the increase in population density and the modification of the street and highway layouts, it will become necessary to replace and improve the existing sewage networks and drainage outlets.

With respect to the supply of electric energy, it has been estimated that the gross annual consumption is of some 700 kwh per person and that not more than 3 per cent of the metropolitan population is deprived of this service. Given that the additional investment needed to overcome this deficit would not exceed US$ 5 million it has been assumed that towards the year 2000 all the population will be supplied with electricity.[38/] The calculation of the investments required for the period 1970-2000 has been complicated by the fact that Santiago is part of the National Electric Grid System, for which reason it is probable that there exists a certain amount of over-estimation in the figures obtained.

38/ The information was supplied by the "Dirección de Planificación" and the "Vicepresidencia Ejecutiva" of the "Compañía Chilena de Electricidad" (CHILECTRA). Other antecedents were obtained from the "Empresa Nacional de Electricidad" (ENDESA) and from the "Informe Estadístico Anual de Producción, Operación y Consumo" published by CHILECTRA (Santiago, 1960). In addition, CHILECTRA supplied an ad-hoc report for the purposes of this article.

2.4.5 Transport and Public Roads System. The study of transport and public roads demands has been undertaken in an integrated form taking into consideration the diverse antecedents which alter, to some extent, the prospects obtained when projects related to the construction of the metropolitan underground railway were carried out.[39/] For the purpose of estimates related to future needs(and improvements) in the field of public roads systems and the equipment required for the transport of passengers, it was necessary to take into account the rates of increase in the volume of trips and in the use of different types of vehicles as well as the foreseen increments in the field of residential density.

The stock of passenger vehicles in 1970 reached 70,000 units, of which 64,500 corresponded to cars, and 5,500 to various types of buses used for public transport. The "motorization" rate (number of cars per 1000 persons) has gradually increased following a rhythm which ranges between 11.5 and 13.5 per cent annually. With these records it is reasonable to suppose that the total number of private vehicles would reach between 550,000 and 700,000 units by the year 2000. Despite this fact, it is estimated that even with a level

39/ Among other documents, the following were consulted: BCEOM-SOFRETUCADE, Estudio del Sistema de Transporte Metropolitano de Santiago de Chile (Santiago, MOPT, 1968; 5 volumes); Juan Escudero, "El Futuro en Torno al Metro de Santiago", in EURE III (11):61-73; Francisco Sabatini, Santiago, Uso Social del Automóvil CIDU-IPU, DT N°88, Santiago, 1976); INECOM, Bases para una Política de Inversiones en Obras Públicas,(Santiago INECOM, 1976); Luis Willumsen and Enrique Fernández, Perspectivas Tecnológicas para el Transporte Urbano (Departamento de Ingeniería de Transporte, Universidad Católica de Chile, DT N°3, Santiago, 1974); Programa Chile-California, Proyecto de Transporte: Análisis de un Sistema de Locomoción Colectiva para el Sector Céntrico de Santiago, and Encuesta de Origen y Destino de los Viajes en Santiago de Chile; MOPT, Metro de Santiago (1972); Oficina de Cooperación Técnica de Ultramar del Gobierno del Japón, Informe sobre el Estudio de la Inversión Previa de los Sistemas de Transporte Urbano de la República de Chile (Santiago, 1976). Various organisms were consulted; among others: Subdirección de Vialidad Urbana, Direccción de Planeamiento, Dirección General del Metro del MOPT and Ministerio de Transporte.

of motorization of nearly 100 vehicles per 1000 persons, almost 75 per cent of the trips will take place in public transport.[40/] From this it can be deduced that substantial investments in equipment for public transport are inevitable. Besides taking into consideration the metropolitan railroad under construction, it has been estimated that it will be necessary to renew the total number of public transport vehicles at least three times during the period between 1970-2000 and that in order to maintain the current standards of service (regarded as being deficient), it will be necessary to amplify the fleet by 20 per cent every 15 years (on the basis that the metropolitan underground will be in full operation on the lines 1,2 and 3). As the stock consists of buses, minibuses and collective taxis, the pertinent costs have been itemized. The final figures obtained is close to US$ 450 million.

Until the end of the decade 1960-1970 there were a number of indicators which pointed to a serious deterioration in the conditions of displacement and accesibility within the urban structure of Santiago (thus, for example, the daily journey to work, between 1966 and 1969, was extended for the lower income groups by more than 8 per cent in terms of time involved). In effect, the speed of displacement was decreasing so considerably that if the trend continues, in 1980 it would hardly reach to 10 km/h in the city as a whole and to 6 km/h in the central zone. This implied growing social costs and severe problems of future congestion. At the same time, the aim of increasing the

40/ It has been calculated that the rate of travels per each 1000 persons would approximate to 700, and as the use of the private motor car tends to be progressively less efficient as a means of collective transport (the mean value of its use has declined in Santiago from 1.9 to 1.2 persons per vehicle between 1966 and 1976), it seems obvious that the use of public transport will continue to be quite important. This seems even more valid for areas where lower income groups live, where the current rate of motorization amounts to 5 private vehicles per 1000 persons; furthermore, this rate has tended to stabilize or to decrease as a result of the effects of seggregation processes within the urban structure.

density of residential areas presented the risk of accentuating the difficulties that were foreseen. For these reasons, transportation authorities decided to undertake a vast plan to transform the metropolitan roadways and transport network by means of constructing two outer-rings and expressways, in addition to the widening of streets and discongestion routes as well as the establishment of a rapid transport system. This plan should be carried out between 1970 and 1990. It has been estimated that since these works will come into full use by the end of the 80's, the additional investments required between 1990 and 2000 would be small.

It has been calculated that, for the period 1970-2000, the costs involved in road constructions will reach US$ 750 million, and that the metropolitan railway will require another US$ 820 millions; to these amounts US$ 280 millions will have to be added in foreseen works of improvement to prevent the deterioration of the standard of service supplied by the urban roadways as a result of the progressive increase in the rate of use of motor vehicles.

In brief, the total necessary investment in roadways and transport, in the lapse between 1970-2000 will amount to US$ 2,300 millions (see table 6).

2.4.6 Urban Land Use. Based on the preceding estimates, which are summarized in table 7, as far as their direct financial implications are concerned an attempt has been made to point out the set of changes which would take place at the level of land use patterns. Table 8 compares the ways in which the urban area is distributed according to several uses in 1970 and 2000.

Given that a criterion of moderate residential density was adopted, the number of inhabitants per hectare of urban land would rise from 95.12 (1970) to 120.87 (2000), provided that the proportion of land maintained in reserve remains constant. Nevertheless, if one relates the total population

to the "maximum" urban surface -as defined by the Dirección de Planificación del Desarrollo Urbano del Ministerio de Vivienda y Urbanismo- for the year 2000, the foreseen density would only increase to 110.96.[41/]

Despite the fact that the increase of total surface foreseen for the year 2000 would only be of 65 per cent, compared with an increase of 109 per cent of the popllation, it can be assumed that the effects of the territory enlargement would have environmental implications which would exceed the urbanized area. In effect, it is probable that the surrounding green areas will receive greater attention for use as recreational and leisure grounds. This would lead to an accelaration of the deterioration process experienced by the agricultural function in a zone endowed with high fertility soils and with expensive works of infrastructure for irrigation. At the same time it is expected that the levels of deterioration of the environmental quality will increase considerably due, in part, to the greater relative increase of the surface occupied by "inappropriate" housing. Furthermore, the persistence of the dispersed pattern of industrial localization, coupled with a situation entailing a thermal inversion within the basin of Santiago would give rise to high levels of atmospheric pollution.

As long as it is not expected that any significant improvement would take place in matters such as green areas, treatment of sewage,elimination of waste, and so on, it is probable that the existing conditions within the metropolitan area would become even less propitious for the attainment of a better living standard. All this would occur even if sufficient resources were available to maintain the current state of provisions (see table 7), whose

41/ Table 9 shows the hypothetical distribution of the population and of the urban surface among the communes making up the metropolitan territory and figure N°3 presents the hypothetical spatial expansion between 1970 and 2000.

finantial implications would be above the gross geographical product of the country in 1974 (which was of US$ 11,628 millions), by 1.5 times.

3. Alternatives to Metropolitan Growth

"Nations all over the world are finding that their big cities are too big, and an ever-increasing number of urban policies are aimed at checking their growth ... the argument that the big cities can be saved by means of huge ... investment is not, by itself, appealing; it is the same argument used by the proponents of rural areas and small towns to save many of them from a natural death ... The real question must be posed in terms of spatial opportunity costs: Are there better alternatives in other places?" (Niles M. Hansen, Intermediate-Size Cities as Growth Centers; New York, Praeger Publishers, 1971, 80).

3.1 On Costs and Benefits of Metropolitan Growth. The well founded expectations of the rising needs of various types presented by the metropolitan populations in countries with scarce degree of development and with a high concentration of people and activities confer significance to the attempts to search for alternatives for redistribution and allocation of resources. The problem seems to lie in the questions as to whether metropolization constitutes the only viable means of achieving higher rates of economic growth.

De Mattos, after a detailed analysis of the centripetal type forces which operate in the Latin American environment, concludes that the countries of this region are facing two extreme options.[42/] On the one hand, the sustaining of observed trends, trying to maximize the benefits resulting from the external economies of agglomeration, as a basis for strengthening the economic growth on the short run. On the other hand, the attenuation of intra-national

42/ De Mattos, Carlos, op. cit.

inequalities which result from the concentration, diverting resources to invest in the infrastructure and services to generate external economies in other regions. This last option would entail taking away resources from the most capital productive areas to orientate them to others where, due to lack of previous material provision, the investments would require a longer period of maturation, which would imply, in the short term, decreasing the rate of economic growth. Matus on his part, warned that the adoption of a development pattern of a "horizontal" type (i.e. outside the actual economic centres) would contribute to enlarging the internal market and to lessen the effects of socio economic marginality and unemployment.[43/]

Alonso has suggested that this type of consideration should not be a reason for essential concern when defining the national policies in developing countries.[44/] In effect, this author maintains that the expansion of the main cities or the regional disbalance lose their currency when faced with the fundamental goal which consists in the acceleration of the rate of economic growth. In spite of the weight of his observations, it is worth enquiring if the costs of metropolitan expansion are compensated by the benefits which are derived from it. The temptation exists to tackle this subject on a purely economic basis, but the difficulties involved in an evaluation of this type clash with the impossibility of quantifying certain social costs. Many enterprises which benefit from the development and maintenance of agglomerate economies do not internalize the resulting costs; on the other hand exists certain economic functions which cannot be defined as costs to the extent that they constitute essential agents for the amplification of the product.

43/ Matus, Carlos, et al. Discusiones sobre Planificación: Dos Polémicas sobre el Desarrollo de América Latina (Santiago, ILPES - Siglo XXI, 1970).
44/ Alonso, William, "Urban and Regional Imbalances in Economic Development", in Economic Development and Cultural Change, 17(1):1-14.

The concern regarding the size of urban centres has a long history and much of the accumulated "evidence" would seem to indicate that the large cities like the smaller ones are more expensive than the medium sized (between 100,000 and 250,000 persons).[45/] The argument on which this widely generalized "finding" is based proceeds from two distinct sources: on one side is the stream of those who relate size with cost and, on the other, that of those who constrast benefits and size. Both orientations have been criticized by Alonso who points out that it is superficial to concentrate on the minimization of costs or on the appearance of large scale diseconomies when large cities of 500,000 inhabitants are studied, while it is true that per capita costs increase as population increases, it is also true that the gross product also increases and even at a greater rate (as data from Japan and West Germany seem to show).[46/]

45/ See, for example, G.M. Neutze, Economic Policy and the Size of Cities (New York, A.M. Kelley, 1967); Colin Clark, "The Economic Functions of a City in Relation to its Size", in Econométrica, 13(2):97-113; Werner Z. Hirsch, "The Supply or Urban Services" in Harvey S. Perloff and London Wingo Jr., eds., Issues in Urban Economics (Baltimore, The John Hopkins Press,1968); Gordon Cameron, "Growth Areas, Growth Centers and Regional Conversion",in Scottish Journal of Political Economy, 17(2); D.J. Reynolds, Economics, Town Planning and Traffic (London, Institute of Economic Affairs, 1966); Wilbur R. Thompson, "The Economic Base of Urban Problems" in Neil W. Chamberlain, ed., Contemporary Economic Issues (Homewood, III., R.D. Irwin, 1969); Niles M. Hansen, op. cit.

46/ Alonso, William, The Economics of Urban Size (Berkeley, CPDR-U of California, 1970: W.P. 138). See also, Escudero and Martin, op. cit.;José R. Lasuén "National and Urban Development" in Banco Nacional de Habitaçao, Symposium on Urban Development (Río de Janeiro, B.N.H., 1974): 89-111. Within the line of reasoning of Alonso, the problem consists in finding relevant cost functions and benefits. Thus, the Gross Product can be conceived as constituting the benefits and that the costs are those of a public (infrastructure and local services) as well as those of a private sort (of production and consumption). By excluding the labour force costs, Alonso adopts a common assumption in economic theory, for he is assuming that the difference between marginal costs and marginal product would be a reflection of marginal productivity of the labour and, therefore, of salaries. If, furthermore, it is assumed that the product is monotonously growing and that the costs curve has a minimum and then grows towards, and eventually, surpasses that of the benefits, it becomes evident that the minimum costs point lacks theoretical relevance since the optimum would be given for larger sizes.

It would appear then, that the question of size of a centre is a matter of points of view. For the average inhabitant of the city it would be convenient that the city increases in size to the point of maximizing the available personal income (i.e., when the difference between mean cost and gross product is greater, both figures estimated at the individual level). From the local perspective, the city should have a size to guarantee the maximization of total income (which implies equality between marginal costs and marginal benefits). For the country as a whole, the size of an urban centre will have reached its optimum when the proportion between marginal costs and marginal products are similar to that registered in the rest of the cities. On the other hand, for a country with rural population surpluses, whose people do not have at their disposal alternative sources of employment, the optimum size will be reached at the point when the marginal product and the marginal costs are the same.

The approach described (on the basis of the argument put forward by Alonso presents some methodological problems difficult to solve within its implicit line of reasoning. In the first place, to be realistic, it is necessary that the analysis adopts a dynamic character; in other words, it must be placed in a historical context. In the second place, consideration must be given to the fact that the cities in a country are not isolated cases but form part of the national urban system, which implies the existence of hierarchies and patterns of spatial divison of work. Finally, the success of the analysis will be a function of the availability of quantifiable antecedents regarding the operation of agglomeration economies and diseconomies. Thus, while it may be valid to argue that not even New York, in spite of its apparent giant size, constitutes a case of a city that it is "too large", such assertion is

bound to be a relative one because of the position of this metropoli in the context of a society with a high rate of technological development and productive resources, and spatialy structured around an urban system that presents effective alternatives. The case of countries with a meager level of technological evolution and with acute lacking situations derived from its reduced degree of development seems to be different. Thus, for example, a study made by ECLA suggests that, granted the metropolitan deficits of Latin America and the considerable costs involved in their solutions, it would be less onerous, in some cases, to create new cities where, presumably, the cost of the urban infrastructure would be lower to that represented by the enlargement of the provisions of the large cities. To some extent, this observation shows the difference that appears when, instead of taking economic rationality at the enterprise level as a basis for decision, a perspective is adopted that departs from the concrete material conditions of the national economy.[47/]

Notwithstanding the validity of ECLA's argument it would seem that concentration of resources in a metropolitan zone constitutes a requisite for the enlargement and diversification of the national economies; at the same time, it would be legitimate to assume that the enlargement and consolidation of a powerful central nucleus of development would generate incentives that would be extended to the rest of the country thereby operating as a dynamic source of growth. But, in order for this effect to have a positive impact, it is imperative that the productivity of the resources invested in such centres be higher to that wich would be obtained in other areas, and that, almost in a simultaneous way, this expansion be reverted towards the rest of the urban-regional system.

47/ ECLA, op. cit.

3.2 Metropolization and Decentralization (Some Notes On the Chilean Case). An investigation about the central region of Chile[48/] reached the conclusion that it was impossible to demonstrate in unquestionable terms the convenience of drastically stopping the growth of Santiago. On the contrary, in order to promote a policy of concentrated decentralization circumscribed to the immediate (daily) sphere of influence of the capital, the authors of the study were able to identify only a very slight "margin of deconcentration" corresponding to a few activities the relocalization of which would not mean a significant detriment to the country's economy. The search for alternative localizations, as a means to eliminate the costs of urbanization of Santiago, encountered difficulties derived from the lack of suitable data about the "incremental" costs (in approximation to the marginal cost) and opportunity costs (in comparison to other localities).[49/]

Even acknowledging that obstacles are sufficiently great as to allow the formulation of definitive opinions, it would still be possible to advance the hypothesis that, in general, the direct costs (accessibility to centres, and subcentres, extension of the sewerage and water networks starting from the current situation, the provision of local services differentiated in quality and quantity, etc.) indicate a favourable trend towards the expansion of the

48/ CIDU, La Región Central de Chile (Santiago, CIDU-ODEPLAN, 1971); Equipo Macrozona Central, "Región Central de Chile: Perspectivas de Desarrollo", EURE, II (6).

49/ The information for the direct calculation of the mean and marginal costs of growth starting from historical figures of investment is scarce and dispersed; moreover, the investment decisions in various urban settlements do not reveal stability or coherence; in consequence, there is a lack of antecedents as to make extrapolations possible. It is not possible either to observe a clear relationship between the rythm of investment and population growth; furthermore, the standards of design and the way the works are used are extremely dissimilar and within one single locality there is often registration of unused capacities and deficits for a single item.

"proposed areas for urbanization" in Santiago.[50/] Some limiting points emerge, nevertheless, in terms of land values, reflected in the high market prices and in the analysis of opportunity costs with regard to the agricultural land susceptible of being "invaded" by the urban expansion. However, this problem could be minimized through the employment of architectural solutions which make intensive use of the scarce resource (the land); besides, the increment of residential density has an incidence on the lowering of other costs of a direct type (particularly, the infrastructure). From this point of view, then, Santiago would appear as the less onerous alternative as far as the cost of urbanization is concerned. This appreciation is strengthened when considering that the metropoli has overcome, or would be overcoming, certain thresholds of growth (as far as it concerns transport and roadworks, supply of drinking water) which implies that its expansion is even more convenient because it would secure a fuller use of the capacities which have been, or are being, provided for. On the contrary, to invest in works which promote the emergence of economies of agglomeration in alternative localities could mean a distraction of resources. Nevertheless, going beyond the direct costs and taking into account the long term induced costs, the capital city of Santiago presents serious inconveniences (atmospheric and water pollution, urban structure rigidities, social segregation patterns, diverse forms of congestion and overcrowding).

In the last analysis, the problem entailed by the rapid growth and the relative "gigantic" size of the metropoli is circumscribed to the mode that these processes assume. If the increment carries with it the creation of agglomeration economies, if it implies the enlargement of the production capacity and if, finally, it contributes to the improvement in the standard of

50/ Escudero, Juan and Martin, Jorge, op. cit.

living of the population, then it becomes a socially justified situation. But, if this growth does not produce along with it a more equalitarian distribution of costs and benefits, if the population lacks qualification, if concentrating and centralizing forms persist, then it is probable that the advantages of the agglomeration economies cease to be such for the greatest part of society.

Table 1

LATIN AMERICA: ESTIMATES OF PERSONAL INCOME PER CAPITA AND ITS DISTRIBUTION FOR SOME METROPOLITAN AREAS AND COUNTRIES

Country and City	Personal Income per Capita US$ (1965)	Percentage of total income by strata (Ca. 1961) Perceiving Units				
		20% (Lowest)	30% (Lower Middle)	30% (Upper Middle)	15% (Upper)	5% (Highest)
BRAZIL	255	3.5	11.5	23.5	22.0	39.5
Rio de Janeiro a/	805	5.0	15.1	29.2	26.6	24.1
Sao Paulo	755	5.8	15.2	26.2	24.8	28.0
COSTA RICA	286	6.0	12.2	21.8	25.0	35.0
San José	500	5.0	14.5	25.5	29.0	26.0
CHILE	480	3.5	12.5	25.7	27.8	30.5
Greater Santiago	660	4.3	14.3	29.2	29.2	23.0
MEXICO	475	3.0	11.8	26.1	29.5	29.0
Federal District	1 050	5.3	14.2	26.7	27.8	26.0
VENEZUELA	530	3.6	11.3	27.7	31.5	26.5
Caracas b/	870	5.7	17.3	29.3	27.7	20.0
Country Average	-	3.1	10.3	24.1	29.2	33.4
City Average	-	5.0	14.8	28.4	27.5	24.3

Source: ECLA, 1973.

a/ Personal income per capita corresponding to Guanabara.
b/ Personal income per capita corresponding to the Metropolitan Area of Caracas.

Table 2

METROPOLITAN LIMA: CONSUMPTION STRUCTURE BY SOCIAL STRATA

Items of Expenditure	Upper	Middle	Lower	"Pueblos Jóvenes"	Total
Foodstuff	22.1	33.1	48.2	51.8	43.4
Housing	34.5	26.6	15.3	17.4	20.0
Clothing and Home Appliances	20.3	19.5	17.5	13.8	17.4
Health and Education	5.2	4.6	3.2	3.7	3.8
Leisure	3.2	2.9	2.6	2.1	2.6
Public Transportation	1.6	2.3	3.1	4.1	3.1
Other	13.1	11.0	10.1	7.1	9.7
Annual Consumption Index (Base: Peruvian Soles, 1969)	331.8	147.0	67.7	65.1	100.0

Source: Henry Etienne, 1975.

Table 3

SANTIAGO DE CHILE: REPRESENTATIVE HOUSING TYPES

Attributes	Types				
	P-132	C-1020	T-21	V.L.1	V.L.2
Number of housing units per building	2	16	118	1	16
Number of persons per building a/	9	72	531	4.5	72
Ground surface per building (m^2 occupied by the construction)	85.14	301.92	384.18	250.00	650.00
Built area per building (m^2)	85.14	1 207.67	8 067.78	250.00	6 500.00
Density related to ground surface per building (inhabitants/m^2)	0.11	0.24	1.38	0.01	0.11
Density per built area (inhabitants/m^2)	0.11	0.06	0.07	0.01	0.01
Total area per building (construction plus open spaces)(m^2) b/	178.57	1 666.67	2 500.00	1 000.00	3 333.33
Density related to total area per building (inhabitants/hectare)	504	432	2 124	45.00	216.00
Construction costs per m^2 (US$) c/	54.00	82.00	133.00	166.00	200.00
Total cost per m^2 (US$) c/ d/	71.82	109.06	176.89	220.78	266.00
Total cost per building (US$) c/	6 114.75	131 708.49	1 427 109.60	55 195.00	1 729 000.00
Total cost per housing unit (US$) c/	3 057.38	8 231.78	12 094.15	55 195.00	108 062.50

Source: CORVI, CORMU, Escudero y Martin, 1975.

a/ An occupancy rate of 4.5 persons per housing unit has been assumed.
b/ Open spaces refer to circulation, parking and gardens.
c/ Preliminary estimates.
d/ It is assumed that land cost plus its "urban habilitation" (electricity, water supply and sewerage) amount to 33 percent of the construction costs.

Table 4

GREATER SANTIAGO: PRELIMINARY ESTIMATES OF HOUSING PRODUCTION BY REPRESENTATIVE TYPES (1970-2000)

Items	Representative Types of Housing[a/]						
	"Emergency solutions"[b/]	P-132	C-1020	T-21	V.L.1	V.L.2	Total
Number of housing units	83 945	328 102	208 912	42 362	11 652	4 832	679 805
Number of buildings	41 973	164 051	13 057	359	11 652	302	231 394
Population[c/]	377 752	1 476 459	940 104	190 629	52 434	21 744	3 059 122
Construction area (m^2)	3 573 539	13 967 302	15 768 547	2,896 333	2 913 000	1 963 000	41 081 720
Ground area (m^2)	7 496 336	29 294 587	21 761 710	897 500	11 652 000	1 006 666	72 108 799
Total costs (US$)	192 489 243	1 003 132 493	1 791 717 623	512 323 823	643 132 140	522 158 000	4 664 953 322

Source: CORVI; CORMU; CORHABIT; MINVU.

a/ See Table N°3.

b/ The "Emergency housing solutions" have spatial attributes (construction area and total ground area) similar to those of P-132 housing units; nevertheless, as long as they are built using lower quality building material and on the basis of self-help, total costs would be lower (it is assumed that these would amount to US$ 2 293.04 per housing unit, that is 75 percent of the costs represented by a P-132).

c/ An occupancy rate of 4.5 persons per housing unit has been assumed.

Table 5

GREATER SANTIAGO: PRELIMINARY ESTIMATES OF ADDITIONAL REQUIREMENTS ON EDUCATIONAL AND HEALTH BUILDINGS (1970-2000)

Educational levels	Total number of students a/	Requirements according to current standards b/		Requirements according to "optimum" standards c/	
		Construction (m^2)	Costs (US$)	Construction (m^2)	Costs (US$)
Nursery	89 854 d/	299 415	39 822 195	299 415	39 822 195
Elementary school	1 314 700	995 703	132 428 499	3 099 224	412 196 792
High-school					
Scientific/Humanities	192 283	231 996	30 855 468	539 648	71 773 184
Technological/Professional	130 256	182 311	24 247 363	612 132	81 413 556
University	120 500	510 000	67 830 000	---	67 830 000
Health					
Hospitals and Dispensaries		192 817	25 644 661	505 802	67 271 666
Total costs (including rehabilitation of ex existing stock)		-	423 065 007	-	-

Source: M.O.P. (D.G.O.P., Dirección de Arquitectura); Ministerio de Educación; S.C.E.E.; S.C.E.M.

a/ Estimates based on the analysis of trends; there is an underestimation of the figures concerning private schools.

b/ Implicit (current) standards as of 1970-1975.

c/ "Optimum" standards defined by official authorities.

d/ This figure would correspond to an optimum use of the built area which is expected to be constructed by 2000; there is no information on current standards. If one assumes that the implicit (current) standards for nursery shcools are similar to those for elementary schools, then the total number of "nursery students" would be 256 123 in 2000.

Table 6

GREATER SANTIAGO: PRELIMINARY ESTIMATES ON INVESTMENTS REQUIRED FOR THE CONSTRUCTION OF COMMERCIAL (RETAIL AND WHOLESALE), TRADE, OFFICE AND SERVICE BUILDINGS AND ON INVESTMENTS REQUIRED FOR THE DEVELOPMENT OF INFRASTRUCTURE (1970-2000)

Items	Costs (US$)
Construction of commercial, trade, office and service buildings (including rehabilitation)	1 395 831 047
Water supply	121 192 277
Sewerage	45 548 053
Electricity	2 992 760 000
Public road system and Transport	2 390 000 000

Source: M.O.P. (D.O.S., D.G.A., O.P.R.U.); E.A.P.S., CHILECTRA, ENDESA, D.G.M. and Sub-Dirección de Vialidad Urbana (M.O.P.); Ministerio de Transportes; C.O.U.; BCEOM-SOFRETU-CADE; INECON.

Table 7

GREATER SANTIAGO: PRELIMINARY ESTIMATES OF ADDITIONAL INVESTMENTS REQUIRED IN ORDER TO SATISFY SOME NEEDS OF THE METROPOLITAN POPULATION AS OF 2000 a/ (US$)

Items	Additional investments (millions)	Additional investments		
		Per capita (1970)	Per capita (2000)	Per each new inhabitant (2000-1970)
Housing	4 664.95	1 572.74	752.09	1 441.33
Trade and Commerce, Offices, Communal and Public services buildings	1 395.83	470.59	225.04	431.27
Education and health buildings	423.07	142.63	68.21	130.72
Public road system and transport	2 390.00	805.77	385.32	738.44
Water supply, sewerage and electricity	3 159.90	1 065.33	509.44	976.31
Sub-Total	12 033.75	4 057.06	1 940.10	3 718.07
Industrial buildings b/	2 712.35	914.44	437.29	838.03
Other items (Leisure, recreation, green areas) c/	678.59	228.78	109.40	209.66
Total	15 324.69	5 200.28	2 486.79	4 765.76

Source: MINVU (CORVI, CORMU, D.P.D.U.); Ministerio de Educación; S.C.E.E.; S.C.E.H., M.O.P. (Sub-Dirección de Vialidad Urbana, Dirección de Arquitectura, Dirección de Planificación y Urbanismo, D.G.M., D.O.S.); E.A.P.S.; CHILECTRA; ENDESA; INECON; Ministerio de Transportes.

a/ Estimates based on the assumption that the level of satisfaction of needs will be the same as of 1970. Costs of rehabilitation are considered.

b/ An investment ammounting to 20 percent of the figure given in the preceding sub-total is assumed.

c/ An investment amounting to 5 percent of the figure given in the preceding sub-total is assumed.

Table 8

GREATER SANTIAGO: CURRENT (1970) AND PROSPECTIVE (2000) LAND USE BY MAIN TYPES (HECTARES). PRELIMINARY ESTIMATES

Types of land use	Ground area		Inhabitants per area	
	1970	2000	1970	2000
1. Housing (including open spaces amounting to 20 percent of the surface)				
"Appropriate" stock to be maintained during the period	6 712	6 712		
"Appropriate" stock to be renewed during the period	6 032	2 539		
"Appropriate" stock to be added during the period	-	5,528		
"Deteriorated" stock not to be renewed during the period	3 186	3 186		
"Deteriorated" stock to be replaced by "Emergency housing solutions" during the period	-	750		
"Deteriorated" stock to be added during the period	-	3 945		
Sub-Total 1	15,930	22 560	186.2	273.7
2. Commerce, Services, Offices				
Current stock (including rehabilitation during the period)	1 692	1 692		
Stock to be added during the period	-	2 006		
Sub-Total 2	1 692	3 698	1 753.0	1 677.3
3. Education				
Current stock (including rehabilitation during the period)	343	343		
Stock to be added during the period	-	392		
Sub-Total 3	343	735	8 647.6	8 439.0
4. Health Services				
Current stock (including rehabilitation during the period)	44	44		
Stock to be added during the period	-	48		
Sub-Total 4	44	92	67 411.9	67 420.5

Table 8 (Continued)

Types of land use	Ground area		Inhabitants per area	
	1970	2000	1970	2000
5. Public road system				
Current layout (including modifications to be introduced during the period)	4 861	4 910	-	-
New layout to be added during the period	-	3,443	-	-
Sub-Total 5	4 861	8 353	610.2	742.6
6. Industry (8.14 m^2 per inhabitant)				
Current stock (including rehabilitation during the period)	2 413	2 413	-	-
Stock to be added during the period	-	2 633	-	-
Sub-Total 6	2 413	5 046	1 229.2	1 229.2
7. Leisure, recreational and rreen areas (7.75 m^2 per inhabitant)				
Current stock (including modifications to be introduced during the period)	2 300	2 520	-	-
New stock to be added during the period	-	2 290		
Sub-Total 7	2 300	4 810	1 289.6	1 289.5
8. Other uses (including reserves)				
Availability according to current (1970) standards (11.54 percent of the urban surface)	3 599	5 924	824.2	1 047.0
Potential availability (on the basis of the "maximum" urban area established by DPDU for 2000)	-	(10 508)	-	(590.3)
Total Urban Area	31 182	51 318	95 12	120.87
"Maximum" urban area established by DPDU for 2000	-	55 402	-	(110.96)a/

Source: MINVU (D.P.D.U.-P.R.I.S., Plan Director del Area Metropolitana, 1976); M.O.P.T. (Dirección de Arquitectura - Departamento de Vialidad y Urbanismo, Plan Intercomunal de Santiago, 1960); D.G.O.P. (Oficina de Estudios y Proyección Espacial de Transporte Urbano, 1968).

a/ The "statutory" density established by D.P.D.U. for the "maximum" urban area is 139.68 inhabitants per hectare. This figure is similar to the one obtainedin this study as long as the area devoted to other uses (mainly reserves) is not considered for the relevant calculation; in so doing the resulting density is 136.64.

Table 9

GREATER SANTIAGO: A HYPOTHETICAL DISTRIBUTION OF POPULATION AND URBAN AREA BY COMMUNES IN 2000 COMPARED WITH FIGURES REGISTERED FOR 1970 AND WITH THE "MAXIMUM" STANDARDS ESTABLISHED BY THE MINISTRY OF HOUSING AND URBAN PLANNING

Communes	Population (in thousands)			Urban surface (hectares)			Density (inhabitants per hectare)		
	1970	2000 a/	2000 b/	1970	2000 a/	2000 b/	1970	2000 a/	2000 b/
Santiago	544	410	898	4 489	4 489	4 489	115	91	200
Quinta Normal	145	155	171	1 138	1 138	1 138	121	136	150
Providencia	90	105	163	903	903	903	96	116	160
San Miguel	338	350	370	2 466	2 466	2 466	130	142	150
Conchalí	256	420	480	1 761	2 900	3 200	139	145	150
Quilicura	21	140	161	357	1 000	1 070	56	140	150
Renca	70	240	282	941	1 730	1 882	70	139	150
Pudahuel	193	690	770	1 709	5 000	5 130	107	138	150
Maipú	118	595	660	2 199	5 800	6 600	51	103	100
La Cisterna	258	350	375	2 183	2 500	2 500	112	140	150
San Bernardo	110	430	581	1 290	3 100	3 870	81	139	150
La Granja	170	370	383	1 276	2 500	2 552	127	148	150
Puente Alto	74	300	396	961	2 340	2 640	81	128	150
La Florida	53	190	214	1 071	1 900	2 142	44	100	100
Ñuñoa	293	875	975	3 625	6 200	6 500	77	141	150
La Reina	58	90	150	903	1 000	1 000	67	90	150
Las Condes	174	500	782	3 910	6 350	7 820	42	79	100
Total c/	2 966	6 203	7 809	31 182	51 318	55 902	95	121	140

Source: D.P.D.U.; P.R.I.S.; P.D.A.M.

a/ Preliminary estimates based on preceding tables.
b/ "Minimum" standards established by MINVU (D.P.D.U.)
c/ Slight differences due to the rounding of figures.

FIGURE Nº1

A SIMPLIFIED MODEL OF METROPOLITAN POPULATION NEEDS

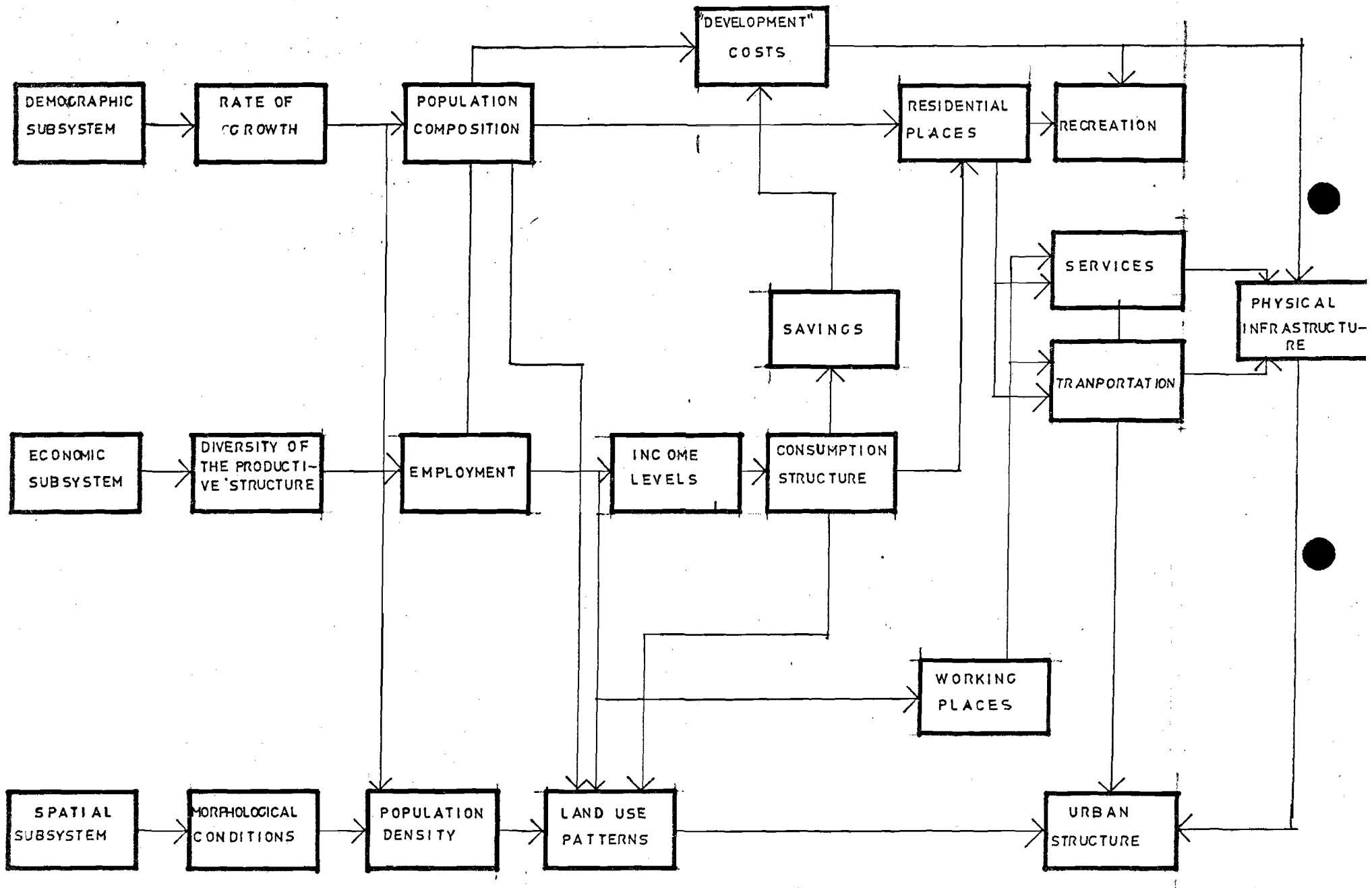
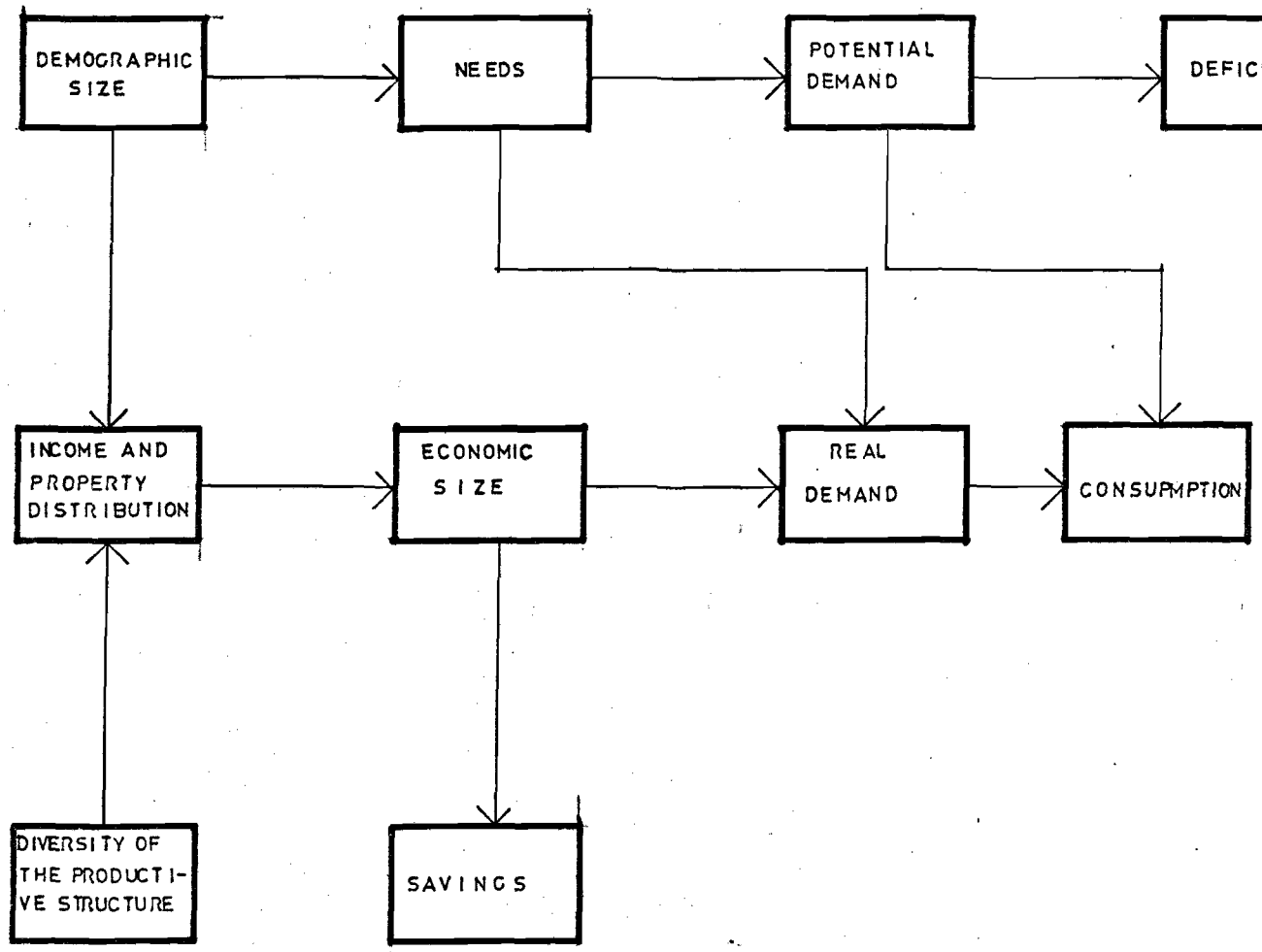
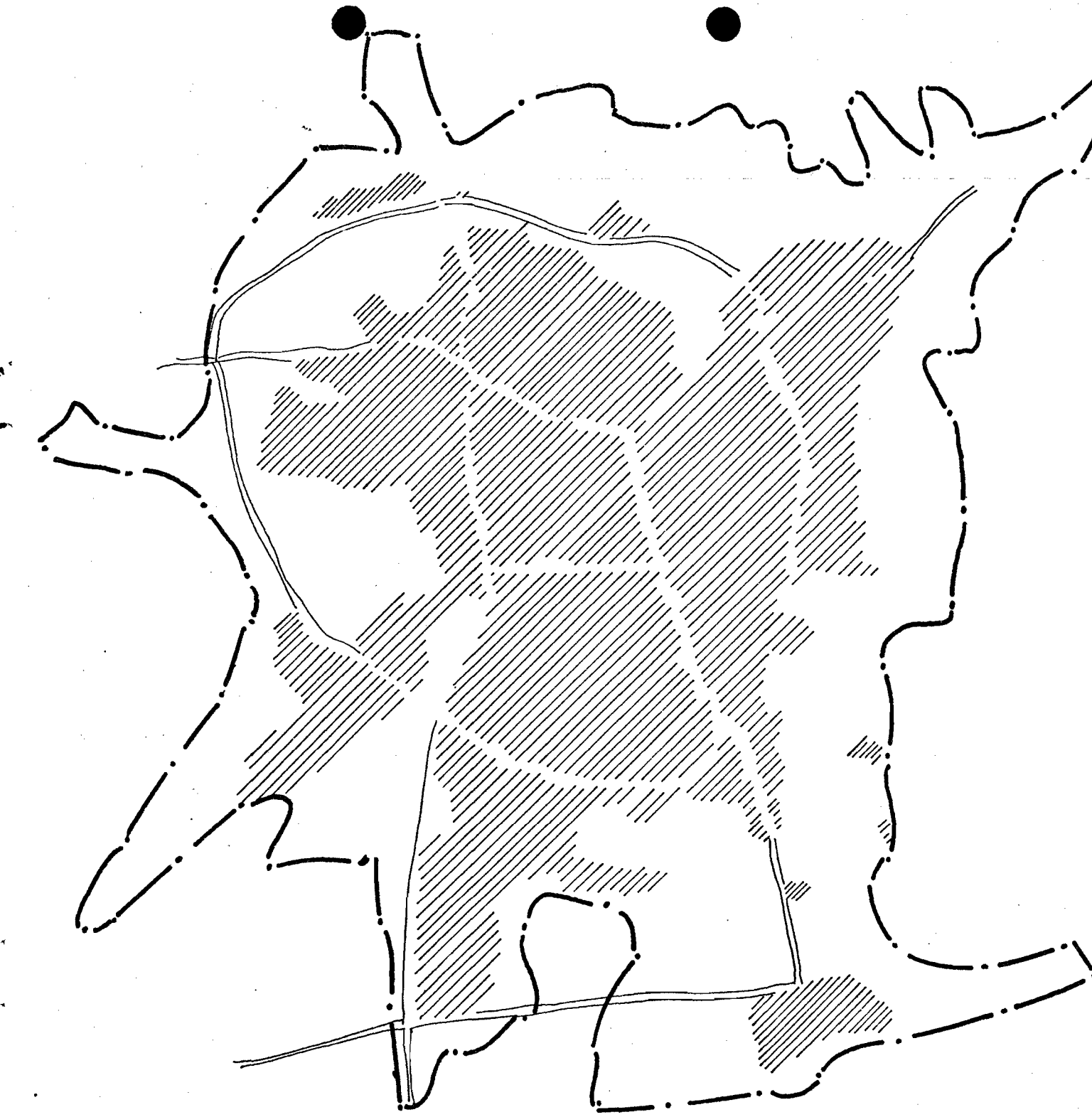


FIGURE Nº 2

SIZES, NEEDS, DEMANDS, DETERIORATION.





GREATER SANTIAGO: A HYPOTHESIS ABOUT PROSPECTIVE SPATIAL EXTENTION.
1970-2000

URBAN AREA 1970 URBAN AREA 2 000