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Central America *

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Discussion Paper

CONSIDERATIONS FOR PROMOTION AND REGIONAL CO-OPERATION
IN THE BUILDING MATERIALS INDUSTRY IN CENTRAL AMERICA **

Prepared by the UNIDO Secretariat

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1. INTRODUCTION

The First Consultation on the Building Materials Industry held in Athens, Greece, in 1985 discussed three issues in connection with the production of building materials in developing countries in general. The 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.

Based on the recommendations of the Consultation it was felt that improvement in the building materials industry could be achieved through measures to restructure this industry which is currently operating, with no particular guidance in several cases.

By providing a coherent infrastructural basis that could promote this industry, also the existing linkages between raw materials, production, supply, transportation and construction could be reinforced at the national level and widened on a regional scale. Such an undertaking would create more employment opportunities and human resources development as well as provide better conditions for a dynamic integration of the building materials and construction industry in the development process of the countries in the region.

Based on the regional study commissioned by UNIDO,^{1/} covering Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua, the purpose of this meeting is to analyse the conditions in Central America with the view to

^{1/} Materiales de Construcción en Central América, by Mauro Aníbal Mejía Aragón, Consultant, Guatemala, Julio 1988.

formulating action-oriented measures necessary to organize the industry in a more productive way through regional co-operation, placing special emphasis on the low-cost housing sector.

This meeting is also part of the preparatory work for the Second Consultation on the Building Materials Industry to be held during the biennium 1990-1991.

2. THE BUILDING MATERIALS INDUSTRY IN THE REGION

Considering the potential contribution to social and economic development, the building materials industry in Central America can be evaluated from different points.

As regards production, the industry gives rise to important activities at both formal and informal levels. To some extent the linkages with other sectors and subsectors i.e. finance, engineering, transportation, commerce are also of relevance.

For the countries under consideration in the region, it was estimated that building materials represent 30 percent of the production of the entire manufacturing industrial sector.

Materials needed by the construction industry, unfortunately, create an outflow of foreign exchange due to the fact that either they are imported or, if manufactured locally, a large amount of the raw materials are imported, as is the case for polyvinylchloride (PVC), iron and steel, electrical construction materials, aluminium products and finished materials, and to a larger extent, some equipment, spare parts and fuel. All plate glass is imported.

In the early 1980s, the economic crisis in the region had serious repercussions on the construction programmes. Imports of materials in 1980 were estimated at slightly over 300 million pesos in Central American currency. In 1984 the imports decreased to 192.6 million. A slight increase was registered in 1985 with respect to the previous year when figures rose to 203.6 million pesos in Central American currency.*

*Source: Materiales de Construcción en Centroamérica, Op.Cit.

In terms of authorized floor surface for new buildings to be built, the trend is the following: In Costa Rica in 1985, 50.6 percent less than the authorized figure for 1981; in El Salvador in 1984, 32.5 percent less than in 1982; in Guatemala in 1984, 60 percent less than 1982; in Honduras in 1985, 29 percent lower than 1982, but only 1.4 percent lower than 1981; in Nicaragua for 1982 and 1984 the level is practically identical whereas the decline registered between 1982 and 1983 was of the order of 25 percent.

There is a noticeable trend towards smaller floor surfaces in new buildings as can be seen from the following table which indicates the surface of building construction in general as authorized in each country between 1980 and 1985:

NEW BUILDING CONSTRUCTION AUTHORIZED*
(All buildings: floor area $m^2 \times 10^3$)

<u>COUNTRY</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
COSTA RICA	3.291	1.854	875	792	1.100	938
EL SALVADOR	425.4	504.3	706.6	588.3	229.6	433
GUATEMALA	228.2	301.9	377.7	343.5	227.5	433
HONDURAS	304.6	260.8	332	198	257.1	236
NICARAGUA	19.6	54.7	62.5	47.1	62.8	-

The construction industry is divided between the formal sector mainly in charge of Government and large private projects and the informal sector which covers low-cost type of construction, namely housing.

In view of the foreseeable increase in the demand for low-cost dwellings the construction problem will be aggravated. The managerial and technical limitations of the informal sector and the lack of infrastructural framework call for urgent solutions for the housing sector of the construction industry.

*Source: United Nations, Construction Statistics Yearbook, 1985, New York 1988 Publication No. ST/ESA/STAT/SER.B/14. Department of International Economic and Social Affairs, Statistical Office (pp. 36, 55, 80, 82, 140).

3. DEMAND FOR BUILDING MATERIALS

The demand for materials is characterized by the types and sizes of construction project and the type of technology required for their realization.

Both Governments and the private sector have an influential part in the construction process considering that 70 per cent of building activities are devoted to housing and 30 per cent to infrastructural construction projects in the developing countries.^{2/}

Governments play a major role both as sponsor and client in all large infrastructural undertakings such as:

- Highways, bridges, urban and rural roads
- Dams and irrigation
- Sanitation
- Power stations and electrification lines
- Public schools, hospitals, public markets etc.

A significant part of the demand for building materials comes from the private sector. The modern type of construction is generally the choice of a limited section of the population who, because of easy access to investment possibilities, are able to finance large-scale housing, offices and commercial centres with the scope of investing and generating profits.

At the lower scale of the private sector, the demand for materials, particularly the low-cost type, is for the semi-urban and rural areas where the informal sector plays an important role in construction activities.

^{2/} United Nations, Monographs on Appropriate Industrial Technology No. 12, "Appropriate Industrial Technology for Construction and Building Materials", 1980, p. 4.

4. MAIN BUILDING MATERIALS PRODUCED IN THE REGION AND INDUSTRY PROFILE

The materials locally processed for which no imports of raw materials are necessary are: sand and gravel, lime, clay and clay products, cement derivatives, wood and wood products. In the case of fibrocement, iron and steel, aluminium products and thermoplastics, imports of raw materials are required for the manufacturing process.*

The production and supply of these materials were seriously affected by the economic crisis of 1980-1985 during which construction activities have declined. However, in 1986 the construction industry began to regenerate a demand for materials.

The characteristics of the industry are briefly described as follows:**

4.1. Cement

Cement is one of the most important building materials in the region.

The installed capacity of production varies from 795 tons per day in Nicaragua, to Honduras 1535 to 2.740 in Costa Rica. The percentage level of utilization indicates 58 per cent in Costa Rica, 100 per cent in both Honduras and Nicaragua and 95 per cent in Guatemala and El Salvador.

During 1988 Honduras will expand its current installed capacity by approximately 1400 tons per day with the possibility of creating a surplus capacity. Guatemala is also considering increasing its capacity, however, in a long-term strategy.

Because of the tendency of individual Governments to fix their own cement prices, producers of this commodity are having to face reduced profits. Costs to the consumer do not show the same trend in various countries. For example, in Guatemala between 1979 and 1988 the cost of cement increased by 317 percent from 2.05 Quetzals to 6.50 Quetzals. In El Salvador and Costa Rica where the prices were fixed in March 1986 there was a drop of 11.1 percent per sack of 42.5 kg.

*All plate glass for windows, doors and partitioning is imported.

**Source: Materiales de Construcción en Centroamérica. Op.Cit.

Attempts to export to the Caribbean mainly by Honduras and Costa Rica were not successful. The cement was exported at \$45 per ton whereas the domestic price was respectively 30 percent and 15 percent higher in these two countries.

Most of the companies have national private capital but in some cases the Government is a shareholder. In Nicaragua and Honduras the cement companies are Government-owned. No particular financial problem seems to affect the sector, but in Honduras and Nicaragua scarce foreign exchange makes it difficult to import the paper bags.

In the case where two firms are operating in one country i.e. Costa Rica, El Salvador and Honduras the market is divided geographically to avoid competition and to reduce transportation costs.

Considering the technical aspects in production of cement, both Guatemala and Costa Rica base their entire production on the dry process. Honduras and El Salvador have a combined system of production whereas in Nicaragua the wet process is used.

Finally, the input of raw materials in the production technic i.e. calcareous stone, iron oxides and gypsum are all locally available except in El Salvador which has to import both iron oxyde and gypsum from Guatemala.

Currently, there are 8 cement plants operating in the region each with an average of 450 employees (of which 80-85 per cent are workers, 15-20 percent staff and 2 percent technical personnel).

4.2. Sand and Gravel

These two materials are used in most construction undertakings. Large firms produce properly washed and selected sizes of gravel according to the demand. The plants have a high percentage of imported equipment for which transport, maintenance and costs of spare parts and fuel have their bearing on operational costs. Investment in raw materials is relatively low in view of the local availability from river beds.

Both formal and informal sectors are found in the region, the former having a higher number of production units.

During the period 1984-1988 the cost index rose from 1.3383 to 3.000 for sand. For gravel during the same period the index registered a rise from 1.1955 to 3.188. In both cases the base index 1.00 was related to 1979.

It has not been possible to estimate the level of production of these two products mainly due to lack of surveys on this subsector. Most of the production units belong to the informal sector and are family-owned small enterprises. Access to credit institutions for expansion or new equipment is very difficult to obtain.

The workforce of a plant varies. Most of those from the informal sector have less than 20 employees and few plants employ more than 40 people.

Between 85 to 90 percent of the employees in the formal sector are unskilled workers, 5 to 8 percent are in the administration. The technical staff is less than 1 percent of the total.

4.3. Lime industry

Lime is mainly used as a binder in mortar and is particularly associated with housing projects. It is also used for whitewashing walls.

The better equipped formal sector produces hydrated lime whereas the informal sector is only equipped for the production of quicklime which is a less pure product.

One hundred per cent of the calcareous raw materials is locally available and used in the production process. Imported fuel and electricity account respectively for 18 to 25 percent and 15 to 20 percent of estimated costs.

Large firms have a capacity of more than 40.000 tonnes per year, but the equipment is out of date and needs to be replaced. Thus the situation hampers smooth production and supply. Consequently, the cost of lime is seldom higher than that for cement.

Contrary to the cement industry prices are not determined by Governments, but by the plant itself. The entrepreneurs have a more flexible margin for profits.

The cost index has progressed during the last ten years as follows, from 1.60 in 1980 to 4.50 in 1988, the base index being 1.0 in 1979.

The capital invested in the industry is basically domestic. Besides, the firms are mainly the family-type of ownership. Return on investment in most cases is low.

Employment can reach 120 to 250 persons per plant in the formal sector in which case the work force has the following profile: 79 percent manual workers, 20 percent administrative employees and one percent of technical staff.

4.4. Clay products industry

Mainly 3 types of products are produced by this industry: the tubular bricks, the solid bricks and the roofing tiles.

Firms specializing in tubular brick are to some extent mechanized. The production of solid bricks is mainly done by the informal sector. Clay products are manufactured by both the formal and the informal sector, the former being equipped with mechanized equipment.

The large firms of the formal sector expend between 20 and 30 percent of their cost structure on fuel and electricity, whereas the informal sector uses firewood for the production process.

There are no particular data on installed capacity of all the production units in Central America. There are, however, 10 or 12 large enterprises operating in the area. A large firm can have an annual production capacity in the order of 50 million bricks, but currently the effective production is estimated to be less than half this amount. At the level of the informal sector there is a capacity to make 3 million bricks per year, but also here the real production is below the installed capacity.

Most of the firms are family enterprises operating with domestic capital. Marketing is made at the plant, products are sold on a cash-basis and transport is organized by the clients.

4.5. Cement derivative industry

The products manufactured by this sector are mainly blocks (15x20x40 cm and 20x20x40 cm in size) for walls, paving slabs and in some cases concrete. Blocks are the most commonly used building materials in the region.

In most instances the equipment used is locally made, but it is sometimes imported from Mexico. The capital investment is also local.

The raw materials i.e. cement, sand, gravel, pumice stone are all locally available.

The production capacity in the entire region has not been evaluated, but it is believed that as for other products, the firms in many countries are working below capacity.

There are a few fully mechanized enterprises in Central America. The employment level in a large production unit of the formal sector can be over 40 employees of which 85 percent are labourers, 14 percent administrative staff and one percent technical personnel. In production units equipped with a high level of mechanization the workforce is reduced. In the informal sector the production units have less than 10 workers.

4.6. Fibrocement industry

This industry has become quite important in the region, due to the fact that the materials provided on the market have replaced the traditional roofing clay tiles and corrugated zinc sheets. However, in Costa Rica, fibrocement products have not yet been generally accepted.

The technology comes basically from the main supplier, Eternit, in Switzerland. Joint efforts are being made locally with this firm in the research for new products. In fact, in El Salvador a cheaper and smaller sheeting has been well accepted in the rural areas.

Raw materials i.e. asbestos and paper pulp are imported. Cardboard and cement wastes are locally available with the exception of El Salvador which imports cardboard from Guatemala.

Imports of raw materials range between 30 and 34 percent and the local ones account between 4 and 5 percent in the cost structure of production.

Not all the enterprises are financed by domestic capital. The firms in Costa Rica, El Salvador and Guatemala have mainly foreign capital, but in the case of Nicaragua the enterprise is State-owned. In general, the firms have no special financial problems.

The current annual production capacity is around 2 million m² in any one country in the area. Employment at a large plant is of the order of 300 to 400 people of whom 80 percent are workers, 15 percent administrative personnel and 5 percent technical staff.

About 50 percent of the finished product is marketed through small-scale distributors; the rest of the production is sold directly from the plant and transport is provided by either private firms or intermediaries.

4.7. Sanitary equipment and tile industry

The sanitary equipment and the glazed tiles are two different lines of production of this industry. The sanitary equipment is characterized by high investment with 50 percent of the capital owned by transnationals. The installed capacity for the sanitary equipment industry varies from 8.000 to 10.000 units annually. The tile industry is more modest in terms of investment, size and manpower.

The sanitary equipment industry basically uses technology imported from the United States. 75 percent of raw materials are locally available and 25 percent are imported from the United States. Raw materials namely enamel and kaolin are not locally obtainable.

A large firm in the Central American region specializing in sanitary equipment would employ between 200 and 300 people, 85 percent of which are labourers, 12 percent administrative staff and 3 percent technical personnel. The more modest glazed tile sector employs a minimum of 40 workers.

In Guatemala, about 60 percent of the production is exported to the neighbouring countries whereas 40 percent is marketed locally. No data were available in connection with imports or exports of these items from the other countries in the region.

4.8. Iron and iron derivatives industry

Iron and its derivatives are used in the region primarily for the construction of buildings and infrastructural works.

The principal raw material, billet, is imported. Its cost has risen sharply during recent months from US\$210 per ton in January 1988 to US\$275 in May of the same year. The imported component is between 15 to 20 percent of the production cost structure.

No detailed installed capacities are available for all the countries in the area. However, in the case of Guatemala the annual capacity of production is estimated at 385.000 tons, but the effective level of output is 60 percent or 219.000 tons. In El Salvador, the capacity is estimated at 300.000 tons with a production level of 66 percent.

The iron industry which is financed predominantly with domestic capital has wholesale distributors who provide transportation to the consumers. Smaller firms sell directly from the plant.

4.9. Aluminium Industry

Demand for aluminium products dropped sharply during the crisis of 1980-1985. Since 1986 the situation has improved and it is now estimated that the plants are operating at 40 percent of capacity. However, in many cases out-dated North American technology is used.*

The raw materials in the form of billets or cylinder of aluminium are imported and cost between 40 to 55 percent of production cost. Costs of electricity which account for approximately 10 percent of production costs are the second highest figure in the cost structure.

The cost index over the last five years for profiled aluminium has increased from 2.66 in 1984 to 4.89 in 1988 or 54.4 percent, the index for 1982 being 1.00.

4.10. Wood industry

Honduras and Guatemala are the main producers of sawn wood. Government institutions in charge of forestry control are INAFOR (Instituto Forestal) in Guatemala and COHDEFOR (Corporacion Hondureña de Desarrollo Forestal) which also control the production of wood. In these two countries the installed capacities are estimated to be respectively 450 million and 500 million of pies tableros, but effective production level in both cases ranges between 30 to 60 percent.

Plywood is very common in the above two countries with about 85 percent of small businesses from family-type enterprises. Data on production of plywood for the overall region are not obtainable. In Honduras the installed capacity is estimated at 720.000 sheets per year. Real output is, however, 33 percent of the full capacity.

* The installed capacity in Guatemala is estimated to be over 6.000 kg with an effective production of 2.400 kg annually.

There is practically no institutional control in the industry, resulting in major supply problems, especially in Nicaragua and Costa Rica. El Salvador imports its timber from Honduras and Guatemala.

The timber to be processed is obtained locally. However, for the fabrication of particle boards, synthetics are imported from Germany and Italy.

The equipment used in sawn wood plants is very outdated and the workers are mostly non-skilled. The plywood and the particle board sectors have more modern machinery imported from Asia. Employment level is between 30 and 150 persons of which over 90 percent do not have specific qualifications.

Seventy-four per cent of the capital invested in plywood enterprises is from private domestic funds with 26 percent participation from the Government. Resources for expansion are difficult to obtain from credit institutions.

4.11. Thermoplastic industry

Extensive use of thermoplastic products is made in the construction industry. Galvanized piping, copper and cast-iron pipes are being replaced by polyvinylchloride (PVC) piping. The use of PVC is also extended to sewerage, drainage and electrical installations. All raw materials (PVC) and resins are imported from outside the region, and are estimated to account for between 38 and 43 percent of the production costs.

A factory employs between 125 and 150 persons of which 81.5 percent are workers, 11.5 percent administrative staff and 7 percent technical staff.

5. MAIN PROBLEMS FACING THE BUILDING MATERIALS INDUSTRY IN THE REGION

Among the problems common to all the countries in the region hindering the productivity of the industry, are lack of skilled manpower, poor managerial skills of the small enterprises, know-how, inadequate and/or outdated equipment, and quality control. However, consideration should be given to the following points, which encompass the major issues confronted by the industry as a whole at regional, national and local levels.

5.1. The building materials industry in Central America appears to be well oriented towards manufacturing a choice of materials suited to the local needs and consumption of the modern sector. The production of these materials is basically due to the entrepreneurship of the owner of the better equipped large plants. But on the one hand relevant outflow of foreign exchanges is resulting from the imports of raw materials, equipment, machinery and fuel that are required for manufacturing these basic products. However, the industry as a whole has never received proper attention or guidance through an adequate institutional framework. Its participation in a national or regional development plan has never been the subject of any particular study.

Prospects for expansion, modernization or integration in a national economic plan are not promising if no appropriate measures are taken to provide this sector with a coherent infrastructural basis that could ensure a more beneficial contribution to the economic development of the region.

5.2. The conventionally large industries of the formal sector and the smaller enterprises of the informal sector have a similar course of development. The formal and the informal sector do not necessarily depend on each other.

Government projects are usually supplied by large enterprises of the formal sector. The informal enterprises are not in a position to provide acceptable products to the conventional modern market and, therefore, concentrate on marginal construction activities, mainly on the neglected housing sector. The economy would improve if proper strategies and policy measures were developed and enforced with the objective of integrating the informal sector with the formal sector.

Special programmes would be required for training and upgrading quality and production to enable the informal sector to contribute more productively to the economy.

5.3. Low level of the production capacity is common in almost all the enterprises due to the inability of the market to absorb the full capacity. Production would increase if appropriate steps were taken to widen the line of products that the lower income group of customers nationwide could afford. The alternative products should be compatible with reasonable cost and safety regulations.

Under-utilization of the plants is also due to (a) the lack of appropriate technology, (b) poor co-ordination of production that could otherwise have regional dimensions in view of the potential demand for a large market and; (c) inaccessibility to foreign exchange.

5.4. The low-cost housing would greatly benefit from the above measures. Cheaper, locally-produced materials would step up the need for better research and development strategies based on the exploitation of locally available raw materials and resources. In this respect, relevant Government institutions should establish policy priorities for the low-cost housing sector. Adequate support should be extended to professionals, universities, and producers.

5.5. Governments and the private sector should join their efforts in setting up a common strategy aimed at promoting a self-reliance policy within the possibilities of each country and in the frame of coherent development at the regional level. The policy should be instrumental in increasing the capacity of the building materials industry at both national and regional levels so as to reduce its dependency on imports. In addition this policy should encourage co-operation and exchange of technical assistance, research and trade in areas complementary to the countries of the region.

6. FINAL CONSIDERATIONS

Combined with the construction sector, the building materials industry with its diversity of products, minimally processed or manufactured, provides one of the basic needs of the population that is housing. In addition, linkages are created with other economic activities as well as employment to skilled and unskilled labourers, managers, professionals and entrepreneurs.

Nevertheless, the development of the industry in the Central American region is hampered by the following aspects at regional, national and local levels:

- (a) The dependency on imports of raw materials and equipment that require substantial amounts of foreign exchange;
- (b) The low level of current production capacity;
- (c) The lack of development strategies;
- (d) The absence of an infrastructural basis that could be beneficial to both the formal and the informal sector;
- (e) The lack of an institutional framework and promotional policy in the housing sector.

In the light of these problems the meeting is invited to concentrate the discussions on the following:

- 6.1. Identification of possible solutions to the problems identified above.
- 6.2. Priority areas of production to be identified that could be promoted at national and regional levels.
- 6.3. Framework of regional co-operation in the field of commercial relations, specialization and possible joint productions.

- 6.4. A plan of action with the objective of achieving coherent development at national and regional levels which should consider:
- 6.4.1. The definition and the co-ordination of the demand for main building materials.
 - 6.4.2. Policies needed for trade, technology, financing and investment.
 - 6.4.3. A programme of co-operation among Government representatives, producers, and professionals.
 - 6.4.4. The identification of programmes of technical assistance and projects.
 - 6.4.5. The definition of an appropriate institutional framework that could help in the process of achieving the targeted objective.
- 6.5. In the context of the situation in the Central American region the meeting is also invited to identify possible issues to be discussed at the Second Consultation on Building Materials planned for.