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Regionalization as a Tool of Economic Policy

Part Two

By

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Chapter Four

The Time Horizon of Planning and its Impact on Regionalization

4.1 The various time-horizons in planning and the main features and functions of the appropriate plans.

Any planning decision has to be made at a certain point of time. This implies, that the social conditions, given at that particular moment, determine or at least influence character and quality of this decision.

Three factors should be mentioned here:

1. Planning decisions have to be made proceeding from the prevailing level of economic and social development (production relations, level of productive forces and of social organization of labour).
2. Planning decisions have to rely on the given level of scientific knowledge about the further development of society, about the development of the wants and needs of the population, about scientific-technological progress etc.
3. Planning decisions have to be made on a certain level of mastering planning and management of the economy itself, i.e. with a given set of more or less sophisticated planning tools and techniques, with a certain institutional set-up and with a given more or less qualified and experienced staff.

Studying the impact of these factors on plans with different time-horizons reveals some of the specific features,

of short, medium and long term planning.¹⁾

There is first the degree of predetermination of the plans. The correlation between the length of the planning period and the predetermination of the planning decisions is obvious.

The shorter the planning period is, the heavier will be the impact of the economic and social conditions prevailing during the basic period and of planning decisions made during earlier planning periods.²⁾

1) In this context we define

- Short term plans as plans covering one to two years with a break down into shorter periods on certain levels and for certain targets (for instance production plans of enterprises are usually subdivided according to months and for some targets even to days or shifts).
- medium term plans as plans over five years or a number of years close to five normally with an annual subdivision.
- long term plans as plans stretching over periods from 10 to 20 years.

2) To illustrate this impact we take the following, very simplified example:

Suppose the national income during the basic year was 1500 out of which 70% were spend for consumption i.e. 1050 units. Our annual plan aims at a 10 per cent increase of national income. Thus 1650 units will be available for distribution, if it is implemented. To maintain the level of consumption asks for 1050 units plus the increment to provide for the population growth of let's say 2%. This takes another 21 units and leaves now 579 units for further distribution. Suppose now, that the gestation period of investment is four years on average and that during the previous years the following projects were started:

Year	Total value of the projects	Annual investment
planyear -1	280	70
planyear -2	340	85
planyear -3	400	100

Hence the utilization of another 255 units of the national =

With extending time horizon conditions of the basic period are loosing significance and the degree of freedom to decide with less strings about the future development of the economy increases. But even in long term plans one should not overestimate these opportunities to bring about considerable structural changes, since beside the various dynamic forces, there are certain stabilizing factors, that have to be taken into account.

Nevertheless, a growing time horizon offers a growing number of possible development strategies or plan variants to choose between. This variability is particularly high in countries where natural resources are too scarce to form a considerable foundation for economic development and therefore the manufacturing industries have to provide the backbone of the productive sphere, and in countries, still in an early stage of economic development. This may provide many additional problems especially since we now have to consider another phenomenon, that is the exactness of planning information.

In short term planning-based on the high degree of predetermination of the plan-a great share of the economic

- = income is definitely predetermined for the continuation of projects under construction. This reduces the still "free" national income to 324 units and the list of commitments is by far not yet exhausted.

Thus, even with this high growth rate of 10%, it can be expected, that the degree of freedom to decide about the distribution of national income is very low in annual plans. Similar strings exist of course with regard to the production assortment, which is to more than 90% predetermined by the capacities available and with regard to other important plan targets.

relationships, technical parameters, norms of behaviour and consumers' preferences can be considered as constants or at least as variables with predetermined changes, exactly predictable by the planners.

Thus, even with rather crude planning techniques, the possible margin of planning errors is low and planning can be performed in detail. But with growing time horizon the situation changes considerably, since the information basis of the plan shifts more and more from data reporting about actual developments to data forecasting them and many of the indicators, which for practice purposes could be regarded as exactly predictable in the annual plan become now variables of a strategic or stochastic type.¹⁾

- 1) The technological coefficients for each technology of power generation can be planned with a very high degree of reliability in the annual plan, and even in the medium-term plan, since all capacities of a considerable size which will be available during the planning period are already in operation or at least under construction, when the plan is elaborated. But for a 20-year planning period their development is a function of such variables as
- Results of scientific research and their technological applicability
 - resources made available for the improvement of the energy basic and investment strategy (extension on the same technological level, reconstruction to achieve a higher technological level etc).

It is obvious, that these variables again are functions of several other variables.

Thus with growing time horizon the quality of planning decisions depends increasingly on the scientific knowledge, that is at hand, when plan elaboration takes place and on the ability of the planners to organize that the latest findings of science and technology are made available to them by means of prognostic work in all relevant fields. But even then certainty and reliability of information will diminish with the extension of the forecasting period and consequently the tolerance range of planning widens. Beside this it becomes more and more difficult and in many cases even senseless, but at any rate too costly to be efficient, to try to plan in detail. Hence growing time horizons in planning imply an increasing generalization and concentration on the decisive issues.

Proceeding from these general remarks one can now describe the main functions of the three abovementioned types of plans.

Beginning with long-term plans (10-20 years), these are the strategic programmes, outlining the most important social aims and the principal development directions of the national economy for the period under consideration.

These tasks are roughly balanced against the resources in order to make sure that they are feasible, but still the greater part of quantification takes place on a highly aggregated level and with considerable tolerances. The basic issues, dealt with in long-term planning are:

- The development of needs and demand according to large

"need-complexes" (Bedurfniskomplexe).¹⁾

Under these complexes the most important social aims i.e. the aims, for ^{the} development of working and living conditions, are planned. Therefore it is this part of the plan, that provides the foundation for all other considerations.

- The decisive macroeconomic proportions to ensure the efficient proportional development of the national economy. These are the growth rates of gross product and national income; the distribution of national income according to main funds, i.e. accumulation and consumption and the proportions between the main sectors of the

1) The following grouping of needs is for instance applied in the G.D.R.'s planning practice:

- | | |
|--------------|------------------|
| • Labour, | • Culture, |
| • Nutrition, | • Health, |
| • Clothing, | • Recreation and |
| | physical Culture |
| • Housing, | • Communications |
| • Education, | • Transport |

In this context "Housing" means not only the provision of the dwellings but simultaneously the planners have to deal with furniture, household appliances, air-conditioning, environmental problems etc., in order to meet all significant aspects of the housing requirements. It is obvious, that this grouping doesn't coincide with the structure of economic management. Therefore one has to take care, that the targets are properly transformed to the executing organs (ministries, general organizations, enterprises) during the following stages of planning. This provides of course additional methodological problems, but on the other hand this procedure guarantees, that planning is demand oriented, as opposite to a capacity-oriented planning, which is very often the result if one starts right from the beginning to plan exclusively according to sectors. Hence it is deemed worth while to choose this approach in long-term planning, despite the methodological complications.

For further information compare G. Schilling Bedurfnisse und Bedarf als Ausgangspunkt der Planung - eine grundlegende Frage der Erhöhung des wissenschaftlichen Niveaus der Planung, Wirtschaftswissenschaft No, 2, 1973.

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economy in particular between the production of means of production and the production of means of consumption.

- The main development directions of the most significant components of the social reproduction process as for instance:

- the main targets of scientific-technological development.
- the main directions of specialization of the national economy within the framework of international labour division
- the principal ways to increase the efficiency of the economy (electrification, mechanization, automation etc)
- labour force development and education
- the main features in the development of the energy and raw-material basis (sources of energy, substitution of man made materials for natural resources etc).
- the general concept of the spatial organization of productive forces, of the settlement network and of environmental development.

- Development programmes for selected sectors/sub-sectors and regions. Such programmes are elaborated for sectors and regions that are decisive for the dynamics of the economy as a whole and in cases, when the character of the processes under consideration demands it. Very frequently both criteria apply to the same programme as for instance in the power and fuel industry or in transport.

Although the importance of long-term planning is

increasing rapidly, due to several reasons¹⁾ the medium-term plans are still the mainstay of the entire planning system.

The five-year plans are the comprehensive, balanced action programmes for economic and social development. Proceeding from the long-term plan and from the analysis of the actual economic situation (by means of this bringing the long-term plan up-to-date) this plan assigns the tasks and resources to each economic unit from top to bottom. Whereas, in the long-term plans many sections are only elaborated with regard to ^{the} national economy as a whole, in the five year plans care has to be taken, that a clear cut responsibility for all plan targets is gained. This asks of course for more details and a higher degree of definiteness. The five-year plan is the most important instrument, to coordinate and balance all the essential relations among the different sectors and spheres of social reproduction within the national economy as well as the economic relations in inter-national labour

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- 1) One should be mentioned here, since it is essential for a planful cooperation between developed socialist countries and many of the "developing countries". In the past the typical pattern of relations between economies on the opposite end of the development scale was the flow of raw materials from the undeveloped to the developed and the flow of finished products vice versa. It goes without saying, that this pattern has to be overcome by means of industrialization on the part of the developing countries, but this implies of course also structural changes in the countries hitherto receiving the raw materials, since some of the processing industries relying on certain raw materials, will at least partly become superfluous in these countries and will be replaced gradually by the growing manufacturing industries of the raw material producing countries. The development of the cotton-processing industry in Egypt provides a good example of this trend, replacing raw cotton exports by the export of yarns, woven materials and ready made garments. To bring about such changes in international labour division as frictionless and efficient as possible asks for a long-term development strategy on both sides and for coordination and cooperation.

division and foreign trade.¹⁾ The hard core of the five-year system of balances, consisting mainly of the following balances:²⁾

- Balances of social gross product and of produced and disposable national income.
- Balances of formation and utilization of real income.
- Balances of population and labour force,
- Balances of foreign trade and balance of payments.

-
- 1) The CMEA-countries regard the mutual coordination of their five-year plans as a principal method to strengthen their cooperation and the targets agreed upon on the international level concerning labour division among the countries, joint research, joint projects and similar tasks shape more and more the main features of the national plans.
 - 2) According to the GDR's planning methodology for 1976 to 1980.

- Balance of the state's finances,
- Balances of building/construction and investment,
- Natural resource and commodity balances (material, equipment and consumer goods.)¹⁾

As far as necessary these balances are subdivided according to sectors and regions.

The short-term (annual) plans are the instruments to execute the five-year plan. There, the targets are set in detail and with the exact timing.

4.2 Importance and contents of long-term plans in territorial planning-criteria to select the tasks for long-term planning

From our review of the three stages of planning, we may conclude, that territorial planning has its tasks in all three of them.

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- 1) The commodity balances form a partial system organized like a pyramid. On the top i.e. by the central planning organ only the most important commodities are balanced in detail and all others in more or less high aggregated commodity groups. The next broader layer is provided by the different ministries, which elaborate within their range of responsibility an already greater number of detailed or less aggregated balances, but the majority of the so-called assortment-balances, i.e. the detailed balances for certain products are elaborated on the level of enterprises and general organizations. There either the main producer or the specialized wholesale trade organization bears the responsibility. In the case of products of regional importance these function is taken over by the regional authorities or organizations/enterprises subordinated to them.

By means of this "Balance-Pyramid" it is guaranteed, that the system is comprehensive without overcentralization and that the balances are elaborated on that particular level, that is most capable for the task.

The three types of plans or stages of planning form a certain hierarchy with the strategic decisions (long term plans) at the top and the detailed action programmes (short term plans) at the bottom. Thus, for instance the decision to develop a certain town as a growth center within a given part of the country has to be made in the long-term plan. This decision should include the special functions which this center should exercise within the framework of national and international labour division in their main outlines (most important projects), the order of size (in terms of inhabitants and area), the intended zone of influence (hinterland) regarding the most important relations (commuter-area, important services for the immediate hinterland), the principal decisions about area-utilization within the town and in the immediate surroundings and the main projects in infrastructure. The medium term plans include then such problems as the annual allocation of investment, the exact timing of the projects, a more detailed specification of their productions, decisions about the microlocations, balances of building capacity, manpower distribution and similar regional resource balances.

The tasks of the short term plans are quite similar to those of the medium term, ones, but in even greater detail and taking into consideration new conditions, that may have developed since the five-year plan was elaborated. In our case this could imply corrections in timing, changes in the demand for regional resources for reason of the development of new resource saving technologies and similar factors.

In chapter one, we identified already the planning of the spatial distribution of productive forces as the decisive task of territorial planning. But this means, that

in territorial planning the long-term plans are of a particular importance for the reason that on the one hand changes in the spatial structure are very often taking a considerable time and on the other that the implementation of decisions influencing this structure may have very far reaching results, sometimes irreversible or reversible with very high social losses only.

Thus the socialist countries learned by experience that the five-year-plans cover a still too short period for the planning of such important phenomena as the spatial distribution of productive forces, the hard core of territorial planning.

This justifies to confine the following discussion to the problems of long-term planning. We described already the tasks of long-term planning in general. Now we have to deal with the question what are the tasks to be selected for long-term planning under a territorial point of view. There are two criteria, that provide an orientation:

1. The gestation period between the planning decision and its implementation and
2. the operation period, i.e. the period, over which the implementation of a certain decision will exercise its influence upon the future development.

4.2.1. The gestation period between the decision and its implementation i.e. the period necessary to fulfil the planned target. These periods differ widely with the targets decided upon and with the level of development of the productive forces and of the relations of production.

There can be no doubt, that the establishment of a hydro-electric power-station like the High Dam or the opening up of new regions in the desert zone belong for this reason, to the class of tasks which have to be included into long term plans whereas for instance the extension of an existing textile mill (provided certain thresholds in the infrastructure are observed) can be dealt with in the medium-term plan and the detailed territorial distribution of consumer goods is a matter of short-term planning.

This principle becomes even more clear if one considers more complex targets as for instance the reorganization of the settlement network in order to overcome the essential differences in the living conditions between rural and urban areas. The implementation of such a target exceeds in many cases the life-time of a generation and can be planned only step by step even in long-term plans.

It is also obvious, that this gestation period depends not only upon the task under consideration, but also upon the quantity and quality of the resources available.

Based on the length of this period of preparation and implementation the following tasks should be taken into account, when drawing up a long term plan:

- The principal development directions of territorial specialization in particular:
 - o The opening up of natural resources and the manner of their utilization for all resources with a long (five years and more) preparatory period to turn them out of potential into disposable resources.
 - o The principal investment complexes in all branches which

are decisive for regional specialization and the related investment to run these complexes smoothly and to use their capacities to their full extent as soon as possible. Emphasis has to be laid on the exact timing of the interrelated activities. Therefore special and relatively detailed programmes should be drawn up for the most dynamic areas, which should be kept under the constant supervision of the central authorities.

- The suspension of certain activities in certain regions and the transfer of the freed resources to other activities in particular in cases of exhaustion of natural resources, decreasing or vanishing demand, new site-requirements of this type of economic activity (due to scientific-technological progress) which can't be met in the region¹⁾ concentration of this particular activity on less sites than during the previous period in order to apply economies of scale, concentration of the region's resources on these activities for which the best conditions are given in this particular area.
- The main features of the settlement network's development. In particular:
 - The development tendencies of the main types of urban and rural settlements as size, specialization of the different types, standards, determining the equipment of the settlements with service facilities according to their size and functional structure.
 - The reorganization of the settlement network (if necessary). This covers such problems as foundation of new settlements, concentration of the settlement network in fewer units, changes in the existing hierarchy etc.

¹⁾ Take for instance, the ongoing changes in the sector of power production. For the traditional heat-power-station, a cheap supply of fuel was the main factor of location and therefore they were more or less sited near to the coal-mines, or to waterways, providing an efficient channel of transport. The nuclear power stations show quite another locational behaviour. The transport of fuel doesn't play any part at all in the decision, because its quantity is negligible. But what becomes important now, is the, very high demand for cooling water in the at present most common reactor type, the pressure water reactor. This turns electricity generating plants towards the water-resources. But this branch could become really "foot-less" as soon as gas cooled reactors and fast breeders take the lead.

- The development of selected settlements and their surrounding region in areas, where large structural and quantitative changes have to be performed. Here are of particular importance new emerging growth centers and centers where measures are necessary to avoid or reduce the negative effects of overagglomeration as for instance in the region of Greater Cairo.
- The planning of the settlement network has to be combined with the planning of the internal migration policy.¹⁾
- The main networks of technical (economic) infrastructure in particular:
 - The territorial consequences of scientific-technological progress in infrastructure as for instance the changing proportions between the various transportation systems (railways, roads, air, waterways, pipelines).
 - The projects to guarantee a proper supply of the large investment complexes in production and in the settlement system.
 - The main projects to overcome regional disproportions between demand and supply in infrastructure, which prevent that the potential of the region becomes effective to its full extent and are harmful to the living conditions of the people.
- Other targets, overstraining the resources which can be made available during a short- or medium-term plan as for instance certain programmes to maintain and improve the quality of the natural environment, as purification and regulation of rivers, land reclamation etc.)

Mentioning these groups of tasks separately doesn't however mean that they can be planned isolated from each other. On the opposite, emphasis has to be laid on their mutual relationships. Only if these relationships with regard to quantity and quality as well as with regard

1) compare part one, paragraph 3.32.

to timing are observed, a proportional development can take place.

Consequently, the planning of the interactions among the several partial structures (economic infrastructure, territorial structure of production, settlement structure etc) is decisive for the quality of territorial planning as a whole.

4.2.2. The operation-period

It is not only, that it takes a considerable time to implement many of the tasks, set in territorial planning, what makes it a field for long-term planning. But once implemented many territorial planning decisions have a rather long lasting impact on the future development.¹⁾ This throws a heavy responsibility upon the planners and forces them to mind the consequences of their decisions in the long run, i.e. to plan long-termed.

A review of the planning targets, that should be considered under this point of view in a long-term plan leads more or less to the same complexes of tasks as mentioned in the previous paragraph.

But this approach stresses some aspects of the problem additionally. One of these aspects is the necessity to take into account the stabilizing effect, the implementation of a certain planning decision will exercise upon the economic structure of a region.

To evaluate this factor properly, one has to bear in mind that the implementation of the planning decisions of today forms the environment of the planning decisions of tomorrow, thus creating a stabilizing force, that operates far beyond the time-horizon, one would expect, proceeding from the initial decision only.

1) That is the reason why the territorial structure of any given country and at any given time reflects not only contemporary influences but bear the marks of the past. This is of particular importance during the transition period from capitalism to socialism, when the new social formation takes over an economy that developed according to =

Take for example, the construction of a factory in a sector that gives a quick return of the capital outlays. Thus the investment could pay itself for the enterprise, when the factory is run over ten years only. But in the meantime, this factory has trained a specialized labour-force, certain cooperating enterprises have developed in the region and probably infrastructural changes have been taken place to supply the production complex and the population attached to it. The result is obvious: even if the original (initial) activity could be shifted to another area without disadvantages for this particular sector or enterprise it would be highly probable, that the society as a whole and especially the region concerned would face serious problems.¹⁾

Hence long-term planning is required for these activities that are decisive for the economic profile of the region for reason of their high share in the regions economy and/or their strong internal ties with a great number of other supporting activities. Proceeding from these "location-leaders" the chain reactions in related activities have to be planned, when major changes in the former take place. But nevertheless, it will prove impossible to plan all the consequences of territorial planning decisions, not only for reason of their complexity, but for the reason that their operation period exceeds the time span over which a

= the laws, valid for the capitalist society, i.e. according to the principle of profit-maximization for the private owners of the means of production. A similar situation arises normally in countries after gaining independence, because they take over an economy which was shaped in its sectoral structure as well as in its territorial organization according to the interests of the former colonial power and has to be reshaped to meet the needs of national development.

- 1) That this is not only a theoretical speculation, can be proved if one takes the trouble to analyze the reasons why some of the so called depressed areas, come into being in capitalist countries. The ongoing reallocation of the steel industry towards the coastal areas and the decline of the old steel-centres in the Federal Republic of Germany, is only one contemporary example of the social diseconomies of such isolated sector minded decisions.

scientifically based forecast or even an educated guess is feasible, too.

This asks for planning solutions, that are adaptable to requirements, which will arise in future but are not yet known at present. The way to gain such a flexibility is to plan with reserves allowing for future development.

The most common method to create such reserves-widely used in town planning but not only there is to set aside space for future utilization. Reserves of this type are:

- Protected areas for mining and quarrying.
- Potential water supply areas (underground and surface water reservoirs).
- Areas of reclaimable land.
- Areas claimed for the extension of the several functions of settlements within the settlements itself and in their vicinity (living quarters, industrial areas, traffic space etc.).

To build up this space reserve doesn't mean, that the land has to lay idle until it is needed for the purpose it is intended for. But this means to make sure, that it is only utilized in a manner not interfering with or spoiling it for its final destination.¹⁾

1) To neglect this point of view can become the cause of considerable losses in efficiency and inconveniences for the people. Therefore a farsighted policy of land utilization is a very substantial precondition to create a rational territorial organization of economy and society. To introduce and implement such a policy implies, that the social system prevents any opportunity of land speculation and that its utilization is subject to the interest of society as a whole. The developed western capitalist countries are living examples what happens otherwise. The crisis of the cities is only one phenomenon. But there are other symptoms of the same disease as soil devastation or wasteful utilization of natural resources. Literature, describing the facts and projecting a dark future, is abundant and growing on a fast rate in the west. But the writers unearthing the roots of the problem are rather scarce. One of the best with regard to this is in my opinion still the already mentioned W.Kapp. (Social Costs of Business Enterprise, Bombay, 1963).

Another type of reserves, not so easy to manage, is typical for infrastructural networks, but not only confined to them. These are the capacity reserves i.e. the deliberate construction of capacities in excess of those definitely required ^{during} the planning period. In the course of our study we mentioned this type of reserves already, when we discussed the carrying capacity of a certain region. There we arrived at the conclusion, that to measure out the rational order of magnitude of such capacity reserves is a planning problem, which should receive greater attention.¹⁾ This point should be stressed again, since too many questions are still unanswered in this context and too much is at stake.²⁾

The general nature of the problem is, similar to many other economic decision problems, to shape counteracting tendencies into one optimum solution.³⁾ In our case these are the following tendencies:

- Confining the development to the known demand in the immediate future may provide certain savings in investment and probably in running

1) Compare Part One, Page 69.

- 2) To illustrate the order of magnitude with regard to infrastructure, the following example may suffice: According to analyses in the socialist and some western countries infrastructure counts for about two thirds of the fixed assets at present and has, due to several reasons, a still growing tendency. In the case of the GDR that meant a fixed capital of approximately 350 thousand millions Mark (about 56 thousand millions L.E.) in 1973. If only one per cent of this amount is wrongly placed, this means a waste of resources, sufficient to equip more than 90 thousand working places in the textile industry with fixed assets. Although no comprehensive figures about fixed assets are available for the A.R.E., one can judge from the distribution of investments according to sectors, that the situation is, if not already quite similar, at least developing along the same line. Infrastructure received during the first five-year plan (1960/65) 49.2% of the total investments and 50.5% during the second (1965/66 - 1969/70).
- 3) Of the same nature is for instance the already discussed task to balance growing economies of scale against growing transport costs in location policy for sectors.

costs too in the short run, but inflict losses in the long run since the system will be hopelessly undersized long before its physical life-span has outrun and will therefore have to be replaced or at least reconstructed.

- Vice Versa, to invest with excess capacity may ask for higher initial investment and higher running costs during the period, when the degree of utilization is relatively low, but may lead to considerable savings in the long run, since rebuilding, the outsized system would be much more costly than constructing it at once on a larger scale. But overplaying this point of view may produce the opposite result for the reason, that a considerable amount of resources is idle for too long a time and therefore the overall economic results would have been much more favourable if this amount would have been gainfully employed in other sectors. Beside this, to set the horizon for full utilization of the capacity too far implies, at least in certain fields, either to hamper technological progress or to face the possibility, that the system has to be reconstructed even before it is full in use for reason of moral depreciation.¹⁾ Thus the problem is to find the level up to which it is more profitable to keep capacities idle for

1). This problem occurs in general with all long lasting elements of the territorial structure. And since foresight and resources are always limited it can't be solved by extending the time horizon of planning or increasing reserves only. It is therefore deemed worth while to think the other way round and to try to close the gap by means of shortening the lifespan of the structural elements and thus gaining a greater flexibility. The problem is discussed among architects, town planners and construction engineers under this point of view and at least for the construction of buildings for productive purposes first results are available like air pressure carried plastic structures or rope and network constructions, all designed for an easy and cheap mounting and dismantling and adaptable to various purposes. Similar developments take place with regard to dwelling houses, in particular to increase their internal flexibility. For further information compare K. Kartaschow, W. Alexaschina, Wie bauen wir die Betriebe von morgen? Presse der SM Nr. 51, 1973 and G. A. Gradow, Stadt und Lebensweise, VEB Verlag für Bauwesen, Berlin 1971.

a certain period instead of investing the resources required for the timely idle capacities immediately in other sectors.

This is only the purely economic presentation of the problem. But there are other aspects to consider. To choose the advantage in the long run means apparently to make some sacrifices at present. And this may be not advisable or even admissible under certain circumstances. There is a saying in German which translated runs, the poor man lives costly. Seeming a contradiction in itself, the paradoxon proves its truth in our case. If the economic situation is strained and reaching for future gains means to neglect the life necessities of today one might be forced to make "short-sighted" decisions, despite better knowledge.¹⁾

All this reveals that a decision whether one should build up capacity reserves or not, and if, up to which extent, involves many factors to consider. In the case of infrastructural networks, which may stand as an example for the greater part of all decisions of this type, there are at least the following:²⁾

- The physical life-span of the network.
- Tempo and direction of scientific-technological progress.

1) The solution of the housing problem in the GDR may serve as an example. After World War II about 30% of all dwelling units were destroyed or badly damaged, and many more were in a bad shape due to the lack of maintenance during the war time. So it was an urgent task to provide the people with shelter. To manage this in a bearable period made it necessary to build during a rather long time only relatively moderate types of dwelling houses, well knowing that these houses could not meet future requirements with regard to optimum land utilization, to size and technical equipment of the flats etc. But nevertheless it was the only way to solve the most pressing problems.

2) A brief discussion of these factors is attempted in Appendix I

- Development of demand
- Cost-benefit relations.

4.3 Time horizon and regionalization

Since territorial planning has its tasks in all three stages of planning its organizational framework, has to be shaped in accordance with the necessities arising from long, medium and short term planning. Hence, when establishing the system of regions one should bear in mind that it has to be suitable for strategical, structural decisions as well as for detailed current planning.

Proceeding from the tasks of the three stages of planning as described in the previous paragraphs it becomes obvious that this implies to set up a hierarchy of regions of different order, with the first order regions primarily shaped according to long-term planning requirements whereas on the lower levels medium and short term planning points of view grow in importance.¹⁾

Consequently the number of spatial planning units is normally much smaller in long-term planning than in the following stages.

In the GDR for instance, in long-term planning the five regions South, South-West, Middle, North and Berlin are used, whereas the medium and short-term planning is based mainly on the 15 districts and the over 200 counties. This is valid for comprehensive territorial planning. Concerning certain very special tasks other planning spaces are used.²⁾

- 1) As discussed in chapter 5, administrative points of view are another even more significant factor in particular with regard to the delineation of the regions below the first order.
- 2) Railway districts, water economy districts are examples of this type. For further explanations compare part one paragraph 3.44.

The same practice of varying the number of regions with the time horizons can be observed in other socialist countries. The Soviet Union uses for long-term planning 19 planning-regions, each of them with an economic capacity, which can be compared with the GDR as a whole. But for the calculation of certain main proportions in planning the spatial distribution of productive forces the Soviet planners are working with two regions only, East and West (divided by the Ural Mountains). In Bulgaria for long-term planning 6 regional planning units were formed, medium and short term planning is relying on the 30 rayons (administrative regions) and in Poland -- 6 macroregions form the first level and the 17 voivodships (administrative regions) the second.¹⁾

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- 1) Although this applies in principle, one should however mention that there is no "iron curtain" between the regional levels. Certain tasks in long term planning are therefore always carried through to the second and sometimes even to the third level (second and third order regions). In particular in Poland a considerable share of long-term planning work is done in the voivodships, i.e. on the second level and the same can be said for the GDR, where the districts play an active part in the elaboration of the plan up to 1990. One of the tools applied to this end in the GDR are the "location offers of the districts." These location-offers are elaborated by the regional planning authorities (the planning commissions of the district councils). They proceed from an analysis of the regional location-conditions and the probable development of their main elements (population and labour force, settlement-network and infrastructure, other regional resources) and put forward proposals to increase the efficiency of the territorial organization of social labour. These proposals are based on resource balances and efficiency-calculations. Their hard core is the improvement of the regional production structure. Therefore, they contain the main directions of specialisation of the district which can be chosen on the basis of the given potential. Thus the regional planning authorities become active counterparts to the sectors and play their role in the elaboration of the targets of the long-term plan right from the beginning.
- Still another method to organize the participation of the regional authorities in long-term planning is to set up temporary working groups under the guidance of the department of territorial planning (very often ~~here~~ the direct responsibility is given to the research coordination centre of the department) but consisting to the greater part of experts from the regional authorities and of scientists in the particular fields. Examples of this kind from the GDR's planning practice are the working group "Infrastructure" and the working group "Northern Districts". =

But also in non-socialist countries dealing with some sort of regional programming like France this principle is applied. In his book "Problems of Regional Economic Planning" the French economist J.R. Boudeville writes:

"A correlation exists between the length of the plan and the size of the programming region. For traditional year to year-current administration the department is large enough; for medium term (four year) plans the larger twenty-one programming regions are necessary, for long-term (fifteen to twenty years) prospective development three

= The first one was operating on a nationwide scale and charged with the task to analyze, the development level of infrastructure in the different districts, the influence of the regional conditions on infrastructure in the different types of regions (agricultural areas, industrial centres) and size groups of settlements and to put forward recommendations for the further development of infrastructural networks. The other working group was confined to a certain part of the territory of the GDR and consequently mainly staffed from the districts concerned. Here the task was to elaborate recommendations how the relative backwardness of that particular region could be overcome in the most efficient and time saving way within the framework of the national plan.

(for the Polish example compare: J.C. Fisher (ed.) City and Regional Planning in Poland, Cornell University Press, New York, 1966)

(For the reader interested in regional planning in socialist countries this book is **strongly recommended**", because it is as far as . Know the hitherto most comprehensive publication in English about socialist theory and practice of regional planning, written by some of the most competent men in the field.)

to eight remodelling regions only should be taken into account."¹⁾

In general one finds that the number of first order regions is kept below 20. The nearest approximation to this figure is reached in the Soviet Union with her 18 economic rayons. This great number is of course due to the vast territory of that country with its widely varying economic and natural conditions.²⁾

But in all other known cases the number is considerably less. This applies also to newly developing countries, which have embarked on regionalization as for instance Chile with 12, Zambia with 6, Thailand with 5 or Peru with 4 first order regions.³⁾ The proposals⁴⁾ submitted hitherto for the regionalization of the A.R.E.

- 1) J.R. Boudeville "Problems of Regional Economic Planning" Edinburgh University Press, Edinburgh 1965, p. 18.
- 2) The first order regions of the Soviet Union are only comparable with the whole territory of many other countries or to use the terminology of some well known authors: The Soviet Union has to be regarded as a Mega-space and her first order regions as Macro-spaces. Most of the other countries, among them the above given examples as well as Egypt, are Macro-spaces, comprehending a set of major-spaces as first order regions. (compare Mennes"/Tinbergen/Weardenburg, The Element of Space in Development Planning, North Holland Publishing Company, Amsterdam-London, 1965, p. 3)
- 3) Compare E.B. Alayev, Regionalnoe Planirovanje razvivajushichsja stranach, Izdatelstvo Nauka, Moskva 1973 and Ch.Heimpel/S.K. Musto/P.P. Waller/D.Weiss, Planning Regional Development Programs, German Development, Institute, Berlin 1973.
- 4) For a review of some of them compare S.Voigtsberger, Some Comments on Proposals concerning Regionalization-An Attempt of Synthesis INPC Memo No(370) Cairo 1974 and Memo No (381) containing an english version of Dr. Ahmed Khalid Allam's paper Planning and the Delineation of Egypt (Sub-dividing Egypt into Planning Regions) translated from the Arabic by Mrs. Azza Abdel-Aziz Soliman.

are also within this range, varying between 6 and 9 planning regions.

Although it can be taken for granted, that a correlation exists between the length of the planning period and the size of the regions, this alone doesn't provide criteria to delineate long, medium or short-term planning regions.

Therefore we have to return to the aims and tasks of the plans and their dynamics.

The long-term plan is mainly concerned with the basic problems of interregional labour division (the spatial distribution of national and international sectors) and with the main indicators of the level of economic development within the regions (normatives of supply with services, employment rate etc).

Long-term planning regions are regions for comprehensive planning of a rather macro-economic type. That implies, that these regions should form partial systems with a relatively high degree of ultrastability within the multistable system of the national economy. This asks for an order of magnitude which allows the complex development of the region and consequently the planning of proportionality as an intraregional task for a considerable share of the region's economy according to the general planning directives and social standards, representing the aims set for the period under consideration.¹⁾

During the previous investigation we found however that the development of the conflicting unity between spatial organization of social labour and carrying capacity of space leads to the result, that such a comprehensive proportionality can be maintained and planned only

1) This refers in particular to such targets that are fixed only as level indicators in the long term plan as for instance in many fields of social services.

in relatively large spatial units. Hence, to allow an area to attain the quality of a comprehensive planning region a certain minimum size is required. In this context size is a relative term and not only understood in the sense of spatial dimension but as a broader concept as "economic size" taking into consideration the level of economic development, the density of population and the natural potential.

Therefore in the literature this minimum size is rarely given in units of area but it is characterized by such indicators as population, national income or per capita income and sometimes by combinations of them.¹⁾ As one may already suspect from the greater complexity of the measurement, the variety in the sizes of planning regions is much wider than in their number, as a comparison among different countries shows. Although no detailed data about the planning regions are available it will suffice to support this thesis by comparing the average sizes in terms of population and area for the above mentioned examples.²⁾

1) Compare for instance J.R. Boudeville "Problems of Regional Economic Planning, Edinburgh University Press, 1965.
Mennes/Tinbergen/Waardenburg, The Element of Space in Development Planning North Holland Publishing Company--Amsterdam-London, 1969.

2) All figures calculated from Statistisches Jahrbuch der DDR 1973, Staatsverlag der DDR Berlin 1973 Anhang II Tab. 4.

Country	Number of Planning regions	Average area per region in sq. km.	Average Population per region in 1000 *	Population per sq. km
Bulgaria	6	18 485	2 423	77
G.D.R.	5	21 636	2 412	158
Poland	6	52 113	5 511	106
Soviet Union	19	1 179 063	12 900	11
Chile	12	63 075	749	12
Peru	4	321 304	3 615	11
Thailand	5	102 800	7 067	69
Zambia	6	125 436	713	6

* all figures for 1971.

Even if one omits the Soviet Union, for the above mentioned reason, the variance remains very high. This scale becomes once more broader if one advances to a detailed analysis within the countries. To illustrate this, the example of the GDR will be sufficient. There, the size of the regions in terms of population ranges from about 2 million in the Northern region, the less developed but largest one, measured in area units, to more than 7 million in the highly developed southern region. Although this example as well as the table above indicate that a certain correlation between the level of economic development and the size of the regions may exist, there is not sufficient empirical material available to establish any kind of well founded rank-size rule. Nevertheless, since the GDR and Bulgaria represent types of developed diversified socialist economies and in particular Bulgaria not too long ago had an economic structure resembling that of Egypt, one may take these countries as reference points i.e. a population of about two million people as a minimum figure to proceed from. But since the population structure of Egypt is different from the above mentioned countries, the number of children below working age being higher than there, and because the optimum size is surely higher than

the smallest one, a population of approximately five to six million seems a reasonable figure for an average long term planning region under the prevailing conditions in Egypt. Also under this point of view the proposed number of regions between six and nine fits to the requirements. So far the consideration of the time horizon resulted in some ideas about the necessary size/ potential of a long-term planning region and proceeding from this about the number of first order planning regions.⁽¹⁾ But to delineate the planning regions it is necessary to have measurable criteria to distinguish the regions from each other. The question therefore arises, whether the time horizon of planning offers some ideas concerning suitable criteria for regionalization.

In the introductory part of this study we discussed the general aims of territorial planning under socialist conditions as derived from the basic economic law of socialism. We found then, that the degree of realization of these aims is a function of time and that these aims, reflecting the wants and needs of the people are dynamic, that the concrete expression of these general aims changes over time in quantity as well as in quality. The same applies to the means, that is, to the

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- (1) This seems a rather formalistic operation, but it is of importance during the practical process of delineation. For the application of several types of criteria it is a condition, that the number of spatial units is fixed prior to their application. Only then will they yield sensible results. This applies for instance to such criteria as the maximization of intra-regional ties or the maximization of homogeneity. The first criterion without a constraint to the minimum number of regions would lead to a solution which shapes the whole territory under survey into one region and the latter one, without a predetermined maximum number of spatial units, would under certain circumstances result in splitting the country into an indefinite number of single locations.

Hence, precisely it is not an absolute necessity to fix the actual number of regions but for certain criteria the upper and for others the lower limit. Nevertheless, since one can expect, that the solutions normally are based on a number of regions equal to the number put forward in the constraint, it is advisable to treat the number of regions as a constant because this simplifies the procedures considerably. Since to fix this basic set of spatial units is a preliminary decision it can be made in a rather rough manner and it is of course always possible to work with several, variants differing in the number of regions. But this decision shouldn't be made completely arbitrary, because a fair approximation to the final number will economise the iterative process of defining the regional boundaries considerably.

resources available to put the aims into practice. Between aims and means exists a dialectical interrelationship because, on the one hand, the presence of a certain aim forces the society to develop the means to satisfy this demand, and on the other hand, the availability of certain means (resources, new technologies and other scientific discoveries) creates new kinds of social requirements or at least turns them into phenomena with mass character.

A territorial relevant example for the first part of this interrelationship is the growing demand for the protection of environment against negative effects of human activities, and as an answer to this a speedy development of the respective technologies and of the sciences concerned with ecological problems.

For the other part of this relation, the development of tourism over long distances as a mass phenomenon, can serve as an example because it became-beside other causes - only possible through the development of fast, safe, comfortable, and relatively cheap systems of passenger transport.

Under socialist conditions, these dialectical non-antagonistic contradictions between social requirements and means available to satisfy them are a very important stimulus of social development. The social aims play the leading part within this dialectical game^{between}/aims and means. While the means provide the material basis, the social aims - that means the social order - decide which use is made of the resources.

From this follows, that in the first rank, the problem of the dynamics of the planning aims is the problem of how the social system has to be developed, how this development forms the wants and needs of the people, of the individuals and collectives, and up to which degree these

wants and needs can be satisfied with the means available.⁽¹⁾ This includes of course the question of an optimum utilization of the resources.

In spite of the dominating role of the social aims in general, when regionalizing the country particularly for long term plans, it will probably be the means to achieve these aims which will provide the criteria to delimit planning regions. To use the means rather than the aims is deemed advisable, because, the most significant final aims will become more and more similar in all regions so that they can't, any longer, serve as criteria to divide the country.

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- (1) A typical example for this development is the utilization of spare time in the socialist society. Socialism educates the people to use their spare time in a healthy and creative manner. Therefore, the social institutions (parties, mass organizations, state) are encouraging all types of such activities as, cultural life, physical culture, and, last but not least, a broad mass participation in the government of the country on all levels from the smallest village up to the central government. To bring about such a way of life is a long-term education process. But it can only be successful if important structural changes in the time-budget take place, cutting the time hitherto necessary for house work, shopping, and things like that in favour of real spare time activities.

This aim creates a wide scale of social requirements. From the one side, these social requirements are in the form of improved service facilities, household appliances and rational organized shopping centers to decrease the non-productive time-consuming activities while from the other side, they are in the form of a widespread network of different facilities to use the spare-time properly.

It is quite obvious that demand as well as resources available for that special purpose change quite a lot over time.

If we take, for instance, the real income per capita as an indicator of living standard, then the more successful territorial planning is in diminishing the unjustified differences between the various parts of the country, the more loses this indicator its significance as a criterion to reveal regional differences. Or if one takes the working conditions (they are of course not so easy to measure as the real income) the same phenomenon appears. With the developing mechanization and automatization in, more or less, all economic sectors, the working conditions are more and more equalized. But because territorial labour division is an economic necessity, the means to achieve such aims, as high real income or socialist working conditions, will always be different in the different therefore, such a criterion, as the special function of a certain area within the framework of national and international labour division, gains weight in long term planning as practice in the European socialist countries proves.

A very illustrative example of this development provides the case of the Soviet Union. When discussing this development. W. Kostennikow arrives at the following conclusions:

"The equalization of the level of economic development of all Union Republics was one of the socialist state's basic aims. The necessity of such an equalization was resulting from the requirements of socialist production relations, since the economic inequality of the individual republics heavily aggravated a rational organization of the social production and didn't allow to create a unified economic complex on the scale of the union. The main objective of this equalization of the Union Republics economic development level was to overcome the economic backwardness of the individual regions and the improvement of the working people's life according to plan in all parts of the country. Today, in principle this task is solved,

... The solution of the equalization problem doesn't, however, mean that there exists no social necessity to develop the production in certain Union Republics or economic main regions faster than in the USSR in general ...

But the accelerated industrial growth in certain regions nowadays, no longer results in the first rank from the task, to overcome the economic backwardness. Now the problem is principally different, namely the economic opening up of the mighty potentialities of these regions resp. republics in the interest of all peoples of the USSR.⁽¹⁾ One can observe a similar development in other socialist countries as for instance in the GDR, where the northern regions are loosing more and more their backward features and the emphasis in territorial planning changes in the same direction as in the Soviet Union. Taking this development into account, the following statement of A.B. Mettwally in his interesting analysis of the ARE's regional structure becomes more than doubtful:

"The main aim of any regional division is to distinguish between developed and underdeveloped areas, in order to indicate areas to be developed and to seek a sort of regional balanced growth."⁽²⁾ This is by far a too narrow concept to form a basis for planning regions, especially if one has long-term planning and of course a socialist society in mind. The first argument against such a concept is, that under socialist conditions proportionality and not disproportionality, is the characteristic feature and that this is, also valid with regard to the spatial relations. Following Mettwally's statement leads to the conclusion that the necessity of regionalization, and even the necessity of territorial planning would consequently die away as soon as the regional disparities which were inherited from the past are overcome. To get rid of this consequence requires to

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- (1) W. Kostennikow, "Territorjalnoe razdelenie truda i wirawniwanje urovnei ekonomiceskove razwitija sojuznich respublik", planovoe chozjajstwo, 1972, No. 12.
 - (2) Abo-Bakr E.O. Mettwally, Regional Aspects of the U.A.R.'s Economic Development, Rotterdam 1970, p. 86/87.

postulate that the existence of developed and underdeveloped regions is an unavoidable social contradiction which makes sense only, if one deals with a capitalist society but not with a socialist one. However, then no regionalization can solve the problems, because they are part and parcel of this mode of social production. The second argument is that, even when we proceed from the undeniable fact, that the inherited territorial disproportions will exist during a relatively long period and therefore the task of overcoming the unjustified differences between the regions will get high priority in territorial planning during this transitional period, still this concept proves too narrow. That is because, such an approach places one aspect of regionalization, which is under the prevailing conditions in the A.R.E. admittedly very important as the sole one. Hence it neglects such tasks as the utilization of a rational territorial structure (and this is more than equalization of the economic level among the regions) as a growth factor, the improvement of the efficiency in planning and management, the creation of the proper relationship between central planning and management and local initiative and similar tasks. But regionalization has to create the framework to solve all these tasks and therefore they should be considered right from the beginning. Nevertheless, it has to be stressed, that the regional disparities, pointed out in Mettwally's analysis very convincingly, will surely have a heavy impact on all territorial planning activities for a certain, rather long, time. But on the other side, their weight should not be exaggerated in order to avoid onesided solutions.

As a third point against such a criterion it should be just mentioned that this approach is a purely analytical one, taking into account the present conditions only. But for planning purposes in particular for long-term plans, it is the potential of a certain region rather than its present stage of development that matters.

This is especially important in the case of Egypt, because the A.R.E. faces the situation that only a small portion of her territory is inhabited space, i.e. space which is utilized for social activities. Considering the extremely high population density in the developed areas and the relatively

fast growth of population on the one hand and the unexplored potential of the desert regions on the other it becomes quite obvious, that a new pattern of land utilization has to be found to save Egypt's future.

Summing up the discussion about the impact of the time horizon on regionalization (with special reference to long-term planning) one can draw the following conclusions: about the impact of the time horizon on regionalization (with special reference to long-term planning) one can draw the following conclusions:

- in long-term-planning ask for regions with a sufficiently large potential to allow for the proportional development of territorial economic complexes.
 - Since long-term plans are aiming at equalizing the level of economic and social development throughout the country "level-indicators" (as for instance income per capita) are not suitable as criteria for delineation. This becomes the more true the more territorial planning succeeds in reaching its goals.
 - Since the long-term plans deal mainly with the activities of national and international importance and their dynamics (special functions planned originally within the framework of territorial labour division); in these activities gain a high weight when regionalizing the long-term planning. Activities of intraregional and local importance provide criteria towards further subdivision in short and medium term planning.
- (1) This doesn't however say anything against the significance of level measuring criteria in territorial planning. They are indispensable tools to optimize the plan and to evaluate the results of its implementation.
- (2) Many of the town-hinterland relations of small and medium sized towns come under this heading.
- (2) Many of the town-hinterland relations of small and medium sized towns come under this heading.

planning region as such, but that the actual division of the country into regions is depending from the economic strategy pursued over the period under consideration.¹⁾ Hence, regionalization can be carried out only within the process of shaping this strategy.²⁾ All attempts to deal with regionalization as an independent activity are doomed to failure.

- To achieve the necessary degree of stability of long-term planning regions they have to be organized in such a manner, that external (extraregional) effects of the development of other phenomena than those, included in the long-term plan, are minimized. This calls again for their organization as rather large and complex spatial units because only then will it be possible to equip them with all necessary facilities to execute their special functions efficiently and to supply their population with all those goods and services which have to be produced on local or regional level for reasons of convenience of the consumer and/or efficiency of the sector.

1) To give a simplified example: A strategy giving priority to oil mining and petro-chemical industries would lead to a set of regions quite different from that one, that would be the optimum solution for an economy based primarily on agro-industrial complexes.

2) J. Zaremba, proceeding from the Polish practice, arrives at the same conclusion:

A plan for the regionalization of the country, with an outline of the functions of the particular regions, is to emerge as a synthesis of this work (the elaboration of the long-term plan S.V. it.

J. Zaremba, Regional Planning in Poland : Theory, Methods, and Results, published in J.E. Fisher (ed.) City and Regional Planning in Poland, Cornell University Press Ithaca, New York 1966, p. 290.

Appendix I: Some factors influencing the advisability to develop capacity reserves in infrastructural networks

1. The physical life-span of the network and its elements. This is a mostly technical question and the information required for the planning decisions has to be supplied by the technicians, responsible for the projects. This life-span will vary between the different services but even within one specialized field from project to project for reason of different environment conditions, different materials and technological solutions and similar factors.

But, proceeding from practical experience, one may conclude, that the greater part of infrastructural installations physically outlives the period covered by a comprehensive long-term plan. This applies in particular to the underground networks as water supply and sewage-systems, cables and similar installations.¹⁾

The longevity of infrastructure becomes even more obvious, if one considers such complex infrastructural systems as the settlements. Hence under this point of view the overwhelming part of infrastructure qualifies for planning with reserves.

The knowledge of the expected physical life-span gives the planner a first clue to guess the probable gap between the now known demand and the demand at the end of this period. If this life span amounts for instance to 40 years and demand research points to an annual growth of 5%, the demand for this particular type of capacity

1) The sewage system in the central districts of Berlin for instance was constructed more than a hundred years ago and proves to be still in a good shape, meeting all the requirements of the city.

will be in the range of 700% compared with the basic year and this provides an upper ceiling for our considerations. But this approach renders only sensible results over still relatively short periods. If the life-span is extended to 80 years the same assumption for demand growth (which itself becomes highly questionable for such a time) leads us to a demand about fifty times as high as the present one and this provides no longer any orientation.

But even with such systems the life span analysis may help, if the single elements have different operation periods as for instance in a railway system. There, the permanent structures as railway-dams, bridges and stations last much longer than the rails. Thus probably a clear cut ceiling can be found for the latter, but not for the first.

2. Tempo and direction of scientific-technological progress in infrastructure.

Knowing the expected physical life-span of infrastructural installations, doesn't already imply to know the economic life-span too, since they are subject to distinct influences, though it would be of course the ideal planning solution if they could be brought to coincidence. But for the economic life-expectancy it is not only the wear and tear, but the degree of moral depreciation, that becomes decisive,¹⁾ i.e. scientific-technological progress and its economic applicability.

1) "As the magnitude of the value and the durability of the applied fixed capital develop ... the lifetime of industry and of industrial capital lengthens... where as the development of fixed capital extends the length of this life on the one hand it is shortened on the other by the continuous revolution in the means of production, which likewise incessantly gains momentum... This involves a change in the means of production and the necessity of their constant replacement on account of moral depreciation, long before they expire physically."

(K. Marx, Capital, Progress Publishers Moscow, 1971, Volume II, p. 188)

This raises the question, how long will the technological solution, available during the period, when the respective capacity has to be built, represent a standard, that makes its utilization still worth-while?

Although, the pace of development was relatively low in infrastructure, compared with other economic sectors, and mainly confined to those elements, which have also physically a short lifetime (rolling stock in the railway system, generators in power-stations, process control devices etc) there are indications, that this is changing.¹⁾

Hence a new criterion is added to our tool-kit. Under this point of view reserves should be only built up to that extent, that they cover the period until a new considerably more efficient solution is ready for introduction, including the period necessary to perform the reconstruction: This period again may vary for technological as well as for economic reasons. Economically it depends mainly on the amount of resources, that can be allocated to the scheme.

Hitherto scientific-technological progress was dealt with only as an internal problem of the sector concerned. But one has to consider the economic environment too, in particular in the sectors equipping and constructing the systems under

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- 1) The introduction of the container-technology in freight traffic is one contemporary example, that asks not only for adaptations in the transport fleets of all freight carriers, but also for major reconstructions in the permanent structures as for instance terminals. Beside this it requires a new approach to the organization of labour division among the different carriers, including their spatial patterns of operation. In power transmission the future may hold a similar development as soon as the scientists and technicians succeed to make use of supra-conductivity economically, because this would require quite a new type of transmission grids and consequently the gradual reconstruction of the power distribution network.

consideration and in the sectors utilizing their services. This leads to two further factors, demand and costs.

3. The development of demand. To ascertain the development of demand in the long run is one of the most complicated tasks in planning. We mentioned already, that demand in the comprehensive long-term plan is projected according to large demand complexes and with considerable tolerances, But that doesn't provide sufficient information to solve our problem how to measure out capacity reserves. There are at least two reasons for. One is the fact, that demand as we have to understand it here means demand for a certain type of capacity using a given technology. Hence, even if we know exactly how many Mega-Watt-hours power are needed in the year 2000 the question whether to construct our distribution system according to this demand can only be answered, if we know at the same time, whether the technology of power distribution, that we are using now, will be still feasible economically, i.e. it may occur, that the demand for this particular type of capacity has vanished for reason of scientific-technological progress.

The second reason is that in territorial planning we are not concerned with demand in general, but with "directed demand". Thus again, it doesn't help much to know only the volume of power production or demand, if no information is available where this demand is located. Consequently the territorial planner has to provide himself first, with a basic hypothesis about demand distribution in space before he can settle down to plan the infrastructural networks.

Patterns and development tendencies of demand distribution in space were already discussed in part one of

this study.¹⁾ But what we have to consider here are the dynamics of this development according to regions. The more dynamic demand development in a certain region is; the more it seems to be desirable to have such capacity reserves. There is however, one serious constraint to observe, that may turn our conclusion upside down. To illustrate this let us take the following example:

Suppose that in a fast developing region or subregion the demand for a certain service grows by 10% per annum. Then the demand during year 10 (the last year of our planning period) will reach about 260% of the requirements during the basis year. To construct a capacity that will meet only this demand, not considering any reserves beyond this time horizon, leads to the following development of capacity utilization

Plan year	Degree of Cap. ut.	Plan year	Degree of Cap. ut.
1	42.4	6	68.3
2	46.7	7	75.1
3	51.3	8	82.6
4	56.4	9	90.9
5	62.1	10	100.0

If we now think about reserves for further five years the degree of utilization goes down to 26.33 at the end of the first year, reaches 38.55% after the fifth and only 62.09% after the tenth year. But in systems with a high share of constant costs, which is very often the case in infrastructure this low degree of capacity utilization may result in very high running costs per unit of actual output, thus more than eliminating the savings in investments.

1) Compare paragraph 3.42.

Consider now for instance a growth rate of 2% annually i.e. a service with a high level of saturation, developing nearly at the same speed as population grows

Then the development of demand and capacity utilization will be as follows:

Number of years, the capacity has to cover the demand	Demand development in percent compared with the basis year	Degree of the 1 st year	Capacity the 10 th Year	Utilization after the 20 th year
10	121.9	83.7	100	-
20	148.6	68.6	82.0	100
25	164.1	62.2	74.3	90.6

Under this point of view it is deemed sound to conclude that it are the systems regions with a relatively low growth rate of demand, that are most suitable for the development of reserve capacities, because then a small excess capacity that doesn't affect the degree of capacity utilization seriously, can bridge a rather long additional period.

4. Cost-benefit analysis

A certain synthesis of the aforementioned factors can be gained by means of cost-benefit analysis, i.e. by means of measuring the net results of the various possible solutions in money terms and selecting the most rational one.¹⁾

With regard to the reserve problem it are in particular three points, one has to consider, the average reflux period of capital, the development of productivity in the investment goods producing and building industries and the existence of thresholds.

1) It should be stressed again, that the results of such an analysis provide a basis for decisions, but not automatically the decisions =

The reflux period of capital is decisive for the period over which it pays itself to keep a certain capacity unutilized.

The following relation reflects the condition under which out of two possible variants the one with the greater reserves is efficient;

$$I_2 - I_1 + \sum_{t=1}^n (C_2^{(t)} O^{(t)} - C_1^{(t)} O^{(t)}) \geq \sum_q (I_1 - I_2^{(q)}) (1+x)^{n-q} + \\ + \sum_{t=1}^n (C_1^{(t)} O^{(t)} - C_2^{(t)} O^{(t)}) (1+x)^{n-t} - \sum_q V^{(q)} (1+x)^{n-q}$$

I_1 - Total amount of investment, necessary for the variant with the larger technological units.

I_2 - Total amount of investment, necessary for the variant with the smaller technological units.

$C_1^{(t)}$ - Actual costs per unit of output in variant 1 during year t (t from 1 to n)

$O^{(t)}$ - Total output during year t

$I_2^{(q)}$ - Total amount of investment, spent for variant 2 up to the end of year q (for all years during which investment is made)

x - Rate of reflux

V - Losses of capital due to replacement of equipment not yet written off.

The model supposes the situation, that it is possible to satisfy the demand over a given period either by setting up the necessary capacity in one technological unit during the year zero (for simplicities sake, we assumed a time-lag of only one year) or by establishing several smaller units in consecutive steps during the years q .

= Themselves, since there are several factors to consider, not measurable in money terms.

For a numerical example we assume the following case:

Demand rises by 100 units per annum, i.e. the rise over a ten year period equals 1000. To satisfy this demand two solutions are feasible under the technological point of view. Variant 1, to set up a technological unit with an output of thousand and variant 2 to build two technological units, each with a capacity of 500. Variant 1 requires a total amount of investment of 1000 currency units to be spent during year zero, variant 2 asks for 1500 to be spent in two equal parts during years zero and five. No capital losses will occur if variant 2 is chosen.

The structure of prime-costs is as follows:

Variant 1 - 1500 currency units constant costs per year

3.5 currency units proportional costs per unit of output.

Variant 2 - 1200 currency units constant costs per technological unit and year.

3.6 currency units proportional costs per unit of output.

The development of costs per unit of output is given with the curves in figure 1.

The rate of capital reflux is assumed with 0.39, i.e. the capital flows back in a little bit more than two and a half years.⁽¹⁾ Comparing the efficiency of the two possible solutions, under these conditions renders the result, that variant 2 is the preferable one.

$$I_2 - I_1 = 500$$

$$\sum_{t=1}^{10} (c_2^{(t)} - c_1^{(t)}) = 3550$$

(1) This figure is not arbitrarily fixed but compiled according to the actual development in the GDR over the years 1964 to 1973. There the relation between national income and fixed assets remained constant over this period at 0.39. The two related indicators show, that the reflux of capital is treated here in an overall social context, not as the reflux to the single firm.

Hence the sum of the left side of the condition amounts to 4050. Calculating the right side one receives

$$(1000 - I_2^{(q)}) (1 + 0.39)^{10-q} = 4137 \quad \text{with } q(0;5)$$

$$\sum_{t=1}^{10} (C_1^{(t)} - C_2^{(t)}) \cdot 0^{(t)} \cdot (1 + 0.39)^{10-t} = 4967$$

with $t(1,2,3,\dots,10)$

Thus the sum of the right side is with 9104 considerably higher than that of the left. Consequently the condition is not fulfilled, indicating that variant one is inferior to variant two.

With a growing reflux period the picture changes. In our case, the critical value of the reflux rate lies approximately at 0.332. With this rate the numerical values in our condition are 4050 against 4039, i.e. a reflux rate of 0.332 or lower will turn the balance in favour of variant one.

In our numerical example we assumed hitherto, that the investment costs for the erection of a certain capacity remain constant during the entire planning period. But experience proves, that this is very often not the case since scientific-technological progress results in decreasing costs and hence in our example the costs for the second unit may come down to 700 or even 600. This of course has again its impact on the decision. Just to illustrate the order of magnitude of this impact, we return to our example. Now we assume, that the first capacity unit in variant two costs 750 as in the original case, but the second, built during the fifth year of the plan, can be constructed for 600 only. This will also reduce the constant part of the prime costs by 15 units from 1200 to 1185. All other conditions unchanged, we get the result that the critical level of the reflux rate is reduced from 0.332 to 0.318.

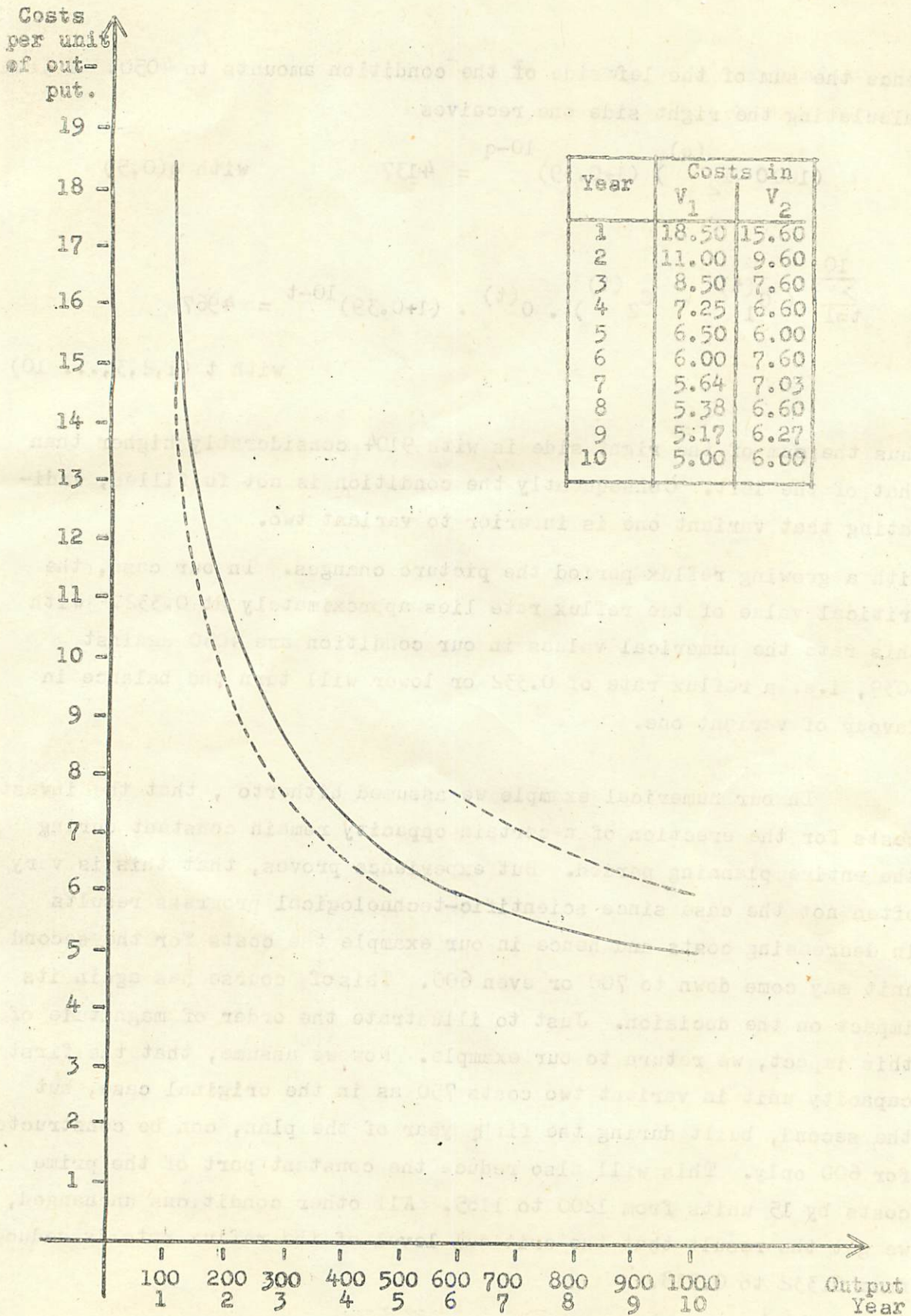


Figure I. Development of Costs per Unit of Output

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Now we have to eliminate another simplifying assumption. The previous calculations were based on a demand growth of 100 per year. There are however, many cases in which the planner can influence the growth of demand within a certain region. Take for instance housing construction. If we are able to build 100000 housing units per year throughout the country it will make quite a difference whether the building activities are either distributed equally over time and regions or concentrated during certain years on certain regions (and within the regions on certain settlements).

Suppose for instance that our example represents, the capacity demand for transformer stations in a developing settlement centre and suppose further that the pace of development is speeded up by means of concentration of investment during the initial four years of the planning period. Instead of 100 units demand grows then by 150 units during these years and slows down to $56 \frac{2}{3}$ after that. Under such conditions, the critical level of the reflux rate increases to more than 0.50, i.e. variant I will be in all practical cases the preferable one.

To deal with problems of this kind threshold analysis proves to be a very suitable tool. This analysis, first applied in economics by Polish regional and town planners¹⁾ investigates the relations between the development of the "carrying capacity" of regional units and development costs under the condition, that the development of the carrying capacity faces at certain points thresholds where a further increase is only possible if a new system of facilities is created or the existing one drastically reconstructed. For reason of investment indivisibilities this development will go by leaps and bounds and the crossing of a threshold will require a concentrated input of capital. But the crossing of a threshold creates at the same time a certain reserve for the future growth of demand. Threshold analysis enables the planner to investigate in quantitative terms how demand should be developed in order to cross the threshold as efficient as possible.

1) Compare B. Malisz, Implications of Threshold Theory for Urban and Regional Planning, Journal of the Town Planning Institute LV (1969) (Reprinted in H.W. Richardson (ed.) Regional Economics: A Reader, Macmillan St. Martins Press, London 1970), J.C. Fisher (ed.) City and Regional Planning in Poland, Cornell University Press, New York, 1966.

Take for instance a regional unit that has to cross thresholds if the number of inhabitants increases. The first of these thresholds appears with 60 thousand inhabitants, the next with 125, 200 and 300 thousand.

Suppose now the following amount of capital will be required to support the life of the people within this region with the necessary infra-structural facilities.

Inhabitants	Capital required	Capital per inhabitant
(in 000)	(in mill.)	(in 000)
above 60 - 125	270	4.50-2.16
above 125-200	380	3.04-1.90
above 200-300	410	2.05-1.37

From this table one may draw the following conclusions:

1. To cross the threshold pays for itself, since with growing population density (within the analysed limits) the investment per inhabitant decreases i.e. under this point of view the region is suitable for further development.
2. There are however certain development stages that should be crossed as fast as possible since they lead to increasing costs. As indicated by the table the capital per inhabitant leaps from 2.16 to 3.04 at crossing point 125 thousand and from 1.90 to 2.05 at crossing point 200 thousand. That means, that immediately behind the crossing points lie zones with unfavourable economic conditions and the longer the region remains in this range the greater will be the losses. In our case this unfavourable zone reaches from above 125 thousand to 176 thousand at the first threshold and from above 200 to 216 thousand at the second, because 176 thousand and 216 thousand are the points where our indicator "capital per

inhabitant" reaches again the level of 2.16 and 1.90 respectively. (compare figure 2).

With regard to the setting up of capacity reserves that means, that it is not advisable during certain stages of development, i.e. within the unfavourable zones, to keep reserves over a long time.

Summarizing this excursion about capacity reserves in regional development we find that, although certain general tendencies exist no general solution of the problem can be given since the decision depends entirely upon the actual conditions. Nevertheless the theoretical analysis brought about some ideas and tools how to establish a scientific basis for practical planning.

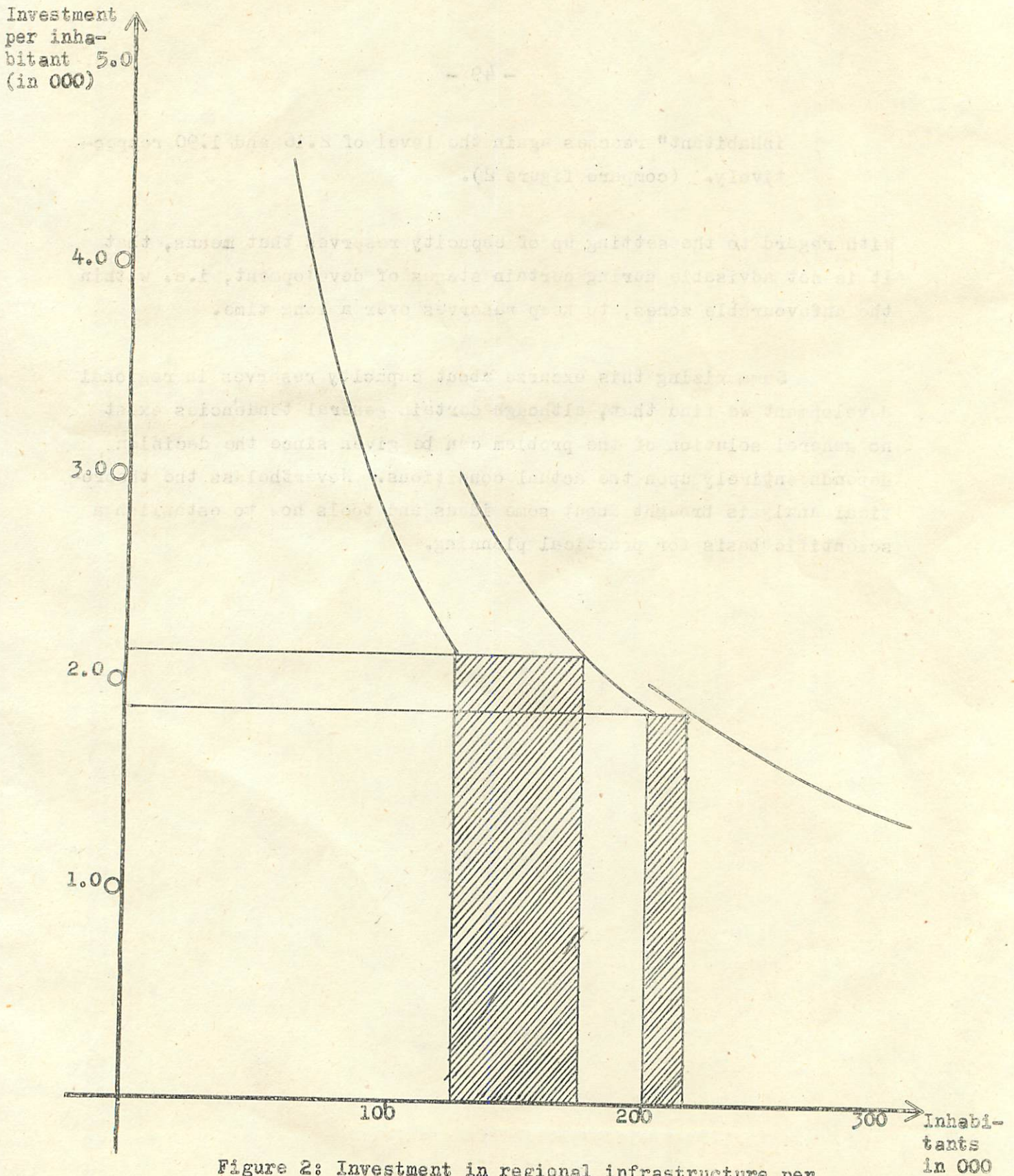


Figure 2: Investment in regional infrastructure per inhabitant.

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