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Interregional Expert Group Meeting  
on Building Materials Industry  
for Africa and Asia \*

Nairobi, Kenya  
20-23 November 1989

Discussion Paper

CONSIDERATIONS FOR PROMOTION OF THE LOW-COST  
BUILDING MATERIALS INDUSTRY IN AFRICA AND ASIA  
AND CO-OPERATION AT REGIONAL AND INTERREGIONAL LEVELS

Prepared by the UNIDO Secretariat

3a/44

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\* This meeting was organized by UNIDO in co-operation with the United Nations Centre for Human Settlements (Habitat).

\*\* This document has not been edited.

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## 1. INTRODUCTION

The First Consultation on the Building Materials Industry held in Athens, Greece, in 1985 in co-operation with HABITAT discussed three basic issues related to the sector in the developing countries. These issues were:

- 1.1.: Development of the building materials industry, including financing, planning and programming methods, emphasizing alternative scale plants, particularly in the cement industry.
- 1.2.: Measures to strengthen indigenous technological capabilities in the production of building materials, related to, among other things, the appropriate choice of products, selection, adaptation and transfer of technology, training, organization of production, design and production of capital goods, and research development.
- 1.3.: Measures required to develop building materials production in the informal economy, including research and development, information, training and quality improvement.

A set of recommendations was agreed upon with the view to providing appropriate guidelines to assist the industry in coherent development. It was felt that improvement in the building materials industry could also be achieved through restructuring the indigenous sector so that the demand for materials particularly those for low-cost housing could be met.

The establishment of an adequate infrastructural basis was considered a key aspect for the promotion of this industry in view of its linkages with other sectors i.e. capital goods, engineering, transportation, and construction. This promotion could generate more opportunities for establishing production complementarities at the national level as well as at regional and interregional levels.

By reinforcing the linkages between the building materials industry and other related sectors in particular the construction industry, more employment opportunities could be created. In addition there would be greater potential for human resources development at all levels.

Proper integration of the building materials industry in the planning process of governments could bring about an important contribution to the economic development process of the sector and at the same time encourage forecasting and planning of the overall needs for materials, particularly for the housing sector.

In view of the sector's vast range of products it was felt that selective areas should be promoted with the aim of proposing positive approaches to the production of building materials for low-cost housing.

It was in that context that the Regional Expert Group Meeting on Cooperation and Development in the Field of Building Materials Production, Guatemala City, Guatemala 24-27 October 1988 was organized by UNIDO in co-operation with SIECA\* with the view to promoting co-operation at the regional level in Central America in the field of building materials. 25 participants attended the meeting 9 of which were from regional institutions.

Some of the basic recommendations from this meeting<sup>1/</sup> are as follows:

(i) Governments of the region should formulate strategies, policies and programmes and should institute national and regional machinery to promote the production of building materials based on local resources and intended for the construction of low-cost housing;

(ii) Appropriate governmental and private institutions must promote the informal sector of the building materials industry through associated forms of production and/or marketing in order for the sector to gain access to credit lines for inputs and equipment.

(iii) A regional productivity programme for the purpose of lowering the costs of the main building materials used in the low-cost housing sector should be formulated and implemented stressing the aspects of enterprise organization, training at various levels, machinery and equipment maintenance, quality product, energy utilization and transport.

(iv) Legislations currently in force must be revised in order to eliminate the provisions limiting or discouraging production based on locally available resources;

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\*Secretaría de Integración Económica para Centro América.

<sup>1/</sup> Report, ID/WG.479/4 (SPEC.), 15 November 1988, pp. 5,6

(v) As key topics consideration should be given, at the Second Consultation to be held in 1990 to the manufacture of low-cost building materials for low-cost housing and to measures for the strengthening of regional and interregional cooperation with the view to reducing the use of foreign exchange.

Against this brief background a regional study for Africa and Asia was undertaken by UNIDO<sup>2/</sup> with the view to analysing the general conditions of the building materials industry in selected regions as well as the possibilities for promoting and developing the sector. There was a necessity for identification of areas of common interest that could encourage regional and interregional co-operation among the developing countries in those regions with emphasis on appropriate materials for the low-cost housing sector. The study was carried out in the following countries in Africa: Egypt, Ethiopia, Kenya and Tanzania. In Asia the study covers Pakistan, India, Thailand and the Philippines.

In addition another study was carried out by HABITAT<sup>3/</sup> to analyse the technological aspects and the appropriate standards for locally-made low-cost building materials as well as the co-operation that can be developed between developing countries.

Through the analysis of these two background papers and the country case study to be presented by the experts, the meeting will discuss strategy and measures necessary to expand domestic industry, encourage the use of locally available raw materials and local resources and promote entrepreneurship in the small and medium-scale production sector. An important component of this programme of discussion consists of the transfer of technologies and standards through cooperation at regional and interregional levels between Africa and Asia.

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2/ An overview of the building materials industry in Africa and Asia, by F.M. Iqbal, UNIDO Consultant. ID/WG.496/2 (SPEC.), 31 August 1989.

3/ Co-operation between developing countries on technologies and standards for local building materials. UNCHS (Habitat). ID/WG.496/1(SPEC.) August 1989.

This interregional meeting is part of the preparatory work for the Second Consultation on the Building Materials Industry to be co-sponsored by UNIDO and HABITAT. The Consultation is scheduled for the last trimester of 1990.

## 2. GENERAL CLASSIFICATION OF BUILDING MATERIALS

Demand for building materials is oriented mainly towards processed or minimally processed materials, the production of which is provided by the formal or informal sector in accordance with the capabilities of each sector. The building materials subject to market demand are classified in six different categories as follows:<sup>4/</sup>

- (1) Non-metallic building materials (such as cement, lime, asbestos, clay, tiles, glass, bricks, electrical insulation, sanitary and plumbing fixtures);
- (2) Primary metal building materials (such as metal bars, rods, sections, tubes, pipes, nails, screws, etc.);
- (3) Finished metal products (such as finished metal structural parts, hard tools, boilers, stoves, locks, hinges, valves, fixtures and fittings);
- (4) Wooden building materials (such as lumber, veneers, wood-based panels, and builders' woodwork);
- (5) Chemical building materials (such as pitch, tar, bitumen, paints, varnishes, plastics, and glues); and
- (6) Minimally processed mineral building materials (such as stone, sand, gravel, and aggregates).

Taking into account the costs of machinery, equipment, raw materials, energy and transportation, the production of many of these basic building materials such as cement, structural steel, glass, and thermoplastics requires in most cases significant investment and imports which create a depletion on the foreign currency reserves in developing countries. This dependency has its economic and technical implications both on the formal and the informal productive sectors.

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<sup>4/</sup> The Building Materials Industry: Its Role in Low Cost Shelter Programmes. UNIDO, Sectoral Studies Series, No. 39, P/D.62, 5 Nov. 1987, pp.10-11

Basic building materials which are predominantly used in construction are in many cases not available in sufficient quantities and, sometimes are not available at all. When available they are extremely expensive.<sup>5/</sup> Affordable materials could be obtainable for the low-income housing sector if appropriate local resources were properly exploited and utilized.

Locally available materials such as earth, stone, bamboo, lime or clay have an important role in the informal low-cost sector. In many developing countries these materials are extensively used in the construction of housing and shelter, but are not favoured either by Government or by the modern construction undertakers or professionals. Appropriate production technologies and standards would make them more acceptable by the construction industry. On the one hand housing could be more durable and on the other the industry and the users would benefit from a wider selection of improved and/or new indigenous materials.

### 3. ORIGIN OF DEMAND AND TRENDS

Governments play a key role both as sponsor and client in the construction of practically all important infrastructural works in developing countries. The construction of roads, bridges, dams for irrigation and electrification, sanitation and drainage projects, ports, and airports generates a significant demand for materials. Other government projects for social services consisting of facilities for education, health, offices, sports and housing exert a great demand for building materials. In addition, the private sector has its share in the demand for the construction of industrial, commercial, touristic and housing complexes for investment purposes and profits.

Typically, building tends to account for 70 per cent of the construction market in both developed as well as developing countries; civil works take up the rest.<sup>6/</sup> Building materials and components contribute between 50 and

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5/ The use of selected indigenous building materials with potential for wide application in developing countries. UNCHS (Habitat), Nairobi, 1985. p.6., par.6

6/ The Construction Industry. Issues and Strategies in Developing Countries. The World Bank, Washington D.C., USA, February 1984, p.4

60 per cent of the total value of construction output.<sup>1/</sup> Out of the total construction demand, government accounts for 63 to 90 per cent of the demand.<sup>2/</sup> Within the demand structure each construction type, i.e. infrastructure or civil works, needs materials which are not identical and have their own demand, production and supply mechanisms.

In view of the difficulties in obtaining uniform information on the source of the demand in the countries surveyed, note was made of the areas where construction mainly took place. They are briefly mentioned as follows:<sup>2/</sup>

**Egypt:** roads, railroads, social services (education, health) tourism, commercial buildings and housing.

**Ethiopia:** education, health, transport and communication.

**Kenya:** housing and commercial buildings the construction of which increased by 140 per cent between 1976 and 1985 and has since sharply declined.

**India:** residential and non-residential buildings for which the demand registered an increase of 60 per cent between 1979 and 1985.

**Thailand:** the major increase was registered between the period 1977-1986: 250 per cent in tourist establishments; 33 per cent in health infrastructure; 15 per cent in education. Housing and commercial buildings on the other hand grew by only 10 per cent during the same period.

**Philippines:** between 1977 and 1983 housing and commercial building construction gained 40 per cent but slumped by almost 60 per cent in 1985. Construction activities have picked up since 1986.

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1/ Building Materials Industry, United Nations New York, 1969, ID/40/3, p.1

2/ Measures and actions to increase the production of indigenous building materials in the context of enhanced import substitution, by F. Moavenzadeh, ID/WG.425/3, August 1984, p. 11

3/ ID/WG.496/2 (SPEC.) op.ct., pp. 7. 8



#### 4. MAIN BUILDING MATERIALS PRODUCTION AND CONSUMPTION

The building materials needed for the construction industry in the countries surveyed can be identified through the general classification already mentioned; many of these materials are locally manufactured. A brief outline, however not uniform in terms of capacity, production and consumption, is summarized as follows:

##### 4.1. Cement

**Egypt:** the combined production capacity of all the operating plants is 13 millions t.p.a.; efforts are being made to upgrade the capacity to 16 million by 1991 through a rehabilitation and expansion programme and construction of new factories.<sup>10/</sup> The consumption since 1980/1981 to 1987/1988 increased by 88.2%; in 1987/1988 alone the consumption registered a component of 21.7% of import.<sup>11/</sup>

**Ethiopia:** the installed capacity of 3 operating plants is estimated at 440.000 t.p.a. Plans are being made to bring production capacity to 1.340.000 t.p.a. by 1993.<sup>12/</sup>

**Kenya:** two plants are currently operating. Consumption registered 691.000 tons in 1980 and 864.000 tons in 1987 thus an increase of 20%.<sup>13/</sup>

**Pakistan:** 15 plants with a production capacity of over 5.9 million t.p.a. belong to the public sector and 6 other plants with a capacity of almost 2.2 million tons operate in the private sector.<sup>14/</sup>

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<sup>10/</sup> ID/WG.496/2 (SPEC.) op.ct., p. 41

<sup>11/</sup> ID/WG.496/2 (SPEC.) op.ct., p. 10

<sup>12/</sup> ID/WG.496/2 (SPEC.) op.ct., p. 42

<sup>13/</sup> ID/WG.496/2 (SPEC.) op.ct., p. 42

<sup>14/</sup> ID/WG.496/2 (SPEC.) op.ct., p. 43

India: the cement industry has over 100 operating plants. India has pioneered in the design development and manufacture of vertical shaft kiln cement plants up to 300 t.p.d. capacity.<sup>15/</sup> In 1988/1989 the production is estimated to reach 44 million tons against an installed capacity of nearly 59 million tons; in 1981/1982 the production of cement was at 29 million t.p.a. with a total capacity of 21 millions.<sup>16/</sup>

Thailand: 3 major companies operating different plants have a capacity of 13 millions t.p.a. The current consumption is estimated to be over 11.4 million tons.<sup>17/</sup>

Philippines: the cement industry is composed of 18 plants; some of them were inoperative during the last 5 years or were operating irregularly. The installed capacity is at 7.5 million tons with an effective production at 5.5 million t.p.a.<sup>18/</sup>

#### 4.2. Cement-based products

This sector of the industry is widely dispersed between private and small-scale enterprises with a few large-scale public sector enterprises.

In Egypt, three large public sector companies are involved in the production of concrete pipes, concrete posts, concrete sleepers and concrete blocks. Several other small-scale enterprises are engaged in the manufacture of concrete blocks and bricks with locally made equipment.<sup>19/</sup>

In Ethiopia, 10 to 15 per cent of the total production of concrete blocks, and cement pipes and tiles are produced by the Cement Products Industry of the Ethiopian Construction Materials Corporation. Several municipalities have their own small plants for making hollow blocks. In addition, private contractors make their own concrete blocks on site.<sup>20/</sup>

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15, 18/ ID/WG.496/2 (SPEC.) op.ct., p.44

16/ ID/WG.496/2 (SPEC.) op.ct., p.85

17/ ID/WG.496/2 (SPEC.) op.ct., pp.16, 44

19/ ID/WG.496/2 (SPEC.) op.ct., p.45

20/ ID/WG.496/2 (SPEC.) op.ct. pp.45, 46

In Kenya, about 40 private sector small and medium enterprises produce cement-based products such as: concrete blocks, drain pipes, channels, fencing poles, concrete tiles, roofing tiles, etc.<sup>21/</sup>

In Tanzania, concrete blocks and fencing poles, roofing tiles are manufactured by several producers. Asbestos cement sheets are also produced at a rate of 50 per cent of the plant capacity.<sup>22/</sup>

In Pakistan, four major companies have the capacity to produce about 55.000 t.p.a. of asbestos cement pipes. Small private companies produce products such as blocks, fencing screen, roofing tiles, terrazzo, floor tiles.<sup>23/</sup>

In India, the major cement products are asbestos cement sheets and pipes, and reinforced concrete pipes. New products such as cellular concrete, doors and window frames are being introduced, however, with slow market response.<sup>24/</sup>

In Thailand, prefabrication appears to be the orientation for the cement-based building materials mainly precast concrete slabs, paving blocks, piles, poles.<sup>25/</sup>

In the Philippines, asbestos cement pipes, concrete blocks, concrete pipes are produced and supplied by a variety of small, medium and large companies.

#### 4.3. Sand and Gravel

The sand and gravel industry in all the countries considered in the study is widespread with a large number of small- and medium-scale contractors. Nevertheless, in Egypt, in addition to the small- and medium-scale sector, public sector companies produce crushed stone; in Ethiopia, the Ministry of Mines has a 200 ton per hour crushing plant.<sup>26/</sup> In India, efforts are being made to use industrial wastes such as cindered fly ash for aggregates. In the Philippines, sand, gravel and stone are being supplied through a large number of small and medium companies.

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21/-25/ ID/WG.496/2 (SPEC.) op.ct. p.46  
26/ ID/WG.496/2 (SPEC.) op.ct. p.47

#### 4.4. Lime

Lime is not known as an important building material in many countries covered by the study. In Egypt the public sector produces 92.500 t.p.a. and 150.000 m<sup>3</sup> of limestone blocks. Pakistan has experienced a drastic reduction in the use of lime in construction. In India, lime is produced at a small-scale level and used in several regions of the country. In Thailand, production is usually at the traditional small-scale cottage type of operation and the product is usually of poor quality. In the Philippines, there is no lime industry.<sup>27/</sup>

#### 4.5. Clay

Clay products constitute a traditional and extensive source for building materials of which bricks and tiles are the main products. In Egypt, bricks are mainly produced by 3 large-scale public enterprises which together have a capacity of over 183 million clay bricks as compared to 1400 small-scale private entrepreneurs with a total production capacity of 10 million bricks.<sup>28/</sup> In Ethiopia, the public sector has an installed capacity for producing 18 millions clay bricks.<sup>29/</sup> In India, clay products are the most commonly-used building material in both urban and rural areas. Clay bricks and tiles are produced by about 45.000 small-scale traditional enterprises in the country. The situation in the Philippines is somewhat different because clay products in general are not extensively used except for decorative purposes.<sup>30/</sup>

In Pakistan, burnt clay brick production rose from about 6 million to 11 million between 1979/1980 and 1987/88 with a forecast of over 13 million in 1990/1991. The industry still pursues largely traditional manual methods of production, and lack of quality control has allowed the sector to flourish without any particular improvement.<sup>31/</sup>

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27/ ID/WG.496/2 (SPEC.) op.ct., pp.47,48  
28/, 29/ ID/WG.496/2 (SPEC.) op.ct., p.48  
30/ ID/WG.496/2 (SPEC.) op.ct., p.49  
31/ ID/WG.496/2 (SPEC.) op.ct., pp.25, 49

#### 4.6. Ceramic tiles and sanitary ware

The Ethiopian Cement Corporation is currently setting up a ceramic plant to produce sanitary ware and tiles the production of which is estimated to reach in 1992 respectively 465 t.p.a. and 406.000 m<sup>2</sup>.<sup>32/</sup> In India, Thailand and the Philippines there are producers of high quality sanitary ware with export capabilities to the neighbouring countries.<sup>33/</sup>

#### 4.7. Iron and steel products

Iron and steel products are widely used in construction in all the countries surveyed. In Egypt, the demand forecast between 1978 and 1987 increased from 630.000 tons to 1.820.000 tons; in Ethiopia, there was an increase of 112% in the consumption of reinforcement bars between 1980 and 1986; in Tanzania, the production of steel rolled products decreased by 48.4% between 1980 and 1987, but between 1987 and 1988 the increase was 12.3%. In Kenya, local facilities are available for the production of galvanized steel products, wire rods, nails and rolled products. In Pakistan, consumption registered 688.000 tons in 1980/1981 and over 821.000 tons in 1985/1986. In the case of Thailand, consumption is expected to grow by 12% during the next few years; currently it is 1.4 million tons per year 30% of which is met through imports.<sup>34/</sup>

#### 4.8. Wood and wood products

In Ethiopia, the consumption of wood and wood products increased from 32.800m<sup>3</sup> to 120.200m<sup>3</sup> between 1977 and 1986.<sup>35/</sup> In Tanzania, the installed capacity for sawn timber is for 100.000m<sup>3</sup> but 79.000m<sup>3</sup> are delivered.<sup>36/</sup> Pakistan produced 290.000m<sup>3</sup> in 1985/86 but imported an amount of 215.000m<sup>3</sup>.<sup>37/</sup> In Thailand, timber is used predominantly as a building material in the rural areas. In the Philippines there has been a decline in the local production in recent years; production registered 261.000m<sup>3</sup> in 1977 and 241.000m<sup>3</sup> in 1985 but will rise to 258.000m<sup>3</sup> by 1992.<sup>38/</sup>

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32/ ID/WG.496/2 (SPEC.) op.ct., p.51

33/ ID/WG.496/2 (SPEC.) op.ct., p.27

34/ ID/WG.496/2 (SPEC.) op.ct., pp.28, 29, 30

35/ ID/WG.496/2 (SPEC.) op.ct., p.31

36/ 37/ ID/WG.496/2 (SPEC.) op.ct., p.33

38/ ID/WG.496/2 (SPEC.) op.ct., p.34

#### 4.9 Other products

The thermoplastic industry has successfully gained acceptance in the countries surveyed. A wide range of products is locally manufactured i.e. drainage pipes, screens, sanitary pipes and fittings, electrical conduits, junction boxes, water storage tanks, insulation, sealants etc. Kenya has an installed production capacity of 350.000 m<sup>2</sup> for vinyl asbestos tiles; actual production is only at 185.000 m<sup>2</sup>. The demand for PVC pipes in Ethiopia is projected for 1994 at 495 tons whereas the production in 1984 was at 119 tons.<sup>39/</sup> In India it is estimated that the consumption of synthetic resins stood at 700.000 tons annually of which about half is imported and 20% of the plastics production is used in the building and construction industry.<sup>40/</sup>

Use of paints in Ethiopia doubled from 1980 to 1985 respectively from approximately one to two million litres. In Kenya there is consumption and demand for 9 million litres<sup>41/</sup>; the production is distributed among 14 manufacturers. In Pakistan, the projection for 1992-93 in terms of consumption is estimated at over 22 million litres.<sup>42/</sup> In the Philippines, 29 companies produce a variety of paints and varnishes for local consumption; their combined capacity is reported to be about 50 million litres.<sup>43/</sup>

In the countries surveyed, with the exception of Ethiopia, Kenya and Tanzania, sheet glass is being produced for local consumption. The installed capacity in Egypt and Pakistan indicates respectively 37.000 tons and over 100.000 tons.<sup>44/</sup> In the Philippines a new plant is scheduled to produce about 100.000 t.p.a. in 1991; the operations of an aging plant which currently produces 90.000 t.p.a. will be phased out.<sup>45/</sup>

Some materials with indigenous character i.e. thatch roofing materials, bamboo, straw board, coconut lumber, laterites are produced by the small-scale informal sector but no detailed information was available to assess

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<sup>39/</sup> ID/WG.496/2 (SPEC.) op.ct., p.35

<sup>40/</sup> ID/WG.496/2 (SPEC.) op.ct., p.36

<sup>41/</sup> ID/WG.496/2 (SPEC.) op.ct., p.39

<sup>42/</sup> ID/WG.496/2 (SPEC.) op.ct., p.39

<sup>43/</sup> ID/WG.496/2 (SPEC.) op.ct., p.40

<sup>44/</sup> ID/WG.496/2 (SPEC.) op.ct., p.59

<sup>45/</sup> ID/WG.496/2 (SPEC.) op.ct., p.59

the demand or the consumption. It was also noted that factory-produced products had been introduced in the market i.e. vinyl tiles in Egypt, bitumen coated roofing felt in Kenya, marble slabs and tiles in Pakistan, gypsum board in Thailand.

#### **5. MAIN PROBLEMS CONFRONTED BY THE SECTOR**

Many problems related to production of building materials are common to most developing countries. High cost of fuel and energy, limited hard currency reserves for equipment and spare parts, lack of managerial skills, are among the areas of concern. Other basic problems of an institutional and organizational nature confronted by the industry are summarized as follows:

5.1 There is lack of strategies and policies regarding the development of the building materials industry. In addition, there is no particular institutional framework through which the sector could be promoted. The industry is increasingly oriented towards the production of materials for the "modern" type of construction. Consequently, it is not possible to adequately satisfy the housing needs of the population at affordable cost, particularly to low-income end users.

5.2 Production is on a parallel course between formal and informal sector with no complementary ties between them. The informal sector is marginalized by the conventional market due in some cases to quality of the products and in others to financial constraints. No particular assistance is given to enhancing the important role the informal sector could fulfill in the production of low-cost materials.

5.3 Governments and most private sector projects obtain their supply of building materials from large enterprises. Existing standards for production and regulations for utilization of building materials are mainly designed for the modern construction sector. Current codes and standards have no proper flexibility that would allow low-cost building materials of the small-scale

sector to be used by professionals and contractors. Too often the small entrepreneur is faced with a framework of concepts, procedures and policies which have proven useful for the large-scale undertakings.<sup>46/</sup>

5.4. In many cases public and private enterprises of the formal sector share the market and compete with each other; both are provided with costly imported equipment which needs maintenance and repair. Imports of spare parts and raw materials generate further depletion of hard currency reserves. The dependency on imports is also due to the lack of appropriate measures to utilize local resources more rationally and develop indigenous technological capabilities.

5.5. Underutilization of installed production capacity may be attributed to, among others, limited capacity of the local market, poor maintenance of the machinery and equipment of the production units, and inappropriate technology based mainly on mass production. A rehabilitation programme would compensate for the losses due to unutilized plant capacities and widen the production of new products and materials to be used for construction of low-cost housing. Research should be encouraged in the selection of appropriate alternatives or improvement of materials for the main components of a low-cost dwelling i.e. wallings, roofings and bindings.

5.6. The transfer of technology constitutes a key element in the process of development and production of building materials. In most cases the transfer is conceived by the recipient country simply as a supply of machinery, spare parts and equipment from a developed country. Between developing countries the transfer of technology has not yet materialized to the extent of creating an impact on the promotion of building materials in particular on the low-cost sector. In order for the transfer to be beneficial, the choice of the

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<sup>46/</sup> Sources: Small-scale industry promotion in developing countries. Editors: N. Molenaar, M.S.S. El-Namaki, M.P. Van Dijk, Research Institute for Management Service. Readings from a conference on small-scale industry problems and prospects in developing countries, Delft, 19-20 September 1983; Policies for financing of small industries, by J. de la Rive Box, chapter 12, p. 134.



source and the scale of the technology should be identified. The types of building material should be selected and their production consistent with the technical capabilities and the local absorbing capacity of the country. The effectiveness of the transferred technology must be consolidated by a package of measures to be implemented such as: information exchanges, extension services, demonstration projects, financial assistance and long-term institutional support.\*

## **6. FINAL CONSIDERATIONS**

In the light of these key problems, concrete conclusions and recommendations for viable solutions to the main identified problems should be formulated. The meeting is invited to consider the following:

### **6.1. Selection of priorities**

Due to the segmentation of the building materials industry resulting from a variety of materials which require different raw materials and production systems it would be impractical to face all the problems of the industry at the same time. What should be the set of production priorities to develop this industry in a coherent manner, particularly in the use of local resources as substitutes for imports?

### **6.2. Policies and measures to meet social needs**

An integrated approach for the development of this industry at the national and regional levels may provide the necessary basis for the solution of the main problems identified following the selection of the priorities. What would be the most suitable policies and measures that would lead to a concrete integration of the sector within a general development framework mainly from the perspective of producing low-cost building materials?

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\* The above subject on technologies and standards is fully developed by Habitat in document ID/WG. 491/1 (SPEC) op. ct.

### 6.3. Institutional mechanisms

It is only recently that the deplorable living conditions of the vast majority of the people living in urban slums and rural areas have attracted the attention of governments in the developing countries. Being primarily responsible for most construction activities it would be appropriate for governments to consider the promotion of the building materials industry through an institutional context. In this framework what would be the appropriate institutional mechanisms that could assist the industry in a more balanced development so that alternative and cheaper materials could be produced at more affordable costs?

### 6.4. Entrepreneurship development

The small-scale productive sector offers many advantages as opposed to the capital-intensive conventional plants. Among the advantages, particular relevance should be given to the flexibility in locating the small production units near the source of raw materials, low installation and energy costs and the availability of the labour-intensive work force. Another advantage is the possibility of locating these units in the rural areas where low-cost houses are required. Based on these considerations a coherent programme of development for the small-scale producers should focus on a package of support such as access to credit institutions; training seminars for improving quality of products, management, cost control, marketing and technical assistance. In this context how could an integrated programme of development for the building materials sector benefit the small-scale entrepreneurs and which channels would be necessary to implement measures with a view to assisting the small producers in upgrading the quality of production and developing their entrepreneurship capabilities?

### 6.5 Transfer of technology

Appropriate technology and standards, quality control and building codes are among the relevant areas to be incorporated into a programme of promotion for wider adoption of low-cost building materials. What criteria and viable measures would be required for the transfer of technology and standards between developing countries taking into account the choice and scale of technology, the conditions in the recipient country and the type of material(s) to be promoted?

#### **6.6. Programme of co-operation**

A programme of co-operation between countries of the same region in Africa and Asia or between Africa and Asia could concentrate on common complementary areas to be identified, i.e. exchange of information on raw materials and applicable methods of production and utilization of building materials; technical co-operation between institutions in charge of research and development; training, maintenance, production complementarity. In this respect what would be the mechanisms and the instruments that would permit concrete implementation of the different possibilities of co-operation between the countries within the same region either in Africa or Asia or between Africa and Asia and, how should such co-operation be encouraged?

#### **6.7 Other considerations**

A plan of action should be developed on the basis of the main aspects pointed out. The following points could also be taken into account:

- (i) Proposal of regional and interregional mechanisms to monitor and co-ordinate follow-up action of the meeting as well as of the planned consultation.
- (ii) Demonstration projects for appropriate use of technologies involving groups of recipient countries either in Africa or Asia;
- (iii) Identification of projects for technical assistance and investment either at regional or interregional level;
- (iv) Co-ordination between research institutions of the different countries in the African and Asian regions.

#### **6.8 Issues for the Second Consultation**

Based on the conclusions drawn by the meeting the experts are invited to select and propose the basic issues to be developed by UNIDO and HABITAT for the Second Consultation scheduled for 1990.