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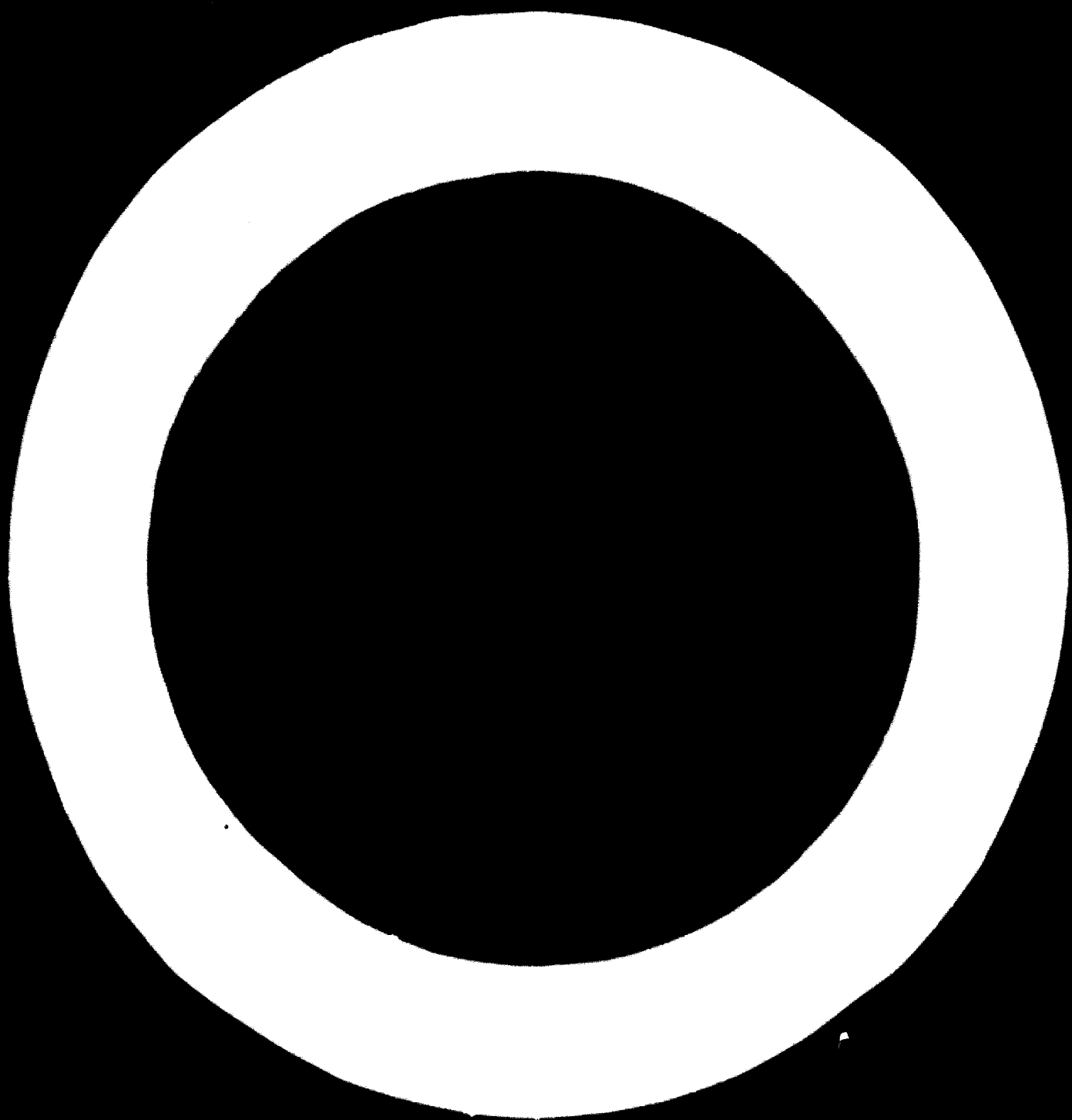
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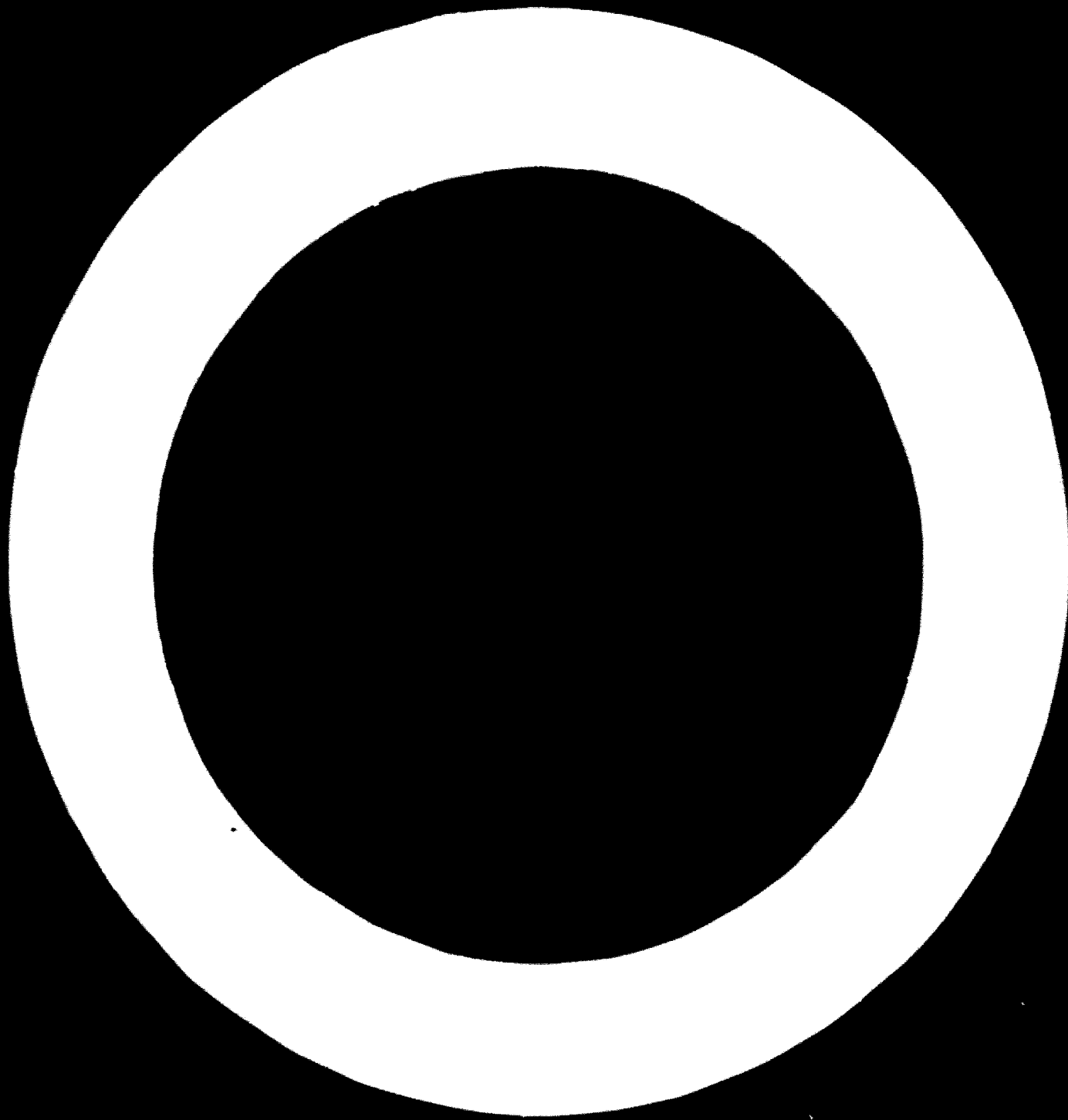
FACTORS IN THE LOCATION OF INDUSTRIES ✓

Issue paper on agenda item II

✓ The document is presented as submitted, without re-editing.

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## I. Introduction

1. The expression "factors in the location of industry" means the resources and conditions which are essential for industrial production and differ fundamentally from area to area.
2. By definition, factors in the location of industry are characterized by a lesser degree of geographical mobility than the location of industrial undertakings which they determine.

The relatively small mobility of location factors may be due to either economic reasons (where geographical displacement of the location factors is clearly inexpedient from the economic point of view) or physical reasons (where such displacement is physically impossible).

3. Generally speaking, location factors comprise the following considerations: natural conditions and resources, social and economic conditions, and transport.

Up to now there has been no uniform classification of location factors and consequently many of them overlap. For example, the terms "external economies", "inter-industry economies" and "urbanization economies" often reflect the same or different advantages affecting individual enterprises when they are located in areas with a high territorial concentration of industry and other activities. Moreover, in some cases economies may result from lower transport costs while in others they may be achieved as a result of lower expenditure on infrastructure, easier contacts between representatives of firms and enterprises, the availability of skilled labour in auxiliary industries and intermediate industries, etc.

Another imprecise term is "economies of scale", which covers the lowering of production expenses as enterprises increase their capacity through technological advances, the increase in transport costs with the growth in the transport radius, and questions of urban development: (as a rule, it is expedient for large manufacturing enterprises to be located in large urban centres).<sup>1/</sup>

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<sup>1/</sup> On the inadequacies of the existing classification of location factors, see J. Tosco, "The role of auxiliary industries and services in industrial location", (paper prepared for the Interregional Seminar on Industrial Location and Regional Development).

It is not the purpose of this paper to provide a comprehensive and entirely unequivocal classification of location factors, although it will attempt to avoid repetitions and duplications as far as possible. Consequently the problem of establishing an appropriate classification still remains to be solved.

4. In this paper, the analysis of location factors is subordinated to the task of devising an adequate instrument for decision-making in connexion with industrial location and regional development policy. Accordingly, location factors must also be classified according to the level at which the decision is taken and, consequently, according to the level of detail of the analysis (economic zones, economic areas, urban agglomerations, towns, groups of enterprises and individual enterprises).

On the other hand, specific groups of factors should be taken into consideration only when making the relevant analysis.

5. The hypothesis that it can be expedient to consider the role of individual location factors in isolation cannot lay any claims to scientific accuracy, as it is obviously essential to take into account simultaneously the frequently contradictory influence of all the location factors put together. Putting the matter more generally, it is essential to take into account all the conditions which have to be observed in order to satisfy the criteria of effectiveness.

6. At the same time, however, in practice it is necessary to use less highly perfected and less all-embracing methods of solving problems of the location of industry. Simplified methods of solving these problems presuppose the careful analysis of the relative influence of the individual factors on the branch of industry in question, under the specific social and economic conditions of different countries. Indeed, this is the main subject of discussion under agenda item 2.

7. A very important location factor is the industrial development policy followed in the country in question, as this covers a number of the most important social, economic and non-economic problems such as the development of a network of towns, the development of backward areas, the equalization of income among the population, national politics, defence requirements, and so forth. ✓

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✓ See "Industrial location planning", International Symposium on Industrial Development, Athens, 29 November - 20 December, 1967, page 11.

These questions, however, call for special discussion, as provided for in the agenda.

## II. Natural conditions and resources

8. Extractive industries can obviously only be located where there are appropriate natural resources. The discovery of resources in a given area depends to a considerable extent, however, on the magnitude and direction of geological survey work, which thus influences to a considerable degree the future location of extractive industries.

The painstaking and purposeful investigation of natural resources in developing countries, despite its considerable cost, is thus an important prerequisite to the determination of the correct line of future development and location of industry. The amount of expenditure on geological survey work in relation to the country's level of development and other specific factors is an interesting question for discussion at the seminar.

### Natural and climatic conditions

9. Favourable or unfavourable natural and climatic conditions of given areas of a country manifest themselves in variations in the cost of building and fitting out industrial undertakings and in the cost of roads, housing, service requirements, etc. They also have an influence on the cost of living and consequently on wage levels.

Generally speaking, it is mostly extractive industrial undertakings which are located in areas with unfavourable natural and climatic conditions, such location being justified by the presence of important deposits of natural resources and the need for only a relatively small labour force.

### Resources of fuel, power and raw materials

10. Resources of fuel, power and raw materials influence the location of manufacturing industry through the differences in their price (including production and transport costs) in different areas of the country.

The use of isolated individual figures for the cost of extracting and transporting these resources in calculations of the relative advantages of different locations for manufacturing enterprises may lead to serious errors, however. A more correct method is the preliminary calculation of optimum models

for the development and location of appropriate branches of extractive industry, followed by the determination, through the solution of the dual problem, of so-called optimum planning estimates (shadow prices).<sup>1/</sup>

11. Water resources are often a limiting factor in the location of modern industry, particularly in such branches as the chemical industry, the fuel and power industry and the ferrous and non-ferrous metals industries. In estimating future use of water resources it is essential to bear in mind their wider significance as one of the most important prerequisites for the existence of man and the satisfaction of his needs.

In a great many countries there is a real need for the establishment of a scientifically based policy for the conservation and comprehensive utilization of water resources. Such a policy can have a significant influence on the location of industry.

12. Land resources are a general condition for the location of industry. In this paper they will be considered only as the site for location of particular installations (without reference to sub-soil or mineral resources). Topography and soil combinations have a considerable influence on the cost of installing an enterprise but, as a rule, these factors need be taken into account only at the stage of studying the location of specific enterprises.

Equally important is the economic evaluation of a particular piece of land in connexion with the rental.<sup>2/</sup> The rental on land in large towns, in fertile agricultural areas and areas with mineral deposits should be given careful consideration when estimating the advantages of industrial location.

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1/ N.N. Nekrasov, "Teoria i praktika razmeshchenia promyshlennosti v SSSR" (paper prepared for the Interregional Seminar on Industrial Location and Regional Development); also M.M. Albogov "Otsenka satrat na zamykayushohee toplivo" (report to the All-Union Conference on problems of the power and fuel balance of the USSR, Moscow, 1966).

2/ See "Industrial location planning" op. cit., page 6.



When such a criterion is employed, industrial enterprises will be located in areas that are of less agricultural value. Care will also be taken to ensure the rational utilization of land in towns, industrial centres and urban agglomerations.

13. The majority of the location factors grouped under the heading of natural conditions and resources exert the same influence on the location of industry over quite large areas, and they must therefore be taken into consideration at the level of the macro-economic analysis, as for example in the preparation of programmes for the development of economic areas.

### III. Social and economic conditions

14. The term "social and economic conditions" covers a wide range of location factors encountered in the process of economic development. The role of these factors steadily increases in importance and complexity with relative reduction of the importance of the role of transport. Among social and economic factors are labour resources, infrastructure, the presence of production facilities, the mutual effect of industries located in the same area, and the scientific and experimental basis for industry. The effects of all these factors are closely interlinked.

15. Labour resources can be considered from various points of view. For many branches of industry which do not require a highly skilled labour force, the decisive consideration is simply the fact of the presence of labour resources and of labour cost differentials. These are mostly the labour-intensive branches of industry, for which the transport factor is of no great significance. Since almost all regions in developing countries have abundant supplies of labour, and backward areas also have a lower wage structure, such industries can be used to accelerate industrial growth in lagging regions.<sup>1/</sup> An approach based on the consideration of whether there is a surplus or a deficiency of labour resources is extremely useful in the macro-economic analysis of future prospects, when it is particularly important to determine in which areas the actual or planned rate of increase of production (bearing in mind increases in the productivity of labour) lags behind the rate of increase of labour resources, or vice versa.

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<sup>1/</sup> See "Industrial location planning", op. cit., page 7.

The problem of organized inter-area migration arises in this connexion. Experience shows that even with extensive and costly State promotion such migration does not reach very large proportions. This is particularly true of highly qualified personnel in the developing countries. Programmes for the development of backward areas must therefore also cover the question of the training of local cadres.<sup>1/</sup>

In inter-area analyses, labour resources must be considered as a factor of extremely low mobility, but in analyses confined to a single area such resources are characterized by high mobility (especially in the light of the constant migration of part of the population from the villages to the towns).

16. In many branches of industry, especially those which are new and rapidly developing, the skill and qualifications of the labour force, the engineers and technicians and the executives are of decisive influence. As a rule, however, highly qualified staff are located in large towns which they are extremely reluctant to leave.<sup>2/</sup> As a result, complex modern branches of industry tend to gravitate towards large urban centres.

17. Because it is so costly to establish, the infrastructure - both industrial and social - is a powerful factor in the location of industry under present-day conditions. In planning the location of industry it is essential to take careful account of the infrastructure requirements of the various factories involved. This means that when setting up a factory it is necessary to work out its coefficient of "consumption" of the various elements of the infrastructure. The question of interrelationships of time in the establishment of the infrastructure and of industrial enterprises is of great importance.<sup>3/</sup> The high cost of

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<sup>1/</sup> See "Industrial location planning", op. cit., page 8; W. Alonso, "The location of industry in developing countries"; J. Hills, "Regional economic growth and labour mobility" (papers prepared for the Interregional Seminar on Industrial Location and Regional Development).

<sup>2/</sup> See Alonso, op. cit.

<sup>3/</sup> See Shubin, "Regional location and efficiency of industrial complexes in relation to the provision of infrastructure" (paper prepared for the Interregional Seminar on Industrial Location and Regional Development).

establishing an infrastructure makes it necessary that it should be used as efficiently as possible, and this is an additional stimulus to the concentration of manufacturing industry in existing large towns.

Urban development problems have a decisive impact on the location of industry, and particularly the manufacturing industry. Up to now there has not been sufficient clarity either on the subject of the optimum dimensions of a town for the conditions prevailing in a particular country or region or on the subject of town planning theory. It is a well known fact that large towns have a considerable economic effect on production (owing to the existence of an infrastructure, a skilled labour force, a scientific and experimental basis, services and the like), but beyond certain limits of growth an acute rise in general municipal expenditure is involved, together with a deterioration in living conditions. It should be noted that there are various points of view on these problems. ✓

There are grounds for asserting that the growth of towns cannot be determined on the basis of the estimated advantages of locating individual industrial enterprises in them. First of all the social advantages of such location are unclear and, secondly, uncontrolled urban expansion can have unknown social repercussions.

It is wiser to formulate an advance policy for the growth of existing towns and creation of new towns taking due account of architectural, town planning and natural conditions, service needs (cultural, administrative, etc.) for the population of the surrounding rural areas and the desirable dimensions of the towns. The subsequent location of industrial enterprises should be carried out in the light of the prospects (previously determined) for the growth of each town.

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1/ See Lewis, John P., "Quiet Crisis in India" (New York Brookings Institution, 1962), chap. 7: "The role of the town in industrial location", and also W. Alonso, "Location, Primary and Regional Economic Development" in Annals of the second Inter-American Congress on Regional Planning.

18. The presence of existing production facilities and the inter-industry effect of the territorial concentration of industrial activities are also among the most important considerations in the location of industry.

The presence of existing production facilities enables production to be expanded by the reconstruction and extension of existing undertakings. At the same time, the possibility of making use of existing staff with the requisite qualifications heightens the economic effectiveness of such measures.

The inter-industry effect of the territorial concentration of industrial activities is a source of both visible and "invisible" economies. This applies to types of industrial activity of which the products do not lend themselves to long-distance transport; consequently the territorial proximity of suppliers and consumers is of decisive importance.

The presence, in areas of concentration of industrial activity, of specialized undertakings for the repair and servicing of machines and equipment, intermediate industries, enterprises providing various types of technical and commercial services, and construction facilities is an important factor in the concentration of manufacturing industry into the existing industrial centres and areas.<sup>1/</sup>

The invisible sources of economies are the greater ease of contacts between representatives of undertakings and firms, the extra possibilities for obtaining various types of information, the extra possibilities for contact with government institutions and scientific research organisations, etc.

19. The transport factor, which was of very great importance in the past, is gradually losing its importance because of the increasing role played by social and economic factors. Its influence remains extremely great, however, in calculations of the effectiveness of location of extractive industries. The transport factor is of considerable significance in developing countries.<sup>2/</sup>

Transport occupies a special place among location factors since the magnitude of general transport costs in a particular location variant for an enterprise reflects the influence of the location of sources of raw materials, supplies and consumer demand. As a result, the transport factor conditions the

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<sup>1/</sup> See E. Tosco, op. cit.

<sup>2/</sup> See "Industrial location planning", op. cit., page 13.

mutual influence of the location of most branches of industry (which to some extent coincides with inter-industry economies), interlinked through their co-efficients of direct costs, and also the influence of the location of consumer demand.

The general principle in the establishment of a transport system development policy should be the recognition of transport's servicing role in the development and location of the economy of the country.<sup>1/</sup>

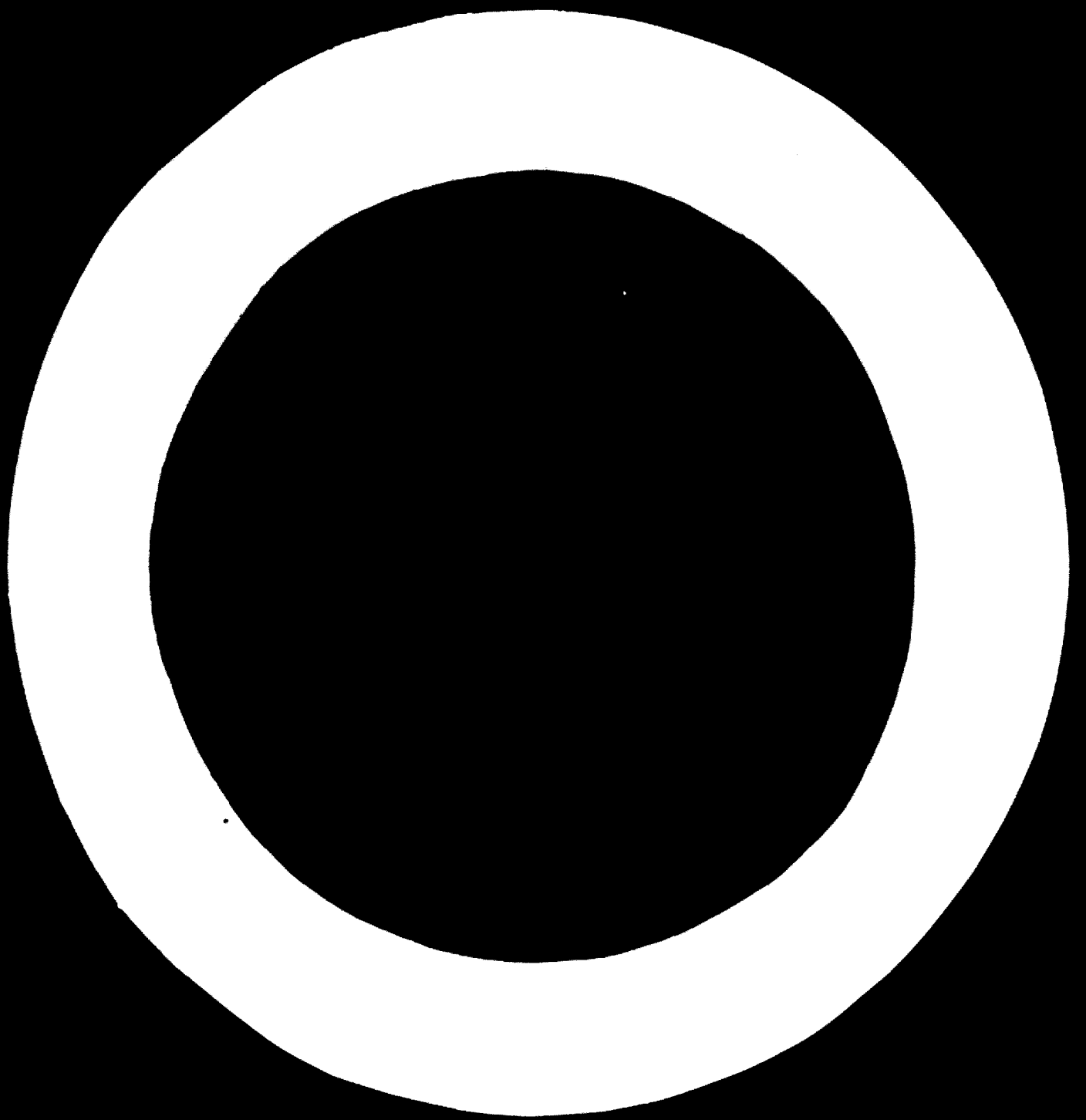
20. A review of the influence of location factors on the territorial distribution of industrial activity bears witness to a marked tendency towards the concentration of manufacturing industry in existing large urban centres and urban agglomerations, with wide possibilities for the location of extractive industries in new areas not yet opened up so much from the industrial point of view. The role of extractive industry as a means of stimulating general industrial growth in such areas is not very considerable, however.

21. An effective industrial location policy which sets out to solve not only economic but also social and other problems must be based on careful consideration of the additional expenses incurred in the acceleration of the industrial growth of formerly backward areas. At the same time, however, account must also be taken of the enormous and unreckoned possibilities for the over-all expansion of the economy of the country which may be realized by bringing into the national economy the natural and labour resources of formerly backward areas.<sup>2/</sup>

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<sup>1/</sup> See W. Owen, "A transport strategy for development" (paper prepared for the Interregional Seminar on Industrial Location and Regional Development).

<sup>2/</sup> See T. Victorioz, "The planned interregional location of industry" (paper prepared for the Interregional Seminar on Industrial Location and Regional Development).



Annex 1

RELEVANT UNITED NATIONS DOCUMENTS

I. PRESENTED TO THE INTERREGIONAL SEMINAR

Symbols

A. Discussion papers (Agenda item 2)

- |    |  |                        |
|----|--|------------------------|
| 1. | <u>C. Michalopoulos</u> : "Inter-industry Relations, External Economies and Regional Economic Development"                 | ID/WG.9/7 and Summary  |
| 2. | <u>J. Mills</u> : Regional Economic Growth and Labour Mobility in Canada, 1956 to 1961                                     | ID/WG.9/8 and SUMMARY  |
| 3. | <u>W. Owen</u> : "A Transport Strategy for Development"  | ID/WG.9/15             |
| 4. | <u>J. Shubin</u> : Regional location and efficiency of industrial complexes in relation to the provision of infrastructure | ID/WG.9/10 and SUMMARY |
| 5. | <u>E. Tosco</u> : Relevance of intermediate industries and industrial services for correct location planning               | ID/WG.9/12 and SUMMARY |
| 6. | <u>Final Report</u> of the <u>Ad Hoc</u> Advisory Expert Group Meeting on Regional Industrial Planning (Geneva, May 1967)  | ID/WG.9/16             |
| 7. | <u>UNIDO</u> Industrial Location Planning  | ID/Conf.1/12.<br>1967  |

B. Background papers

- |    |   |             |
|----|---|-------------|
| 1. | <u>E. Alayev</u> : Planned Location of Industries and Regional Development in the East African Sub-region   | ID/WG.9/B.1 |
| 2. | <u>S. Jack</u> : Industrial Location and Regional Development in Africa   | ID/WG.9/B.2 |
| 3. | <u>U.N. Commission for Africa</u> : Cartographic Methods applied to regional planning   | ID/WG.9/B.3 |
| 4. | <u>UNIDO</u> : Industrial Location, Regional Development and related subjects: A Partially Annotated Bibliography   | CID/1.1966  |
| 5. | <u>A. Koloshin</u> : Regional Planning, Policy and Goals of Location of Industrial Enterprises in the Byelorussian S.S.R.   | ID/WG.9/B.4 |
| 6. | <u>F. Martinkevich</u> : ) Features and Factors Governing Location<br><u>Y. Alexandrovich</u> : ) of Enterprises Processing Agricultural<br><u>A. Pavlova</u> : ) Raw Materials | ID/WG.9/B.5 |

<u>B. Background papers (continued)</u>		<u>Symbols</u>
7.	<u>V. Medvedev:</u> ) <u>W. Kagan:</u> )	Economic Mathematical Models and Methods of Locating Industrial Enterprises ID/WG.9/B.6
8.	<u>B. Yemelichev:</u> ) <u>I. Klebanov:</u> ) <u>V. Komlik:</u> )	Possibilities for Using Electronic Computers and Methods of Mathematical Programming for Solving Problems of Production Location ID/WG.9/B.7
9.	<u>V. Chonichev:</u> ) <u>A. Aegorn:</u> )	Micro-location of Industrial Enterprises and Planning of Towns ID/WG.9/B.8
10.	<u>M. Adong:</u>	Experiments of Development and Industrial Location in Soviet Armenia ID/WG.9/B.9
11.	<u>G. Ovelesiani:</u>	Characteristic Features of Industry in the Georgian S.S.R. ID/WG.9/B.10
12.	<u>S. Hodjaev:</u>	Experiments and peculiarities of Industrial Enterprises Location in Formerly-Backward Regions with Relation to Industry (case of Uzbekskaja S.S.R.) ID/WG.9/B.11
13.	<u>A. Ming:</u>	Natural Resources as a Factor of Territorial- Productive (Regional) Complex Development ID/WG.9/B.12
14.	<u>M. Vilevski:</u>	Technical Progress and Efficiency of Distribu- tion of Productive Forces ID/WG.9/B.13
15.	<u>J. Feigin:</u> ) <u>V. Udovenko:</u> )	Basic Principles and Factors of Industrial Location ID/WG.9/B.14
16.	<u>N. Utenkov:</u>	Methods of Development and Distribution of Productive Forces on New Digested Territories ID/WG.9/B.15
17.	<u>L. Karpov:</u> ) <u>V. Gochman:</u> )	Peculiarities of Modern Urbanization and Industrialization of Production ID/WG.9/B.16
18.	<u>Galkina:</u> ) <u>L. Kochovkina:</u> ) <u>K. Sokolov:</u> )	Post-war Problems of Regional Development of West-European Countries ID/WG.9/B.17

C. Country papers

1.	<u>M. Serwadda:</u>	Uganda - experience as related to problems of industrial location and regional development ID/WG.9/ Country 1
2.	<u>A. Faria:</u>	Regional disparities and the allocation of investments in Brazil ID/WG.9/ Country 2
3.	<u>Ministry of Economic Affairs, Ghana:</u>	Industrial Location and regional development in Ghana ID/WG.9/ Country 3

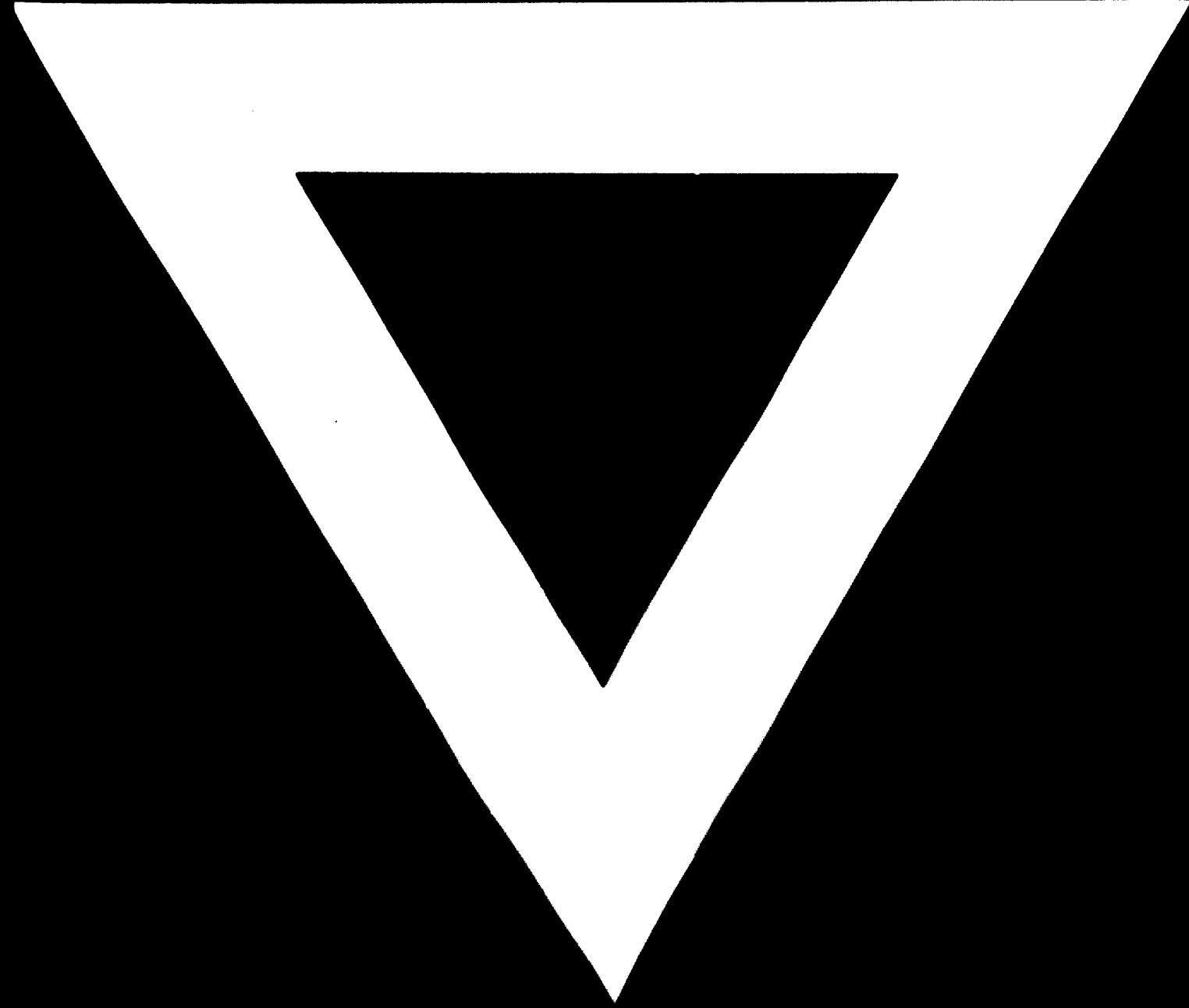


II. PRESENTED TO THE INTERNATIONAL SYMPOSIUM ON INDUSTRIAL DEVELOPMENT (Athens, 29 Nov. - 19 Dec. 1967)

Symbols

- |  |                               |
|--|-------------------------------|
| 1. Issues for Discussion: General Policies - Economic and Social Aspects   | ID/CONF.1/A.14                |
| 2. Issues for Discussion: Formulation and Implementation of Industrial Programmes  | ID/CONF.1/A.16                |
| 3. Issues for Discussion: Regional Co-operation  | ID/CONF.1/A.24                |
| 4. Implementation of Industrial Projects   | ID/CONF.1/3                   |
| 5. The Role of Policy-makers in Project Formulation and Evaluation   | ID/CONF.1/4                   |
| 6. Regional Integration and the Industrialization of Developing Countries  | ID/CONF.1/11                  |
| 7. Policies and Programmes for the Establishment of Industrial Estates   | ID/CONF.1/29<br>and Corr.1    |
| 8. Criteria for Location of Industrial Plants: (Changes and Problems)  | ID/CONF.1/B.3                 |
| 9. Problems of Development of Export-oriented Industries in Developing Countries with regard to the Expansion of their Co-operation with Socialist Countries | ID/CONF.1/G.11<br>and SUMMARY |
| 10. The Use of Input-output Analysis in the Preparation of Economic Development Programmes   | ID/CONF.1/G.15<br>and SUMMARY |
| 11. Yugoslavia's Industrialization and the Development of her Under-developed Regions  | ID/CONF.1/G.27<br>and SUMMARY |
| 12. Co-operation between Countries as a Factor of Economic Development   | ID/CONF.1/G.36<br>and SUMMARY |
| 13. Principles and Models of Industrial Location   | ID/CONF.1/G.38<br>and SUMMARY |
| 14. Economic Regionalism as a Method for Co-ordinating Economic Development in Africa  | ID/CONF.1/G.39<br>and SUMMARY |
| 15. The Location of Industries in the Socialist Republic of Romania  | ID/CONF.1/G.47                |
| 16. Location of National Industry within a Wider Economic Context  | ID/CONF.1/C.63<br>and SUMMARY |





**23. 6. 72**