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INTEGRATION PROBLEMS IN CONSTRUCTION
IN THE FIELD OF BUILDING MATERIALS PRODUCTION AND CONSTRUCTION
WORKS AMONG DEVELOPING COUNTRIES^{1/}

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INTRODUCTION

The aim of this study is to focus attention on the advantages and conditions of integration both in the building materials and construction industries as possible means and exploitable sources of development among developing countries. It is not intended to break new ground in the classical theory of integration or to investigate the subject in details but rather to outline in general the coherent factors and to raise thoughts and ideas to be considered at the outlining of the final recommendations.

The complexity of building materials and construction industries and the key role that they play within the national economy and social development, require special attention from the Governments. It is a fact that construction industry itself represents about the half part of all fixed capital formation. The ever growing demands and requirements to be solved by these industrial branches, induce Governments in advanced countries as well to make great efforts towards more efficient development in this field. It is well known that the investment is relatively important in these sectors and on the other hand the expectable speed is modest, the progress of development is time intensive. Decisions to be taken in connection with the establishment of the structures of these branches determine the character and direction to be followed for a long period and it is rather difficult to make urgent changes, if needed.

All these phenomena underlined the importance that there is a demand for careful planning of the establishment and development of these branches, at the level of national economy, as a part of long range strategy and industrial policy. It has to be considered at the planning stage, the complexity and the ramified linkage with other industries and the possible relations and economical connections with the branches of foreign countries, especially in the

region where the country is located. The economical planning has to extend over the borders searching for counterpart interested in the development of the country or its national economy has supplementary factors to complete the other. To take into account these peculiarities necessitates the formation of special organizational and directional measures influencing the industrial policy on private and public sectors too.

In each country the methods can be different, but the question of "how", by all means, has to be analyzed with the same thoroughness, considering all local conditions and every outside factor which affects the domestic circumstances. These investigations, among other things, will show and verify those particular fields: (a) where the national economy is too weak and inexperienced to carry out alone efficient and profitable development or, more likely, it is in need of some kind of assistance and help; (b) where the national economy has no reason to extend its activity, because the local characteristics are so extreme that the local requirements can be satisfied by foreign supply more economically for a long period, than to make local investments. In most cases these unswayed fields compose the vulnerable points of the economy if they represent a high proportion.

Advanced building materials production and building activity are based on a relatively high technical knowledge, sophisticated equipment and also high investment. Generally the developing countries are short of these factors and it is difficult to introduce advanced methods and modern techniques even if most of them are available and the local circumstances are good. The introduction needs help and assistance, as usual. What kinds of assistance or promotion are generally required when a country decides and intends to build up or develop one of its industrial sectors? The varieties can be of many kinds, such as technical knowledge,

experience, new products, equipment, staff, capital, co-operation, joint activity etc.

The relatively simplest solution would be, but not always the most advantageous, if the country obtains them by usual commercial or financial actions, in that case, the country plays only the role of buyer and user, and its role and interest finish at this point.

Undoubtedly, for long term, the more favourable and also more independent way is when developing countries are able to make efforts alone and try to prepare themselves for development using their proper sources, or they look for counterparts, not necessarily only in their neighbourhood, who have the same interest and they try to solve their difficulties with joint efforts and risks. This means that the parties interested in forming collaboration, carry out joint actions, establish co-operation, in order to unite and integrate their aims, resources, efforts for a certain period, and in that way the countries can achieve better results and favourable conditions, than by doing it alone. The scale of participation can vary according to the ability, willingness and decisions of the participating countries. If the aims are carefully set up in accordance with the ability of the participants, the common effort can result favourable effects.

The idea of integration is as old as the theory of division of labour. In the present century, in the period of the ever growing technical and industrial evolution, the importance of integration is greater than ever. Governments recognize that it is difficult to carry out efficient and profitable mass production by every country and every branch with the same results. The widened technical knowledge, the flooding results of industrial research, the continually appearing new technologies and the enormous demand have induced many countries, mostly the advanced ones so far, to search for, approach and form some kind of integration.

This is the century of specialization, huge concerns and companies have turned to selected and specified production. Industrialized and more advanced countries as well are not in a position to finance research work in every field with total complexity. The field of research is also specialized. In the last two decades, in Western Europe, in the socialist countries and in other parts of the world, several forms of economical or technical integrations have been created by countries, and the effects and results achieved upto now can be recognized.

In developing countries, though the basic aims are in a certain sense the same as in advanced countries in connection with integration, the present situation and possibility of integration is quite different. In several developing countries the level of building materials and construction industry is low and the sectors are characterized by traditional handicraft and the presence of modern sectors is rare. The efforts to be taken are: to create governmental building administration, planning, to transfer knowledge, introduce modern systems etc. The starting points of integration are different to those of an industrialized country, but the recognition of the importance of integration necessitates that developing countries also have to deal consciously and systematically with integration possibilities already in the early stages of development, a part of an important factor. Consequently, consideration of and the first steps towards integration require a certain order in the national economy, a thorough planning and programming of development, which means the consequent knowledge of the future, and on the other hand, it requires good connections and co-operation between developing countries.

The integrations would be realized in the fields of research, standardization, transfer of technical/scientific knowledge, specialization of production and activities, share of market and common

activities in production. One of the important basic conditions of integration is: to have a common technical "language" among the participating countries, which mean common standards, common qualifications, building codes etc. This common "language" makes it possible to adapt and transfer technical knowledge, to exchange goods or use the common product or carry out common undertakings.

In spite of the fact that integration can be a fruitful means of development among developing countries, the start and realization encounter difficulties. Some are, lack of national planning, differences between developing countries in geography, economic level, customs, prejudices, lack of co-ordinated policy for industry, regional planning and so on, not forgetting the differences in politics. The existing economical integrations in Europe show that to make a fast progress is very difficult and so there should be expected only a modest progress realistically in developing countries, in the near future.

I. GENERALITIES

1. What does "integration" mean?

This study interprets and approaches the principle in a broader sense than usual, and on the other hand it is limited to the activities among developing countries and also to the field of building materials production and construction activities.

Generally, all the common, mutual administrative, technical, social and economical activities in which two or more developing countries or their organizations take part with common interest and united efforts, aiming at faster development and favourable economic results in a determined field, can be called (as one of the kinds of) integration.

Usually, the integration is a sophisticated kind of economical co-operation; considering that in the near future a spectacular progress in all probability cannot be expected among developing countries, but only the first steps of the preparatory stages, the study will try to introduce as integration those fields of activities too which are only coherent with it or form its basis or constituent parts.

Integration, in that sense, can be created at the administrative level as well, for example, when countries decide to use common standards or accept mutually the qualifications of their institutes. The share of market or co-operation between scientific associations or an agreement on production specialization can be added to this determination of the study. These facts by themselves do not compose real integrations, but represent the first steps and fundamentals which can lead towards integration.

2. Advantages of integration

In the early stages of development, the developing countries generally are not able to support sufficiently the growth of building materials and construction industries; their efforts are mostly engaged in the development of agriculture and export making industries. This means that the activity of these sectors cannot be controlled and co-ordinated with satisfaction and the situation of the rather disintegrated sectors cannot be surveyed clearly.

If developing countries form integration in certain fields, it would give advantage at the outset. Integration needs preparation, planning, marketing, several investigations at both local and international levels etc., so the integrating parties from the beginning are forced to go forward in an organized way, determining aims in advance.

Undoubtedly, the basic advantage is, that integrating parties can better use their existing and available resources, they can carry out such large-scale task too which otherwise would be beyond their possibilities. They are able to concentrate and unite their efforts, divide and share the work, determine the roles and especially avoid parallel and overlapping developments, and they can supplement each other. The common standards, the specialization, almost at the start enlarge their market, and the interchangeable materials can be used in a wide circle. The co-operation to be created makes it easier for them to achieve international level and with it better export activity.

The integration does not mean political obligations at all. The parties integrate on economic or financial basis, for mutual benefit, interest and risk, without discrimination and under equal conditions.

3. Present situation, trends of integration

During the past decades more political and economical integrations were formed and shaped out involving several countries, mostly from the advanced countries, but at regional level, developing countries have also started to form collaborations. It cannot be seen clearly whether these integrations have influenced basically the building materials and construction industries, changing their character, or if the modification has been insignificant. Probably the most important effect is that market barriers have been decreased and as a result of this, the exchange of knowledge, know-how, results of scientific research work have speeded up between the integrating countries, and the enlarging turnover of building materials induced the countries to start with the introduction of common regulation and standardization practice.

In the Eastern European socialist countries, in the COMECON integration, the countries based their activities on a long-range complex programme. The integration started with the elaboration of unified standards of production and codes in several industrial fields, and according to the agreement exchange of technical documentation and knowledge has begun as well. Certain specialization of production and share of the fields of activity has been determined, for example in the production and manufacturing of building machinery. Large and long-term co-operation has been formed in the fields of building materials production, new factories are established by common investment, and the trade terms and form of connections are planned for years according to national economy plans.

In Western Europe, in the countries of the Common Market, it may be observed that the Governments form out common policy of industry, and regulations of market. In the construction branch,

research and qualifying institutes concluded several agreements on terms and standards and conditions on which they accept each other's qualifications or "agreements". The aim of harmonization of standards have been set up, Great Britain turned to the metric system to ensure similar conditions. In the extended market there has been a greater choice and spreading of building materials, and construction activities and joint ventures have been expanded in great numbers over borders.

In developing countries, it may be seen also that many steps have been taken in connection with integration, especially in other industrial branches concerning the better exploitation of available natural resources and raw materials. Regional, multi-, and bilateral "industrial co-operation" or "development committee" have been set up to determine common interest, ability and possible fields of co-operation or integration. Governments have recognized the great advantage of common efforts, but the realization depends on many subjective factors and real obstacles to be cleared away.

4. Difficulties of integration

The first obstacle that may be mentioned, is that generally the developing countries are not at a stage, not even in the building materials and construction industries, where real integration can be set up. They are in the preparatory stage and a great part of the efforts has to be diverted to strengthening and integrating the local industry. There are only a few developing countries which already have adopted comprehensive policy for co-ordinated development of industrial branches. The domestic market is rather instinctive than conscious, the local possibilities have not been discovered in detail, so it is rather difficult to outline the fields where some co-operative development would be desirable.

Integration also necessitates good relations and confidence with the integrating parties and to have thorough knowledge and information about their circumstances and about the international level of the field in which they intend to work together. The integration needs preparation, the parties interested have to prepare themselves in advance with special local arrangements, - which means that integration requires a certain degree of preparedness and development.

The mutual platform of communication, the common technical "language", standards, characteristics must be set up at the start, resulting in a rather long realization time.

There are other factors which make more difficult the integration such as, social, economical differences, differences in geography and climate, in national customs and in politics. Usually people are distrustful of foreign countries, they fear the independent and the backwardness is connected with prejudice. Considering these facts, Governments do not make easily decisions on common matters.

It is also a drawback that the preparation period, the time of co-ordination before the real start is rather long, it takes years, therefore the real advantage lies in the future.

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II. INTEGRATION PROBLEMS AND POSSIBILITIES IN THE FIELD OF BUILDING MATERIALS INDUSTRIES

1. Review of building materials industries

According to the character of building materials production, this field may afford more possibility for integration. Most of the materials are not used in the place of manufacturing, they can be transported from one country to another, making possible a broader co-operation in the manufacturing of basic materials, such as cement, steel, glass, plastics, which necessitate significant investment and in most cases the investments exceed the private sector's financial possibilities and need Governmental participation. The presence of Governments also helps in the planning for long term and encourages foreign co-operation.

There is an urgent need to accelerate the development of the production of building materials because developing countries still produce only a small proportion of the world out-put with the result that the proportion of construction out-put is also very small. Figures about trade statistics show that in many developing countries the import of materials represents a rather important part of the total import, ^{ing}troubling the balance of payment.

The sorts of building materials used in construction are very wide and a significant part of them are manufactured for other branches of the national economy. The building materials industry is characterized by the dependence on users, especially in the construction sector. The out-put of this sector does not show a permanent level, usually it fluctuates considerably, and even if the out-put is constant, the fluctuation appears at local level. These facts make it difficult to plan the production of building materials and to ensure a stable and growing market. On the other hand,

probably the main problem is that key building materials have to be produced in large quantities ensuring profitable size of production. The size of profitable capacity and the local demand are usually different and most of the existing building materials factories and plants are constrained to work under capacity causing the anomalous situation that the same products are more expensive in developing countries than in the country from where the factory originated.

In most developing countries building materials are produced by small plants using simple machinery and the products do not have a consistently satisfactory quality. The plants are located in close proximity to larger cities and in the vicinity of their use, because of poor transportation facilities, the supply and availability are different by regions. It is also typical that the share of Governmental participation in that sector is not significant.

At the early stage of development the Governments would be advised to transform, step by step, this sector into more controlled, organized and encouraged branch. It is advisable, first, to establish this disintegrated sector on a planned basis and to integrate it into the national economy, and to strengthen its local market, before integration would start. It is also advisable to encourage the public and private sectors to make large investment for greater production, even if the plants produce temporarily for stocks. At the same time, starting with establishing standards, research, industrial policy, the strengthening sector could be gradually supervised and planned for longer periods.

On the basis of long range estimates, industrialists and planners are able to survey the situation looking for the bottlenecks, the fields where common efforts involving other countries could be expected to develop certain production fields.

It is evident that during the early stage of development integrations could be formed above all in the field of the production of key materials, which are at present mostly imported. Such are, cement, steel, glass, plastics, and these necessitate a production profitable over the local demands and the transportation cost of these materials from one country to another can be acceptable.

International terms differentiate six main building materials categories: load bearing structures, external envelope, improvement of internal climate, hygienic requirements, internal subdivisions, aesthetic requirements. The six categories consist of vast members of materials. A part of them is produced by the construction sector, another part is so heavy and used in large quantity (brick, stone, lime etc.) that the transportation of them is not economical. There are also materials which do not represent an important production even if they have to be imported for long term. These materials mentioned above usually are not the objectives of integration on an international level.

Consequently the main field of integration could be carried out in the manufacturing of cement, steel, glass, plastic materials and certain sanitary articles. The production of these materials causes serious problems not only in developing countries but in industrialized countries too. The high investment costs, the sophisticated equipment and technologies to be used, in most cases necessitate certain kinds of foreign participation. The participation varies from technical assistance to investment. It could be favourable if developing countries would be involved in greater scale in executing such tasks, in common co-operation, manufacturing and also supplying.

Considering that these basic materials to be produced in some kind of co-operation, will be need for a long period, avoiding long

import, the idea of integration, in principle, could meet with reality. The realization depends on many factors.

2. Possible fields of integration

Investigating the possibilities of integration, it may be that the following fields where common efforts, co-operation and collaboration could achieve good results leading towards the goal of integration.

2.1. Standardization and research work

It is advisable for neighbouring countries living approximately in the same geographical and economical circumstances to carry out elaborate common quality standards of production of building materials and accomplish common research work under special agreement avoiding expensive, parallel and overlapping research. For this reason a good solution could be, as has been done by some countries, to found common regional industrial committees or standardization institutes at intergovernmental level or with semi-public participation to undertake the following tasks: survey of national resources, outlining fields of common interest, exploration of raw materials, elaboration of quality standards, codes and materials characteristics suitable for the countries' conditions and to organize common testing and research work. In this framework of activity, participating countries can make easier the transfer of knowledge, know-how, technical processes. At the same time, it is desirable to build up connections and to have linking-up with similar kind of organizations, ensuring and helping the exchange of technical novelty and scientific knowledge. It could be a special advantage if one of the aims of these common duties is to search for real fields for integration. Naturally the work mentioned above could be carried out from the beginning as a part of agreed integration.

2.2. Exploitation of raw materials

Developing countries involved could also undertake common exploitation of available raw materials supplying them to their local market or over a third country. It could be profitable if the common exploitation is followed by the common use of the materials in further production. Such materials can be: lime, gypsum, clay, marble, stone, perlite etc. The distances between the location of mines and the use, the transportation facilities, the value of materials have to be considered before work starts. The participation of Governments is advantageous.

2.3. Production of materials

This is one of the realistic fields where favourable and profitable co-operation can be formed, even in the early stage of industrialization. Common investment and co-operation in the production, in the use and in selling can be effective, especially in the production of materials which call for high investment, large production and supplement import.

To ensure profitable size of production, international level, the participants will have to take into account the importation of sophisticated know-how, equipment and machines, generally imported from industrialized countries. Huge cement, glass, plastics and sanitary ware factories, steel factories belonging to heavy industry, could be operated profitably even if the transportation distances are great between the factories and the participating countries. Usually these materials are transported in the international market everywhere.

In the cases of lime, gypsum, brick and tile plants, the cost of transportation has to be analyzed in advance, if common establishment of plants is raised. In the border-zones of the countries, for example, common brick, gravel or perlite plants can work with mutual results.

The manufacture of plastic building materials is more realistic in the "oil countries", if they have a suitable industrial background. The manufacturing of plastic materials needs basic materials derived from crude oil, and to ensure a continuous supply of these special by-products, the developing countries must take into account long importation or are forced to establish from the beginning sophisticated plants producing plastic bases. The preparation is capital intensive. It can be supposed, that certain developing countries establish such factories (as there are examples), under integration, and produce water- and heat insulating materials, foams and also plastic pipes etc. realizing great and long-term market advantages. There are also good possibilities for production in co-operation; for example, one country has paper and the other bitumen production, and they co-operate to manufacture bitumen insulation sheets.

3. Remarks

The Governments' participation is always desirable in integrations involving several countries besides that of private capital. Also it has to be taken into account that the establishing and the running-in costs of the factory are generally higher than in more developed countries because of higher transportation expenses, construction costs and the lack of trained staff. These can result in higher production costs than in the international market and in sharp competition for import materials. Governments participating in integration have to consider special measures to encourage and at the same time to protect and to share their market of building materials.

The size, the degree and duration of integration can be different, in that it might include only the question of standardization, or only regulations and share of the market; it can be short-term or temporary; but always considering equal treatment, mutual interest and non discrimination.

III. INTEGRATION PROBLEMS AND POSSIBILITIES IN THE FIELD OF CONSTRUCTION ACTIVITY

1. Review of construction industry

Construction and building is an activity carried out on the spot, the end product of this industry according to its character is manufactured and finished at site and it does not constitute an object of export - import. This is an activity, where the materials, semi-finished or prefabricated components, the equipment, machinery and labour are transported to the site of activity, where they are utilized and worked up till the end product is finished. Then the process is repeated and renewed from site to site. Naturally the trend is to transfer a great part of the work from the construction site to fixed factories, in such proportion as possible. But it is restrained so far by the weight, sizes, dimensions and quantities of materials and components to be used. This special character determines and at the same time also limits the possibilities of integrations to be formed by developing countries.

The construction sector in developing countries is one of the largest sectors of economic activity, and the degree of its effectiveness and development influences greatly the realization of a country's economic and social aims. The construction sector requires special attention to be paid by Governments at the time of forming national plans, industrial policy and especially at the determination of development progress.

Figures show that the pattern of development lags behind requirements, the rate of growth of investment in construction and progress has not achieved satisfactory level. The gross domestic capital formation in construction accounts for 2 - 12 percent of the gross domestic product

in developing countries, but mostly under 4 per cent, compared with developed countries where the figures are between 11 - 18 per cent.

It is also characteristic in developing countries that the construction sector is significantly dependent on imported materials, equipment and technical knowledge. Though labour is sufficiently available, unemployment among building workers is greater than in other branches of the national economy because of the floating and barely controlled building demands and activities.

The construction industry in less developed countries is characterized by four sections: the international-modern, the national-modern, the national-conventional and the traditional. The different categories respond differently to changes in structure and in technological level of requirements. Generally the technical level of the industry - except of the international-modern category - which exists mostly in larger towns, is low. There is a lack in building regulations and standards and there are only a few research and other technical organizations which could give help to transfer knowledge and up-to-date systems to the construction sector. There is also a great need for qualified staff.

Planning for the future of the construction industry has to be based on the coherent policy covering the whole national economy. At present only a few developing countries consider the construction industry separately as an independent industrial branch in national plans.

The share of Government's participation in construction varies from country to country, but does not reach a desirable level. More effective Governmental participation would ensure a better organized and planned manner for the sector and would encourage the private sector, surmounting in many cases the financial and investment difficulties. The Government's role is desirable to extend from a

formal participation in the sector as a contractor or client, to undertaking the role of pioneers, showing suitable and adapted models to the private sector.

2. Possible fields of integration

In spite of the building materials production where the production character itself gives good circumstances and spectacular possibilities for integration, in the case of the construction industry the possibilities are limited though to certain imported fields. As an outline of possibilities, integrations can be formed in the following fields:

2.1. Transfer of knowledge

This is a field where developing countries - especially where they have similar conditions - can start on a path resulting in integration. To obtain suitable technical knowledge and to use it properly, is a serious task for every industrial branch. It is advisable for developing countries to establish common institutes or organizations with the task of selecting and transferring licenses, know-how, construction methods to be introduced with equal advantage in the building activity of the countries. The common work avoids at the same time parallel work and expenses.

The common duties may include the elaboration of technical conditions on which the exchange of knowledge, the introduction of new techniques and their effective use can be carried out. The introduction of new systems - should they be industrial management or a prefabricated method - necessitate an experimental period, bearing in mind also possible risk of failure before broader use of the systems can start. With common work, the parties involved can save superfluous efforts and overlapping work, not to mention that the small qualified staff available from both sides can be used in a more efficient way.

2.2. Regulatory practice, standardization

The lack of uniform standards, modular co-ordination and building codes results in difficulties both at national and international levels, as well as in the organization of building activity and undertaking of larger contractor work, or taking part in co-operation. It is also important, at regional level, to assure the interchangeability of building elements and components. The adaptation and wider use of international unification standards and typified designs should be supported by Governments and the joint activity in this field, which forms the common "technical language" too, can bring early good results.

The unified standards to be worked out by a joint organization and the structural elements prefabricated on the basis of interchangeability widen the market, and building activity can also be a part of integration. Agreement at Governmental level is desirable.

2.3. Building research

This field is coherent with the former chapter, it means that building research work should also be carried out and organized in harmony with standardization. Governments should help and assist by the establishment of common, regional building research institutes and centres. Though in the early stages of industrialization this has a secondary priority, it has to be considered at the planning stage. It can be underlined, that the common research work also helps to better use the available highly qualified personnel. The building research centres usually deal with demonstrations and exhibitions of materials and techniques, besides offering information services. The common interest in research work is a good factor for integration.

2.4. Specialization - co-operation

Specialization is a common characteristic in industry everywhere. Specialization also appears in construction, parallel with technical development. It can be seen in developing countries too, especially in

the international category represented by larger, and sometimes by expatriate, firms. These companies work with some kind of speciality, licence or know-how carrying out large projects. They use imported materials and machinery. There are rather small possibilities where integration in construction among developing countries can be formed at the present stage, but in special fields the formation has reality and can be very advantageous.

Particularly if a company in a developing country works with special equipment and qualified personnel utilizing special licence, for example, to erect high industrial reinforced towers with sliding shuttering, or to build huge hangers, the company usually is not able to utilize its total capacity in a smaller country and accordingly its special knowledge and available capacity can be the real object of integrated activity. It is advised that countries select and share the field of specialization, promote it and if necessary commonly establish such specialized sectors. Some examples for field activity are: high-rise building, shells, water-towers, steel structures, special surface treatment (acoustic walls, insulation), hospitals etc.

There is no need to emphasize the advantage if developing countries locating in the same region make efforts to form such joint activities and co-operation in an organized and agreed way. The advantage is the single investment, better use of the available capacity and every participant possesses the knowledge and is able to form branch establishments if they are necessary on the basis of common experience.

3. Remarks

The study is broad in character and deals with a subject which is comparatively recent. The study attempts to outline the difficulties and the possible ways of integration without determining final statements or conclusions. But it can be said that developing countries will be able to close up their ranks, and industrial countries with less

effort and in a shorter time, if they are not constrained to go along the path of development individually and separately.

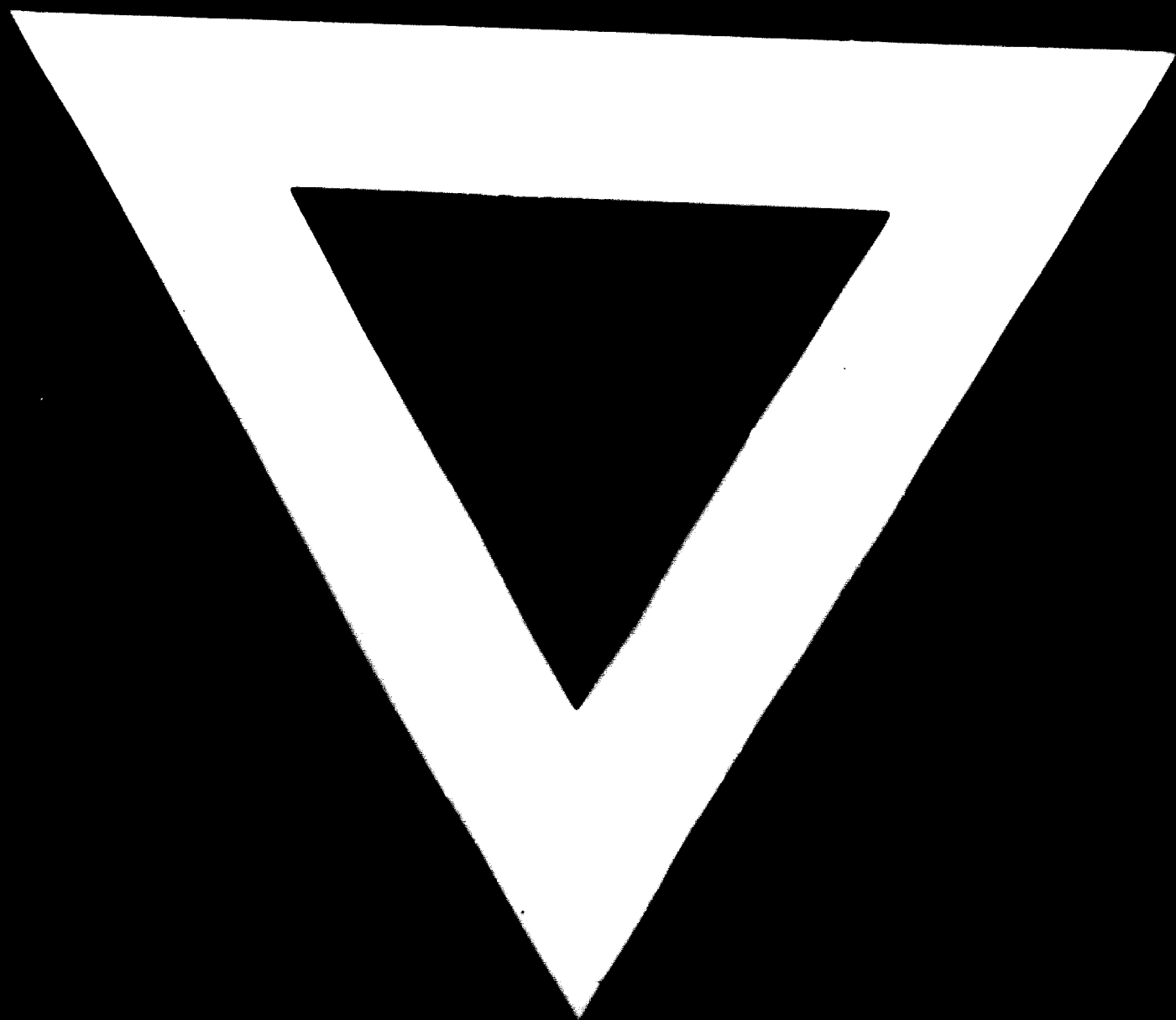
IV. RECOMMENDATIONS, FURTHER UNIDO ACTIVITIES

It is advisable for UNIDO to complete its many-sided activity and programmes with the propagation of the advantages and possibilities of integrations, as a favourable means of development in the industrial progress of developing countries.

It would be of great use if UNIDO could work out the stand-points and characteristics of integration possibilities between developing countries and could emphasize their importance in the national economy, in UNIDO's regional work, meetings and seminars.

It would also be desirable to complete the duties of UN Building and Housing Centres existing in developing countries with the investigation work to be concentrated on possibilities of industrial integrations in the regions concerned.





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