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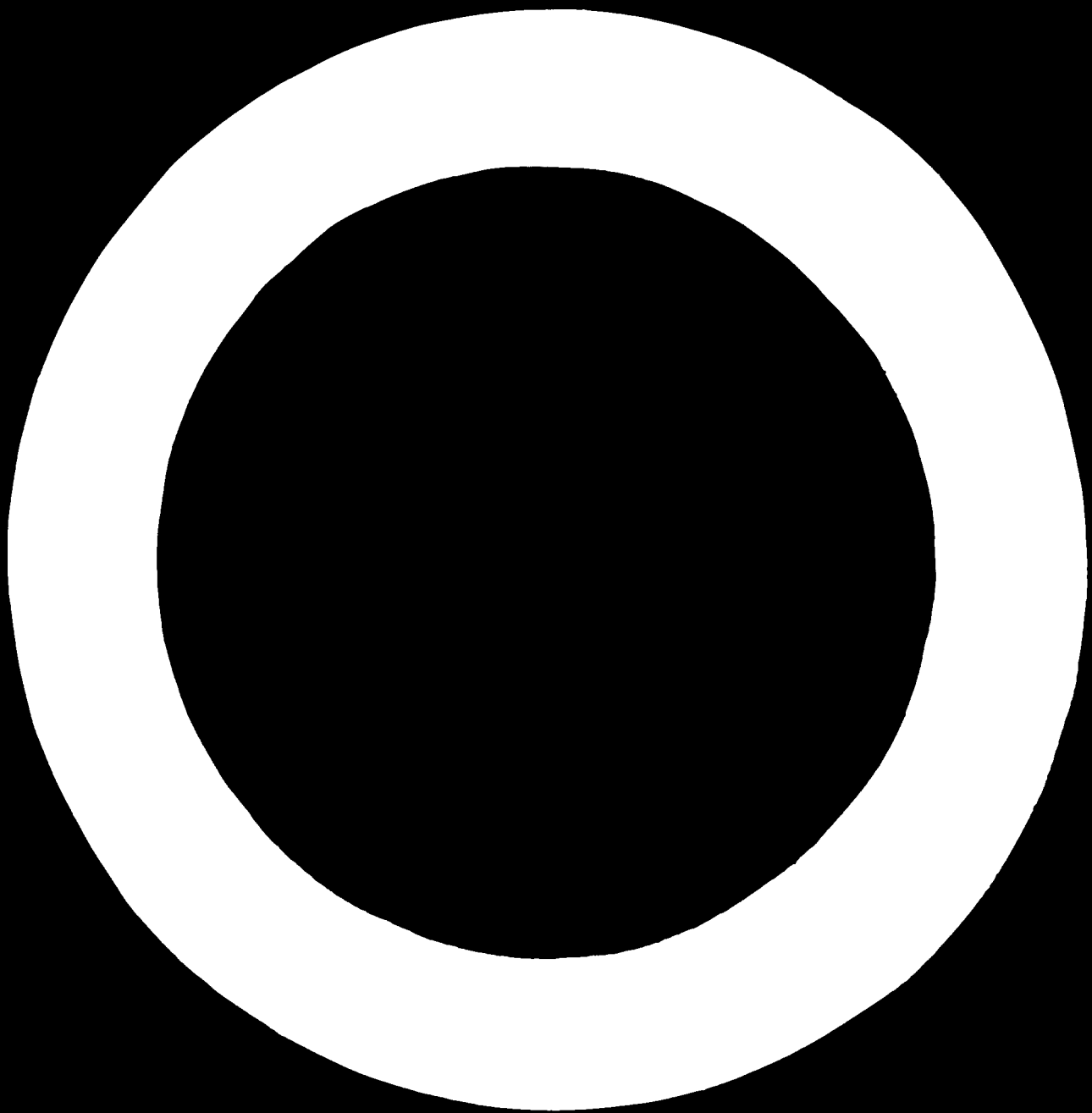
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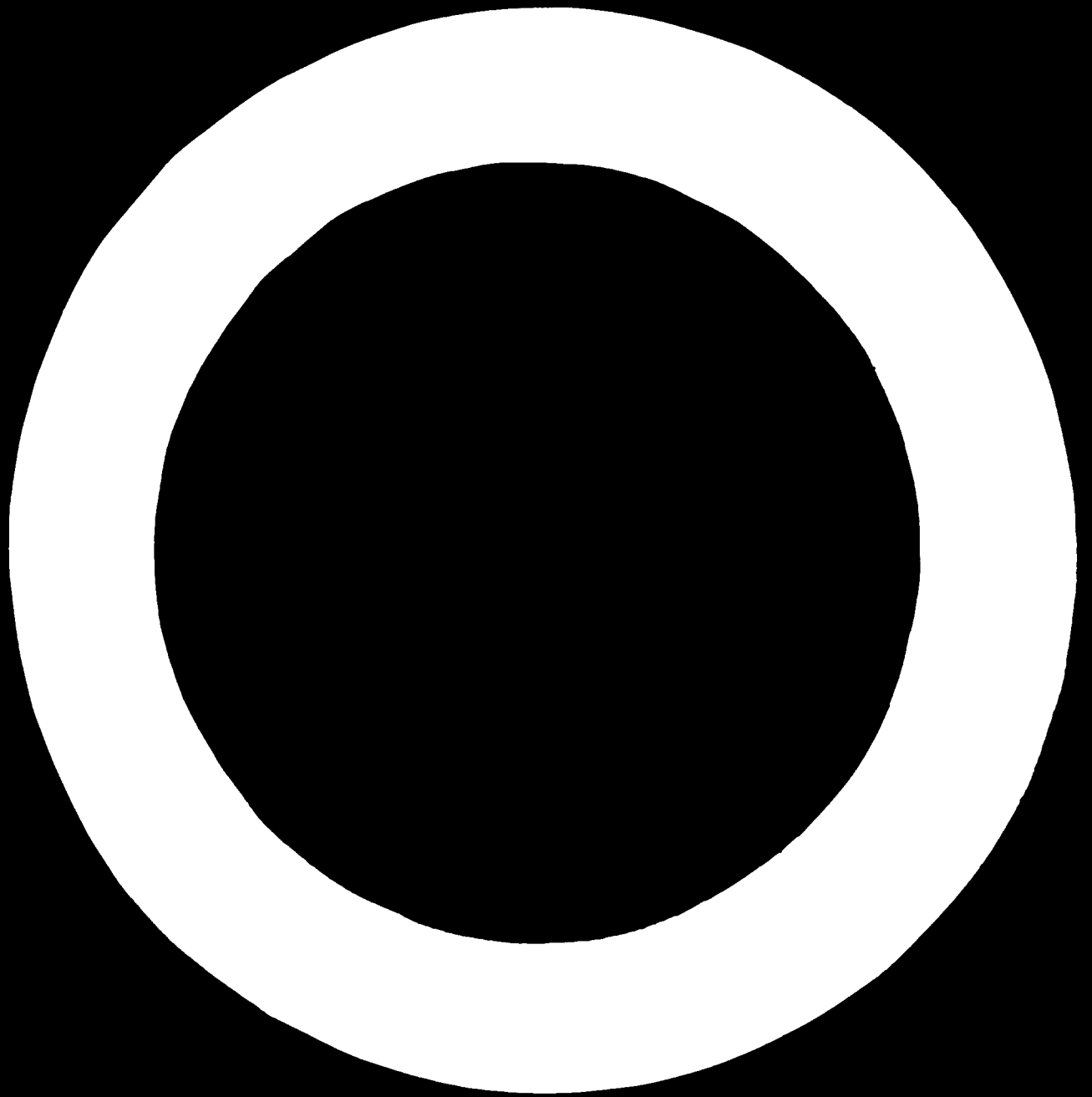


UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

**THE
CONSTRUCTION INDUSTRY
IN
DEVELOPING COUNTRIES.**

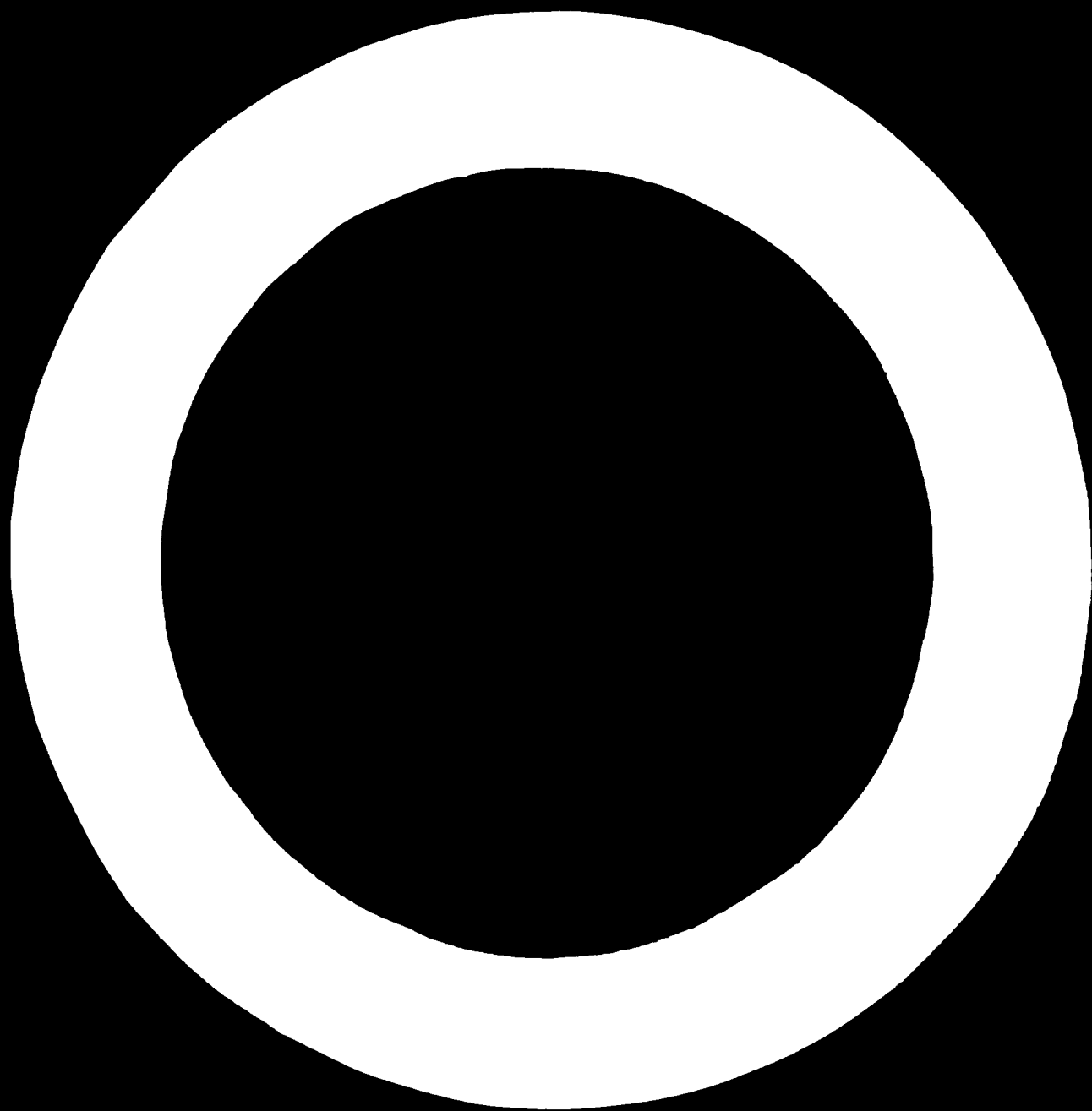
**Report
of an Expert Group Meeting
Vienna
29 October – 2 November 1973.**





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INTRODUCTION

The Expert Group Meeting on the Construction Industry in Developing Countries was held in Vienna from 29 October to 2 November 1973. It was organized by the United Nations Industrial Development Organization (UNIDO).

The purpose of the meeting was to discuss and define the problems to be overcome in establishing and encouraging the growth of effective and appropriate construction industries in developing countries. The meeting recommended certain courses of action to UNIDO that contribute to easing constraints on the growth of developing construction industries.

CONCLUSIONS

The following conclusions are based on the discussions of the three working groups into which the Expert Group was divided.

Group 1. Ways of establishing an effective construction industry in developing countries

1. There appears to be a lack of systematic organization, management and capital investment in the public and private sectors of the construction industries in many developing countries.
2. There appears to be insufficient information on natural resources and skills for the production of building materials and components.
3. There is a need for examination of systems for unification and standardization of building materials and components in the construction industry and other branches of industry associated with construction.
4. A catalogue of building elements in modular systems would be useful. Attempts should also be made to reduce the number of different elements and components and increase the utilization of mass-production details.
5. The use of construction processes appropriate to specific local conditions would contribute greatly to an efficient development of the industry.
6. There is a lack of knowledge on effective methods for training building and civil engineering personnel; this is a priority at all levels of skill and responsibility.
7. Improved systems of quality and cost control that take account of standards appropriate to local conditions are needed.

Group 2. Some specific problems in establishing a construction industry in developing countries

1. There are problems relating to contract procedures in developing countries, including the better co-ordination of design and execution.

2. There are widespread problems in obtaining contract finance in many developing countries.

3. There is a considerable deficiency in innovative and administrative management resources in the construction industry in developing countries.

4. A need exists for the development of technologies, materials and equipment suited to local conditions, and it is desirable to develop alternative techniques to suit the special socio-economic conditions in developing countries. Mechanization in the industry is often undertaken hastily, without a proper analysis of the relative advantages of manual and mechanized methods in the country concerned.

5. Considerable advantages could accrue as a result of the use of dimensional co-ordination, standard specification and codes of practice relevant to local conditions. Unfortunately, in many developing countries there are insufficient facilities for developing these.

6. There is a lack of technical literature relevant to local conditions and no apparent mechanism for the transfer of this type of information between developing countries. In addition, the relatively high cost of technical literature in developing countries imposes constraints on the dissemination of information of all sorts.

Group 3. Co-operation in the establishment of an effective construction industry in developing countries

1. Ways and means of developing bilateral and multilateral aid for developing countries should be directed to encouraging appropriate levels of technology, with special attention to the often neglected problems of the rural areas.

2. Technical assistance programmes are often uncorrelated with a comprehensive and effective development plan; in particular, co-ordination between construction and building material production is often lacking.

3. Co-operation on a subregional level between countries with related problems is a desirable aim. In certain cases establishment of joint facilities would be advantageous.

4. There is a need to increase the reservoir of skilled manpower in developing countries, and possibilities exist for UNIDO

assistance in the area of production-oriented construction management training.

5. Insufficient attention is given to the use of traditional building methods and materials as an alternative to import techniques, which are often inappropriate in the context of a developing country.

6. There is a continuing need for co-operation between UNIDO and other international bodies with responsibilities and interest in construction industry training and development, in order to obtain the maximum impact from United Nations technical assistance.

RECOMMENDATIONS

The Expert Group considered the conclusions of the working groups in plenary session and recommended that UNIDO should:

1. Encourage the growth of appropriate technologies in the construction industries of developing countries by:

(a) Supporting study on the effective transfer of technology related to specific needs;

(b) Developing alternative technologies relating to the design and maintenance of equipment appropriate to the needs of individual countries;

(c) Getting appropriate standards of quality control for building products, recognizing the particular problems of small factories;

(d) Adapting of standards and codes of practice to suit the special conditions pertaining in developing countries;

2. Assist in the provision of an information bank of standard designs for building components, complete with their total technology, and in the publication and dissemination of related manuals and texts;

3. Encourage developing countries or regions to set up construction industry development institutions to continue the activities mentioned above and enhance them in meeting local needs;

4. Provide a comprehensive consultancy service giving advice on overall construction industry planning strategies at the national level. The strategies would vary from country to country according to:

(a) The structure and prospects of the local construction industry;

(b) The material supplies with particular reference to the relation between local production and imports;

(c) The plant and equipment requirements consistent with the levels of technology appropriate to national circumstances;

(d) The existing and potential manpower, bearing in mind the possibilities for training programmes in technical and administrative skills at all levels;

(e) The local methods of organizing and financing construction activities;

5. Encourage training in the higher levels of management skills to meet the specific needs of the construction industry, using international expertise. It is vital that the formulation of training programmes be preceded in each country concerned by a comprehensive survey of the local construction industry;

6. Encourage studies of traditional construction methods and materials with the objective of suggesting ways in which these could be developed;

7. Examine the effectiveness of co-operation between UNIDO and other international bodies to ensure optimum achievement;

8. Give attention to the often neglected problem of repair and maintenance of building and civil engineering works in developing countries.

I. ORGANIZATION OF THE MEETING

The Meeting was attended by 11 experts from 9 countries, 7 observers from 5 countries and representatives of the International Labour Organisation (ILO) and the United Nations Industrial Development Organization (UNIDO).

The Meeting was opened by the Director of the Industrial Technology Division of UNIDO, who welcomed the participants on behalf of the Executive Director of UNIDO.

The officers of the Meeting were:

M.G. Watson (UNIDO), Director

V.A. Avramenko (UNIDO), Secretary

P.A. Campbell (Kenya), Chairman

R. Kriukov (Union of Soviet Socialist Republics), Vice-Chairman

D.W.J. Miles (United Kingdom of Great Britain and Northern Ireland), Rapporteur

The agenda approved by the Expert Group consisted of three items:

1. Ways of establishing an effective construction industry in developing countries;
2. Some specific problems in establishing an effective construction industry in developing countries;
3. Co-operation in the establishment of an effective construction industry in developing countries.

Papers relating to each of these items were introduced by their authors and discussed by the Expert Group. The next three chapters of this report follow this format, the subheadings in general identifying the papers by title.

The Expert Group then divided into three working groups, each of which considered a different agenda item. The working groups presented their conclusions individually to a plenary session of the Expert Group, which then discussed and adopted the formal recommendations to UNIDO.

In the final remarks it was suggested that a series of smaller meetings for specialists be held in the next two to three years, preferably in developing countries, followed by another meeting of the Expert Group in four to five years.

During the Meeting, the Expert Group visited a clay building materials factory in Vienna.

II. WAYS OF ESTABLISHING AN EFFECTIVE CONSTRUCTION INDUSTRY IN DEVELOPING COUNTRIES

Development of the construction industry in Europe based on United Kingdom experience

The author traced the development of the construction industry in the United Kingdom from its beginnings in the industrial revolution, demonstrating the gradual separation of the roles of the professions, the contractors and the suppliers of building materials. The way in which the speculative private housing market became a specialized "consumer-oriented" division of the industry was described.

The influence of government and local government bodies on the remainder of the industry, which catered for a "bespoke" demand, was discussed, especially the implications of fluctuating spending according to national economic conditions. The development and growing specialization of the professions were traced, and the implications of a watertight division of responsibilities between architect and contractor were discussed.

The structure and emphasis of employment policy in the industry were contrasted with the needs of developing countries. Various attempts at improving productivity included system building, and the advantages and disadvantages of this approach were discussed. The important trends to modular co-ordination were emphasized, together with the implications of a higher required standard of accuracy in construction.

The trend to mechanization and the growth of the plant-hire industry were limited by the structure of the industry, and the repairs and maintenance sector and the smaller building contracts were not normally susceptible to economy through mechanization. However, the shortage of suitable labour had led to an increasing use of construction plant.

An important milestone was the recognition of the vital role of training, marked by the setting up in 1964 of the Construction Industry Training Board (CITB). This board had been given power to levy funds from construction firms in order to make available technical training for their managers, operatives and personnel as well as grant-aiding attendance at relevant courses by other institutions.

The author emphasized that over 100 years ago very large construction projects had been accomplished using labour-intensive methods. Currently, the trend was towards system building and module co-ordination and towards the mechanization of the construction process. The author commented that these trends should not be assumed to be automatically relevant to the needs of developing countries. The balance between effective cost of plant and effective cost of labour varied from country to country and area to area.

One activity which had particular relevance to the needs of developing countries was that of training, and the work of CITB in encouraging training as a lifelong activity at all skill levels was worth nothing. The question whether construction should always be treated as a separate training activity depended on the size of the country; in smaller developing countries with limited resources, it might be better to have joint training organizations.

It was noted that CITB was financed by a levy on contractors, and a comment was made that a levy on payroll as distinct from a levy on turnover could be counter-productive in that it stimulated the replacement of labour by machinery. The author commented that there were advantages in financing by levy rather than by direct Government grant, since this encouraged commitment by the industry, and that that was a practical, as distinct from an over-academic, approach.

The question of the way in which design impinges on technology was sometimes overlooked. For example, it might be possible to encourage employment by using stone-arch construction instead of large embankments constructed by mechanical methods. Another important point

was the cost per workplace. Many developing countries simply could not afford to provide jobs for the unemployed at the figures common in industrialized countries, \$10,000-\$15,000. A figure of \$100-\$150 would be more realistic.

It was noted that quality control was often a problem in developing countries. That should lead to a consideration of standards; the subject would be discussed in more detail in later papers. It was emphasized that even within one country, problems of urban and rural areas were very different.

Experience of the USSR in the development
of the construction sector

The author commented that the USSR had become a very large industrialized country, but that 50 years ago the USSR had itself been a developing country. He emphasized the potential for economies of scale in housing construction. The attack on the problems of developing the building industry in rural areas of the USSR was opening new areas of experience that might be relevant to the problems of developing countries. The major problem was material resources. First one should decide which materials were locally available, then choose the appropriate technology. Standardization and modular systems had been very valuable in the USSR. Time was often a factor influencing the choice of mechanized methods.

In answer to a question on training, the author commented that in large automated factories, training was less of a problem, since there was no need to understand more than one machine. The training problem could be met by simplifying industrial processes to reduce training needs (e.g. using brick-panel construction). In the USSR, the problems were those of achieving high output with limited labour availability.

The question was asked how the USSR had managed to jump directly from labour-intensive operation to full mechanization. The author replied that such a jump could only be achieved where there was a very detailed national planning system.

The monotony of mass-produced pre-cast concrete-panel construction was mentioned, and the Group agreed that it was necessary to bear in mind the effect of these methods on the environment.

The formation of an effective construction industry sector in developing countries

The author emphasized that the general development of a country could not be separated from the advance of its construction sector, so it was important to view the sector as a part of the over-all economic system. This was particularly true in the context of the limited resources available in most developing countries.

There should be a wider regional distribution of development efforts in order to avoid over-concentration in certain urban areas. This required a better utilization of the existing housing stock in rural communities.

Maintenance was often neglected, and special measures were needed to arrest the deterioration of the existing stock of buildings.

Manpower, especially in a developing country, was the most important resource available to the construction industry. Thus the education and training of manpower provided the most significant contribution to the progress of the construction sector, and efforts should concentrate on them, rather than on purchasing expensive machinery and equipment. To begin, a detailed plan should be established with curricula for education and training, encompassing all the various professions, trades and functions, and providing also for continuing education after the initial period of formal training.

It was vital that designers should contribute to the increase in construction efficiencies by acquiring a thorough knowledge of local conditions. Standardization and dimensional co-ordination should be introduced at an early stage of development, as the required changes were fewer then than later.

Great care should be taken in the introduction of capital-intensive production methods, with prior consideration of their impact on employment, real economic benefits, positive or negative, availability of skilled operators, possible shortening of project execution times et

The change from a labour-intensive to a capital-intensive form of production, including the introduction of some prefabricated methods, should take place only gradually, with careful consideration of all the factors mentioned at each stage of development.

A good system for the collection, processing and supply of relevant statistical information was an important tool in the hands of planners and decision makers responsible for the development of the construction industry. The establishment of such a system should never be neglected.

Construction activity in India - present situation and trends

It must be remembered that, before India became independent, methods and materials were very much patterned after those in the United Kingdom. Another important factor was the diversity of the industry. The complexity of construction as a process was not so much due to its technological complexity, as to the number of individuals and groups involved. A major constraint was the lack of a systematic approach to construction management. Problems associated with the use and maintenance of imported machinery had led to increasing local manufacture. One special factor facing the contractor in a country like India was the difficulty of providing reasonably continuous employment opportunities. The problem of the lack of status of construction as a career was often worse in developing countries than in industrialized ones.

The management problems of supervising large-scale labour-intensive construction projects were quite considerable, and merited further study. More work was needed on shadow pricing and on the total end-cost of mechanized as against labour-intensive methods. In India, most of the unskilled workers in the industry were drawn from the agricultural sector. There was a general shortage of trained people, particularly in site management.

There was a need for proper estimation of the required levels of building materials production, as well as for innovation and improved production methods. Technical associations, which currently concentrate on design and research aspects, could also give attention to improving construction methods.

III. SOME SPECIFIC PROBLEMS IN ESTABLISHING AN EFFECTIVE CONSTRUCTION INDUSTRY IN DEVELOPING COUNTRIES

Problems associated with the establishment of a construction industry in developing countries with particular reference to Kenya

The major difficulty in many developing countries was effective communication between the design and construction sectors. Local contractors relied very heavily on full information and supervision, which was not always available. The third sector, the teaching sector, was not often in a position to remedy these deficiencies. In none of these sectors was there a real incentive to ensure that standards, designs, methods and techniques were properly suited to local conditions.

The service sector included plant and materials manufacturers and importers. In industrialized countries, this sector could provide valuable support through market research, trade associations etc., but in developing countries the contribution was minimal. Standards and quality control were often lacking. A serious deficiency lay in the area of written information, as suitable technical books and journals were almost entirely lacking. Local professional bodies were not in a position to rectify this. Help was needed:

- (a) In making syllabi more relevant in the teaching sector;
- (b) In providing technical books and publications;
- (c) In construction management training;
- (d) In developing standard designs of components;
- (e) In making high-level enabling resources available to the construction sector, particularly high-level management expertise;
- (f) In setting standards relevant to local conditions.

In answer to a question on the status of practical subjects within the teaching sector, the author commented that this could be enhanced by integrating training in construction management into the general curriculum.

The construction industry - a separate branch of economy

From the point of view of function, the construction industry belonged among the final branches of the national economy and therefore reflected the level of development of other branches. On the other hand, as a participant of investment the industry itself influenced the technical and economic level of development of other branches. Construction not only realized architectural and urbanistic plans, as far as the construction of various building units and important individual buildings was concerned, but also the construction of whole agglomerations. In this sense, construction strongly influenced the whole environment. Within the national economy construction had an important role to play, especially in the realization of structural changes demanded by the economic plan and concerned with both production and consumption.

In Czechoslovakia, construction had made and continued to make an important contribution to the development and industrialization of Slovakia and to the concentrated development of specific regions within the country, as had been the case in the construction of large industrial agglomerations at Ostrava and in Eastern Slovakia. Thus it had also participated in carrying out the regional policy of the government.

Construction was the decisive factor in investment. For instance, in the sphere of productive investments the share of construction represented approximately 50 per cent, and in the sphere of non-productive investments, as much as 90 per cent, of the total volume of work.

For these reasons construction was preparing, in a planned manner, to increase its technological and economical level, which assumed not only the further development of productive capacities and the production of construction materials, but also important changes in specialization, co-operation and especially the territorial localization of productive capacities.

A comment was made that this was an interesting example of the advance of a construction industry based on a high-level managerial and planning skills in government. However, the question arose how far

this experience was relevant to the problems of developing countries whose economic planning departments had limited administrative resources

Organization of the management of construction in the USSR.

The author commented that the construction industry in the USSR was an important branch of community material production. The industry could be defined as the whole complex of construction and assembly operations using all the available modern techniques, with a permanent staff of workers and specialists.

The construction industry was closely linked with other branches of the economy. Construction absorbed a large proportion of the output of many industrial sectors, on which it depended for materials inputs (building materials and components, fuel, energy etc.) and for a number of services (professional, transport and marketing).

The most important component of the construction industry in the USSR was the building materials industry. Building materials and components made up between 50 per cent and 60 per cent of the total value of construction output. These materials were not usually transported over great distances owing to their low value/weight ratio. The production of many building materials could be dispersed, but local fluctuations in demand could result in local fluctuations in production. A few materials must be produced in large-scale, centralized plants.

The main trend in the development of construction in the USSR was towards industrialization as a basis for technological progress. However, it must be noted that industrialization usually implied decreasing levels of labour utilization.

Industrialization of construction required the establishment of construction organizations specializing in particular types of work. As a result, labour and financial outlays could be reduced and the time spent on the building process could be cut back considerably. The industrialization of construction in the USSR had considerably reduced the adverse effects of climatic conditions.

There was a need for radical improvement of construction in the developing countries in order to increase the volume of construction and reduce the time of construction, as this had great social significance.

Selection of the methods and technical direction to be employed in developing a construction industry had to be determined for every country individually, taking full account of local conditions. The choice must be made after economic analysis of different opinions and decisions on this problem. UNIDO should include this type of work in future programmes arranged by special expert groups.

It was suggested that the practicability and value of using advanced computer-based management techniques should be investigated by UNIDO.

The question of fitting components together needed more attention. In the USSR an attempt was being made to rationalize components in order by site management.

The relationship between construction industry and employment conditions in particular areas should be investigated more closely, although it was appreciated that this was primarily a responsibility of ILO.

Education, training and conditions of development in the construction industry in developing countries

The two papers presented on this topic emphasized the key role of the Government in defining training needs. Training programmes varied according to the nature of the skill involved. For example, a shortage of maintenance men and machine operators could be overcome reasonably effectively by short periods of intensive training. It was important that a real effort be made to make training much more production-oriented. This implied a reduction in academically oriented advanced courses, and a greater emphasis on practical work. The ILO was working on:

- (a) Introducing the concept of modules of employable skill;
- (b) Standard setting;
- (c) Technical co-operation activities;
- (d) Documentation and training for industry generally and construction in particular.

A regional group for Latin America had already been set up, and one for South-East Asia was to follow shortly. The need to improve the status of technical education was re-emphasized. Work was being done on model codes of practice, which can be used in part by individual countries. Standards for quality control were important as they had ramifications on building materials production design and site operations. The Centre for Housing, Building and Planning of the Department of Economic and Social Affairs of the United Nations Secretariat had also done some work in this field.

In the discussion it was emphasized that much less emphasis on research as distinct from development was required. It was suggested that UNIDO could usefully sponsor applied research, particularly in education and training. A project based in, say, six universities in various developing countries on approaches to training in construction management would be very useful. UNIDO could make a very valuable contribution in this field.

Another field for sponsored research was quality control in the small factory, not only in construction and building materials but also in mechanical engineering. Research and development was also required on the potential use of local construction materials, covering both manufacture and application.

The cement industry in Iran

The author reviewed the growth of the Iranian cement manufacturing industry, presented statistical data on production trends and forecast increases in capacity. In Iran a major problem in long-term development planning was the fact that the available levels of development funds were closely linked to oil prices and production. Currently, there was a severe shortage of cement in Iran, although it was appreciated that the problems of Iran are the problems that result from the successful implementation of high rates of planned economic growth.

The major technical problems in cement production in Iran were associated with standards and quality control, although other difficulties had been caused by the lack of a phased training plan associated with the introduction of new plants. It was again emphasized that successful training must be linked to the local industrial environment and should be essentially production-oriented.

Transfer and adaptation of technology in the
construction industry

The construction industry was responsible for the construction of physical facilities that had played a critical and highly visible role in the process of development in many regions of the world. Its output was a major fraction of the gross domestic product, and it employed between 5 and 15 per cent of the labour force in most developing nations.

In most developing countries, the Government was the largest client of the industry, in addition to being its regulator and material supplier. The labour-intensive nature of the construction industry coupled with the fact that most developing countries had some indigenous industry in that area, had made the construction industry an attractive area for creation of jobs, conservation of foreign currency, and a training medium for transformation from agricultural-based employment to manufacturing.

The possibility of introducing various mix labour and capital technologies and the use of staging strategies in major public work construction offered an excellent opportunity for transfer and adaptation of technology.

The author drew attention to the danger that students from developing countries who received their professional training in an industrial country might apply an imitative rather than an adaptive approach.

The effect of development of the construction industry on the development of building materials industries should not be neglected. However, the integration of construction and building materials industries was usually economically attractive only at the local level in rural areas.

Construction standards and regulations in low-cost housing
and minimal infrastructural programmes

The author pointed out that housing and infrastructure programmes based on models of advanced countries had made little impact on the living conditions of many families living in urban and rural areas in developing countries. It was suggested that successful low-cost housing programmes could be based on:

- (a) Participation by families and co-operatives;
- (b) Self-help by individual families where appropriate;
- (c) Minimal infrastructure and low-cost materials.

That, however, implied a realistic approach to building standards and regulations, as well as the adoption of labour-intensive methods whenever feasible.

IV. CO-OPERATION IN THE ESTABLISHMENT OF AN EFFECTIVE
CONSTRUCTION INDUSTRY IN DEVELOPING COUNTRIES

Bilateral and multilateral aid for the construction
industry in India

It must be remembered that countries do not always realize that the developments in the construction industry should have a high priority. Dissemination of information was often a problem, and some activities of UNIDO could usefully be of a "clearing-house" nature. There was a real need for more attention to the many and varied socio-economic influences that affected decision making.

The Group noted with approval that UNIDO was already taking a greater interest in small-scale in building materials production, one example being suggestions for small-scale brick making in Lesotho. The major problem was that machinery available for export from industrialized countries was designed for use in those countries and often geared to economies of scale. Thus, there was often a great gap in availability of machines for small-scale processes. It might be helpful to encourage the design and production of suitable machinery locally in developing countries. UNIDO could help by assisting countries to write performance specifications for equipment that was needed.

It was pointed out that in the United States of America, the East West Center had extended its activities from agricultural to construction equipment. The Technology Adaptation Program (US AID) had also done some work in this area. However, a major constraint was the lack of a market base. The problem of status occurred, in the sense that research in university departments did not gain the same recognition for developing simple plant as for advanced technological work.

A great deal of work on small-scale production processes had been done in countries such as India, but collection and dissemination of information was a problem. More work was needed on clearing house activities, but it might as well be advantageous to cover industry generally rather than set up institutions confined to the construction

industry. The Group also noted that the work of UNIDO on the assessment of proposals for plant construction was increasing.

The International Bank for Reconstruction and Development could make an important contribution by amending the requirements for information to be included in the preparatory phase of consultants' reports. There should be a requirement that this phase include an assessment of the local construction industry on the basis of which recommendations for maximizing the contribution of local resources could be made.

Bilateral and multilateral aid granted by the United Kingdom
to the developing countries in the field of the
construction industry

Although a considerable amount of assistance had been available for many years on the financing of individual capital projects, it was only recently that the United Kingdom had embarked on work that was specifically intended to promote the growth and stability of indigenous construction industries in developing countries.

In fact, although the series of "on-off" management training courses for local contractors that had been organized in a number of African countries over the past few years by the United Nations Economic Commission for Africa had been a valuable initiative, there was a general lack of appreciation of the potential role of an indigenous construction industry in national development. Yet Governments and development agencies were important clients of the industry and were thus in a strong position to influence the performance and direction of construction activity.

This general gap in aid programmes had led the Intermediate Technology Development Group (ITDG), based in the United Kingdom, to put forward a proposal for technological and procedural guidance to the construction industries of less-developed countries. This project had been financed by the Overseas Development Administration, Foreign and Commonwealth Office (then the Ministry of Overseas Development) for the initial period 1969-1972.

In order to avoid too great a degree of diffusion of work and interest, it had been decided that this initial project should be limited mainly to African countries, and particular attention had been given to work in Nigeria and Kenya. Since adequate construction management skills had been identified as one of the main constraints on indigenous construction capacity in a number of African countries, it had been decided that the attention of the project should be concentrated on two particular areas of work:

- (a) The identification of relevant management techniques for indigenous building contractors;
- (b) The subsequent exploration of appropriate teaching material and effective management techniques.

In Nigeria a series of four-day "conventions" had been held for contractors and government officers of each of the six northern States. At these conventions, prepared teaching material covering elementary management skills for small building firms had been presented to the participants, using a variety of techniques including lectures, seminars, films, exhibitions and dramatizations. Visual aids had also formed a vital part of the programmes, as it had been felt that the many contractors with a limited experience or formal education would find such material easier to absorb than mere verbal exposition. Since relatively few of the participants had been really fluent in the English language, it had been encouraging that they had shown themselves willing and able to absorb the information and techniques presented to them and had felt that these could be usefully applied in their work.

The experience gained in Nigeria had led to an invitation to work with the training staff of the Kenya National Construction Corporation on the preparation of specialized course material for use in their training programme for Kenyan building contractors. This had given the project team an opportunity to develop further their training methods and media in the rather different economic and social environment of Eastern Africa.

As a result of these opportunities to study at first hand the reaction of practical African businessmen to a construction management training programme, ITDG had produced a series of teaching kits that could form the basis of a comprehensive construction industry training programme.

It was suggested that subject areas which should be particularly emphasized in such a programme include:

- (a) The business management of a contracting firm including marketing, book-keeping and accounting, estimating and tendering, cost control, budgeting and forward planning;
- (b) The operational management of building projects including contract procedure, site layout and organization, job programming, plant management and maintenance, purchasing and storing of materials;
- (c) Personnel and supervisory management with particular emphasis on intermediate technologies and labour-intensive techniques.

The final section of the paper proposed certain measures to encourage the organization of modern construction production in developing countries. It emphasized the fact that the one resource usually abundant in developing countries was unskilled manpower, and that many construction industry operations were capable of adjustment to maximize their local labour content. Many of the difficulties imposed by the greater strain that was thereby thrown on managerial and technical resources could be minimized by the prior implementation of properly planned training and development schemes.

After discussing the initiatives of the Kenya National Construction Corporation on this field, the author emphasized the importance of formulating policies covering tender procedure, contract finance and administration that would be most likely to encourage the development of a capable, self-reliant local construction industry.

Integration problems in the construction sector

The author emphasized that in most countries the construction industry itself represented about half of gross fixed capital formation. He commented that the complexity of the building materials and construction industries and their key role in national development justified special attention from the Government.

However, construction industry planning must be very carefully executed because of the ramified linkage with other industries and other countries in a particular region. This was rather more difficult to achieve in many developing countries, where there was less experience of detailed planning methodology.

Advanced building materials production and building activity required a high level of technical knowledge, sophisticated equipment and high investment. Generally, developing countries were short of these facilities.

It could sometimes prove advantageous for developing countries in the same region to co-operate in providing joint facilities.

International assistance to the construction sector

The paper covered basic questions relating to international assistance to the construction sector.

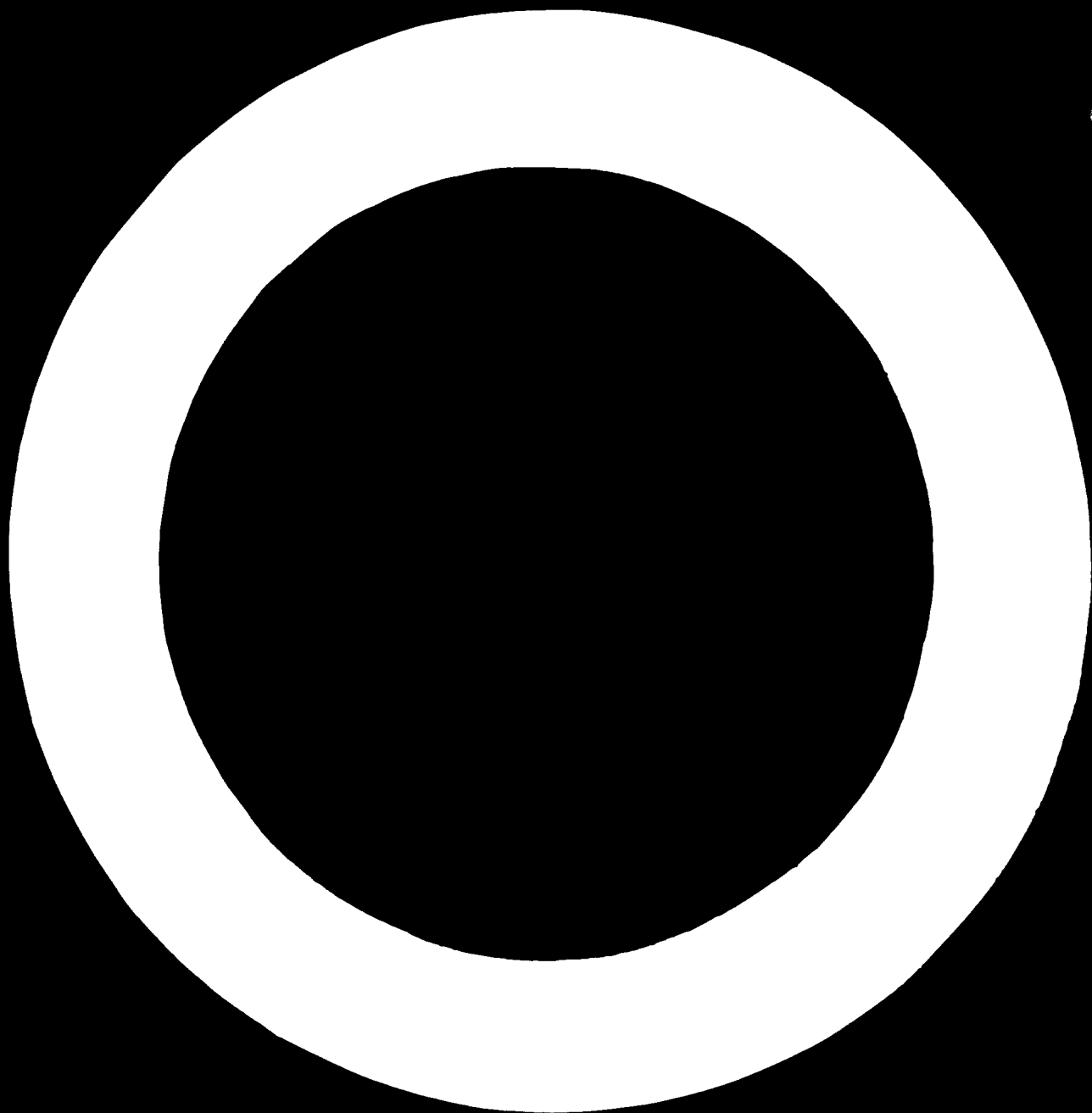
Special attention was given to the analysis of international assistance within the framework of United Nations activities, particularly those of such bodies as UNIDO. The activities of the regional economic commissions were also described. The author evaluated the achievements of these bodies in the construction industry (including housing), the civil engineering industry and the building materials industry.

More attention should be given to the questions of standardization and unification, as well as to the control of the process of construction in its economical and financial aspects. This should, of course, be related to the development programmes of individual countries and regions.

Attention should be given to the evaluation of the results of past policies, with the aim of giving publicity to the real achievements of the developing countries, and also to the utilization of the knowledge and experiences of the developed countries.

It was important to improve the contacts between United Nations bodies and the construction industry. At the same time, it would be useful to direct more international aid towards the solution of those production problems that are the main constraints on the growth of developing countries.

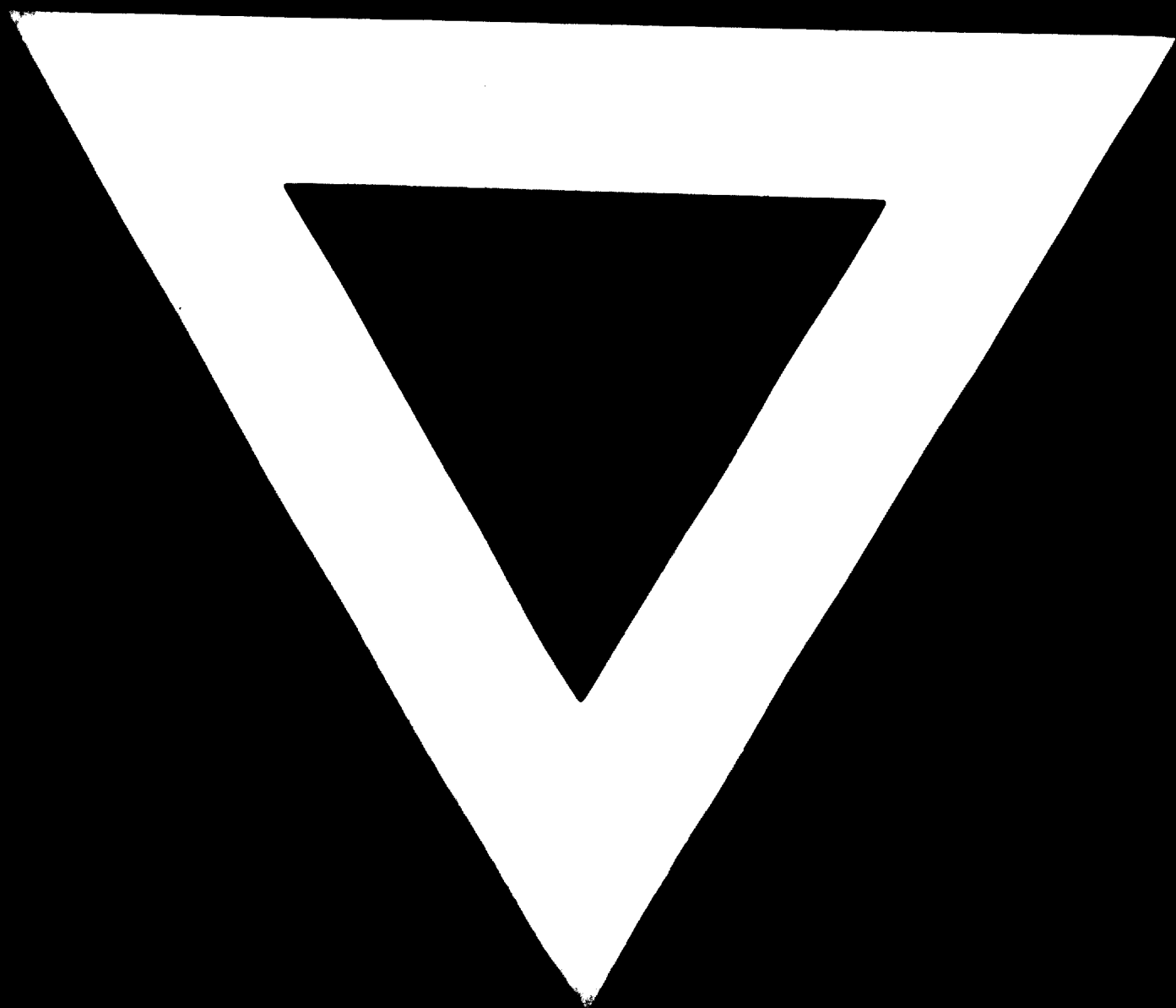
The importance of improving and adapting traditional methods was strongly emphasized.



ANNEX

List of documents

- ID/WG.148/1 Provisional agenda and work programme
- ID/WG.148/2 Outline of papers to be presented
- ID/WG.148/3 Outlooks for the development of industrial construction
in the USSR
R.V. Kriukov, Union of Soviet Socialist Republics
- ID/WG.148/4 Conditions of employment and training in the
construction industry in developing countries
International Labour Organisation
- ID/WG.148/5 Bilateral and multilateral aid granted by the
United Kingdom to developing countries in the field of
the construction industry
D.W.J. Miles, United Kingdom of Great Britain and
Northern Ireland
- ID/WG.148/6 Development of the construction industry in Europe:
United Kingdom experience
D.W.J. Miles, United Kingdom of Great Britain and
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- ID/WG.148/7 Education and training in construction
United Nations Educational, Scientific and Cultural
Organization
- ID/WG.148/8 Legal, economic and technical problems in the
establishment of construction industries in developing
countries, with particular reference to Kenya
P.A. Campbell, Kenya
- ID/WG.148/9 Inter-national assistance to the construction sector
L. Riha, Czechoslovakia
- ID/WG.148/10 The construction industry: a separate branch of the
economy
L. Mikova, Czechoslovakia
- ID/WG.148/11 The formation of an effective construction industry
sector in developing countries
M. Hareli, Israel
- ID/WG.148/12 Construction activity in India: present situation
and trends
A. Nagabhushana Rau, India
- ID/WG.148/13 Bilateral and multilateral aid for the construction
industry
A. Nagabhushana Rau, India



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