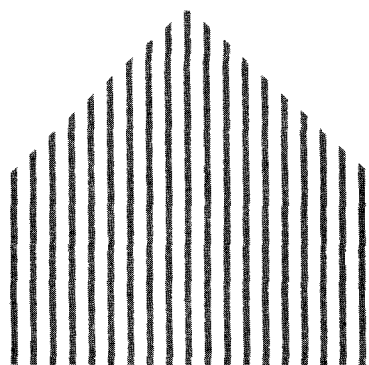
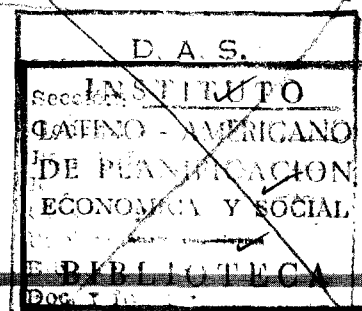


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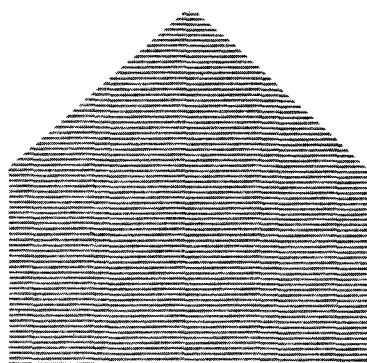
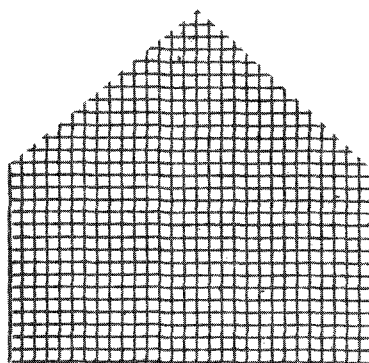
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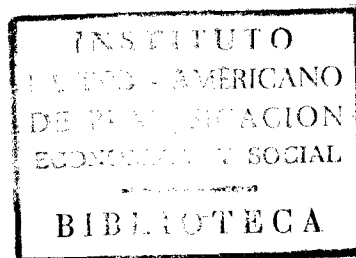


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Housing and Building Materials Industry



Central American Economic Integration Programme

**PREPARED BY THE SECRETARIAT OF THE ECONOMIC COMMISSION
FOR LATIN AMERICA (ECLA) AND THE BUREAU OF SOCIAL AFFAIRS**

UNITED NATIONS ■ NEW YORK, 1960

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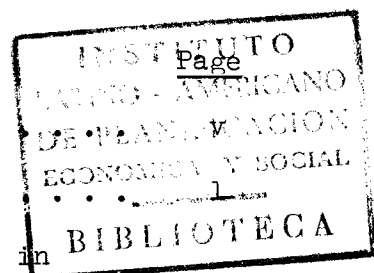
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* Translator's note. Wooden framework filled with mud and straw and reinforced laterally with strips of bamboo or cane.



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FOREWORD

The Housing, Building and Planning Sub-Committee established in June 1958 by the Economic Co-operation Committee of the Organization of Central American States adopted, at its first meeting held at San José, Costa Rica, in October of the same year, a work programme which included the following items: preparation of a Central American inventory of industries producing building materials, indicating their productive capacity and the main characteristics of the material produced; a study of the demand for building materials and of the industries' present capacity to meet that demand; a report on suitable measures for the standardization of the principal Central American building materials; comparative studies of the cost of building public housing, and the annual submission of such data.

The present report - the first submitted by the Housing, Building and Planning Sub-Committee - was prepared by the Secretariat of the United Nations Economic Commission for Latin America (ECLA) and the Housing, Building and Planning Branch, Bureau of Social Affairs, United Nations Secretariat. It deals with some of the items of this programme, in such preliminary manner as the statistical and other data available permit.

It is to be regarded only as a first step, which will enable future assessment to be made of the progress achieved in building and the building materials industries, within the framework of the Central American Economic Integration Programme.

I. Introduction

One of the gravest problems facing the Latin American countries is that of housing, and especially of housing for families with limited resources, which constitute the overwhelming majority of the population. The countries of the region have paid increasing attention to this problem, and have intensified their efforts to expand their various programmes. They are also engaged in developing their natural resources and economic infrastructure, a task which is vital to any general improvement. These combined activities are reflected in many public works and construction projects of all types, which require adequate development of the building and building materials industries if the dislocation attendant upon a demand for building materials in excess of the local supply, and upon the increased need for imports where materials are of foreign origin, is to be avoided.

That the building materials industries should be developed and improved is therefore essential, not only for any reduction in the cost of house-building, but for the execution of programmes requiring large-scale capital investment, as in the spheres of agriculture, industry, transport and electrification in the developing countries. There is therefore a vital need for these countries to increase the capacity and productivity of their building and building materials industries, since these industries absorb a proportion of investment funds greater than that employed by any other single branch of production. Furthermore, they constitute, in themselves, a very important sector of a country's industrialization, by reason of their contribution to capital formation and employment opportunities and their indirect effect on many other industries, such as those involved in the production of furniture, textiles and domestic appliances, which are complementary to the building industry.

The methods and programmes adopted by the region's countries to overcome the housing problem clearly show the urgent need of reducing the margin between construction costs and the paying capacity of families in need of accommodation. This concern to make housing available to low-income families, within the compass of the State's limited financial resources, points in its turn to the need for special assistance for the purpose of improving and increasing the productivity of the building and building materials industries.

Considering the progress made in other fields, building has so far been one of the most backward industries. While mass production permits of a reduction in the cost of a host of industrial products, the methods mainly used in the building

industry are still rudimentary; they have undergone no important change for many years, and clearly reveal poor utilization of labour, waste, and general inefficiency. The advances made by the building industries of the industrialized countries have not been applied by the developing countries with the same speed and interest as in other branches of industry, despite the fact that in Latin America, for example, large sums are invested in building, by comparison with other activities.^{1/}

Mechanization of the building materials industry is progressing slowly, prefabrication (particularly the prefabrication of building units) is on a small scale, and the use of machinery to accelerate the building process is also limited. With these drawbacks and the lack of skilled labour, productivity in the building industry is not increasing so as to balance, or at least partially to offset, the continuous rise in the cost of materials and manpower. This rise, caused by inflationary pressures, by building programmes not properly adjusted to the production of materials, and by inadequate financing methods, widens the gap, in housing, between the capacity to pay and the cost of building, besides hampering the development of public works and construction in general.

Under mass production methods, parts are assembled in specialized plants and factories. In building, however, it is necessary in each case to transport all the parts and assemble them on various sites and in different ways, according to the architect's design and the owner's desire. As a partial solution of this problem, some countries have adopted standard designs for certain types of buildings such as schools, barracks, single and multiple dwellings, commercial, and other buildings. Examples of the use of such standard plans are to be found in the United States, the Scandinavian countries, the Soviet Union, Venezuela, etc. They have proved advantageous because of the speed with which the buildings can be erected and the savings accruing from the use of standard mass-produced units. In Latin America (except for Venezuela) little use has been made of this building method; and in Central America, where the possibility of repeating a single design in quantities sufficient to secure the above-mentioned benefits is limited, it appears essential to adopt standards for building materials, to standardize

^{1/} Between 1950 and 1956, rather more than half (53.3 per cent) of the gross fixed capital investment in Latin America went into building. Approximately \$4,000 million are invested annually in building of all types (ECIA, Economic Survey of Latin America, 1957).

certain units such as doors and windows and to adopt a common module for the various countries, so as to effect savings and to facilitate the exchange of building materials and building units.

In connexion with these problems, several Latin American countries have aimed at continuing their efforts with a view to establishing an inter-American financing system so as to increase the sums available for housing and, in particular, to expand the production of building materials and their interchange throughout the American continent. To this end, various meetings^{2/} were held, at which resolutions were adopted urging countries and international organizations to undertake the necessary studies for determining how the project could be carried out. The United Nations, under the Central American Economic Integration Programme, has taken account of the interest shown by Governments in the development of the building industry and has lent its support to the project through the Economic Commission for Latin America and the Bureau of Technical Assistance Operations of the United Nations Secretariat. The United Nations has also prepared studies on the financing of housing in the various regions of the world and has compiled a special study on Latin America^{3/} in order to make available to Governments information which may lead to the adoption of methods which have proved successful in other countries.

The present report attempts to review briefly the principal efforts made by the Central American countries under their economic integration programme and, particularly, the measures they have taken in connexion with the building and building materials industries. It also includes a study of the principal building materials and of the economic significance of housing programmes in Central America and Panama.

2/ Ninth Inter-American Conference, Bogotá, 1948; Tenth Inter-American Conference, Caracas, 1954; First Inter-American Technical Meeting on Housing and Planning, Bogotá, 1956; Inter-American Committee of Presidential Representatives, Washington, 1957; Economic Conference of the Organization of American States, Buenos Aires, 1957.

3/ Financing of Housing and Community Improvement Programmes, United Nations publication, Sales No.: 1957.IV.1.

Financing of Housing and Community Improvement Programmes in Latin America, United Nations, 1956 (TAA/IAT/7).

II. Housing and the building and building materials industries in the Central American Economic Integration Programme

Central America covers an area of 517,881 square kilometres (roughly 200,000 square miles) and consists of six republics whose total population was estimated in 1958 to be 11,200,000, distributed as follows:

| <u>Country</u> | <u>Population</u> |
|----------------|-------------------|
| Costa Rica | 1,072,000 |
| El Salvador | 2,434,000 |
| Guatemala | 3,530,000 |
| Honduras | 1,882,000 |
| Nicaragua | 1,370,000 |
| Panama | 995,000 |

The population of Central America is increasing at an annual rate of 3 per cent and, generally speaking, approximately 65 per cent of the inhabitants live in rural areas. The greatest increase in the urban population has occurred in Panama, where its annual rate of increase is 4.9 per cent. El Salvador comes next with a rate of 3.3 per cent.

The per capita income of the Central American countries was approximately \$220 in 1955. Panama, with \$350, had the highest figure, while Costa Rica came next with \$307. Honduras, with \$137, had the lowest figure. However, the distribution of income in Central America is very uneven, and it is estimated that between 85 and 90 per cent of the population have an annual per capita income of less than \$90.

1. The Economic Integration Programme

The main obstacle to these countries' economic development is the small size of their national markets and the low purchasing power of their populations. The Central American Governments therefore jointly decided to take certain measures to integrate their countries' economies for the purpose of accelerating their industrialization and improving the level of living. In 1951, at its fourth session, the Economic Commission for Latin America adopted a resolution submitted by the Governments of Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua, in which they expressed interest in integrating their economies and expanding their markets through:

- (a) The exchange of their products,
- (b) The co-ordination of their development plans, and
- (c) The establishment of enterprises in which all or some of the countries had an interest.

A committee of Ministers of Economic Affairs was set up to implement this programme, and was named the Central American Economic Co-operation Committee.

Since that time a series of studies have been made of tariffs and customs nomenclature, public administration, transport, electric power, industrial research, training of personnel and financing of development plans. Studies have likewise been made of certain specific industries such as the pulp and paper, plywood, cement, textile, building materials, livestock and dairy industries.

Steps have also been taken to meet the need for improving conditions in public administration and industry, for which purpose the Economic Co-operation Committee has established two institutions: the Advanced School of Public Administration, at San José, Costa Rica, and the Central American Research Institute for Industry, at Guatemala City.

Furthermore, owing to the increasing number of specialized subjects submitted for consideration by the Committee, the work has been divided among sub-committees and ad hoc groups. The following sub-committees are at present functioning: (1) the Statistical Co-ordination Sub-Committee; (2) the Trade Sub-Committee; (3) the Industrial Initiatives Commission; (4) the Housing, Building and Planning Sub-Committee. Ad hoc groups are dealing with (1) electrification and (2) land transport.

One of the first steps taken by the Committee was the preparation of a uniform customs nomenclature. A sub-committee organized for this purpose drew up, in collaboration with the Statistical Office of the United Nations and the Inter American Statistical Institute, a draft standard nomenclature and customs code based on the Standard International Trade Classification (SITC) recommended by the United Nations. Both the standard nomenclature and the customs code were approved by the Committee and are gradually being put into effect. They have also served as a model for other Latin American countries.

The next step taken was the preparation and discussion, at various meetings of the Committee, of a Multilateral Treaty on Free Trade designed to expand the Central American markets by permitting free trade in certain goods within the region. Subject to reservations on the part of certain countries, this Treaty was signed at Tegucigalpa at the fifth meeting of the Economic Co-operation

Committee (June 1958); its ratification by El Salvador, Nicaragua and Guatemala has permitted its entry into force. It was also considered desirable to promulgate, at the same time, a Régime for Central American Integration Industries, which defines the "integration industries" and establishes general principles governing their location, capitalization, powers, fiscal privileges and obligations. The Régime also provides for methods of supervision and control and for the possibility of establishing a Central American development fund.

A study is being made of the practicability of financing the new activities under the integration programme through private and/or public investment within the five countries and with the assistance of foreign capital. For this purpose, the central banks held three meetings at which consideration was given to measures for expanding the stock and share markets on a reciprocal basis, accumulating financial resources and making use of savings.

The Committee's programme provides for gradual and progressive integration and is thus, so far, limited in scope. It has not yet, however, been deemed desirable to establish a customs union or to unify fiscal, administrative or banking facilities and services. The aim has rather been to achieve some uniformity in approach, and in economic policy and legislation with regard to certain sectors of industry. From a strictly economic standpoint, integration has been contemplated on a very limited scale, special emphasis being placed on industry. This means, not that integration in the matter of livestock-raising and agriculture has been abandoned, but rather that there is a need to pay greater attention to the industrial sector, with a view to accelerating its development.

2. Housing, building and planning within the framework of the Integration Programme

In recent years the Governments of Central America have begun to recognize the importance of housing in economic and social development. Ambitious public housing projects have been undertaken with assistance from the State or its agencies, and considerable amounts of private capital have been invested in residential construction. In 1956, during the First Inter-American Technical Meeting on Housing and Planning, held at Bogotá, Colombia, the directors of the Central American housing agencies met with officials of the United Nations and of the Pan American Union to study steps which they might take in order to deal, at the Central American regional level, with common problems connected with housing, building and planning. To this end they agreed to hold a meeting in

Central America and to seek the assistance of the Economic Co-operation Committee. A mission composed of experts from the United Nations, the Economic Commission for Latin America (ECIA) and the Pan American Union visited Central America in 1957 in order to make preparations for this meeting and to carry out preliminary surveys of housing and of the building and building materials industries. In connexion with these problems, the mission concluded that the combined activities of the building and building materials industries constituted a substantial proportion of the economic activity of any region, and the building materials survey carried out by ECIA indicated that the market for such materials was extremely active and was expanding at an increasing pace.

In 1957, at its fourth meeting, the Economic Co-operation Committee decided to call together the representatives of official and semi-official agencies and of private industry in order to study the problem of housing, the building and building materials industries, and planning, within the framework of the Integration Programme. The main topics to be discussed were: the role of housing in economic and social development, the possibility of expanding the building and building materials industries, the possibility of developing a common market for those materials, and the problems of physical planning in Central America.

The meeting, held in November 1957, was attended by eighty delegates and arrived at several important conclusions.^{4/} These included recognition: (1) of the need to establish Central American standards for certain building materials; (2) of the desirability of establishing, in countries where they do not exist, agencies responsible for the preparation and execution of housing, building and planning programmes; and of the need for the regional co-ordination of their activities; (3) of the need for a continuous exchange of information on building materials produced in Central America, with a view to promoting trade in such materials - several measures being recommended, including, in particular, the holding of periodic exhibitions of building materials produced in Central America; (4) of the lack of full and accurate statistical data on the building industry, and of the need to take measures to remedy that deficiency; (5) of the need to take measures to promote the development of the building industry which, from a technical standpoint, was very backward; (6) of the need to establish and expand the plywood, cement, sanitary and kitchen appliances, doors and windows, clay and asbestos cement products, iron piping and other industries in order to supply the regional market; (7) of the need to take measures to facilitate the exchange of

^{4/} See "CEPAL - Informe del Relator", document E/CN.12/CCE/AC.6/7.

information and experience in the field of planning, with a view to avoiding speculation in land, the haphazard division of land and the unauthorized occupation of urban land, and to enable facilities to be provided for the financing of purchases of land for public housing; (8) of the need to promote the development of financing methods designed to channel small savings into housing construction; and (9) of the need to establish, within the framework of the Economic Integration Programme, a body to ensure continuity of action in the fields of housing, building and planning at the Central American regional level.

At its fifth meeting, held in June 1958, the Economic Co-operation Committee approved the conclusions and recommendations of the San José meeting and established the Housing, Building and Planning Sub-Committee. This Sub-Committee, composed of the directors of the agencies responsible for housing and planning programmes in the Central American countries, held its first session in October 1958, again at San José, Costa Rica. The meeting was devoted to the discussion and adoption of a work programme for the period 1958-59. The work programme adopted includes the following items: (1) preparation of an inventory of the building materials industries in Central America, indicating their productive capacity and the main characteristics of the materials produced; (2) a study of the demand for building materials and of the industries' present capacity to meet that demand; (3) a report on suitable measures for the standardization of the principal Central American building materials; (4) comparative studies of the cost of building public housing, and the annual submission of such data; (5) collection of the current national and municipal laws and regulations connected with planning, and the analysis and evaluation of their effectiveness; (6) establishment of minimum standards for public housing built with durable materials for the different climates of the region; (7) the holding, during the Sub-Committee's sessions, of exhibitions of building materials manufactured in the region; and (8) requests to international bodies for technical assistance and for their co-operation with the housing agencies in the execution of the approved programme.

In addition to approving this work programme, the Sub-Committee adopted further resolutions dealing with the training of professional, skilled and unskilled personnel; to that end it requested the assistance of the national universities of the Central American countries for the organization of special courses, and the international organizations were also asked to assist with this project. The housing and planning agencies were made responsible for the

preparatory work at the national level, and agreed to submit the results achieved to the Secretariat of ECIA for compilation and presentation to the Sub-Committee at its next meeting. The Central American Economic Co-operation Committee studied the problems of housing, building and planning at its sixth meeting, held at San José, Costa Rica, from 26 August to 2 September 1959. It noted with satisfaction the work done by the Sub-Committee, approved the work programme mentioned above, and recommended that the Secretariat should co-ordinate its execution in 1960. The Committee also recommended that, in addition to the studies and surveys already provided for in the programme, a study should be made, as soon as possible, of the economic and social aspects of the housing problem in Central America.

III. Materials used for housing in Central America

Materials used for building have varied from the pre-Columbian era to the present day, but two main periods of change which have influenced their production may be distinguished. The first change in methods of construction took place with the arrival of the Spaniards, who brought their building techniques with them to America and made the maximum use of local materials. They initiated the manufacture of many materials which today are still produced and utilized according to the same methods. The second important innovation was the introduction of iron and reinforced concrete during the third decade of the present century. At the same time, imports of materials made abroad assumed greater importance because builders realized the need to modernize the traditional Spanish methods in order to satisfy the increasing demand for building. However, the inventory of Central American dwellings reveals that most of them are traditional constructions in which clay products, earth, bahareque and timber predominate.

From the last housing census carried out between 1949 and 1950 it may be established that the predominant material in walls is adobe in Guatemala, bahareque in El Salvador and Honduras, and timber in Costa Rica and Panama. These three materials are the major feature of the inventory in all countries, except for the case of adobe in Costa Rica and Panama and timber in El Salvador. The principal flooring material is earth, except in Costa Rica where it is wood (although the census there was carried out only in towns). The great majority of roofs are made of mud tiles; next most frequently found are the more modern metallic and asbestos cement tiles. Straw and palm-leaves are widespread in the rural areas of Honduras, Guatemala and Panama.

Table 1

Central America and Panama - Houses, according to materials used, expressed as a percentage of the total number of dwellings recorded by census

| Census year | Guatemala | El Salvador | Honduras | | Panama | Costa Rica |
|---------------------------------|-----------|-------------|----------|-------|----------------------|------------|
| | 1949 | 1950 | 1949 | | 1950 | 1949 |
| | | | Urban | Rural | | Urban |
| <u>Walls</u> | | | | | | |
| Concrete | 3.5 | 0.9 | 1.6 | 0.2 |) -- | 3.6 |
| Brick | 1.5 | 1.5 | 1.2 | 0.1 |) 16.8 ^{a/} | 5.5 |
| Adobe | 53.9 | 33.3 | 20.5 | 7.4 | -- | 4.8 |
| Stone | 0.9 | -- | 2.3 | 0.4 | -- | -- |
| <u>Bahareque</u> ^{b/} | 14.5 | 53.2 | 44.1 | 51.0 | 20.0 | 13.4 |
| Timber | 13.5 | 4.3 | 22.0 | 18.2 | 37.5 | 69.0 |
| Logs | 3.0 | -- | 3.4 | 17.4 |) -- | -- |
| Bamboo | 7.5 | -- | 0.8 | 1.2 |) 20.1 | -- |
| Others | 1.7 | 7.5 | 4.1 | 4.1 | 3.6 | 3.2 |
| <u>Floors</u> | | | | | | |
| Cement bricks | 14.4 | 27.2 | -- | -- | 24.7 ^{c/} | 7.8 |
| Earth bricks | 19.8 | 26.7 | 21.8 | 3.1 | 2.0 | 8.1 |
| Cement mixture | 6.1 | 3.6 | 10.3 | 0.9 | -- | -- |
| Timber | 4.1 | 0.8 | 15.1 | 6.2 | 30.2 | 69.0 |
| Earth | 55.3 | 40.6 | 52.7 | 89.8 | 42.3 | 15.1 |
| Others | 0.3 | 1.1 | 0.1 | -- | 0.8 | -- |
| <u>Roofs</u> | | | | | | |
| Concrete | 1.1 | 0.5 | 0.3 | -- | -- | -- |
| Metal | 31.1 | 1.8 | 18.9 | 5.9 | 44.6 | 71.0 |
| Earth and asbestos-cement tiles | 44.2 | 91.5 | 72.4 | 53.8 | 17.8 | 25.1 |
| Straw and palm-leaves | 21.4 | 5.0 | 6.5 | 33.8 | 34.7 | -- |
| Others | 2.2 | 1.2 | 2.1 | 6.3 | 2.9 | 3.9 |

Source: La Vivienda de Interés Social en América Latina, Istmo Centroamericano. Washington, Pan American Union, 1957.
Censos Nacionales, Primer Censo de Vivienda, Volume I, Características de la Vivienda. República de Panamá, Dirección de Estadística, September 1956. Censo Urbano de Edificios y Viviendas, noviembre y diciembre de 1949. Dirección General de Estadística y Censos, San José, Costa Rica, 1954.

Notes: a/ Includes stone walls.
 b/ Bahareque is known as quincha in Panama.
 c/ Includes floors of cement mixture.

/...

The above table is important in that it lays practical emphasis on the need to give special attention to local materials and, on the basis of more complete studies, to take steps to investigate their improved uses and to modernize their production. This report will first deal with the main aspects of these traditional industries.

1. Clay

The production of building materials based on clay is fairly extensive in Central America and Panama. Generally speaking, clay bricks and tiles are produced in all these countries. Production techniques cover a whole range - from the most clumsy, in which bricks are moulded by hand and fired in primitive wood-burning kilns, to the most modern, in which the raw materials are crushed and mixed mechanically and are moulded in brick-making machines under vacuum. Bricks are cut automatically, transported to artificial dryers by mechanized means and fired in modern petroleum-burning kilns.

However, the bulk of Central American production of clay products is in the hands of small producers with little capital, whose manufacturing methods are rudimentary. In Guatemala,^{5/} the 1953 industrial census revealed that, of the 165 establishments producing clay tiles and bricks, only some seven employed more than five workers and 158 less than five, while two-thirds of them had a capital fluctuating between 1,000 and 15,000 quetzals. In Nicaragua,^{6/} only some twenty-three establishments employed more than five workers in August 1956; in Costa Rica, production is confined to the area surrounding the town of Cartago, where there are thirty family-operated brick kilns.

Under these conditions, the brick-making industry requires virtually no financial investment (producers can construct their own capital equipment) and the raw material may be regarded as ubiquitous and easy of access. As a result, entry into the industry presents no difficulties, and the whole family may help in production. In view of the small profit margins obtainable from an inferior product, it may be asserted that this type of output represents almost another

5/ Industria de Materiales de Construcción y Posibilidades de Intercambio. Document submitted by the Guatemalan delegation to the Meeting on Housing, Building Industries and Construction Materials Problems in Central America and Panama (AC.6/I/DT/4, November, 1957).

6/ José F. Terán C. La Construcción en Nicaragua - Estudio Preliminar. Instituto de Fomento Nacional, Managua, Nicaragua, July, August 1956.

form of hidden unemployment and has certain repercussions on the mechanized industry. For example, in Costa Rica hand-made bricks are cheaper than those made by machine, so that firms manufacturing bricks on an industrial scale have to adopt the prices of the small manual producers in order to sell their products.^{7/}

In these circumstances, it would seem highly advisable to study educational methods and the assistance which could be given to the manual brick-making industry, in order to improve quality and standardization, by means of loans for the purchase of tools, moulds and other equipment as well as the organization of demonstrations and short courses. Thought might also be given to the formation of co-operatives of small producers or to other forms of association which would enable production methods to be improved, since the making of clay products by hand constitutes the most important source of supply in the Central American countries.

However, the mechanization of the brick-making industry has progressed in Central America, and more or less modern plants are in existence. For example, in Guatemala there is a new plant with a capacity of 40,000 bricks per twelve-hour day, which possesses a vacuum moulding machine, an artificial dryer and a Hoffmann kiln with twenty-two chambers. The production programme for this plant envisages that its capacity will be used preferably for the production of hollow clay blocks and clay tiles for floors and roofing, since there is already a supply of common bricks on the market.

Another modern plant is in operation in San Salvador. It produces bricks of various types, hollow blocks and Spanish- and Arab-type tiles, with average sales of between 130,000 and 200,000 bricks per month. It has a vacuum moulding machine and automatic equipment for cutting bricks and transporting them in electric cars to the artificial dryer and the kilns. Besides its two petroleum-burning kilns which have a capacity for 100,000 units every thirty-six hours, two additional kilns with a capacity of between 20,000 and 25,000 units for each firing operation are being installed in this factory. One of these kilns uses rice and cotton husks as fuel, and the other petroleum and steam. They form part of a scheme for expansion and research which also envisages the installation of a new pressure machine capable of producing 20,000 bricks per eight-hour shift.

^{7/} Francisco F. Schuschny, La Industria Ladrillera en Costa Rica. Centro Interamericano de Vivienda y Planeamiento (Inter-American Housing and Planning Centre), (October 1957), p. 5.

In San José, two brick-making plants are in operation. One of them possesses a vacuum moulding machine, but the other work is done by hand; it has a capacity of 30,000 bricks per day. Some distance from Tegucigalpa, a factory operates with an antiquated moulding machine which produces 5,000 bricks per five-hour shift; the bricks are dried by air under cover, and there are three small wood-burning kilns for firing them. In Managua, the main building material has so far consisted of cement blocks, since the nearest brick factory is at La Paz, an hour and a half away from the capital by rail. However, it is planned to build a modern factory in the near future with an output capacity of 40,000 units per eight-hour day. A new brick-making plant with vacuum-moulding machinery has been set up in Nicaragua. It has been operating since September 1959 and produces high-quality bricks.

The oldest factory is in Panama. It began operations in 1901, was reorganized in 1927, and has now been producing tiles and porcelain sanitary equipment for some years. It turns out common bricks, vitrified facing bricks, hollow clay blocks, and ornamental clay articles which are exported to the south of the United States. It has a vacuum moulding machine, mechanized cutters and hand-propelled loading cars. The bricks are fired in petroleum-burning kilns.

In Costa Rica, two plants produce vitrified clay piping. One of them, in San José, manufactures pipes, four, six and eight inches in diameter and can turn out 500 four-inch pipes per eight-hour shift. It uses a hydraulic machine for moulding the pipes and has two kilns with a joint capacity of 1,000 pipes per firing operation.

2. Bahareque

Particulars on the use of bamboo as an important element for construction with bahareque are incomplete, but both the Food and Agriculture Organization of the United Nations (FAO) and the Inter-American Housing and Planning Centre (IHPC) might study how it can be better employed. As seen in table 1, bahareque plays a significant role in El Salvador, Honduras and Panama as well as in Nicaragua, according to the report of the National Development Institute (Instituto de Fomento Nacional) already mentioned. Bamboo is important because it can be used not only in bahareque construction but also in scaffolding, reinforcements, Venetian blinds, conduits and ornamentation. It is very useful in low-cost housing because the family concerned can cultivate bamboo for house-building and also for fences, protective covering, cages or enclosures, and the manual

industries. However, in a study prepared by the United States Department of Agriculture, it is stated, with reference to Nicaragua, that bamboo of better quality for building purposes should be introduced into the country because the species which predominates there (guadua amplexifolia) is really the poorest for building. This is possibly true of other countries as well. The study of bamboo should therefore be undertaken as quickly as possible because of its importance for low-cost housing, especially in the rural areas, and also because of the multiple uses of this material already described.

3. Timber

The most important aspects of this building material - which plays a great part in Costa Rica, Panama, Honduras and Guatemala in that order - are discussed later in this report in connexion with the possibilities of a Central American common market for the building materials industries.^{8/} Mention is, therefore, not made of them here.

^{8/} See chap. VII.

IV. Effects of the replacement of indigenous materials by cement

The utilization of essentially local materials has so far enabled the inventory of Central American dwellings to be drawn up. It now appears desirable to consider briefly the effects of the introduction of concrete, particularly on building costs. However, in order to deal fully with this aspect, complete studies should be undertaken, covering all the Central American countries. For the moment, Guatemala City has been chosen as an example, because certain data and series of statistics relating to it are available and will enable the changes which have occurred in recent years to be analysed.

In Guatemala City,^{9/} between the years 1950 and 1955, there was a reduction in the number of private buildings constructed but the value per square metre of ground coverage increased at a much greater rate than did the general price index. Thus, while in 1950 the private sector invested, in that city, the sum of \$2,576,000 in 1,082 buildings with a total ground coverage of 159,600 square metres, in 1955 it invested \$2,521,300 (i.e., a similar sum) in 637 buildings occupying a total area of 62,500 square metres. Hence, over the five-year period, each square metre built upon rose in value from \$16.14 to \$40.34, i.e., two and a half times. Parallel with this increase, the average ground coverage decreased from 147 square metres per dwelling unit in 1950 to 92 square metres in 1955 (table 2).

Although no accurate information on the subject was available, the fact that the price per square metre of ground coverage increased so much faster than the general rise in prices seemed attributable to the use of better materials such as concrete and brick, better sanitary installations, and more luxurious finishings. It is also possible that higher buildings cost much more than those of one or two floors constructed with traditional materials. An additional factor has been the more frequent use of imported materials, consequent upon higher standards and increased luxury building. As a result, between 1946 and 1956 the volume and value of building material imports trebled. On the basis of 1946 = 100, the index rose to 355.8 (volume) and 340.3 (value).^{10/}

^{9/} Industria de Materiales de Construcción y Posibilidades de Intercambio. Document submitted by the Guatemalan delegation to the meeting on Housing, Building Industries and Construction Materials Problems in Central America and Panama (AC.6/I/DT/4, November 1957).

^{10/} Ibid., p. 38.

Table 2

Guatemala City - Index of prices, number of private buildings constructed, value and ground coverage in square metres, 1950-1955

| Year | Wholesale price index (1953 = 100) | Number of new buildings constructed | Value of new buildings constructed in thousands of quetzals <u>1/</u> | Ground coverage in thousands of square metres |
|------|---------------------------------------|-------------------------------------|---|---|
| 1950 | 95 | 1,082 | 2,576.2 | 159.6 |
| 1951 | 101 | 941 | 2,798.9 | 175.5 |
| 1952 | 100 | 775 | 1,874.1 | 121.4 |
| 1953 | 100 | 728 | 2,170.9 | 55.7 |
| 1954 | 105 | 824 | 3,486.1 | 81.3 |
| 1955 | 101 | 637 | 2,521.3 | 62.5 |

Sources: Price index: Compendio Estadístico Centroamericano, United Nations Publication, Sales No.:1957.II.G.8.

Buildings: Industria de Materiales de Construcción y Posibilidades de Intercambio. Document submitted by the Guatemalan delegation to the meeting on Housing, Building Industries and Construction Materials Problems in Central America and Panama (AC.6/I/DT/4, November 1957).

Note: 1/ The quetzal is at par with the dollar.

During 1953 the total area built upon dropped sharply to less than half that of the previous year and was the lowest recorded during the period 1950-1957 - only 55,700 square metres (table 4). Prices increased moderately between 1950 and 1953, although adobe and sand showed the biggest increases - 15.3 and 20.9 respectively. After 1953 building recovered and the prices of materials required for concrete construction experienced the largest increases between 1953 and 1956: cement 18.0, gravel 33.7, sand 19.1 and brick 42.0. Under the influence of this rising trend, adobe went up to 18.8 and timber (cedar) to 21.4 (table 3). As there is no relationship between these rises and the wholesale price index, they are probably attributable to a sudden demand for materials whose production was insufficient to meet the building programme undertaken. Indeed, the data available reveal a steady decline in brick and timber output between 1950 and 1953, while cement production gradually increases, except in 1954 (table 4).

Table 3

Guatemala City - Variations in the price index of building materials (1946 = 100), 1950-1956

| | 1950 as compared with 1946 | Increases and Decreases 1953 as compared with 1950 | 1956 as compared with 1953 |
|--------------|----------------------------------|---|----------------------------------|
| Average | 13.2 | 10.1 | 15.6 |
| Cement | 4.9 | 4.9 | 18.0 |
| Common brick | 7.9 | 6.9 | 42.0 |
| Adobe | 27.0 | 15.3 | 18.8 |
| Gravel | 5.6 | 7.5 | 33.7 |
| Sand | 25.1 | 20.9 | 19.1 |
| Tile | 20.1 | - 4.1 | 3.6 |
| Pine | 6.6 | 5.5 | 5.7 |
| Cedar | 4.7 | 3.4 | 21.4 |
| Lime | 5.1 | 1.5 | - 10.0 |
| Floor boards | 8.4 | 4.6 | 8.0 |

Source: Document submitted by the Guatemalan delegation (AC.6/I/DT/4), ibid.

Table 4

Private building in Guatemala City in thousands of square metres and production index for certain building materials in the country (1946 = 100)

| Year | Private building in Guatemala City in thousands of square metres | Production index for certain building materials | | | |
|------|---|---|------------|--------------|--------|
| | | Cement | Clay brick | Cement brick | Timber |
| 1950 | 159.6 | 150.3 | 88.2 | 108.3 | 97.8 |
| 1951 | 175.5 | 207.1 | 69.4 | 108.5 | 94.4 |
| 1952 | 121.4 | 216.7 | 63.9 | 91.6 | 84.6 |
| 1953 | 55.7 | 240.2 | 65.6 | 63.8 | 76.8 |
| 1954 | 81.3 | 231.1 | | | |
| 1955 | 62.5 | 289.3 | | | |
| 1956 | 99.0 | 283.9 | | | |
| 1957 | 127.0 | 333.8 | | | |

Source: Private building: United Nations Statistical Yearbook, 1958,
Sales No.:58.XVII.I.

Production indices: Document submitted by the Guatemalan delegation
(AC.6/I/DT/4).

The above data reveal a marked tendency towards building with concrete, and an extraordinary rise in costs. From table 5 it may be seen that, while in 1950 a dwelling occupying 147 square metres was worth on the average 2,380 quetzals, in 1955 one of the 92 square metres was worth 3,985 quetzals. If this average is compared with the per capita income it will be observed that in 1950 the value of housing in Guatemala City was equivalent to about eighteen times the value of per capita income, but in 1955 to about twenty-five times. This situation reflects the tendency to build for high-income families, to the detriment of the poorer people who constitute the majority. It also shows that the introduction of new building techniques and the boom in concrete construction have exerted pressure on the prices of basic materials and have exacerbated the problem of finding accommodation for less wealthy families. It is therefore a matter of the utmost importance and urgency to study building systems and the utilization of materials with a view to erecting dwellings within reach of the poorer sectors of the population, and even to consider whether State subsidies should bridge the gap between building costs and the tenant's capacity to pay.^{11/}

Table 5

Guatemala City - Building Costs compared with per capita income, 1950-1955

| Year | Average ground coverage of building in square metres | Average value of building in dollars | <u>Per capita</u> income in dollars | Value of building compared with <u>per capita</u> income |
|------|--|--------------------------------------|-------------------------------------|--|
| 1950 | 147 | 2,380 | 132 | 17.8 |
| 1955 | 92 | 3,985 | 160 | 24.7 |

Sources: Edificación en m² y valor (Building in square metres and value): document submitted by the Guatemalan delegation (AC.6/I/DT/4, November 1957).

Ingreso per cápita (Per capita income): "La Vivienda de Interés Social en América Latina, Istmo Centroamericano", Pan American Union, Washington D.C., 1957.

^{11/} In several of its settlements the Guatemalan Government has already granted subsidies of various types in order to solve this problem, but it has not been possible to meet the full needs of low-income families. Several settlements have been allocated to such families, but there have been difficulties in collecting rents even when these are fixed as low as in the Tres de Julio and Bethania projects. A co-operative settlement is now being built as an experiment, but its results have not yet been evaluated (AC.6/I/DT.6, 1957).

/...

V. Research on building materials

The Central American countries have laboratories attached to various establishments where research on building materials may be conducted, but none of them is completely equipped for specialized studies. So far, relatively little progress has been made; and hence the great need for the conducting of fuller research.

From the information submitted at the Meeting on Housing, Building Industries and Construction Materials Problems in Central America and Panama it may be gathered that in El Salvador studies have been made on lime and the use of light boards and cement. The Inter-American Centre for Industrial Productivity (Centro Interamericano de la Productividad Industrial) is located in this country, and laboratories are attached to the Ministry of Public Works and the El Salvador Cement Factory.

In Costa Rica there are laboratories at the University, the Ministry of Public Works and the Housing and Town-Planning Institute. With the help of experts from the Inter-American Housing and Planning Centre (IHPC) the brick-making industry of Costa Rica has been studied and the Department of Standardization has conducted research on the common brick.

In Guatemala there are the laboratories of the School of Engineering, the Department of Roads, the Department of Public Works and the Department of Mining and Hydrocarbons. The laboratory of the Ministry of Public Works was recently incorporated with the laboratory of the University, which as a result has become the only laboratory in the new University City of Guatemala.

In Nicaragua the National Development Institute has carried out a preliminary study of the main building materials used, and has published a report entitled "Building in Nicaragua" which contains data on dimensions, weights and other characteristics, as well as on methods of production and development.

At the regional level, the laboratories of the Inter-American Housing and Planning Centre have engaged in research on stabilized earth, certain properties of bamboo, and reinforced concrete. This Centre was founded by the Pan American Union with the help of the United Nations, and is located at Bogotá, Colombia. There is also the Central American Research Institute for Industry (ICAITI), established by the Central American countries, with its headquarters in Guatemala City. The United Nations has constantly collaborated in the work of these two institutions and has provided permanent technical assistance through experts. The

United Nations Special Fund has included ICAITI among the projects to which it intends to give economic aid for the purposes of research.

1. Standardization

The information on the standardization of building materials is also fragmentary. This problem appears to have been studied only in Costa Rica: here, the Department of Standardization and Industrial Technical Assistance, which comes under the Industries Department, has worked out standards for various articles, including common solid bricks.

2. Module co-ordination

No efforts towards the adoption of modules have been made, except in El Salvador and Costa Rica. In both these cases, housing institutes have been the bodies most interested; they have adopted a module, at least for their own building operations. In Costa Rica, the first effort along these lines was made by the Housing and Town-Planning Institute on the basis of certain existing materials, especially cement blocks, but application of the modules proved very difficult. Subsequently, since timber is the material most used in the construction of houses, a module of 813 mm. was adopted, as being the sum of the dimensions of a number of planks used as wall linings.^{12/} This module is used mainly in prefabricated timber houses which the Housing and Town-Planning Institute manufactures with the help of a workshop donated by the United Nations. The workshop can produce four low-cost wooden houses per day; they have been used mainly to fulfil undertakings assumed under the philanthropic programme known as Vivienda en Marcha.

In El Salvador, the Urban Housing Institute has adopted a module of 1.35 m. on the basis of available construction materials and the measurements of the human body. Materials had to be produced in multiples of 15 cm. This is now being done, but a period of three years was required before it was possible. From this module the Institute has developed a series of dimensions for housing design. For example, the design of bedrooms is governed by the following table:

| | |
|----------|------------------|
| 1 bed | 4 square modules |
| 2 beds | 6 " " |
| 2-3 beds | 8 " " |
| 3 beds | 9-10 " " |
| 4 beds | 11-12-13 " " |

^{12/} Normalización de Materiales de Construcción y Dimensionamiento. Document submitted by the Costa Rican delegation, ECLA, AC.6/I/OT/33, November 1957.

In the same way, the Institute fixed dimensions for single-family dwellings of two and three bedrooms at 30 and 39 square modules respectively. For multi-family dwellings it established dimensions varying between 36 and 79 square modules, according to the type of apartment.^{13/}

The advantages observed by the two Institutes in the adoption of a module are great, and the other countries are keenly interested in expediting studies which will enable modules to be co-ordinated throughout Central America for the purpose of encouraging the exchange of certain construction materials. A United Nations expert is initiating in 1959 the preliminary studies on the standardization of building materials and on the possibility of adopting a common module.

^{13/} Ponencia de la Delegación Salvadoreña sobre Normalización de Materiales de Construcción, Dimensionamiento y Coordinación Modular (AC.6/I/DT/16, November 1957).

VI. Professional personnel and construction firms

This aspect of building, which has a bearing on the development of construction techniques and the adoption of standards and common measurements, appears satisfactory in Central America. The universities in Panama, Guatemala and El Salvador have departments of architecture, and in the other countries the schools of engineering have given their students training in architecture. According to a preliminary report prepared by the Pan American Union,^{14/} there are enough professional staff and building firms to meet the needs of the various countries, but measures might well be taken to encourage the movement and interchange of professional personnel between countries. This is particularly important for building firms which cannot expand or adopt more modern methods of construction because they have an inadequate volume of business within each individual country.

According to the study already mentioned, there are at present in Central America approximately 939 engineers-architects-builders and 115 building firms, distributed as in table 6.

Table 6

Central America: Engineers-architects-builders
and building firms, 1957

| Country | Professional Personnel (engineers-architects-builders) | Building firms |
|-------------|---|----------------|
| Costa Rica | 209 | 13 |
| El Salvador | 130 | 17 |
| Guatemala | 150 | 20 |
| Honduras | 100 | |
| Nicaragua | 90 | 5 |
| Panama | 260 | 60 |

There are also some unqualified builders working on a small scale. They undertake minor operations and their exact number has not been estimated.

^{14/} Bosquejo sobre la Capacidad de la Industria de la Edificación en Centro América y Panamá, October 1957

According to an appreciation made in the report of the Inter-American Housing and Planning Centre, the largest building firms are in Panama and some of them have accepted work in other countries of Central America. However, for fairly large public projects the Central American countries have had recourse to foreign contractors, mainly from the United States but in some cases from Venezuela. If, therefore, building firms could broaden their markets to include the other countries they could probably operate on a much bigger scale than at present.

VIII. Possibility of establishing a Central American common market for the building materials industries

Prospects for a common market for building materials industries in Central America and Panama depend on the magnitude of the demand for building materials, the effective production capacity of domestic sources of supply, the structure of these industries, their geographical distribution in the various countries, the cost of production and the price of building materials, the relation between the prices of materials imported and of those produced locally, and the degree of tariff protection.

A common market would mean the elimination or reduction of tariff and other barriers hampering the free exchange of these materials between the countries in question, and the adoption, by some of these countries, of a uniform duty on similar products coming from outside the free trade area which the common market would constitute.

The chief purpose of such an arrangement would be a greater degree of international specialization of production, based on the various advantages offered by each country. Through such specialization, the building materials industries in each of these countries would have access to a market wider than their own national one. On the one hand, this would help to bring about an increase in the scale of production and even in the capacity of existing industries, with a consequent reduction in costs; on the other, it would permit the establishment and economic operation of industrial activities which would be impossible in Central America on the basis of purely national markets. Both types of development would bring considerable benefits to the participating countries, not only by increasing trade between them but by raising the level of employment and income. This latter factor would in turn contribute to an increase in exchanges with countries outside the free trade zone, and so, eventually, help to increase world trade.

If the problem of these industries is examined from another standpoint, there can be no doubt that building materials are one of the most important factors in the cost of a housing programme designed to satisfy the needs of the lowest paid sections of the population. It is therefore useful, when discussing and analysing the problems presented by the housing needs of the great mass of the population of Central America and Panama, to be acquainted, in broad outlines, with the structure of the building materials industries in the six

countries, with their main features, with their chief defects, and with their future potentialities. This information will, it may be hoped, provide the national housing authorities with further material on which to base their housing policy, with a view to a more effective and hence more economical use of resources, both at the national and at the Central American level.

The advantage of possessing this information is still more apparent if it is remembered that no specialized surveys of the building materials industries in Central America and Panama have yet been completed and that, in surveys based on industrial production censuses, the coverage of the building materials industries has been no more than partial. It should also be noted that industrial censuses, which are very useful for the analysis of activity in the building materials industries and are an essential requirement for the preparation of continuous statistics and the corresponding indices, as well as for that of investment programmes for the industry, give only an intermittent picture, at several years' intervals, of this great sector of production.

The present chapter of this report describes, along these general lines, the situation in the most important building materials industries in each of the Central American countries and in Panama during the period 1945 to 1956, and gives forecasts for the period of five years between 1958 and 1962, where this has been possible and with occasional reservations due to lack of information.

Thus, sections 1 to 7 contain a general review of the principal industries manufacturing building materials; this includes, where data has been available, such aspects as productive capacity, actual production, volume and value of imports, past trends in apparent consumption, and approximate forecasts for consumption in the future. Section 8 endeavours to assess shortages in the manufacture of building materials in Central America and Panama, and attempts an evaluation of the productive capacity in those materials which now exists, is under development or is in project, compared with the present and potential demand for them. Lastly, section 9 indicates some of the requirements for the establishment of a common market in building materials in Central America and Panama.

1. The cement and allied industries

Cement production is an industrial activity which has expanded most rapidly in recent years in Central America, thanks to a growing demand based on a high level of public and private building in most of the region's countries. One

reason for this development has been an increasing tendency to rely less on imports - now representing a smaller proportion of the total consumption, which in 1956 amounted to 330,000 tons - and the establishment of new factories in Central America. Nevertheless, if the high rate of increase in consumption is maintained in the future, a considerable shortage in production may be anticipated. If capacity now existing and in course of development is taken as a basis, the shortage in Central America as a whole would amount to 223,000 tons in 1962 if an annual increase of 10 per cent in consumption were assumed, and to 322,000 tons if the annual increase in consumption amounted to 12.6 per cent (the average rate observable for the period 1945-1956). If two additional projects now under consideration were carried out during the coming years, the shortage for Central America as a whole, already mentioned, would be eliminated in the case of the lower increase in consumption, although there would be considerable shortages in certain countries along with surpluses in others. For this reason, increasing importance attaches to the idea of co-ordinating the development plans of the cement industry in Central America, with a view to interchange among the countries under a common market system, provided that transportation and other problems are solved.

The situation described is not greatly altered by the addition of the corresponding figures for capacity, production and anticipated consumption in respect of Panama, although during the intervening years Panamanian production might help to reduce the anticipated shortages, especially if the higher rate of annual increase in consumption were to materialize.

A detailed analysis of the foregoing considerations will be found in section 8 and in tables 29 and 30.

(a) Productive capacity

In Central America, the capacity of producing cement increased two and a half times in the period of eleven years between 1945 and 1956, with a growth in annual production from 90,900 to 234,000 tons during that period, i.e., an increase of 157 per cent.^{15/}

^{15/} The figures for annual capacity are based on the theoretical daily capacity during a year of three hundred working days. See table 7.

In 1945 the only factories operating in Central America were those in Guatemala, with an annual capacity of 71,400 tons, and in Nicaragua, with an annual capacity of 19,500 tons. Early in 1953 a new factory began working in El Salvador, near the port of Acajutla, with an annual productive capacity of 45,900 tons. To meet the needs of the Salvadorian market, a new kiln was added to this plant during 1955, with an annual productive capacity of 61,200 tons of cement. Likewise, in 1955, a second kiln with a productive capacity of 36,000 tons was installed in the Nicaraguan factory.

Panama's factory began operating early in 1948 with an annual productive capacity of 90,900 tons, which was increased four years later by 20 per cent to 108,000 tons annually, following improvements to equipment.

Thus, between 1945 and 1956 the installed cement production capacity in Central America and Panama was almost quadrupled, by an increase from 90,900 to 342,000 tons annually.

Table 7

Central America and Panama: Installed cement production capacity,
1945-1956; capacity under construction, 1957 to 1959
 (Tons)

| | | | | | | | | Total for Central America and Panama |
|---|-----------------------|-----------------------|-----------------------|----------------------|---|---|-----------------------|--|
| | | | | | | Total for Costa Rica Central America Panama | | |
| Guatemala | | Nicaragua | El Salvador | Honduras | | | | |
| <u>Installed capacity:</u> | | | | | | | | |
| 1945 | 71,400 ^{a/} | 19,500 ^{b/} | - | - | - | 90,900 | - | 90,900 |
| 1946 | 71,400 | 19,500 | - | - | - | 90,900 | - | 90,900 |
| 1947 | 71,400 | 19,500 | - | - | - | 90,900 | - | 90,900 |
| 1948 | 71,400 | 19,500 | - | - | - | 90,900 | 90,000 ^{c/} | 180,900 |
| 1949 | 71,400 | 19,500 | - | - | - | 90,900 | 90,000 | 180,900 |
| 1950 | 71,400 | 19,500 | - | - | - | 90,900 | 90,000 | 180,900 |
| 1951 | 71,400 | 19,500 | - | - | - | 90,900 | 90,000 | 180,900 |
| 1952 | 71,400 | 19,500 | - | - | - | 90,900 | 108,000 ^{d/} | 198,900 |
| 1953 | 71,400 | 19,500 | 45,900 ^{e/} | - | - | 136,800 | 108,000 | 244,800 |
| 1954 | 71,400 | 19,500 | 45,900 | - | - | 136,800 | 108,000 | 244,800 |
| 1955 | 71,400 | 55,500 ^{f/} | 107,100 ^{g/} | - | - | 234,000 | 108,000 | 342,000 |
| 1956 | 71,400 | 55,500 | 107,100 | - | - | 234,000 | 108,000 | 342,000 |
| <u>Installed capacity plus extensions under construction:</u> | | | | | | | | |
| 1957 | 142,800 ^{h/} | 55,500 ^{i/} | 107,100 | - | - | 305,400 | 108,000 | 413,400 |
| 1958 | 142,800 | 100,500 ^{i/} | 107,100 | - | - | 350,400 | 108,000 | 458,400 |
| 1959 | 142,800 | 100,500 | 107,100 | 45,000 ^{j/} | - | 395,400 | 108,000 | 503,400 |

Source: Manufacturing enterprises.

Installed capacity:

- a/ Kiln No. 1, 119 tons per day.
 Kiln No. 2, 119 tons per day.
- b/ Kiln No. 1, 65 tons per day.
- c/ Kiln No. 1, 150 tons per day.
 Kiln No. 2, 150 tons per day.
- d/ Capacity increased by 20 per cent following improvements to equipment.
- e/ Kiln No. 1, 153 tons per day.
- f/ Kiln No. 2, 120 tons per day.
- g/ Kiln No. 2, 204 tons per day.

Installed capacity plus extensions under construction:

- h/ Kiln No. 3, 238 tons per day; will come into operation at the end of 1957.
- i/ Kiln No. 3, 150 tons per day; will come into operation in the middle of 1958.
- j/ New plant: Kiln No. 1, 150 tons per day; will come into operation at the beginning of 1959.

(b) Production

In the period 1945-1956, cement production in Central America showed a five-fold increase from 37,296 to 189,802 tons, i.e. one of 409 per cent.

Production in Guatemala, which in 1945 was about 26,262 tons, had reached the figure of 79,423 tons in 1956; while in Nicaragua, which produced only 11,034 tons at the beginning of the period, the figure reached at the end of it was 41,692 tons. The greatest contribution, however, to this considerable expansion in the regional production of cement was furnished by the industry of El Salvador; in this country production, beginning in 1953 with 28,953 tons, reached the figure of 68,687 tons in 1956, thus exceeding Nicaraguan production and approximating very closely to that of Guatemala (see table 8).

Table 8

Central America: Cement production, 1945-1956
(Tons)

| Year | Guatemala | Nicaragua | El Salvador | Total |
|------|-----------|-----------|-------------|---------|
| 1945 | 26,262 | 11,034 | - | 37,296 |
| 1946 | 27,666 | 10,654 | - | 38,320 |
| 1947 | 28,013 | 11,562 | - | 39,575 |
| 1948 | 31,469 | 16,234 | - | 47,703 |
| 1949 | 35,740 | 16,398 | - | 52,138 |
| 1950 | 42,505 | 16,789 | - | 59,294 |
| 1951 | 58,807 | 18,231 | - | 77,038 |
| 1952 | 61,039 | 21,098 | - | 82,137 |
| 1953 | 56,947 | 23,739 | 28,953 | 109,639 |
| 1954 | 61,571 | 23,441 | 49,520 | 134,532 |
| 1955 | 78,796 | 28,718 | 55,222 | 162,736 |
| 1956 | 79,423 | 41,692 | 68,687 | 189,802 |

Source: Manufacturing enterprises and Departments of Statistics.

Between 1948 and the first half of 1957 Panama's factory produced a total of 638,382 tons, i.e., an annual average of 67,200 tons, which exceeded by some 20,000 tons the average annual consumption in the country between 1950 and 1955. This enabled Panama to achieve a fair volume of exports (including exports to the Canal Zone).^{16/}

^{16/} No annual production figures are available for the cement factory in Panama.

(c) Imports

Despite the considerable increase in Central American cement production to which reference has been made, the high level of demand led to a high rate of imports, which increased from 52,040 tons in 1945 to 143,856 tons in 1956, i.e. by 176 per cent (table 9). This increase, however, was substantially less than that recorded in production. Moreover, it should be noted that in 1956 Costa Rica and Honduras, which are not yet producer countries, together imported 94,934 tons of cement.

There is, therefore, a growing tendency throughout Central America to lessen reliance on cement imports. In 1945 production accounted for 41.9 per cent and imports for 58.1 per cent of the total apparent consumption of cement in Central America, whereas in 1956 production rose to 57.6 per cent and imports fell to 42.4 per cent of a rapidly increasing total consumption (part I of table 10).

This process is, of course, seen even more clearly if account is taken only of the three manufacturing countries - Guatemala, Nicaragua and El Salvador - where the combined production of cement, which in 1945 was 69.1 per cent of consumption, in 1956 attained to about 80.9 per cent, with a consequent reduction in the share taken by imports, between those dates, from 30.9 to 19.1 per cent (part II of table 10).

Table 9

Central America and Panama: Cement imports, 1945-1956

| Year | Costa Rica | El Salvador | Guatemala | Honduras | Nicaragua | Total for Central America <u>a/</u> | Panama | Total for Central America and Panama <u>a/</u> |
|------------------------|------------|-------------|-----------|----------|-----------|-------------------------------------|--------|--|
| (Tons) | | | | | | | | |
| 1945 | 27,617 | 13,773 | 484 | 7,525 | 2,641 | 52,040 | 52,468 | 104,508 |
| 1946 | 14,011 | 17,407 | 5,911 | 9,436 | 4,817 | 51,582 | 49,287 | 100,869 |
| 1947 | 25,073 | 25,289 | 4,294 | 12,506 | 2,142 | 69,304 | 61,947 | 131,251 |
| 1948 | 21,110 | 28,590 | 4,317 | 14,788 | 3,654 | 72,459 | 17,648 | 90,107 |
| 1949 | 28,357 | 29,936 | 8,496 | 10,709 | 1,104 | 78,602 | 176 | 78,778 |
| 1950 | 33,082 | 46,929 | 6,552 | 17,114 | 1,529 | 105,206 | 2,312 | 107,518 |
| 1951 | 34,548 | 38,702 | 4,814 | 14,086 | 1,324 | 93,474 | 39 | 93,513 |
| 1952 | 39,766 | 49,527 | 149 | 20,457 | 5,309 | 115,208 | 28 | 115,236 |
| 1953 | 45,377 | 31,897 | 185 | 25,029 | 8,498 | 110,986 | 31 | 111,017 |
| 1954 | 52,941 | 24,131 | 2,993 | 25,768 | 16,779 | 122,612 | 36 | 122,648 |
| 1955 | 58,863 | 40,578 | 4,817 | 25,821 | 19,633 | 149,712 | 36 | 149,748 |
| 1956 | 64,415 | 20,010 | 26,900 | 30,519 | 2,012 | 143,856 | 4 | 143,860 |
| (Thousands of dollars) | | | | | | | | |
| 1945 | 576 | 304 | 7 | 8 | 93 | 988 | 907 | 1,895 |
| 1946 | 333 | 424 | 89 | 230 | 109 | 1,185 | 825 | 2,010 |
| 1947 | 794 | 855 | 124 | 169 | 62 | 2,004 | 1,366 | 3,370 |
| 1948 | 573 | 1,306 | 89 | 259 | 84 | 2,311 | 382 | 2,693 |
| 1949 | 834 | 859 | 195 | 251 | 31 | 2,170 | 4 | 2,173 |
| 1950 | 824 | 1,186 | 170 | 326 | 44 | 2,550 | 57 | 2,607 |
| 1951 | 1,001 | 1,254 | 80 | 321 | 43 | 2,699 | 1 | 2,700 |
| 1952 | 1,275 | 1,619 | 3 | 449 | 210 | 3,556 | 1 | 3,557 |
| 1953 | 1,120 | 865 | 6 | 500 | 258 | 2,749 | 1 | 2,750 |
| 1954 | 1,176 | 676 | 52 | 484 | 492 | 2,880 | 1 | 2,881 |
| 1955 | 1,433 | 1,075 | 86 | 521 | 583 | 3,698 | 1 | 3,699 |
| 1956 | 1,669 | 554 | 100 | 623 | 83 | 3,029 | - | 3,039 |

Source: Economic Commission for Latin America, based on Central American foreign trade statistics.

a/ These totals include small imports from the Central American countries themselves and from Panama.

Table 10

Central America: Production as a proportion of apparent
cement consumption, 1945-1956

I. Five countries:

| Years | Production | | Net Imports: five countries | | Apparent consumption: five countries (Tons) |
|-------|------------|--|--------------------------------|--|--|
| | Tons | Proportion of apparent consumption (per cent) | Tons | Proportion of apparent consumption | |
| 1945 | 37,296 | 41.9 | 51,867 | 58.1 | 89,163 |
| 1946 | 38,320 | 42.6 | 51,557 | 57.4 | 89,877 |
| 1947 | 39,575 | 36.7 | 68,232 | 63.3 | 107,807 |
| 1948 | 47,703 | 41.0 | 68,543 | 59.0 | 116,246 |
| 1949 | 52,138 | 41.1 | 74,866 | 58.9 | 127,004 |
| 1950 | 59,294 | 36.3 | 104,000 | 63.7 | 163,294 |
| 1951 | 77,038 | 45.2 | 93,234 | 54.8 | 170,272 |
| 1952 | 82,137 | 42.4 | 111,418 | 57.6 | 193,555 |
| 1953 | 109,639 | 49.8 | 110,353 | 50.2 | 219,992 |
| 1954 | 134,532 | 52.8 | 120,191 | 47.2 | 254,723 |
| 1955 | 162,736 | 52.7 | 145,798 | 47.3 | 308,534 |
| 1956 | 189,802 | 57.6 | 139,755 | 42.4 | 329,557 |

II. Three countries:

| Years | Production | | Net Imports: three producing countries | | Apparent consumption: three manu- facturing countries (Tons) |
|-------|------------|--|---|--|---|
| | Tons | Proportion of apparent consumption (per cent) | Tons | Proportion of apparent consumption | |
| 1945 | 37,296 | 69.0 | 16,725 | 31.0 | 54,021 |
| 1946 | 38,320 | 57.7 | 28,110 | 42.3 | 66,430 |
| 1947 | 39,575 | 56.4 | 30,653 | 43.6 | 70,228 |
| 1948 | 47,703 | 59.4 | 32,645 | 40.6 | 80,348 |
| 1949 | 52,138 | 59.3 | 35,800 | 40.7 | 87,938 |
| 1950 | 59,294 | 52.4 | 53,804 | 47.6 | 113,098 |
| 1951 | 77,038 | 63.3 | 44,600 | 36.7 | 121,638 |
| 1952 | 82,137 | 61.6 | 51,195 | 38.4 | 133,332 |
| 1953 | 109,639 | 73.3 | 39,947 | 26.7 | 149,586 |
| 1954 | 134,532 | 76.4 | 41,482 | 23.6 | 176,014 |
| 1955 | 162,736 | 72.7 | 61,114 | 27.3 | 223,850 |
| 1956 | 189,802 | 80.9 | 44,821 | 19.1 | 234,623 |

Source: Economic Commission for Latin America, based on Central American foreign trade statistics.

(d) Apparent consumption

As previously indicated, the high level of public and private demand has brought about a high rate of increase in cement consumption in Central America during the last eleven years. Thus, cement consumption in the five countries rose from 89,163 tons in 1945 to 329,557 tons in 1956 - an increase of 269.6 per cent. The country showing the greatest increase in consumption was El Salvador, with 514.2 per cent, followed by Honduras and Guatemala with 305.6 and 300.1 per cent respectively. Considerable rates of increase in consumption were also observable in Nicaragua and Costa Rica, although they were not as high as those recorded in the other three cases (table 11).

It should be noted that the coefficient of 12.62 per cent for the annual cumulative increase of apparent cement consumption in the whole of Central America is an extremely high one, since it is approximately equivalent to the doubling of consumption every seven years; but it is particularly high in the case of El Salvador, where it amounts to 17.59 per cent (consumption doubled every five years), and in that of Nicaragua, with 13.53 per cent.

The existence of unused productive capacity in three of these countries must certainly have contributed in large measure to this remarkable increase in cement consumption. This development is shown in one way by the constantly decreasing reliance upon imports, already noted, and in another by the favourable influence known to be exerted on consumption by the availability of accessible domestic sources of supply, through the opportunities arising for the establishment of industries connected with cement, and the atmosphere of confidence created when supply can, unaffected by external factors, respond to a continuous demand.

Table 11

Central America: Apparent cement consumption, 1945-1956
(Tons)

| Year | Guatemala | Nicaragua | El Salvador | Costa Rica | Honduras | Total apparent consumption |
|--|-----------|-----------|----------------|------------|----------|-------------------------------|
| 1945 | 26,573 | 13,675 | 13,773 | 27,617 | 7,525 | 89,163 |
| 1946 | 33,577 | 15,451 | 17,402 | 14,011 | 9,436 | 89,877 |
| 1947 | 31,513 | 13,426 | 25,289 | 25,073 | 12,506 | 107,807 |
| 1948 | 35,739 | 16,027 | 28,582 | 21,110 | 14,788 | 116,236 |
| 1949 | 44,236 | 13,917 | 29,785 | 28,357 | 10,709 | 127,004 |
| 1950 | 49,057 | 17,417 | 46,624 | 33,082 | 17,114 | 160,294 |
| 1951 | 63,386 | 19,555 | 38,697 | 34,548 | 14,086 | 170,272 |
| 1952 | 57,401 | 26,407 | 49,524 | 39,766 | 20,457 | 193,555 |
| 1953 | 56,579 | 32,237 | 60,770 | 45,377 | 25,029 | 219,992 |
| 1954 | 64,015 | 40,220 | 71,779 | 52,941 | 25,768 | 254,723 |
| 1955 | 83,044 | 48,551 | 92,255 | 58,863 | 25,821 | 309,534 |
| 1956 | 106,323 | 43,704 | 84,596 | 64,415 | 30,519 | 329,557 |
| Percentage increase 1956/1945 | 300.1 | 219.6 | 514.2 | 133.2 | 305.6 | 269.6 |
| Coefficient of annual cumulative increase | 11.72 | 13.53 | 17.59 | 11.97 | 12.58 | 12.62 |

Sources: Manufacturing enterprises and Departments of Statistics.

(e) Trade within Central America and with Panama

In view of the fact that all the countries except Panama have shortages in cement production, trade within Central America in this commodity has been, generally speaking, sporadic and of relatively small importance.

Thus, in the eleven-year period under consideration, Guatemala exported 6,700 tons of cement to El Salvador, i.e., an annual average of 610 tons. Between 1946 and 1950 Nicaragua exported 8,645 tons, of which 6,944 went to El Salvador, 1,116 to Costa Rica, 581 to Honduras and 4 to Guatemala. After 1951, Nicaragua ceased its exports. Lastly, between 1953 and 1955 El Salvador exported 5,497 tons of cement, of which 4,788 were sent to Honduras, 653 to Nicaragua and 56 to Guatemala. Exports of cement from El Salvador amounted in 1956 to about 4,100 tons; in the absence of detailed statistics concerning

destination, it may be presumed that the bulk was sent to Honduras. According to information from manufacturing enterprises, cement was exported from El Salvador to Honduras in the first half of 1957 at an annual rate of 6,000 tons (11,700 bags per month).

Panama, which in 1947 imported 62,000 tons of cement, became a net exporter of cement from the time when its factory began working in 1948. Between 1948 and the first half of 1957 exports amounted to some 122,541 tons, equivalent to 19 per cent of the total production during that period (table 12), although after 1952, in which year those exports reached their maximum, they gradually diminished to a mere 1,000 tons in 1956.

Approximately three-quarters of these Panamanian exports went to Central America, and the rest to South America. El Salvador was the biggest market for Panamanian cement in Central America, purchasing 56,480 tons or 62 per cent of the total exported by Panama to Central America. Then followed in order of importance Costa Rica, with 18,825 tons, or 20.7 per cent of the total; Nicaragua, with 9,511 tons, or 10.4 per cent; and Honduras, with 5,937 tons, equivalent to 6.5 per cent.

The entry into production of El Salvador's factory in 1953 with 45,900 tons capacity and, two years later, the addition of a second 61,200 ton kiln to the plant, together with the installation of a second 36,000 ton kiln in Nicaragua's plant, raised the capacity of these two countries to 107,100 and 55,500 tons respectively, and eliminated 70.4 per cent of the Central American market for Panamanian cement. According to Costa Rican foreign trade statistics, imports of cement from Panama, which during the period 1952-1954 had been about 5,924, 5,040 and 5,661 tons respectively, were in 1955 reduced to 2,313 tons.

(f) Plans for increasing capacity and for installing new plants

The considerable growth in the demand for cement which has taken place in Central America in recent years, and which is expected to continue in the years to come, has brought about an expansion of capacity in certain countries of the Isthmus. In two of them the work of installing additional kilns is fairly advanced, and in another the construction of a new factory has recently begun. Besides these extensions, the establishment of two new plants is being studied.

Guatemala's factory is planning to put a new kiln into operation which will double the factory's productive capacity by advancing it to 192,000 tons for a year of 300 working days (thus far in 1960 the factory has been operating

Table 12

Panama: Cement exports by countries of destination, 1948
to first half of 1957 a/

(Tons)

Central America:

| | | |
|---------------------------|---------------|-----------|
| El Salvador | 56,480.29 | |
| Costa Rica | 18,825.46 | |
| Nicaragua | 9,511.16 | |
| Honduras | 5,937.42 | |
| Guatemala | <u>340.00</u> | |
| Total for Central America | | 91,094.33 |

South America:

| | | |
|-------------------------|---------------|--------------------------|
| Colombia | 14,124.45 | |
| Peru | 10,005.01 | |
| Ecuador | 4,618.56 | |
| Chile | 2,125.00 | |
| Venezuela | <u>573.75</u> | |
| Total for South America | | <u>31,447.77</u> |
| Total exports | | <u><u>122,541.10</u></u> |

Source: Manufacturing enterprises.

a/ Does not include sales in the Canal Zone, which amounted to 70,126 tons in the financial years 1950-1955.

at only 50 per cent of capacity). The plan also includes modification of the quarry system by the installation of a conveyor-belt to carry raw material to the factory, the building of six new silos, and the construction of a storage shed for raw material. At present there are five silos for cement and eight for raw mix.

In Nicaragua, a third kiln with an annual capacity of 45,000 tons, is being installed, which is designed to enable the Nicaraguan plant to attain a total annual capacity of 100,500 tons.

Lastly, work has begun on the construction of the new cement works in Honduras, situated near San Pedro Sula in the northern area of the country, which will have an annual productive capacity of 45,000 tons. This plant began manufacturing cement in 1959 (see table 7).

There is another project to establish a new cement plant in Guatemala, whereby present capacity would be doubled. This plant will be situated some sixty kilometres (thirty-eight miles) from Guatemala City, on the Atlantic Highway. In view of the cement supply capacity which will be reached when extension to the existing plant begins operating, the new works will presumably have to depend to a large extent on foreign markets.

The probable trend of future supply and demand for cement in Central America and Panama is examined in section 9 of this chapter.

2. Industries subsidiary to the cement industry

(a) Asbestos-cement products

Two plants in Central America manufacture asbestos-cement products - one in Guatemala, the other in El Salvador.

The older of these is located close to Guatemala City, and began working in the middle of 1945. It manufactures asbestos-cement pressure pipes by the Dalmine system, as well as drain-pipes - both types of pipe having interior diameters ranging from 2 to 12 inches and a length of 6 metres. Its annual productive capacity in pipes, based on an eight-hour shift, is 2,200 tons. This plant also manufactures corrugated and smooth sheets of asbestos-cement, in dimensions of 2.14 m. x 96.5 cm. x 6 mm. and 2.14 m. x 1.07 m. x 5 mm. respectively, as well as other roofing accessories. Its annual capacity in terms of corrugated sheets, based on an eight-hour shift, is 2,000 tons. Although no data concerning the plant's annual production are available, the annual average

of sheeting manufactured from the date of its inception until the middle of 1957 approximates very closely to its capacity calculated on the basis of a daily shift.

This plant formerly distributed its products in El Salvador, and in 1951 it furnished technical and financial help with a view to the erection of the Salvadorian plant. Since then it has concerned itself almost entirely with supplying the domestic market, exporting only sporadically, and in very small quantities, to other Cental American countries.

El Salvador's plant, which began working in 1951, produces corrugated sheeting in dimensions of 2.14 m. x 94 cm. x 6 mm., and smooth sheeting in dimensions of 2.44 m. x 1.22 m. x 5 mm., as well as roofing accessories and water-tanks of asbestos-cement. Its annual productive capacity in terms of corrugated sheeting is 2,500 tons, based on an eight-hour daily shift. However, from 1952 - the first year of its normal operation - Salvadorian imports of these products rose progressively to 900 tons in 1956, when domestic production reached its lowest point. According to information supplied by the industry, El Salvador exports only about 5 per cent of its production to other Central American countries - principally to Honduras and Nicaragua.

Despite the existence of these two Central American factories, large quantities of asbestos-cement products are imported by Guatemala and El Salvador, as well as by the other Central American countries and by Panama.

In 1956, Central American imports of these products rose to 3,700 tons valued at \$430,000, while Panama's imports were 1,000 tons valued at \$70,000. The largest Central American importer was Honduras, with 960 tons valued at \$130,000, followed very closely by El Salvador, with 900 tons valued at \$100,000. In 1956, Guatemala's imports of 100 tons, valued at \$25,000, were low compared with the two preceding years, when they were 290 and 390 tons valued at \$55,000 and \$40,000 respectively (table 13).

Galvanized steel sheeting is widely used, instead of asbestos-cement sheeting, in certain Central American countries and in Panama (table 14). Between 1945 and 1956 consumption of this product increased at an ever faster rate in Central America and Panama, from 3,500 to 19,000 tons, and the value of imports rose from about \$400,000 to \$4,400,000.

Table 13

Central America and Panama: Imports of asbestos-cement sheeting,
1945-1956

| Year | Costa Rica | El Salvador | Guate- mala | Honduras | Nica- ragua | Total Central America | Panama | Total Central America and Panama |
|------------------------|---------------|----------------|----------------|----------|----------------|-----------------------------|--------|--|
| (Tons) | | | | | | | | |
| 1945 | 61 | - | - | 15 | - | 76 | 3 | 79 |
| 1946 | 77 | - | 28 | 445 | - | 550 | 113 | 663 |
| 1947 | 75 | - | 26 | 380 | - | 481 | 663 | 1,144 |
| 1948 | 14 | - | 289 | 163 | - | 466 | 204 | 670 |
| 1949 | 9 | - | 162 | 110 | - | 281 | 141 | 422 |
| 1950 | 3 | - | 679 | 151 | - | 833 | 141 | 974 |
| 1951 | 26 | 450 | 24 | 272 | 346 | 1,118 | 35 | 1,153 |
| 1952 | 748 | 274 | 33 | 3,030 | 379 | 4,464 | 91 | 4,555 |
| 1953 | 247 | 350 | 15 | 560 | 322 | 1,494 | 322 | 1,816 |
| 1954 | 124 | 514 | 287 | 596 | 708 | 2,229 | 866 | 3,095 |
| 1955 | 228 | 562 | 392 | 543 | 108 | 1,833 | 981 | 2,814 |
| 1956 | 506 | 903 | 99 | 962 | 249 | 2,719 | 1,002 | 3,721 |
| (Thousands of dollars) | | | | | | | | |
| 1945 | 17 | - | - | 1 | - | 18 | 2 | 20 |
| 1946 | 12 | - | 2 | 66 | - | 78 | 12 | 90 |
| 1947 | 26 | - | 4 | 25 | - | 55 | 161 | 216 |
| 1948 | 11 | - | 69 | 32 | - | 112 | 25 | 137 |
| 1949 | 2 | - | 22 | 11 | - | 35 | 19 | 54 |
| 1950 | 1 | - | 97 | 31 | - | 129 | 18 | 147 |
| 1951 | 3 | 52 | 3 | 23 | 45 | 126 | 7 | 133 |
| 1952 | 101 | 39 | 7 | 336 | 77 | 560 | 8 | 568 |
| 1953 | 24 | 45 | 2 | 75 | 78 | 224 | 30 | 254 |
| 1954 | 21 | 68 | 53 | 63 | 60 | 265 | 73 | 338 |
| 1955 | 21 | 45 | 39 | 61 | 19 | 185 | 73 | 258 |
| 1956 | 62 | 102 | 26 | 127 | 44 | 361 | 68 | 429 |

Source: Economic Commission for Latin America, based on Central American foreign trade statistics.

Table 14

Central America and Panama: Imports of galvanized steel
sheeting, 1945-1956

| Year | Costa Rica | El Salvador | Guate- mala | Honduras | Nicara- gua | Total Central America | Panama | Total Central America and Panama |
|------------------------|---------------|----------------|----------------|----------|----------------|-----------------------------|--------|--|
| (Tons) | | | | | | | | |
| 1945 | 930 | 257 | 847 | 429 | - | 2,463 | 1,070 | 3,533 |
| 1946 | 994 | 214 | 787 | 708 | - | 2,703 | 1,104 | 3,807 |
| 1947 | 477 | 279 | 526 | 830 | - | 2,112 | 847 | 2,959 |
| 1948 | 609 | 217 | 489 | 596 | - | 1,911 | 868 | 2,779 |
| 1949 | 730 | 369 | 845 | 738 | - | 2,682 | 900 | 3,582 |
| 1950 | 2,748 | 726 | 3,618 | 1,220 | 591 | 8,903 | 1,863 | 10,766 |
| 1951 | 1,586 | 1,168 | 2,726 | 1,874 | 779 | 8,133 | 750 | 8,883 |
| 1952 | 1,735 | 378 | 2,104 | 1,107 | 842 | 6,166 | 1,208 | 7,374 |
| 1953 | 4,246 | 1,827 | 3,136 | 1,350 | 1,783 | 12,342 | 1,566 | 13,908 |
| 1954 | 5,437 | 2,382 | 4,774 | 1,896 | 2,454 | 16,943 | 2,254 | 19,197 |
| 1955 | 2,035 | 2,028 | 4,336 | 1,546 | 2,054 | 11,999 | 1,771 | 13,770 |
| 1956 | 1,790 | 3,826 | 7,333 | 962 | 2,657 | 16,568 | 2,707 | 19,275 |
| (Thousands of dollars) | | | | | | | | |
| 1945 | 98 | 28 | 82 | 54 | - | 262 | 122 | 384 |
| 1946 | 133 | 26 | 131 | 85 | - | 375 | 153 | 528 |
| 1947 | 94 | 61 | 73 | 169 | - | 397 | 154 | 551 |
| 1948 | 199 | 40 | 94 | 135 | - | 468 | 151 | 619 |
| 1949 | 216 | 85 | 215 | 175 | - | 691 | 202 | 893 |
| 1950 | 590 | 156 | 872 | 234 | 114 | 1,966 | 416 | 2,382 |
| 1951 | 429 | 322 | 849 | 408 | 203 | 2,211 | 179 | 2,390 |
| 1952 | 482 | 96 | 741 | 306 | 259 | 1,884 | 311 | 2,195 |
| 1953 | 985 | 432 | 769 | 367 | 381 | 2,934 | 588 | 3,522 |
| 1954 | 1,134 | 522 | 1,027 | 449 | 485 | 3,617 | 453 | 4,070 |
| 1955 | 438 | 449 | 961 | 594 | 423 | 2,865 | 399 | 3,264 |
| 1956 | 345 | 898 | 1,772 | 127 | 619 | 3,761 | 627 | 4,388 |

Source: Economic Commission for Latin America, based on Central American foreign trade statistics.

(b) Cement blocks

Factories producing cement blocks of different sizes, with varying degrees of mechanization, are found in all the Central American countries and in Panama.

The largest and most mechanized of these, situated at Pueblo Nuevo on the outskirts of Panama City, can produce 15,000 blocks measuring 3" x 8" x 18" on the basis of an eight-hour-day shift, as well as blocks of larger dimensions. It also produces tiling for floors and roofs, cement bricks, and mooring posts. This factory has two shake-out machines for producing Basser blocks, a chute and a mechanical weigher which can service two block-producing machines intermittently, an automatic mixer and hydraulic trucks for transporting blocks to the drying-shed.

Another plant in Panama produces 1,600 to 1,800 blocks with two small machines manufactured in the country, and plans to install a new machine of domestic manufacture which will produce 8,000 blocks in an eight-hour shift.

In Guatemala, one of the largest factories can produce from 4,500 to 5,000 cement blocks of 20 x 20 x 40 cms. in an eight-hour shift, and another can produce 1,800 blocks in the same period of time. Besides these two, there are many other small factories with rudimentary machinery.

In Nicaragua, the cement factory has a block-producing plant with a monthly productive capacity of 80,000 to 100,000 blocks. In addition, it manufactures 2,000 fence-posts of prestressed concrete, as well as supports for the carrying of power lines. Another factory in Managua can produce 3,000 blocks of 4" x 8" x 16" in an eight-hour-day shift.

In Honduras, a factory is working with a productive capacity of 4,000 blocks, measuring 15 x 20 x 40 cms., for an eight-hour shift.

(c) Cement drain-pipes

Throughout Central America and Panama, cement pipes are manufactured with various diameters and by different methods of production. In El Salvador, the Ministry of Public Works produces them for its own use and also sells them to private individuals. In Tegucigalpa, the Fábrica Nacional de Tubos (National Pipe Factory) operates under the control of the Ministry of Public Works and manufactures pipes with a diameter varying from 4 to 24 inches.

In Panama, apart from a factory producing ordinary cement pipes up to a diameter of 36 inches, another plant manufactures special oval and circular

pipes for floors, with a productive capacity of 350 pipes in an eight-hour shift.

In Costa Rica, where the market has up to now been supplied by two factories producing vitrified clay pipes, there are plans to install a plant producing concrete pipes.

3. Steel products

(a) Steel rods

There is a fairly extensive demand for steel building-rods in Central America, which is almost fully met by imports. As in the case of cement, the apparent consumption of this product in the region rose rapidly between 1945 and 1956, from 10,587 to 37,445 tons - almost a fourfold increase. If the 1956 consumption of Panama, amounting to 5,784 tons, is added to the 1956 figure for Central America, the total comes to approximately 43,229 tons (see table 15).

Since 1941, a small steel rolling mill has, despite major difficulties, been operating at San Salvador. It is equipped with locally-made machinery and manufactures, from bales of soft scrap-iron, steel building-rods and light steel sections which are rolled with a rather old hand-operated bar milling machine. Between 1950 and 1956, this firm produced approximately 2,500 tons of rods, representing an average annual production of about 360 tons. One of the principal difficulties, of the many encountered by this plant, has been the problem of obtaining supplies of its raw material: low-carbon scrap. In order to overcome this difficulty and permit the use of any type of scrap, the plant has installed an electric furnace with a pouring capacity of 3.6 tons. As this plant is now producing about fifteen tons a day the domestic production of this building material will be increased by approximately 3,000 tons annually. At the present time the annual demand for steel rods in El Salvador is approximately 12,000 tons.

The present demand for steel rods and the foreseeable future increase in that demand make it advisable to consider the possibility of establishing a rolling mill as a Central American "integration industry" for the production of this material in Central America.

Table 15

Central America and Panama: Imports of steel rods, 1945-1956

| Year | Costa Rica | El Salvador ^{a/} | Guatemala | Honduras | Nicaragua | Total Central America | Panama | Total Central America and Panama |
|------------------------|------------|---------------------------|-----------|----------|-----------|-----------------------|--------|----------------------------------|
| (Tons) | | | | | | | | |
| 1945 | 318 | 3,268 | 5,375 | 464 | 1,162 | 10,587 | 7,170 | 17,757 |
| 1946 | 573 | 4,561 | 4,695 | 1,102 | 925 | 11,856 | 3,254 | 15,110 |
| 1947 | 1,313 | 4,564 | 5,103 | 2,275 | 1,448 | 14,703 | 6,154 | 20,857 |
| 1948 | 750 | 5,736 | 6,215 | 1,878 | 1,342 | 15,921 | 3,075 | 18,996 |
| 1949 | 1,163 | 4,966 | 7,161 | 902 | 2,392 | 16,584 | 3,957 | 20,541 |
| 1950 | 2,004 | 7,278 | 6,155 | 1,712 | 1,324 | 18,473 | 3,105 | 21,578 |
| 1951 | 2,253 | 11,143 | 7,637 | 1,295 | 2,298 | 24,626 | 4,126 | 28,752 |
| 1952 | 3,702 | 7,571 | 3,817 | 2,928 | 3,665 | 21,683 | 885 | 22,568 |
| 1953 | 4,849 | 5,179 | 7,156 | 3,106 | 3,364 | 23,654 | 3,317 | 26,971 |
| 1954 | 5,114 | 11,486 | 5,503 | 4,543 | 2,495 | 29,141 | 4,023 | 33,164 |
| 1955 | 7,594 | 13,000 | 8,980 | 2,888 | 3,244 | 35,706 | 5,205 | 40,911 |
| 1956 | 4,108 | 11,767 | 13,892 | 3,286 | 4,392 | 37,445 | 5,784 | 43,229 |
| (Thousands of dollars) | | | | | | | | |
| 1945 | 32 | 286 | 369 | 36 | 129 | 852 | 501 | 1,353 |
| 1946 | 63 | 441 | 374 | 100 | 129 | 1,107 | 225 | 1,332 |
| 1947 | 170 | 597 | 605 | 263 | 235 | 1,870 | 637 | 2,507 |
| 1948 | 107 | 869 | 846 | 307 | 314 | 2,443 | 328 | 2,771 |
| 1949 | 176 | 742 | 919 | 144 | 472 | 2,453 | 449 | 2,902 |
| 1950 | 198 | 794 | 569 | 146 | 155 | 1,862 | 189 | 2,051 |
| 1951 | 239 | 1,340 | 812 | 274 | 341 | 3,006 | 367 | 3,373 |
| 1952 | 565 | 742 | 513 | 489 | 637 | 2,946 | 113 | 3,059 |
| 1953 | 648 | 637 | 760 | 514 | 344 | 2,903 | 306 | 3,209 |
| 1954 | 528 | 1,202 | 523 | 629 | 306 | 3,188 | 358 | 3,546 |
| 1955 | 966 | 1,834 | 989 | 432 | 454 | 4,675 | 558 | 5,233 |
| 1956 | 600 | 1,712 | 1,775 | 431 | 762 | 5,280 | 698 | 5,978 |

Source: Economic Commission for Latin America, based on Central American foreign trade statistics.

a/ Includes light shapes of small cross-section.

(b) Welded steel tubing

Another steel-based building material consumed in considerable quantities in Central America is welded tubing for water-pipes and electrical wiring. In 1956, Central America imported 26,009 tons of this material, and Panama 4,583 tons, making a total of 30,592 tons (see table 16). Preliminary consideration has already been given to the possibility of making the manufacture of this product a Central American "integration industry".^{17/}

Since early in 1956, a Salvadorian firm has been producing, as a partial replacement for such tubing for electrical wiring, 1/2 and 3/4 inch internal diameter plastic tubing of imported polyethylene; it has already been approved for such use by the Salvadorian Inspectorate of Electrical Services. In 1957 between 600 and 750 metres of this tubing were produced daily. However, the output is expected to be tripled when the plant is moved to a new location.

Several plants are manufacturing polyethylene plastic products and plastic tubing in Guatemala, and another relatively large plant in Costa Rica is engaged solely in the production of polyethylene film for containers. Although they are not at present manufacturing polyethylene tubing for electrical wiring, the inclusion of this new item in their production plans would not require substantial capital outlay or additional technical knowledge.

^{17/} See United Nations, Economic Commission for Latin America, Central American Economic Integration (E/CN.12/422) (Mexico City, 1956), pp. 140-141.

Table 16

Central America and Panama: Imports of welded steel tubing, 1947-1956

| Year | Costa Rica | El Salvador | Guatemala | Honduras | Nicaragua | Total Central America | Panama | Total Central America and Panama |
|------------------------|------------|-------------|-----------|----------|-----------|-----------------------|--------|----------------------------------|
| (Tons) | | | | | | | | |
| 1947 | 18,904 | 521 | 2,901 | 7,406 | 1,005 | 30,737 | 6,711 | 37,448 |
| 1948 | 2,871 | 1,190 | 2,028 | 14,000 | 712 | 20,801 | 5,123 | 25,924 |
| 1949 | 3,821 | 1,280 | 4,782 | 9,000 | 1,133 | 20,016 | 3,773 | 23,789 |
| 1950 | 1,456 | 1,252 | 5,894 | 6,000 | 705 | 15,307 | 1,656 | 16,963 |
| 1951 | 2,862 | 1,937 | 3,079 | 8,000 | 898 | 16,776 | 3,284 | 20,060 |
| 1952 | 3,073 | 1,261 | 2,882 | 26,000 | 1,384 | 34,600 | 3,031 | 37,631 |
| 1953 | 4,746 | 1,276 | 6,536 | 16,008 | 1,451 | 30,017 | 2,102 | 32,119 |
| 1954 | 5,075 | 3,021 | 4,139 | 2,925 | 1,628 | 16,788 | 2,353 | 19,141 |
| 1955 | 6,172 | 3,692 | 6,909 | 3,156 | 2,141 | 22,070 | 3,762 | 25,832 |
| 1956 | 8,593 | 5,343 | 8,758 | 1,870 | 1,445 | 26,009 | 4,583 | 30,592 |
| (Thousands of dollars) | | | | | | | | |
| 1947 | 2,769 | 159 | 521 | 670 | 290 | 4,409 | 1,118 | 5,527 |
| 1948 | 555 | 313 | 472 | 2,301 | 193 | 3,834 | 932 | 4,766 |
| 1949 | 723 | 416 | 1,068 | 1,518 | 327 | 4,052 | 1,628 | 5,680 |
| 1950 | 310 | 306 | 982 | 912 | 191 | 2,701 | 242 | 2,943 |
| 1951 | 557 | 547 | 710 | 1,114 | 355 | 3,283 | 631 | 3,914 |
| 1952 | 538 | 407 | 631 | 2,633 | 480 | 4,689 | 635 | 5,324 |
| 1953 | 814 | 334 | 1,131 | 2,604 | 415 | 5,298 | 413 | 5,711 |
| 1954 | 843 | 733 | 785 | 859 | 501 | 3,721 | 416 | 4,137 |
| 1955 | 1,315 | 841 | 1,097 | 791 | 615 | 4,659 | 685 | 5,344 |
| 1956 | 1,898 | 1,265 | 2,220 | 515 | 521 | 6,419 | 936 | 7,355 |

Source: Economic Commission for Latin America, based on Central American foreign trade statistics.

4. The wood industry

With the exception of El Salvador, all the Central American countries, as well as Panama, have extensive forest resources.^{18/}

^{18/} For detailed study of these resources, see Informe sobre los recursos forestales y las posibilidades de producción de celulosa y papel en Centroamérica, prepared at the request of the Central American Economic Co-operation Committee by experts appointed by the Food and Agriculture Organization (Mexico City, 1954).

In 1953, the four lumber-producing countries of Central America exported a total of 219,200 tons of lumber, to a value of \$8.6 million. The main exporters were Honduras and Nicaragua; these exported 116,000 and 82,000 tons of lumber respectively, or 90 per cent of the total exports. In that year, the lumber trade in Central America, although lower in volume than normally, totalled \$883,000, most of the trade being concentrated in El Salvador. Equally in 1953, Salvadorian purchases of lumber from the other Central American countries reached \$670,000, or 77 per cent of the inter-Central American trade.

There were 440 sawmills operating in the region during that period, some of them working both for the domestic market and for export, while others were engaged solely in supplying the domestic market. The majority of these sawmills were very small and did not, generally speaking, produce by the modern processes which increase the lumber's value, usefulness and durability. Consequently, the FAO mission, which surveyed the timber resources of Central America, recommended in its report the adoption of artificial methods of drying lumber, its preservation by the application of pressure, its improvement through impregnation with resins and, finally, the application of high temperatures and pressures or various combinations of these processes.^{19/}

Another obstacle to the economic utilization of timber resources in Central America is the diversity of sizes into which lumber is cut in the region, which causes considerable waste and increases the material's cost unnecessarily.

In view of the fact that the Central American pulp and paper plant, whose establishment in Honduras was recommended by the Central American Economic Co-operation Committee, is to have a modern sawmill annexed to it,^{20/} consideration should be given to the desirability of standardizing lumber sizes in Central America, so as to void waste as far as possible, reduce costs, and thus expand the use of this indigenous building material.

^{19/} In August 1957, a lumber impregnation plant commenced operations in Guatemala. The method of impregnation it employs involves application of high pressure by means of compressed steam and the use of creosote and mineral salts for the impregnation. It can treat 6 million feet of lumber yearly.

^{20/} For further details, see United Nations, Proyecto para la fabricación de delulosa y papel en Centroamérica, prepared by an FAO mission (FAO/157/1/603) (Mexico City, 1957), pp. 84-93.

(a) Manufacture of doors and windows

As a rule, wooden doors and windows are made in Central America by methods of carftsmanship. They are almost always manufactured in carpenters' workshops, which also produce other articles. They are normally made only to order, and the demand calls for a great variety of dimensions which alter for practically every job, with the result that it would not be economic to manufacture these items in order to establish stocks.

As in the case of sawn lumber, it might well be possible to achieve substantial economies in this sector of production, and to expand the market, by adopting standard sizes and by simplifying and reducing the varieties of doors and windows produced. If some progress could be made in this direction, it might serve as a basis for the establishment of one or more Central American plants to produce doors and windows for the whole Central American market, according to modern methods.

Meanwhile, a new industry now appearing in Central America and Panama is partially^{21/} replacing the production of wooden doors and windows. This is the aluminium door and window industry, which uses light aluminium shapes and other imported components.

The largest and most highly mechanized of these plants, located at Panama City, commenced operations in 1952, maintains agencies in the five Central American capitals and sends all its products to Central America by air freight. This plant manufactures articles to order and also produces windows for the building-up of stocks. It is currently expanding, and new premises are under construction. In addition, there is another plant at Panama City and a further one in the Colón Free Trade Zone.

Both El Salvador and Guatemala have plants manufacturing aluminium windows, but particulars of these factories are not available. Furthermore, the import statistics of many countries of the region do not classify these products clearly enough - trade in them being of recent date - and it is therefore impossible to obtain a full picture of the situation. Imports into El Salvador of aluminium doors, windows and mouldings, which amounted to approximately 18 tons in 1951, rose to 71 tons in 1955, but fell to 54 tons in 1956.

^{21/} As it produces windows primarily.

(b) Production of plywood

Four plywood manufacturing plants are at present operating in this area - one at Las Quebradas in the department of Izabal, Guatemala, one at Puerto Castilla in Honduras and - since 1958 - one in Nicaragua. An additional plant is functioning in Panama, approximately twenty kilometres from the capital.

The firm which appears to have operated most successfully is that in Guatemala, which started work in 1950 and produces quarter-inch plywood from the woods known as banak or sangre, laurel, chestnut and San Juan; these had not previously been in commercial use in the country. This plant is theoretically capable of producing 18 million square feet of plywood annually, working three shifts daily. However, its capacity is at present only partially used, as two shifts only are worked.

Nevertheless, between 1951, its first full year of operation, and 1956, it almost doubled its output, producing in the latter year a total of 6.8 million square feet of plywood. In the light of the production figures for the first half of 1957, it is hoped that the total output for the year will reach 9 million square feet.

Approximately 50 per cent of this plant's production is sold on the domestic market - the remainder being exported, mainly to Cuba and El Salvador, with a small amount being sold to the United States and to Puerto Rico.

Table 17

Guatemala: Exports of plywood by country of destination, 1955 and 1956

(Thousands of square feet)

| | 1955 | | 1956 | |
|---------------|----------|----------|----------|----------|
| | Quantity | per cent | Quantity | per cent |
| Guatemala | 2,661.4 | 48.1 | 3,580.0 | 52.0 |
| Cuba | 1,844.8 | 33.3 | 2,245.9 | 32.6 |
| El Salvador | 692.7 | 12.5 | 690.5 | 10.0 |
| United States | 96.3 | 1.7 | 322.1 | 4.7 |
| Puerto Rico | 240.6 | 4.4 | 47.2 | 0.7 |
| | 5,535.8 | | 6,885.7 | |

Source: Manufacturer.

This firm has a distributing agent in San Salvador, and consigns its product directly by rail from Las Quebradas to that city. The distributor in El Salvador has exported small quantities of plywood to Nicaragua. Although no specific data is available, it is estimated that the cost of transport by road to Costa Rica may constitute an obstacle to a trade in this product.

The second Central American plywood plant, which commenced operations in 1955 at Puerto Castilla, Honduras, has a productive capacity of 20,000 square feet of quarter-inch plywood, on the basis of two eight-hour shifts - equivalent to 6 million square feet yearly. However, this plant, which has specialized in the production of plywood from valuable woods such as cedar and mahogany, has been unable to operate normally owing to market difficulties and is currently producing about 4,000 square feet per eight-hour shift.

Approximately 50 per cent of its production has been exported to Puerto Rico and 20 per cent to El Salvador. However, although it enters the latter country duty-free, it is being displaced on the Salvadorian market by Japanese plywood, which sells there at a lower price. Apart from the fact that Honduran plywood is higher in quality than the Japanese product, being made of better woods and therefore, presumably, costing more to produce, and that the costs are further increased by the limited use made of productive capacity, a further unfavourable factor which is of prime importance is the high cost of transport. The only practical way of consigning the plywood from Puerto Castilla to Tegucigalpa is by air, and the air freight rate is \$20 per thousand square feet. The rate from Puerto Castilla to San Salvador is \$30.

In order to expand its market, this plant is considering the possibility of producing prefabricated houses of plywood for export to Venezuela.

Finally, another plywood plant, located not far from Panama City, has been operating for several years under various managements and with varying results. It is capable of producing approximately 12 million square feet of plywood annually. However, it has been impossible to obtain production or export figures from this firm. The total exports of this product during the period 1952-1956 were as follows:

Table 18

Panama: Exports of plywood, 1952-56

| Year | Square feet | Dollars |
|------|-------------|---------|
| 1952 | 151,172 | 21,033 |
| 1953 | 3,969,251 | 420,010 |
| 1954 | 413,167 | 66,027 |
| 1955 | 1,456,898 | 178,150 |
| 1956 | 929,590 | 74,246 |

Source: Statistics and Census Department.

As will be seen from this table, the level of these exports was very uneven during the period.

5. Porcelain sanitary ware and tiles

In Central America and Panama there are only two tile-producing plants in operation. The plant in Panama also produces porcelain sanitary ware and has for some time been exporting this and porcelain tiles, to all the Central American countries, and Aruba, Colombia, Curaçao, Ecuador and Venezuela. It has recently had to suspend exports, because its full capacity was currently absorbed by increase in the domestic demand. Ninety-five per cent of the raw material it uses is of domestic origin.

The plant in Guatemala, which was established several years ago, operated unsuccessfully until it received technical assistance from the Panamanian firm mentioned above. Production on a commercial scale began in 1958. Working two eight-hour shifts per day, it has a monthly productive capacity of 300,000 tiles and hopes to begin production of porcelain sanitary ware at some later date.

In Costa Rica the manufacture of porcelain sanitary ware and tiles was attempted some time ago, but failed. Porcelain sanitary ware is now being produced by another plant, but all of the raw material is imported from California.

Although there are no concrete data on which to base an estimate of the future production of tiles and sanitary ware in Central America and Panama, it is probable that, when the Panamanian firm increases its capacity by 40 per cent as planned, a surplus of these articles will become available for export to Central America. The Guatemalan plant should be able to supply most of Guatemala's domestic needs, and it is hoped that the proposed Costa Rican plant will be able to do likewise in respect of Costa Rica. Eventually, the two Central American plants will be able to export their surplus production to El Salvador, Honduras and Nicaragua.

In 1956, imports of porcelain sanitary ware into Central America and Panama totalled 1,700 tons with a value of approximately \$1 million (table 19), while imports of tiles amounted to 1,300 tons with a value of almost \$500,000 (table 20).

Table 19

Central America and Panama: Imports of porcelain sanitary ware, 1945-1956

| Year | Costa Rica | El Salvador | Guatemala | Honduras | Nicaragua | Total Central America | Panama | Total Central America and Panama |
|--------|------------|-------------|-----------|----------|-----------|-----------------------|--------|----------------------------------|
| (tons) | | | | | | | | |
| 1945 | 167 | 95 | 212 | 53 | - | 527 | 285 | 812 |
| 1946 | 45 | 49 | 125 | 42 | - | 261 | 120 | 381 |
| 1947 | 66 | 130 | 133 | 41 | - | 370 | 150 | 520 |
| 1948 | 129 | 180 | 221 | 91 | - | 621 | 219 | 840 |
| 1949 | 241 | 274 | 319 | 114 | - | 948 | 129 | 1,177 |
| 1950 | 184 | 184 | 247 | 124 | - | 739 | 78 | 817 |
| 1951 | 226 | 396 | 406 | 117 | - | 1,145 | 56 | 1,203 |
| 1952 | 256 | 358 | 263 | 113 | - | 990 | 44 | 1,034 |
| 1953 | 344 | 335 | 253 | 141 | - | 1,073 | 15 | 1,088 |
| 1954 | 431 | 328 | 168 | 119 | - | 1,046 | 29 | 1,075 |
| 1955 | 363 | 461 | 453 | 146 | - | 1,424 | 25 | 1,449 |
| 1956 | 423 | 526 | 463 | 206 | - | 1,618 | 36 | 1,654 |

Table 19 (continued)

| Year | Costa Rica | El Salvador | Guatemala | Honduras | Nicaragua | Total Central America | Panama | Total Central America and Panama |
|------------------------|------------|-------------|-----------|----------|-----------|-----------------------|--------|----------------------------------|
| (Thousands of dollars) | | | | | | | | |
| 1945 | 83 | 44 | 109 | 24 | - | 260 | 111 | 371 |
| 1946 | 23 | 28 | 58 | 20 | - | 129 | 54 | 183 |
| 1947 | 40 | 106 | 92 | 25 | - | 263 | 90 | 353 |
| 1948 | 114 | 153 | 172 | 66 | - | 505 | 165 | 670 |
| 1949 | 170 | 198 | 189 | 79 | - | 636 | 120 | 756 |
| 1950 | 102 | 124 | 143 | 83 | - | 452 | 52 | 504 |
| 1951 | 138 | 287 | 242 | 67 | - | 734 | 58 | 792 |
| 1952 | 172 | 189 | 148 | 83 | - | 592 | 45 | 637 |
| 1953 | 210 | 205 | 117 | 77 | - | 609 | 12 | 621 |
| 1954 | 247 | 221 | 88 | 70 | - | 626 | 25 | 651 |
| 1955 | 207 | 281 | 220 | 86 | - | 763 | 23 | 786 |
| 1956 | 252 | 351 | 254 | 98 | - | 955 | 34 | 989 |

Source: Economic Commission for Latin America, based on Central American foreign trade statistics.

As in the case of welded steel tubing, these two related industries have already been suggested for consideration by the Central American authorities as possible fields for industrial integration.

Table 20

Central America and Panama: Imports of tiles, 1945-1956

| Year | Costa Rica | El Salvador | Guatemala | Honduras | Nicaragua | Total Central America | Panama | Total Central America and Panama |
|--------|------------|-------------|-----------|----------|-----------|-----------------------|--------|----------------------------------|
| (tons) | | | | | | | | |
| 1945 | ... | ... | 72 | ... | ... | 72 | 166 | 238 |
| 1946 | ... | ... | 126 | ... | ... | 126 | 330 | 456 |
| 1947 | ... | ... | 146 | ... | ... | 146 | 39 | 185 |
| 1948 | ... | ... | 208 | ... | ... | 208 | 22 | 230 |
| 1949 | 12 | ... | 107 | ... | ... | 119 | 314 | 433 |
| 1950 | 160 | ... | 181 | ... | ... | 341 | 199 | 540 |
| 1951 | 104 | 308 | 324 | ... | ... | 428 | 16 | 444 |
| 1952 | 172 | 360 | 215 | ... | ... | 387 | 10 | 397 |
| 1953 | 144 | 234 | 117 | ... | ... | 261 | 6 | 267 |
| 1954 | 233 | 341 | 157 | ... | ... | 390 | 21 | 411 |
| 1955 | 245 | 316 | 235 | ... | ... | 482 | 20 | 502 |
| 1956 | 168 | 445 | 627 | ... | ... | 1,240 | 4 | 1,244 |

Table 20 (continued)

| Year | Costa Rica | El Salvador | Guatemala | Honduras | Nicaragua | Total Central America | Panama | Total Central America and Panama |
|------------------------|------------|-------------|-----------|----------|-----------|-----------------------|--------|----------------------------------|
| (Thousands of dollars) | | | | | | | | |
| 1945 | ... | ... | 15 | ... | ... | 15 | 45 | 60 |
| 1946 | ... | ... | 26 | ... | ... | 26 | 62 | 88 |
| 1947 | ... | ... | 58 | ... | ... | 58 | 15 | 73 |
| 1948 | ... | ... | 161 | ... | ... | 161 | 6 | 167 |
| 1949 | 4 | ... | 35 | ... | ... | 39 | 67 | 106 |
| 1950 | 30 | ... | 45 | ... | ... | 75 | 45 | 120 |
| 1951 | 15 | 232 | 81 | ... | ... | 328 | 6 | 334 |
| 1952 | 36 | 230 | 55 | ... | ... | 321 | 4 | 325 |
| 1953 | 28 | 138 | 29 | ... | ... | 195 | 3 | 198 |
| 1954 | 37 | 128 | 32 | ... | ... | 197 | 7 | 204 |
| 1955 | 48 | 155 | 55 | ... | ... | 258 | 7 | 265 |
| 1956 | 41 | 270 | 123 | ... | ... | 434 | 2 | 436 |

Source: Economic Commission for Latin America, based on Central American foreign trade statistics.

6. Paints and varnishes

The situation with regard to the paint and varnish industry in Central America and Panama is somewhat similar to that of the tile and porcelain sanitary ware industry. There are two plants in Panama (one in Panama City, the other in the Colón Free Trade Zone) and one each in El Salvador and Costa Rica.

The plant in El Salvador, which began operations in 1957, can produce 500 gallons of paint per day or approximately 10,000 gallons per month. At present, however, it is producing no more than approximately 3,000 gallons per month. It produces latex-based paints, as well as flat and glossy oil paints, and manufactures its own tin-plate containers, using imported raw materials for all its products.

The plant in Costa Rica has an annual productive capacity of 300,000 gallons (1,500 tons) of paint, and produced 50,000 gallons in 1955. It currently produces flat and glossy oil paints, water paints in paste form emulsified with oil, aluminium paints, enamels and latex-based paints.

Table 21

Central America and Panama: Paint imports, 1947-1956

| Year | Costa Rica | El Salvador | Guatemala | Honduras | Nicaragua | Total Central America | Panama | Total Central America and Panama |
|------------------------|------------|-------------|-----------|----------|-----------|-----------------------|--------|----------------------------------|
| (Tons) | | | | | | | | |
| 1947 | 984 | 429 | 555 | 397 | 452 | 2,817 | 1,327 | 4,144 |
| 1948 | 923 | 275 | 553 | 790 | 516 | 3,057 | 383 | 3,440 |
| 1949 | 984 | 352 | 625 | 421 | 320 | 2,702 | 479 | 3,181 |
| 1950 | 830 | 403 | 487 | 642 | 704 | 3,066 | 742 | 3,808 |
| 1951 | 996 | 497 | 524 | 565 | 528 | 3,110 | 527 | 3,637 |
| 1952 | 1,069 | 596 | 507 | 1,045 | 651 | 3,868 | 585 | 4,453 |
| 1953 | 1,173 | 667 | 572 | 597 | 764 | 3,773 | 807 | 4,580 |
| 1954 | 1,139 | 736 | 630 | 661 | 971 | 4,137 | 947 | 5,084 |
| 1955 | 1,152 | 545 | 912 | 749 | 992 | 4,350 | 918 | 5,268 |
| 1956 | 1,074 | 781 | ... | 489 | 770 | 3,114 | 1,110 | 4,224 |
| (Thousands of dollars) | | | | | | | | |
| 1947 | 478 | 256 | 238 | 185 | 232 | 1,389 | 594 | 1,983 |
| 1948 | 409 | 180 | 259 | 416 | 282 | 1,546 | 171 | 1,717 |
| 1949 | 469 | 236 | 285 | 204 | 189 | 1,383 | 200 | 1,583 |
| 1950 | 411 | 240 | 222 | 336 | 361 | 1,570 | 249 | 1,819 |
| 1951 | 499 | 316 | 238 | 330 | 291 | 1,674 | 239 | 1,913 |
| 1952 | 554 | 394 | 250 | 622 | 374 | 2,194 | 272 | 2,466 |
| 1953 | 616 | 465 | 283 | 334 | 481 | 2,179 | 350 | 2,529 |
| 1954 | 575 | 500 | 330 | 405 | 570 | 2,380 | 412 | 2,792 |
| 1955 | 680 | 358 | 472 | 483 | 605 | 2,598 | 400 | 2,998 |
| 1956 | 596 | 581 | ... | 310 | 556 | 2,043 | 480 | 2,523 |

Source: Economic Commission for Latin America, based on Central American foreign trade statistics.

Table 22

Central America and Panama: Varnish imports, 1947-1956

| Year | Costa Rica | El Salvador | Guatemala | Honduras | Nicaragua | Total Central America | Panama | Total Central America and Panama |
|------------------------|------------|-------------|-----------|----------|-----------|-----------------------|--------|----------------------------------|
| (Tons) | | | | | | | | |
| 1947 | 7 | 20 | 27 | 15 | ... | 69 | ... | 69 |
| 1948 | 12 | 17 | 22 | 25 | ... | 76 | 113 | 189 |
| 1949 | 21 | 17 | 22 | 20 | ... | 80 | 184 | 264 |
| 1950 | 18 | 20 | 32 | 16 | ... | 86 | 196 | 282 |
| 1951 | 18 | 20 | 24 | 19 | ... | 81 | 114 | 195 |
| 1952 | 26 | 23 | 26 | 28 | ... | 103 | 118 | 221 |
| 1953 | 42 | 27 | 29 | 21 | ... | 119 | 140 | 259 |
| 1954 | 34 | 23 | 31 | 19 | ... | 107 | 192 | 299 |
| 1955 | 33 | 22 | 40 | 23 | ... | 118 | 232 | 348 |
| 1956 | 240 | ... | ... | 102 | ... | 342 | 247 | 589 |
| (Thousands of dollars) | | | | | | | | |
| 1947 | 5 | 9 | 14 | 11 | ... | 39 | ... | 39 |
| 1948 | 8 | 11 | 15 | 22 | ... | 56 | 96 | 152 |
| 1949 | 18 | 9 | 13 | 18 | ... | 58 | 128 | 186 |
| 1950 | 12 | 10 | 18 | 14 | ... | 54 | 128 | 182 |
| 1951 | 16 | 12 | 15 | 13 | ... | 56 | 95 | 151 |
| 1952 | 20 | 14 | 17 | 24 | ... | 75 | 108 | 183 |
| 1953 | 33 | 17 | 19 | 17 | ... | 86 | 125 | 211 |
| 1954 | 27 | 16 | 20 | 14 | ... | 77 | 190 | 267 |
| 1955 | 26 | 37 | 31 | 20 | ... | 114 | 183 | 297 |
| 1956 | 210 | ... | ... | 102 | ... | 312 | 193 | 505 |

Source: Economic Commission for Latin America, based on Central American foreign trade statistics.

No information is available concerning the Panamanian plants. In 1956, 4,200 tons of paint valued at \$2.5 million and approximately 600 tons of varnish valued at \$500,000 were imported into Central America and Panama (tables 21 and 22).

These activities have also been proposed for consideration as a Central American "integration industry"^{22/} and, given the volume of these products consumed in the region, there is obviously a possibility of exchange arrangements if the capacity of the plants in operation suffices to provide a surplus for export, after supplying the domestic markets.

7. Sheet glass

Another building material the consumption of which has increased appreciably in recent years, and which is not at present produced in Central America or Panama, is sheet glass. Imports of this product rose from 2,150 tons in 1945 to 4,700 tons in 1956, their value increasing from \$0.5 to \$1 million during the same period (table 23).

From preliminary information, it appears that deposits of silica, one of the principal raw materials used in the production of glass, have been discovered in several Central American countries.

The Central American Economic Co-operation Committee has shown interest in studying the possibility of establishing a plant for the manufacture of glass bottles, as there may be a market for these products - used principally by the beer, soft drink and other industries.

In view of the scope of this industry, it would be desirable, once a comprehensive survey has been made of the natural resources, to consider the feasibility of producing sheet glass in addition to glass bottles, with a view to establishing both industries in a co-ordinated manner, if possible.

^{22/} See Central American Economic Integration, op. cit., pp. 162-167.

Table 23

Central America and Panama: Imports of sheet glass, 1945-1956

| Year | Costa Rica | El Salvador | Guatemala | Honduras | Nicaragua | Total Central America | Panama | Total Central America and Panama |
|------------------------|------------|-------------|-----------|----------|-----------|-----------------------|--------|----------------------------------|
| (Tons) | | | | | | | | |
| 1945 | 481 | 144 | 307 | 73 | 746 | 1,751 | 395 | 2,146 |
| 1946 | 251 | 127 | 221 | 66 | 579 | 1,244 | 683 | 1,927 |
| 1947 | 323 | 241 | 468 | 95 | 936 | 2,063 | 833 | 2,896 |
| 1948 | 448 | 327 | 488 | 190 | 1,475 | 2,928 | 247 | 3,175 |
| 1949 | 486 | 245 | 492 | 110 | 802 | 2,135 | 247 | 2,382 |
| 1950 | 626 | 322 | 513 | 159 | 135 | 1,755 | 274 | 2,029 |
| 1951 | 620 | 471 | 646 | 161 | 358 | 2,256 | 255 | 2,511 |
| 1952 | 659 | 461 | 554 | 191 | 223 | 2,088 | 256 | 2,344 |
| 1953 | 689 | 506 | 757 | 201 | 280 | 2,433 | 458 | 2,891 |
| 1954 | 895 | 651 | 749 | 297 | 435 | 3,027 | 507 | 3,524 |
| 1955 | 1,143 | 696 | 827 | 352 | 435 | 3,453 | 628 | 4,081 |
| 1956 | 1,081 | 803 | 1,295 | 254 | 430 | 3,863 | 818 | 4,681 |
| (Thousands of dollars) | | | | | | | | |
| 1945 | 62 | 25 | 40 | 15 | 234 | 376 | 161 | 537 |
| 1946 | 46 | 21 | 23 | 13 | 184 | 287 | 271 | 558 |
| 1947 | 75 | 76 | 101 | 21 | 249 | 522 | 356 | 878 |
| 1948 | 89 | 82 | 92 | 42 | 334 | 639 | 75 | 714 |
| 1949 | 90 | 59 | 87 | 33 | 240 | 509 | 69 | 578 |
| 1950 | 98 | 70 | 83 | 33 | 25 | 309 | 70 | 379 |
| 1951 | 103 | 98 | 100 | 30 | 58 | 389 | 59 | 448 |
| 1952 | 90 | 105 | 91 | 33 | 41 | 360 | 66 | 426 |
| 1953 | 115 | 118 | 118 | 45 | 59 | 455 | 116 | 571 |
| 1954 | 148 | 157 | 109 | 68 | 80 | 562 | 131 | 693 |
| 1955 | 176 | 182 | 139 | 72 | 72 | 641 | 152 | 793 |
| 1956 | 214 | 188 | 224 | 47 | 74 | 747 | 188 | 935 |

Source: Economic Commission for Latin America, based on Central American foreign trade statistics.

8. Present and anticipated shortages of building materials

Despite the fair amount of building materials being produced in Central America and Panama, there is, in these countries, a serious shortage of such materials. Furthermore, judging from the trends observed from 1945 to 1956, it seems likely that, except in very rare cases, the shortage will become more pronounced if the economic conditions of recent years continue to obtain.

So far as Central America is concerned, the volume of imports of building materials (table 24) is taken as an indication, it will be seen that, between 1945 and 1956,^{23/} the shortage of galvanized steel sheeting, asbestos-cement sheeting, steel rods, porcelain sanitary ware, cement and sheet glass became much more severe; while that of varnishes, paints, welded steel tubing and tiles was also more severe, though to a lesser degree. If the shortage for Central America and Panama together is considered the trend is much the same, except for cement and porcelain sanitary ware, imports of which were, in Panama, fairly successfully replaced by locally-produced materials.

In 1956, shortages in these ten building materials amounted to \$23.3 million in Central America and \$26.6 million in Central America and Panama combined (table 25); this gives some idea of the size of the problem and of the desirability of replacing imports, so far as possible, by domestic production.

^{23/} With the exceptions as to date indicated in the table.

Table 24

Central America and Panama: Shortage of building materials in 1945 and 1956, and its percentage increase

(Tons)

| | Central America | | | Central America and Panama | | |
|------------------------------|----------------------|---------------------|------------------------|----------------------------|---------------------|------------------------|
| | 1945 | 1956 | Increase (per cent) | 1945 | 1956 | Increase (per cent) |
| Cement | 51,867 | 139,755 | 169.4 | 104,335 | 139,759 | 34.0 |
| Asbestos-cement sheeting | 550 ^{a/} | 2,719 | 394.4 | 663 ^{a/} | 3,721 | 461.1 |
| Galvanized steel sheeting | 2,463 | 16,568 | 573.1 | 3,533 | 19,275 | 445.6 |
| Steel rods | 10,587 | 37,445 | 253.7 | 17,757 | 43,229 | 143.4 |
| Welded steel tubing | 20,801 ^{b/} | 26,009 | 25.0 | 25,924 ^{b/} | 30,592 | 18.0 |
| Tiles | 428 ^{c/} | 482 ^{d/} | 12.6 | 444 ^{c/} | 502 ^{d/} | 13.1 |
| Porcelain sanitary ware | 527 | 1,618 | 207.0 | 812 | 1,654 | 103.7 |
| Paints | 3,057 ^{b/} | 4,350 ^{d/} | 42.3 | 3,440 ^{b/} | 5,268 ^{d/} | 53.1 |
| Varnishes | 76 ^{b/} | 118 ^{d/} | 55.3 | 189 ^{b/} | 348 ^{d/} | 84.1 |
| Sheet glass | 1,751 | 3,863 | 120.6 | 2,146 | 4,681 | 118.1 |

Sources: The preceding tables.

^{a/} 1946.

^{b/} 1948.

^{c/} 1951.

^{d/} 1955.

With a view to facilitating the problem's consideration, the figures for the value of the imports of ten important building materials have been classified under two heads: materials entirely imported, and materials partly produced in Central America and Panama and partly imported.

Table 25

Central America and Panama: Value of imports of ten building materials, 1956

(Thousands of dollars)

| | Central America | | Central America and Panama | |
|---|-----------------|--------------|----------------------------|--------------|
| <u>Total imports</u> | <u>23,341</u> | <u>100.0</u> | <u>26,561</u> | <u>100.0</u> |
| <u>Materials entirely imported:</u> | <u>16,207</u> | <u>69.4</u> | <u>18,656</u> | <u>70.2</u> |
| Steel products (welded tubing, rods and galvanized sheeting) | 15,460 | 66.2 | 17,721 | 66.7 |
| Sheet glass | 747 | 3.2 | 935 | 3.5 |
| <u>Materials locally produced in part:</u> | <u>7,134</u> | <u>30.6</u> | <u>7,905</u> | <u>29.8</u> |
| Cement | 3,029 | 13.0 | 3,029 | 11.4 |
| Paints and varnishes | 2,355 | 10.1 | 3,028 | 11.4 |
| Porcelain sanitary ware and tiles | 1,389 | 6.0 | 1,419 | 5.4 |
| Asbestos-cement products | 361 | 1.5 | 429 | 1.6 |

Sources: The preceding tables.

This classification shows that building materials not at present produced in Central America and Panama accounted for 70 per cent of the value of the imports of the ten materials into these regions in 1956: steel sheeting (67 per cent) and sheet glass (3.5 per cent). On the other hand, 30 per cent of the value of the imports consisted of the value of materials which were already being produced, though not in quantities sufficient to meet the demand - such as cement, paints and varnishes, porcelain sanitary ware and tiles, and asbestos-cement products.

The present consumption of the materials in the first group - steel sheeting and sheet glass - is 93,000 and 4,700 tons respectively, and the probable increase in the future would justify a detailed study of the market and of the possibility of establishing plants which for their output could rely on the entire market of Central America and Panama. There are examples of non-integrated plants producing steel sheeting and light sections which operate economically at production levels similar to those that might be expected for a market of this size, and which use imported ingots or bars.

This approach would be suitable in regard to the production of steel rods and welded steel tubing, the consumption of which, in 1956, was 43,000 and 31,000 tons respectively - because flat rolled products raise considerable difficulties with regard to the size of the plant, and the investment required would not be justified by the present market, as the 1956 consumption was only 19,000 tons. The production of welded tubing has already been proposed as a possible industry in Central America.

In the following pages, the potentialities of the second group - the building materials now partly produced in Central America and Panama - will be analysed and the productive capacity of these industries, in relation to the demand for their products, appraised.

Cement. In 1958 the Central American supply of cement amounted to 327,900 tons, as Guatemala's productive capacity doubled towards the end of 1957 and the new Nicaraguan kiln began producing in 1958. With the added output of the new plant in Honduras since 1959, the total production of cement in Central American reached 395,400 tons.

In order to determine the probable course of future demand for cement in Central America during the five-year period 1958-1962, forecasts were made on the basis of the consumption trends of 1945-1956. In the case of Panama, the forecast was based on the sales of cement for consumption in 1950-1955 (table 26).

On the hypothesis that the rate of economic activity and of building in general remains at the same high level as in 1945-1956, the forecast shows a probable cement consumption in Central America, in 1962, of about 718,000 tons, and in Panama of about 110,000 tons, making a total of some 828,000 tons, (Hypothesis I).

It should be noted that in recent years some of these countries have undertaken vast highway construction plans, financed largely through foreign aid; such plans must have been instrumental in increasing the demand for cement. It is quite likely therefore that, once the construction work now under way is finished, consumption will drop to a lower level as the rate of increase slows down. For that reason, an alternative hypothesis for the future consumption of cement by these countries is submitted, 20 per cent lower than the preceding one, envisaging an average increase of 10 per cent.

Table 26

Central America and Panama: Forecast of the future consumption of
cement, 1958-1962

(Thousands of tons)

| Year | Guate- mala | Nica- ragua | El Salvador | Costa Rica | Hon- duras | Total Central America | Panama | Total Central America and Panama |
|----------------------|----------------|----------------|----------------|---------------|---------------|-----------------------------|------------------|--|
| 1956 ^{a/} | 106 | 44 | 85 | 64 | 31 | 330 | 66 ^{b/} | 396 |
| <u>Hypothesis I</u> | | | | | | | | |
| 1958 | 111 | 58 | 132 | 79 | 40 | 420 | 77 | 497 |
| 1959 | 129 | 66 | 156 | 89 | 45 | 485 | 84 | 569 |
| 1960 | 144 | 75 | 183 | 100 | 50 | 550 | 92 | 642 |
| 1961 | 161 | 85 | 215 | 112 | 57 | 630 | 100 | 730 |
| 1962 | 179 | 96 | 253 | 125 | 64 | 717 | 110 | 827 |
| <u>Hypothesis II</u> | | | | | | | | |
| 1958 | 111 | 55 | 125 | 76 | 38 | 405 | 71 | 476 |
| 1959 | 121 | 61 | 142 | 84 | 42 | 450 | 77 | 527 |
| 1960 | 132 | 68 | 162 | 92 | 46 | 500 | 82 | 582 |
| 1961 | 145 | 75 | 185 | 100 | 51 | 556 | 88 | 644 |
| 1962 | 158 | 83 | 211 | 110 | 56 | 618 | 95 | 713 |

Source: Economic Commission for Latin America, on the basis of consumption trends in 1945-56.

a/ "Apparent consumption" data as recorded.

b/ Sales for consumption in 1955.

Note: Hypothesis I is based on the rectilinear trend of consumption in each country for the period 1945-1956, and was obtained by means of the equation $Y_c = a + bX$, after the "least squares" method had been applied to the original data. This is how the trend up to 1962 was extrapolated.

For Hypothesis II, a rate of increase 20 per cent lower than in Hypothesis I was posited.

On the basis of Hypothesis I and of the capacity now installed and under construction, there would be a shortfall of 322,000 tons in Central American production in 1962, and of 324,000 tons if Panama is included. If the two additional projects now under study are taken into account, the shortfall would be reduced to 97,000 or 99,000 tons, depending on whether or not Panama is included in the calculation (see tables 27 and 28).

On the basis of the second hypothesis II, the expected consumption of cement would rise from 405,000 tons in 1958 to 618,000 tons in 1962, and Central America as a whole would then in this last year show a shortfall of 223,000 tons. As Panama seems likely to produce a surplus during that period, the shortage would be only about 210,000 tons in 1962 if that country were to be included in the calculations (table 29).

If the two projects now under study are completed during this period, there would in 1962 be no shortage for Central America and Panama combined, although there might be surpluses in some countries and substantial shortages in others.

If the situation is considered country by country and on the basis of the capacity now existing and under construction, Nicaragua and Panama would have surpluses that would become progressively smaller from 1958 to 1962, in which latter year they would amount to only 17,000 and 13,000 tons respectively. Guatemala would have small surpluses between 1958 and 1960, but there would be slight shortages from 1960 onwards; in 1962 the deficit would amount to 15,000 tons. There would be increasing shortages, of fair proportions, in Costa Rica and El Salvador, amounting to about 110,000 and 104,000 tons respectively in 1962; while there would be a small shortage, of 11,000 tons, in Honduras (table 30).

Table 27

Central America and Panama: Productive capacity now installed, under construction and planned, and expected consumption of cement, 1958-1962
(Hypothesis I)

(Thousands of tons)

| | (1) | (2) | (3) | (4) | (5) |
|-----------------------------------|---|--|----------------------|---|---|
| Year | Capacity installed and under construction | Capacity installed, under construction and planned | Expected consumption | Deficit (-) or surplus (+) production (1-3) | Deficit (-) or surplus (+) production (2-3) |
| <u>Central America</u> | | | | | |
| 1958 | 327.9 <u>a/</u> | 327.9 | 420.7 | - 92.8 | - 92.8 |
| 1959 | 395.4 <u>b/</u> | 545.4 <u>c/</u> | 483.8 | - 88.4 | + 61.5 |
| 1960 | 395.5 | 620.4 <u>d/</u> | 551.4 | - 156.0 | + 68.9 |
| 1961 | 395.4 | 620.4 | 628.8 | - 233.4 | - 8.4 |
| 1962 | 395.4 | 620.4 | 717.5 | - 322.1 | - 97.1 |
| 1958-62 | | | | - 892.8 | - 67.8 |
| <u>Central America and Panama</u> | | | | | |
| 1958 | 435.9 <u>a/</u> | 435.9 | 497.3 | - 61.4 | - 61.4 |
| 1959 | 503.4 <u>b/</u> | 653.4 <u>c/</u> | 567.5 | - 64.1 | + 85.8 |
| 1960 | 503.4 | 728.4 <u>d/</u> | 643.0 | - 139.6 | + 85.3 |
| 1961 | 503.4 | 728.4 | 728.9 | - 225.5 | - 0.5 |
| 1962 | 503.4 | 728.4 | 827.1 | - 323.7 | - 98.7 |
| 1958-62 | | | | - 814.4 | + 10.5 |

Sources: As indicated in the text.

- a/ 71,400 tons from the expanded Guatemalan production and 22,500 tons from Nicaragua, i.e., half of the Nicaraguan capacity, which will become available about the middle of the year.
- b/ 22,500 tons from the expanded Nicaraguan production (i.e., the 45,000 additional tons forthcoming from the whole year's operation), plus 45,000 tons from the new plant in Honduras.
- c/ 150,000 tons from the second guatemalan plant.
- d/ 75,000 tons from the new Costa Rican plant.

Table 28

Central America and Panama: Productive capacity installed, under construction and planned, and expected consumption of cement, by countries, 1958-1962

(Thousands of tons)

| | (1) | (2) | (3) | (4) | (5) |
|--------------------|---|---|----------------------|---|---|
| Year | Capacity installed and under construction | Capacity installed and under construction plus planned capacity | Expected consumption | Deficit (-) or surplus (+) production (1-3) | Deficit (-) or surplus (+) production (2-3) |
| <u>Guatemala</u> | | | | | |
| 1958 | 142.8 | 142.8 | 111.2 | + 31.5 | + 31.5 |
| 1959 | 142.8 | 292.8 | 128.6 | + 14.1 | + 164.1 |
| 1960 | 142.8 | 292.8 | 143.7 | - .9 | + 149.0 |
| 1961 | 142.8 | 292.8 | 160.6 | - 17.8 | + 132.1 |
| 1962 | 142.8 | 292.8 | 179.4 | - 36.6 | + 113.3 |
| 1958-62 | | | | - 9.7 | + 590.2 |
| <u>Nicaragua</u> | | | | | |
| 1958 | 78.0 | - | 57.9 | + 20.0 | + 20.0 |
| 1959 | 100.5 | - | 65.7 | + 34.7 | + 34.7 |
| 1960 | 100.5 | - | 74.6 | + 25.8 | + 25.8 |
| 1961 | 100.5 | - | 84.7 | + 15.7 | + 15.7 |
| 1962 | 100.5 | - | 96.2 | + 4.2 | + 4.2 |
| 1958-62 | | | | + 100.5 | + 100.5 |
| <u>El Salvador</u> | | | | | |
| 1958 | 107.1 | - | 132.4 | - 25.3 | - 25.3 |
| 1959 | 107.1 | - | 155.7 | - 48.6 | - 48.6 |
| 1960 | 107.1 | - | 183.1 | - 76.0 | - 76.0 |
| 1961 | 107.1 | - | 215.3 | - 108.2 | - 108.2 |
| 1962 | 107.1 | - | 253.2 | - 146.1 | - 146.1 |
| 1958-62 | | | | - 404.3 | - 404.3 |
| <u>Honduras</u> | | | | | |
| 1958 | - | - | 39.6 | - 39.6 | - 39.6 |
| 1959 | 45.0 | - | 44.6 | + .3 | + .3 |
| 1960 | 45.0 | - | 50.2 | - 5.2 | - 5.2 |
| 1961 | 45.0 | - | 56.5 | - 11.5 | - 11.5 |
| 1962 | 45.0 | - | 63.7 | - 18.7 | - 18.7 |
| 1958-62 | | | | - 74.8 | - 74.8 |

Table 28 (continued)

Central America and Panama: Productive capacity installed,
under construction and planned,
and expected consumption of
cement, by countries, 1958-1962

(Thousands of tons)

| | (1) | (2) | (3) | (4) | (5) |
|--------------------------------------|--|--|-------------------------|--|--|
| Year | Capacity installed and under construction | Capacity installed and under construction plus planned capacity | Expected consumption | Deficit (-) or surplus (+) production (1-3) | Deficit (-) or surplus (+) production (2-3) |
| <u>Costa Rica</u> | | | | | |
| 1958 | - | - | 79.4 | - 79.4 | - 79.4 |
| 1959 | - | - | 88.9 | - 88.9 | - 88.9 |
| 1960 | - | 75.0 | 99.6 | - 99.6 | - 24.6 |
| 1961 | - | 75.0 | 111.5 | - 111.5 | - 36.5 |
| 1962 | - | 75.0 | 124.9 | - 124.9 | - 49.9 |
| 1958-62 | | | | - 504.5 | - 279.5 |
| Total for Central America | | | | - 892.8 | - 67.8 |
| <u>Panama</u> | | | | | |
| 1958 | 108.0 | - | 76.5 | + 31.4 | + 31.4 |
| 1959 | 108.0 | - | 83.7 | + 24.2 | + 24.2 |
| 1960 | 108.0 | - | 91.6 | + 16.3 | + 16.3 |
| 1961 | 108.0 | - | 100.0 | + 7.9 | + 7.9 |
| 1962 | 108.0 | - | 109.6 | - 1.6 | - 1.6 |
| 1958-62 | | | | + 78.3 | + 78.3 |
| Total for Central America and Panama | | | | - 814.4 | + 10.5 |

Sources: As indicated in the text.

If regard is had only to the future of the cement industry in individual countries, it is obvious from the foregoing that, at the very least, the projected new plant in Costa Rica should be installed forthwith and the addition of a new kiln to the existing plant in El Salvador considered. However, if this problem is looked at from the standpoint of Central America and Panama combined, there should be close co-ordination of future plans so as to ensure that imports which would otherwise come from outside the region can be replaced by the production of the Central American countries and Panama.

From the fact that shortfalls are expected in some countries in the next few years and surpluses in others, it is clear that there will be opportunities for exchanges, of which greater advantage can be taken as transport improves

Table 29

Central America and Panama: Productive capacity installed, under construction and planned, and expected consumption of cement, 1958-1962
(Hypothesis II)

(Thousands of tons)

| | (1) | (2) | (3) | (4) | (5) |
|-----------------------------------|---|--|----------------------|---|---|
| Year | Capacity installed and under construction | Capacity installed, under construction and planned | Expected consumption | Deficit (-) or surplus (+) production (1-3) | Deficit (-) or surplus (+) production (2-3) |
| <u>Central America</u> | | | | | |
| 1958 | 327.9 a/ | 327.9 | 404.5 | - 76.6 | - 76.6 |
| 1959 | 395.4 b/ | 545.4 c/ | 449.5 | - 54.1 | + 95.9 |
| 1960 | 395.4 | 620.4 d/ | 499.6 | - 104.2 | + 120.8 |
| 1961 | 395.4 | 620.4 | 555.5 | - 160.1 | + 64.9 |
| 1962 | 395.4 | 620.4 | 617.9 | - 222.5 | + 2.5 |
| 1958-62 | | | | - 617.5 | + 207.5 |
| <u>Central America and Panama</u> | | | | | |
| 1958 | 435.9 a/ | 435.9 | 475.7 | - 39.8 | - 39.8 |
| 1959 | 503.4 b/ | 653.4 c/ | 526.0 | - 22.6 | + 127.4 |
| 1960 | 503.4 | 728.4 d/ | 581.8 | - 78.4 | + 146.6 |
| 1961 | 503.4 | 728.4 | 643.9 | - 140.5 | + 84.5 |
| 1962 | 503.4 | 728.4 | 712.9 | - 209.5 | + 15.5 |
| 1958-62 | | | | - 490.8 | + 334.2 |

Sources: As indicated in the text.

- a/ 71,400 tons from the expanded Guatemalan production and 22,500 tons from Nicaragua, i.e., half of the Nicaraguan capacity, which will become available about the middle of the year.
- b/ 22,500 tons from the expanded Nicaraguan production (i.e., the 45,000 additional tons forthcoming from the whole year's operation), plus 45,000 tons from the new plant in Honduras.
- c/ 150,000 tons from the second Guatemalan plant.
- d/ 75,000 tons from the new Costa Rican plant.

Table 30

Central America and Panama: Productive capacity installed, under construction and planned, and expected consumption of cement, by countries, 1958-1962
(Hypothesis II)

(Thousands of tons)

| | (1) | (2) | (3) | (4) | (5) |
|--------------------|---|--|----------------------|---|---|
| Year | Capacity installed and under construction | Capacity installed and under construction, plus planned capacity | Expected consumption | Deficit (-) or surplus (+) production (1-3) | Deficit (-) or surplus (+) production (2-3) |
| <u>Guatemala</u> | | | | | |
| 1958 | 142.8 | 142.8 | 110.5 | + 32.3 | + 32.3 |
| 1959 | 142.8 | 292.8 | 120.9 | + 21.9 | + 171.9 |
| 1960 | 142.8 | 292.8 | 132.2 | + 10.6 | + 162.6 |
| 1961 | 142.8 | 292.8 | 144.6 | - 1.8 | + 148.2 |
| 1962 | 142.8 | 292.8 | 158.2 | - 15.4 | + 134.6 |
| 1958-1962 | | | | + 47.6 | + 647.6 |
| <u>Nicaragua</u> | | | | | |
| 1958 | 78.0 | - | 55.2 | + 22.8 | + 22.8 |
| 1959 | 100.5 | - | 61.2 | + 39.3 | + 39.3 |
| 1960 | 100.5 | - | 67.8 | + 32.7 | + 32.7 |
| 1961 | 100.5 | - | 75.1 | + 25.4 | + 25.4 |
| 1962 | 100.5 | - | 83.2 | + 17.3 | + 17.3 |
| 1958-1962 | | | | + 137.5 | + 137.5 |
| <u>El Salvador</u> | | | | | |
| 1958 | 107.1 | - | 124.7 | - 17.6 | - 17.6 |
| 1959 | 107.1 | - | 142.2 | - 35.1 | - 35.1 |
| 1960 | 107.1 | - | 162.2 | - 55.1 | - 55.1 |
| 1961 | 107.1 | - | 185.0 | - 77.9 | - 77.9 |
| 1962 | 107.1 | - | 211.0 | - 103.9 | - 103.9 |
| 1958-1962 | | | | - 289.6 | - 289.6 |
| <u>Honduras</u> | | | | | |
| 1958 | - | - | 37.9 | - 37.9 | - 37.9 |
| 1959 | 45.0 | - | 41.7 | + 3.3 | + 3.3 |
| 1960 | 45.0 | - | 45.9 | - 0.9 | - 0.9 |
| 1961 | 45.0 | - | 50.5 | - 5.5 | - 5.5 |
| 1962 | 45.0 | - | 55.6 | - 10.6 | - 10.6 |
| 1958-1962 | | | | - 51.6 | - 51.6 |

Table 30 (continued)

Central America and Panama: Productive capacity installed, under construction and planned, and expected consumption of cement, by countries 1958-1962
(Hypothesis II)

(Thousands of tons)

| | (1) | (2) | (3) | (4) | (5) |
|--------------------------------------|---|--|----------------------|---|---|
| | Capacity installed and under construction | Capacity installed and under construction, plus planned capacity | Expected consumption | Deficit (-) or surplus (+) production (1-3) | Deficit (-) or surplus (+) production (2-3) |
| <u>Costa Rica</u> | | | | | |
| 1958 | - | - | 76.2 | - 76.2 | - 76.2 |
| 1959 | - | - | 83.5 | - 83.5 | - 83.5 |
| 1960 | - | 75.0 | 91.5 | - 91.5 | - 16.5 |
| 1961 | - | 75.0 | 100.3 | - 100.3 | - 25.3 |
| 1962 | - | 75.0 | 109.9 | - 109.9 | - 34.9 |
| 1958-1962 | | | | - 461.4 | - 236.4 |
| Total for Central America | | | | - 617.5 | + 207.5 |
| <u>Panama</u> | | | | | |
| 1958 | 108.0 | - | 71.2 | + 36.8 | + 36.8 |
| 1959 | 108.0 | - | 76.5 | + 31.5 | + 31.5 |
| 1960 | 108.0 | - | 82.2 | + 25.8 | + 25.8 |
| 1961 | 108.0 | - | 88.4 | + 19.6 | + 19.6 |
| 1962 | 108.0 | - | 95.0 | + 13.0 | + 13.0 |
| 1958-1962 | | | | + 126.7 | + 126.7 |
| Total for Central America and Panama | | | | - 490.8 | + 334.2 |

Sources: As indicated in the text.

Asbestos-cement products. As has been shown, the Guatemalan and Salvadorian plants manufacturing asbestos-cement products have a combined capacity of 4,500 tons annually, in the form of sheets, on the basis of an eight-hour shift. A somewhat rough estimate of the consumption of asbestos-cement sheets in Central America and Panama in 1956 was about 8,000 tons, some 3,700 tons of which were imported. From this it follows that if these factories were able to compete with similar products imported from outside the area, they could amply meet the present demand, working only two shifts per day.

Similarly, the increased demand resulting from an accelerated housing programme could be covered if these factories were able to work more than two shifts. Another problem of a different type is that of replacing, even partially, imports of galvanized steel sheeting by Central American production of asbestos-cement sheets - the present consumption of which, already considerable, might increase even more in certain Central American countries if the housing programmes were accelerated.

Cement blocks and drain-pipes; clay bricks, tiles and drain-pipes. As both these types of materials, one based on cement and the other on clay, are used for the same purposes and can be substituted for each other, they may, for the purpose of the present study, be considered together. Moreover, the various methods of production employed in Central America and Panama, ranging from hand-manufacture to highly-mechanized processes, display similarities at equivalent technical levels.

These building materials are produced in all the countries and do not, except in certain rare cases, appear in their foreign trade statistics. The productive capacity now existing in Central America and Panama may therefore be sufficient to supply the needs of each of the individual countries considered.

As the vast majority of the factories engaged in producing such articles usually work only one eight-hour shift per day, any increased demand which might result from an accelerated housing programme could easily be met by a more intensive utilization of each country's installed capacity.

Wood products. Because of the vast timber resources of all the countries except El Salvador, the large number of sawmills in operation, the fact that Central America is a large net exporter of unsawn and sawn timber, and the very considerable number of carpentry shops making doors and windows to order in all the Central American countries and Panama, there is no possibility of a common market for sawn timber or wooden doors and windows. However, if the latter could be standardized to a certain extent through the introduction of uniform

sizes and a reduction in the number of different types ordered, the market might be expanded, in which case the advisability of establishing one or more factories might be considered.

The productive capacity is sufficient to meet the additional demand for these building materials which might result from an accelerated housing programme.

Plywood is a special case. Although there are three plywood factories with a combined theoretical capacity of 36 million square feet of plywood per year, the actual capacity is much smaller; in fact, plywood is imported from Japan, Surinam and France. However, it has not been possible to determine the level of these imports, as it is only recently that this product has begun to be classified as a separate item in the importing countries' foreign trade statistics.

In reality, the only factory which has been working fairly normally is that in Guatemala. It has a maximum capacity of 18 million square feet of plywood annually, on the basis of three shifts per day; but it has so far been able to work only two shifts, its actual capacity thus being 12 million square feet annually. It is expected that 75 per cent of this capacity will be used this year to produce 9 million square feet of plywood.

In 1955 and 1956 this factory not only sold 50 per cent of its production on the Guatemalan market, but dispatched about 11 per cent to El Salvador, and exported about 39 per cent outside the area, mainly to Cuba (33 per cent).

According to the incomplete data collected, in 1956 Costa Rica, El Salvador and Nicaragua imported a total of 660 tons of plywood, i.e., approximately 2 million square feet - about one ninth of the theoretical capacity of the Guatemalan factory, or a little more than a third of its production for that year. This illustrates the trading possibilities which exist, seeing how much of the installed capacity in this industry is not fully used in Central America.

Tiles and porcelain sanitary ware; paints and varnishes. It is impossible to evaluate the supply of and demand for these building materials in Central America and Panama on the basis of the partial data available regarding the productive capacity and actual production of the factories producing them.

Regarding tiles and sanitary ware, it has already been pointed out that the Panamanian factory is planning to expand its productive capacity so as to be able to cater for the Central American market. The Guatemalan factory is still in an experimental stage of production so far as tiles are concerned, and has not yet begun to produce porcelain sanitary ware; it is not known to what degree it will be successful in placing its production on the local market.

Nevertheless, it is very likely that these two factories, and a third which it is planned to erect in Costa Rica, could meet the requirements of a large part of the Central American market (which, judging solely from imports, amounted in 1956 to about 1,300 tons of tiles and 1,700 tons of porcelain sanitary ware), including any increased demand which might reasonably be expected as a result of an accelerated housing programme.

The same considerations apply to the paint and varnish industry centred in factories in Costa Rica, El Salvador and Panama.

9. Possibility and requirements of a common market in building materials

The building materials market is one of the most dynamic in Central America, and is expanding rapidly. In 1956, the total value of the imports into Central America and Panama of ten selected building materials was \$26.6 million. The increase in the value of the imports during the period 1945-1956 was 573 per cent for galvanized steel sheeting, 254 per cent for steel rods, 207 per cent for porcelain sanitary ware, 394 per cent for asbestos-cement sheets and 120 per cent for sheet glass.

The analysis, in the preceding pages, of a relatively small group of building materials, together with this enormous increase in demand, shows that there are possibilities of free trade which, if properly exploited, would reduce the costs and prices of building materials.

In a first group of industries there are already, in various Central American countries, factories which are supplying all or part of the national demand for their products but which could use their present or planned future capacity to increase their production and cover - either temporarily or permanently, as the case may be - shortfalls in the production of other Central American countries. The industries concerned are those producing asbestos-cement sheets, plywood, cement, etc. In view of the relatively large shortfall in the production of these materials in Central America, the application of a free trade system and the co-ordination of activities between countries would probably lead to better use of productive capacity in Central America as a whole, and to reductions - possibly considerable ones - both in the cost and in the sale price of these products.

A second group of industries comprises a large number of relatively small plants, operating in all the countries, which satisfy practically the entire demand. Even in this group there appear to be possibilities of free trade. For

instance, in frontier areas it might be more economical to buy from a factory close at hand in a neighbouring country than from a non-foreign but distant factory. Furthermore, when there are too many factories, too scattered for their operation to be economic, free trade will tend to produce a more organic industrial structure and encourage production from the most efficient plants. It will also reduce real costs. Nevertheless, the general effect of free trade in the products of this group of industries would probably be greater competition, which would affect prices and quality more than costs.

Lastly, there is a third group of building materials - those imported entirely from outside Central America, such as rolled steel products and sheet glass, the demand for which, in 1956, amounted to over \$18 million. For these products - which must be manufactured on a relatively large scale, and for a market larger than those of the individual countries - free trade presupposes, apart from the other general requirements, the selection of the most suitable site for one or more possible factories, the determination of their economic size, and finally the establishment, in Central America, of the relevant "integration industry".

Such, in broad outline, are the possibilities and advantages of free trade in building materials. Its achievement would involve various institutional changes in the procedure at present governing trade between the countries of Central America.

In the first place, certain materials from Central American countries would have to be wholly or partly exempted from import duties, through their being brought within the provisions of bilateral treaties already signed or to be signed in the future, and of the Multilateral Treaty on Free Trade now being considered by the Governments of Central America with a view to signature. Certain building materials are in fact already covered both by the existing bilateral treaties and by the Multilateral Treaty; and the lists in the latter Treaty are subject to revision with a view to their expansion. The position regarding building materials under both types of treaty is summarized in table 31.

In the second place, the tariffs applicable to building materials is another important factor currently affecting trade between the Central American countries - a factor which would be decisive in determining the volume of the Central American products which could be sold on a common market. What should be sought, therefore, is an adequate tariff for materials imported from outside Central America. It would also be necessary to equalize import tariffs, so that

products imported from outside Central America would always pay the same rate, regardless of the importing country. At present, the customs duties on imported building materials vary greatly from country to country. If all the dues paid on imports - which include, besides customs duties, consular fees and other charges^{24/} - are taken into account, the total duty varies, for cement, from 15.4 per cent c.i.f. in El Salvador to 55.6 per cent in Guatemala; for plywood, from 16.4 per cent in El Salvador to 61 per cent in Nicaragua; and for galvanized sheeting, from 14 per cent in Guatemala to 36.5 per cent in Honduras. Less serious discrepancies exist for other products (table 32).

Apart from the above measures, which are entirely matters of government commercial policy, the manufacturers themselves, and private enterprise in general, could fulfil another important postulate for the promotion of trade between the Central American countries: the establishment of a continuous flow of information between the countries. Generally speaking, this should involve a system whereby, through the chambers of commerce and associations of manufacturers, information on the conditions of supply would be provided, in the form, mainly, of detailed specifications of the products, price lists, statements of credit conditions, volume available and delivery dates, and other important commercial data. It is believed that such information might lead to trade transactions between Central American countries which are now impeded by lack of contact and the absence of any exchange of information between suppliers and possible buyers of the products.

The inadequacy or lack of transport has probably been one of the major factors limiting the area within which enterprises can dispose of their products economically, and the possibilities of trade in building materials between Central American countries. However, the improvements recently effected and the programmes for plant construction now under way or planned, hold out better prospects for trade from the standpoint of transport facilities. In any event, this is a general problem, not specifically connected with the building materials industries, and the Central American countries are gradually working their way towards solving it.

^{24/} For the charges which, it was felt, should be taken into account in this computation, see resolution 17 (SC.1) of the Central American Trade Sub-Committee of the Central American Economic Co-operation Committee (Report of the fourth session, E/CN.12/CCE/106, 27 September 1957).

The standardization of supply, and the establishment of quality standards for building materials, would also contribute markedly to the development of trade in such materials between the Central American countries. Furthermore, a methodical and continuing investigation of the local raw materials available for the manufacture of building material should be carried out, as a project of longer duration, for the whole of Central America.

Lastly, it must be pointed out that the Central American Economic Co-operation Committee, which is implementing the economic integration programme, has, together with its sub-committees and working groups, been studying some of the factors mentioned above and has made steady progress towards the achievement of the central objective - free trade between the Central American countries. The Central American Research Institute for Industry (ICAITI) also has as one of its responsibilities the investigation of Central American raw materials, as well as the duty of studying and promoting modern techniques in Central America - which could be very useful in the development and improvement of the building materials industries.

Table 31

Central America: Building materials included in the bilateral free trade treaties and the draft Multilateral Treaty on Free Trade and Central American Economic Integration

| NAUCA Classi- fication | Product | Draft Multi- lateral | Bilateral Free Trade Treaties | | | | | |
|--|---|----------------------------|-------------------------------|-----------------------|-------------------------|------------------------|-------------------------|-------------------------|
| | | Free | El | El | El | El | Guatemala | Guatemala |
| | | Trade Treaty | Salvador Honduras | Salvador Nicaragua | Salvador Guatemala | Salvador Costa Rica | Guatemala Honduras | Guatemala Costa Rica |
| A. <u>Cement and cement products</u> | | | | | | | | |
| 661-02-00 | Cement | Included | Incl. | - | Incl.(EC) ^{1/} | Incl.(EC) | - | - |
| 661-09-00 | Cement drain-pipes | " | " | - | Incl. | Incl. | - | - |
| 661-09-00 | Cement blocks | " | " | - | " | " | - | - |
| 661-09-00 | Slabs, tiles and piping of asbestos-cement | " | " | Incl. | " | " | Incl. | Incl. |
| B. <u>Lime</u> | | | | | | | | |
| 661-01-01 | Quicklime and slaked lime | " | - | - | " | " | - | - |
| 661-01-02 | Hydraulic lime | " | - | - | - | - | - | - |
| C. <u>Building materials with clay basis</u> | | | | | | | | |
| 662-01-00 | Earth bricks and tiles | " | Incl. | Incl. | Incl. | Incl. | - | - |
| 662-01-00 | Drain-pipes of ordinary clay | " | - | - | " | " | - | - |
| 662-01-00 | Tiles of ordinary clay | " | Incl. | - | " | " | - | Incl. |
| 662-02-00 | Tiles of fine clay | - | " | - | " | " | - | " |
| 661-03-00 | Mosaics | Incl. | " | - | " | " | - | " |
| D. <u>Wood industry</u> | | | | | | | | |
| 242-09-00 | Poles, piling and posts | " | - | Incl. | " | Incl.(EC) | - | - |
| 243-02-00 | Timber sawn, planed or matched | " | Incl. | " | " | - | Incl. | - |
| 631-02-00 | Plywood | " | " | - | - | - | Incl.(IC) ^{2/} | Incl. |
| 632-03-01 | Wooden doors | - | " | - | Incl. | Incl. | - | - |
| 632-03-01 | Wooden windows | - | " | - | " | " | - | - |
| 632-03-02 | Other carpentered work used in building | - | " | - | " | " | - | - |

Table 31 (continued)

| NAUCA Classi- fication | Product | Draft Multi- lateral Free Trade Treaty | Bilateral Free Trade Treaties | | | | | |
|------------------------------|---|---|-------------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------|-------------------------|
| | | | El Salvador Honduras | El Salvador Nicaragua | El Salvador Guatemala | El Salvador Costa Rica | Guatemala Honduras | Guatemala Costa Rica |
| | E. <u>Iron, steel and other metals commonly used in building</u> | | | | | | | |
| 681-04-00 | Corrugated bars | - | - | - | - | - | - | Incl. |
| 681-13-00 | Welded tubing for water and electrical installations | - | - | - | - | - | - | - |
| 699-01-01 | Doors, windows, railings, balconies, and other iron or steel fixtures | - | - | - | Incl. | Incl. | - | Incl. |
| 686-02-01 | Corrugated zinc sheets | - | - | - | - | - | - | - |
| 699-07-02 | Wire nails for building | - | - | - | - | Incl. | - | - |
| | F. <u>Sanitary equipment for building</u> | | | | | | | |
| 812-02-01 | Porcelain sanitary ware | - | Incl. | - | Incl. | " | - | Incl. |
| | G. <u>Glass for building</u> | | | | | | | |
| 664-03-00 | Sheet glass for windows | - | - | - | - | - | - | - |

Sources: ECLA, on the basis of bilateral free trade treaties heretofore signed by Central American countries and of the draft Multilateral Treaty on Free Trade and Central American Economic Integration.

NOTES: a/ EC indicates that the product concerned may be subject to export control.

b/ IC indicates that the product concerned may be subject to import control.

Table 32

Central America: Total customs duties and ad valorem equivalents for the import of certain building materials, per country

(Total customs duties in dollars per gross kilo and ad valorem equivalents per cent c.i.f.)

| NAUCA Classification | Product | Guatemala | El Salvador | Honduras | Nicaragua | Costa Rica | Panama |
|-------------------------|--|-----------|-------------|----------|-----------|------------|--------|
| 661-02-00 | Cement | | | | | | |
| | A. <u>Calculations based on the unit value of each country</u> | | | | | | |
| | (a) Total customs duties | 0.010 | 0.004 | 0.011 | 0.011 | 0.011 | .. |
| | (b) <u>Ad Valorem</u> equivalent | 55.6 | 15.4 | 52.4 | 35.5 | 45.8 | .. |
| | B. <u>Calculations based on uniform unit value for assessment purposes</u> | | | | | | |
| | (a) Total customs duties | 0.010 | 0.005 | 0.012 | 0.011 | 0.011 | 0.010 |
| | (b) <u>Ad Valorem</u> equivalent | 40.0 | 20.0 | 48.0 | 44.0 | 44.0 | 40.0 |
| 661-09-00 | Asbestos-cement sheets | | | | | | |
| | A. <u>Calculations based on the unit value of each country</u> | | | | | | |
| | (a) Total customs duties | .. | .. | 0.023 | .. | 0.027 | 0.060 |
| | (b) <u>Ad valorem</u> equivalent | .. | .. | 20.5 | .. | 29.3 | .. |
| | B. <u>Calculations based on uniform unit value for assessment purposes</u> | | | | | | |
| | (a) Total customs duties | 0.017 | 0.032 | 0.020 | 0.024 | 0.027 | 0.060 |
| | (b) <u>Ad valorem</u> equivalent | 16.7 | 31.4 | 19.6 | 23.5 | 26.4 | 58.8 |

Table 32 (continued)

| NAUCA Classification | Product | Guatemala | El Salvador | Honduras | Nicaragua | Costa Rica | Panama |
|-------------------------|--|-----------|---------------------|----------|---------------------|------------|--------|
| 631-02-00 | Plywood | | | | | | |
| | A. <u>Calculations based on the unit value of each country</u> | | | | | | |
| | (a) Total customs duties | .. | 0.010 | .. | 0.133 | 0.126 | 0.250 |
| | (b) <u>Ad valorem</u> equivalent | .. | 16.4 | .. | 61.0 | 36.0 | 74.0 |
| | B. <u>Calculations based on uniform unit value for assessment purposes</u> | | | | | | |
| | (a) Total customs duties | 0.065 | 0.027 | 0.145 | 0.150 | 0.126 | 0.250 |
| | (b) <u>Ad valorem</u> equivalent | 18.6 | 7.7 | 41.4 | 42.9 | 36.0 | 71.4 |
| 533-03-01 | Ready-mixed paints | | | | | | |
| | A. <u>Calculations based on the unit value of each country</u> | | | | | | |
| | (a) Total customs duties | 0.142 | 0.193 ^{a/} | 0.291 | 0.097 ^{b/} | 0.172 | 0.150 |
| | (b) <u>Ad valorem</u> equivalent | 24.9 | 29.2 <u>a/</u> | 49.6 | 17.0 <u>b/</u> | 31.0 | 38.7 |
| | B. <u>Calculations based on uniform unit value for assessment purposes</u> | | | | | | |
| | (a) Total customs duties | 0.142 | 0.187 ^{a/} | 0.290 | 0.097 ^{b/} | 0.173 | 0.150 |
| | (b) <u>Ad valorem</u> equivalent | 24.9 | 32.7 <u>a/</u> | 50.8 | 17.0 <u>b/</u> | 30.3 | 26.3 |
| 601-07-02 | Galvanized iron or steel sheeting | | | | | | |
| | A. <u>Calculations based on the unit value of each country</u> | | | | | | |
| | (a) Total customs duties | 0.039 | 0.064 | 0.062 | .. | 0.041 | 0.040 |
| | (b) <u>Ad valorem</u> equivalent | 14.1 | 29.0 | 36.5 | .. | 17.9 | 17.8 |

| NAUCA Classification | Product |
|-------------------------|---|
| | B. <u>Calculations based on uniform unit value for assessment purposes</u> (a) Total customs duties (b) <u>Ad valorem</u> equivalent |
| 664-03-00 | Unfinished glass sheets (as used in window construction) A. <u>Calculations based on the unit value of each country</u> (a) Total customs duties (b) <u>Ad valorem</u> equivalent B. <u>Calculations based on uniform unit value for assessment purposes</u> (a) Total customs duties (b) <u>Ad valorem</u> equivalent |
| 812-02-01 | Porcelain sanitary ware A. <u>Calculations based on the Unit value of each country</u> (a) Total customs duties (b) <u>Ad valorem</u> equivalent B. <u>Calculations based on uniform unit value for assessment purposes</u> (a) Total customs duties (b) <u>Ad valorem</u> equivalent |

Table 32 (continued)

Guatemala El Salvador Honduras Nicaragua Costa Rica Panama

| | | | | | |
|-------|-------|-------|-------|-------|-------|
| 0.035 | 0.064 | 0.066 | 0.052 | 0.041 | 0.040 |
| 15.6 | 28.6 | 29.5 | 23.2 | 18.3 | 18.0 |

| | | | | | |
|----|-------|-------|-----------------------------------|-----------------------------------|-------|
| .. | 0.172 | 0.062 | 0.047 ^c / _c | 0.074 ^d / _d | 0.020 |
| .. | 66.1 | 35.6 | 32.4 <u>c</u> | 48.1 <u>d</u> | .. |

| | | | | | |
|-------|-------|-------|-----------------------------------|-----------------------------------|-------|
| 0.029 | 0.168 | 0.064 | 0.050 ^c / _c | 0.080 ^d / _d | 0.020 |
| 14.0 | 81.2 | 30.9 | 24.2 <u>c</u> | 38.6 <u>d</u> | 9.7 |

| | | | | | |
|-------|----|-------|----|-------|-------|
| 0.068 | .. | 0.109 | .. | 0.121 | 0.500 |
| 11.9 | .. | 20.1 | .. | 21.0 | .. |

| | | | | | |
|-------|-------|-------|-------|-------|-------|
| 0.068 | 0.034 | 0.110 | 0.141 | 0.120 | 0.500 |
| 12.1 | 6.0 | 19.5 | 25.0 | 21.3 | 88.8 |

Table 32 (continued)

| NAUCA Classification | Product | Guatemala | El Salvador | Honduras | Nicaragua | Costa Rica | Panama |
|-------------------------|--|-----------|-------------|----------|-----------|------------|--------|
| 662-02-00 | Porcelain tiles | | | | | | |
| | A. <u>Calculations based on the unit value of each country</u> | | | | | | |
| | (a) Total customs duties | 0.049 | 0.087 | 0.040 | .. | 0.179 | 0.250 |
| | (b) <u>Ad valorem</u> equivalent | 18.7 | 37.0 | 20.3 | .. | 92.3 | .. |
| | B. <u>Calculations based on uniform unit value for assessment purposes</u> | | | | | | |
| | (a) Total customs duties | 0.046 | 0.086 | 0.041 | 0.082 | 0.179 | 0.250 |
| | (b) <u>Ad valorem</u> equivalent | 20.7 | 38.7 | 18.5 | 36.9 | 80.6 | 112.6 |

GENERAL NOTE: The total customs duties include import (tariff) duties, consular dues and any other charge in the nature of an import tax.

Source: ECLA, based on the tariffs of Central American countries and on information supplied by customs authorities concerning consular dues and other import charges. Method of computing approved at the fourth session of the Central American Trade Sub-Committee, resolution 17 (SC.1), and described in document E/CN.12/CCE/SC.1/31/Rev.1.

NOTES: a/ The calculation of total customs duties and ad valorem equivalents refers to the item classifying "ready-mixed oil paints".

b/ The consolidated tariff established by the General Agreement on Tariffs and Trade (GATT) is \$0.070 per gross kilo, and the general tariff is \$0.117 per gross kilo. Within the table the total customs duties and ad valorem equivalents are based on the established tariffs; the corresponding figures based on the general customs duty are as follows: total import duties \$0.142 per gross kilo and ad valorem equivalent \$24.9 per cent c.i.f.

c/ The customs tariff established by GATT is \$0.041 per gross kilo, and the general customs duty represents \$0.072 per gross kilo. The table gives the figures corresponding to the calculation based on the consolidated tariff. The corresponding figures based on the general tariff are as follows: (a) based on the unit value of each country: total customs duties \$0.072 per gross kilo and ad valorem equivalent \$49.7 per cent c.i.f., (b) based on the uniform unit value for assessment purposes: total customs duties \$0.080 per gross kilo and ad valorem equivalent 38.6 per cent c.i.f.

d/ The calculation of total customs duties and ad valorem equivalent refer to the item "clear glass in sheets".

VIII. Economic significance of housing programmes in Central America and Panama

Any programme designed to improve the people's housing conditions should be regarded as an integral part of the general plan for the country's economic development, since the amount of money allocated to housing investment in relation to other types of investment will have an important long-term effect on the growth of the economy's productive capacity and, more immediately, may have serious repercussions on the internal level of prices and the balance of payments position. Moreover, in planning housing programmes it is essential to study, by adequate forecasting, the development of industries which will permit the housing plans to be so carried out that the available natural resources and labour are used to the best effect.

The purpose of the present chapter is to examine the economic implications of housing programmes within the framework of development possibilities in Central America and Panama. The analysis begins with an estimate of the total annual cost, in the region's various countries, of a programme considered likely to satisfy the housing needs created by the increase in population and, in the case of two countries, of the cost of meeting the deficit caused by the need to restore houses that have fallen into disrepair and to reduce overcrowding. Such estimates are not themselves in the nature of a programme. Their only purpose has been to obtain some idea of the scale on which funds would have to be absorbed even for a housing project not representing the maximum needs of Central America. With the same object in view, comparisons are also established with the volume of housing investment in other countries outside Central America.

In the following sections consideration is given to the three principal factors that would probably have to be taken into account in deciding what portion of available resources should be allocated to housing as compared with other types of investment. The first factor consists of the housing needs which arise directly from the establishment of new industries and are thus an essential concomitant of those industries.

The second factor considered is the possibility of drawing on the under-employed labour available in the region, in order not merely to reduce the real costs of housing programmes to a minimum, but to increase the productive capacities of the Central American countries' economies.

Finally, attention is paid to the national resources in building materials, in so far as they limit the acceleration of housing programmes, and to the part which such programmes can play in stimulating the development of the building materials industries in the region.

1. Magnitude and nature of the problem

The housing problem in the Central American Isthmus is largely contingent upon the growth of population, amounting to an annual rate of 3 per cent and, except in Nicaragua, to an even higher rate in the case of the urban population, fluctuating between 3.3 per cent in El Salvador and 4.9 per cent in Panama.^{1/} Moreover, with the acceleration of industrialization in the next few years, it may be expected that the rate of urbanization will increase, especially in metropolitan areas which will attract population from other smaller urban centres or from rural districts.

The magnitude of the housing problem created by these factors is indicated in table 33. Assuming a family of the average size of 5.5 persons, the population increase in 1956 would have required a total of 60,545 additional dwellings - 22,600 urban and approximately 38,000 rural - in the six countries considered.

In view of the low per capita income level in Central America, and the distribution of income there, the total annual cost falling upon each country can be calculated, approximately, on the assumption that the greatest need would be for "popular" low-cost dwellings. On that assumption, the estimates referred to in table 33 are based on an average cost per housing unit of \$2,500 in urban areas. This figure may be somewhat conservative, since the estimates of several years ago, when the cost of building materials and labour was lower, indicate that the cost of urban housing units fluctuated between \$2,400 and \$3,200.^{2/}

There are certain difficulties in estimating the cost of a rural dwelling, since it depends, in the last analysis, on the standards established for this type of housing. Assuming that the whole of the rural housing programme were to be carried out on the self-help principle, the cost of each dwelling - excluding labour costs - would probably be not less than \$500. This estimate is based on

1/ Economic Commission for Latin America, Estudio sobre la mano de obra en América Latina (Study of Labour in Latin America), Conference Room Paper No. 2, submitted at the seventh session, La Paz, Bolivia, 15 May 1957, p. 42. The estimated rate of urban population growth is based on the period 1945-1955.

2/ See Estudio sobre la vivienda en El Salvador (Study of Housing in El Salvador) (ST/TAA/K/El Salvador/9), 1954, p. 22; Anatole A. Solow, La vivienda en Guatemala (Housing in Guatemala), Pan American Union, Washington, D.C., 1950, p. 18. In a more recent study on Costa Rica, however, the average cost of low-price urban dwellings is estimated at 15,000 colons (\$2,256) per unit; see R. Carazo, El problema de la vivienda en Costa Rica (The Problem of Housing in Costa Rica), San José, 1955, p. 18.

recent experience obtained with the Self-help and Mutual Aid Programme undertaken in Panama, when each farmer, apart from devoting to the purchase of building materials \$250 received as a loan from the Government, spent between \$250 and \$500 of his own money for the same purpose.

On the basis of the above estimates, the annual cost of a housing programme designed solely to meet the needs created by the growth in population would require an investment ranging from \$8.3 million in Nicaragua to \$20.1 million in Guatemala and amounting to a total of \$75 million for the six countries concerned (see table 33).

Table 33

Central America: Estimated housing needs due to increase of population between 1955 and 1956, per country

| Country | Number of dwellings | | | Total estimated cost (in millions of dollars) | | |
|---|---------------------|--------------|--------------|--|------------|------------|
| | Urban | Rural | Total | Urban | Rural | Total |
| Guatemala | 5,436 | 12,928 | 18,364 | 13.6 | 6.5 | 20.1 |
| El Salvador | 4,778 | 8,858 | 13,636 | 11.9 | 4.4 | 16.3 |
| Honduras | 4,092 | 5,544 | 9,636 | 10.2 | 2.8 | 13.0 |
| Nicaragua | 2,245 | 5,391 | 7,636 | 5.6 | 2.7 | 8.3 |
| Costa Rica | <u>2,732</u> | <u>4,177</u> | <u>6,909</u> | <u>6.8</u> | <u>2.1</u> | <u>8.9</u> |
| Total for Central America (except Panama) | 19,283 | 36,898 | 56,181 | 48.2 | 18.5 | 66.6 |
| Panama | <u>3,282</u> | <u>1,082</u> | <u>4,364</u> | <u>8.2</u> | <u>0.5</u> | <u>8.7</u> |
| Total for the countries concerned | 22,565 | 37,980 | 60,545 | 56.4 | 19.0 | 75.0 |

Sources and method

- (a) For the urban population registered in the 1950 census, the rate of urban population growth 1945-1955 indicated in the document Estudio sobre la mano de obra en América Latina, op.cit., p. 42, has been applied.
- (b) Total number of dwellings: The number of dwellings has been calculated on the basis of an average number of 5.5 persons occupying each dwelling. The increase in population between 1955 and 1956 is calculated according to ECLA estimates based on the rate of population growth since 1950.
- (c) Total cost: The total cost of dwellings has been calculated on an estimate of \$2,500 per urban dwelling and \$500 per rural dwelling (see text).

A housing programme should also allow for the restoration of dwellings in poor state of repair and for the erection of new dwellings to reduce overcrowding. On the basis of estimates made some years ago in Guatemala and El Salvador in respect of such requirements, the annual additional cost in those countries would amount to \$11.5 million and \$9.5 million respectively, assuming that such a programme were to be carried out over a period of twenty-five years.^{3/}

As a result, the total annual cost of the housing programme in Guatemala and El Salvador would be around \$31.6 million and \$25.6 million respectively. These figures are approximately equivalent to 5 per cent and some 6 per cent, respectively, of the gross national product of those countries in 1955. On this basis, housing investment would absorb 36 to 39 per cent of the total resources devoted to investment in Guatemala and El Salvador in recent years.

Comparison of these rates with the rhythm of housing investment in other countries will give some idea of the magnitude of the undertaking involved. In countries where the per capita income level is high - such as Canada, the United States and Sweden - the building of dwellings has, since 1950, accounted for between 20 and 24 per cent of the total gross investment in fixed assets (see table 34).

It is interesting to note that, except for Ecuador, the proportions of housing investment in less developed countries like the Philippines, Puerto Rico, Honduras and Panama are as high as, or higher than, in industrialized countries. This is due to the fact that the total investment rate in those countries is considerably less (between 6.9 per cent and 13.3 per cent of the national product) than in the industrialized countries (16.6 to 22.4 per cent). It also proves, partly, that in less developed countries there is a tendency to invest a high proportion of savings in housing, which is considered the safest and most advantageous form of investment. Moreover, this tendency is strengthened when chronic inflation prevails - which explains the very high proportion of total investment devoted to residential building in Chile.

^{3/} Estimated restoration needs in Guatemala were approximately 35,000 urban and 400,000 rural dwellings (A. Solow, op.cit., pp. 14 and 18); in El Salvador they amounted to 54,743 urban and 188,260 rural dwellings (Estudio sobre la vivienda en El Salvador, op.cit., pp. 21-23).

Table 34

Gross investment in fixed assets as a percentage of the gross national product, and housing investment as a percentage of the gross investment in fixed assets, in selected countries

| Country | Period | Gross investment in fixed assets as a percentage of the gross national product | Housing investment as a percentage of the gross investment in fixed assets |
|--------------------------|-----------|--|--|
| Canada | 1950-1955 | 22.4 | 20.2 |
| Chile | 1950-1954 | 9.1 | 33.3 |
| Ecuador | 1950-1954 | 8.8 | 12.8 |
| Philippines | 1950-1955 | 6.9 | 21.2 |
| Honduras | 1950-1952 | 13.3 | 28.1 |
| Italy | 1950-1955 | 19.3 | 21.7 |
| Panama | 1950 | 7.0 ^{a/} | 33.3 ^{a/} |
| Puerto Rico | 1950-1955 | 13.0 | 23.0 ^{b/} |
| Sweden | 1950-1954 | 19.5 | 23.2 |
| United States of America | 1950-1955 | 16.6 | 24.1 |

Sources: Statistics of National Income and Expenditure, Statistical Paper Series H, No. 10, United Nations Publication, Sales No.: 1957.XVII.4.

a/ The percentages refer solely to private investment (see Financing of Housing and Community Improvement Programmes (United Nations Publication, Sales No.: 1957.IV.1), p. 35).

b/ Estimate of S.L. Descartes, Savings and Investment in Puerto Rico (1956), p. 138.

The figure for housing investment in Honduras (28.1 per cent of the total) is also relatively high, and covers a period (1950-1952) during which the country was beginning to accelerate its economic development. It cannot therefore be taken as representative of housing investment trends in Central American countries in recent years.

The same is true of Panama, where the data available are for a year (1950) fairly close to the immediate post-war period, with its comparatively low level of investment. For that reason, out of a total private investment amounting to 7 per cent of the gross national product, one third was devoted to residential building.

It is very probable that, because of the acceleration of economic development programmes in the last few years, the share of housing in the total investment has decreased, although it may possibly have been no lower than 20 per cent in the majority of Central American countries. The latter figure is equivalent to 3 per cent of the national product,^{4/} and approximates fairly closely to the housing investment rate in the high-level income countries previously mentioned.

It may be concluded that the present rate of housing investment in Central America is high in relation to the per capita product of the different countries. Nevertheless, even if, for the sake of argument, the total or greater part of the resources now devoted to residential building were invested in low-cost housing, it would only be possible to meet 40 to 50 per cent of the estimated needs. However, most residential building in Central America and Panama is for the benefit of high and middle income families, since the low income of the majority of wage-earners and salaried workers places low-cost housing beyond their means.

It is estimated that nearly 63 per cent of the families living in urban areas of El Salvador would be unable to pay more than 18 colons per month in rent, if 15 per cent of their income were reserved for that purpose. Furthermore, families with a monthly income of 50 colons or less (17 per cent of the total) would be able to pay a rent of only 7.4 colons per month, and those with a monthly income of 150 colons or less (45.4 per cent of the total) would be able to pay between 11 and 18 colons per month.^{5/} These figures are insufficient to cover amortization and interest on housing loans, even if the unit cost is very low.

If an average cost per dwelling of 6,000 colons^{6/} is assumed, the monthly rent (or amortization and interest) on the basis of 1 per cent per month, which is the normal rate for private housing, would be 60 colons. Thus a housing programme for families of the lowest income level in urban areas would require a monthly subsidy from the Government of between 42 and 52.6 colons per family, or between 70 and 87.7 per cent of the normal rent. If, in addition to these figures, full information on income distribution were available, this information would probably indicate that at least an additional 20 per cent of the families living in urban

^{4/} On the basis of a general investment rate of 15 per cent of the gross national product.

^{5/} Instituto de Vivienda Urbana (Urban Housing Institute), La Vivienda en El Salvador (San Salvador, May 1957), pp. 8-9.

^{6/} Ibid., p. 7. This estimate excludes the cost of the land and of urban services.

areas would require some form of housing subsidy. However, no further analysis is necessary to show the enormous disparity between the paying capacity of most of the population and the cost of housing that would conform to reasonable standards of accommodation. Although the situation may be somewhat better in other Central American countries, the information contained in previous studies shows that the disparity is on the same scale in all these countries.^{7/}

The foregoing analysis indicates that it is not possible to carry out ambitious house-building plans involving radical changes in the physiognomy of Central America, and suggests a more constructive approach to the housing problem, related to the various countries' potentialities for development. Such an approach would, without ignoring social needs, take into account the influence exerted on the population's productive capacity by the housing programmes, the building industry and the building materials industry. In subsequent sections of the present chapter, some of the main factors to be considered in allocating resources to house-building within a general programme of economic development will be examined.

2. Housing and economic development programmes

Apart from foreign investments, a country's level of investment, and consequently the pace of its economic growth, is determined by the proportion of the national income devoted to savings. It is therefore of paramount importance that the Central American countries and Panama should devote the greatest possible proportion of their available resources to investments which will produce income in the immediate future. A rapid growth of income in the early stages of development will enable these countries to increase the rate at which they save, and hence the rate at which they invest.

If the above-mentioned criterion is regarded as paramount, housing construction is likely to be given a very low priority in economic development programmes in this region, since it is characteristic of this type of investment that its yield in the form of income is spread out over a long period of years. This is one of the main reasons why the ratio of capital to output is extremely high for housing compared with other types of investment. According to estimates made in the United States in 1939 this ratio was 7.1, compared with 1.8 in the steel industry, 1.4 in agriculture and between 0.1 and 0.3 in light industries like those

^{7/} In addition to the reports referred to in footnote 2, see R. López Vázquez, Problema de vivienda en el distrito Central (Consejo Nacional de Economía, Tegucigalpa, D.C., 1956), pp. 5-8.

producing furniture, leather goods, electrical equipment, food and clothing.^{8/} In other words, an investment of \$7,100 for housing, compared with \$1,400 for agriculture and between \$100 and \$300 for the light industries mentioned, would be required in order to obtain an output of \$1,000.

It is likely that the capital-output ratio for housing in Central America and Panama would be considerably less, if only because the climate obviates the need to instal such costly equipment as that for heating. However, the great differences between the ratios given above show that the countries of this region would do better to concentrate their investments in light industry and agriculture in order to increase their rate of economic growth within a short space of time.

Nevertheless, even where a criterion based solely on productivity is applied it would be necessary to allocate certain funds to housing, since the latter can in some cases be regarded as a form of producer goods. This would be true, for example, if a factory were established in a sparsely populated area of the country, so providing a new source of employment and leading to a marked increase in the area's population. In such a case the tendency would be to build whatever additional housing was needed to attract the number of workers required for the new factory's productivity; housing would not compete with other types of investment, but would be an essential complement to them.

In addition to this essential minimum, it is also necessary to provide housing for the purpose of improving the living conditions and health of the population and so increasing its productive capacity. As emphasized in the preceding section, this requirement is far beyond the available resources of the region's countries. Hence the problem reduces itself to that of making the most economic use of local resources.

The problem can be partly solved by the maximum use of under-employed labour and of building materials produced locally; and this, from a technical standpoint, depends on questions of design, the standardization of prefabricated components, the improvement of building techniques, and so forth. Nevertheless, the number of low-cost dwellings which can be built depends, to a large extent, on the general standards established for this type of building.

If the principal aim is to provide adequate housing for the greatest possible number of families, consideration should be given to the alternative solution of

8/ See W. Leontief et al., Studies in the Structure of the American Economy (New York, Oxford University Press, 1953), pp. 220-221.

establishing standards somewhat lower than those laid down under the model programmes, necessarily limited in scope, of the immediate post-war years. One of the main reasons for the relatively high costs of that period was the almost exclusive concentration on the building of private houses.

Recent experience in El Salvador has shown how far the cost per dwelling unit can be reduced by allocating a major part of available resources to the building of multi-family dwellings. The average unit cost of housing erected in that country in 1953 was 10,776 colons; in 1954 the Instituto de Vivienda Urbana (Urban Housing Institute) began to put up multi-family dwellings, and by the end of 1956 had completed 18 such buildings with a total of 372 apartments. The average cost per apartment was reduced to 5,620 colons.^{9/}

It should be remembered that the number of new dwellings which can be built in Central America and Panama - and this is also the case in other countries - constitute only a very small proportion of all the existing housing. Consequently, the concentration of investment on new housing would only partially solve the problem. Any housing programme must place equal emphasis on the improvement and extension of the accommodation provided by existing housing, through repairs, maintenance, the provision of drinking water and sanitary installations, street improvement and so forth, as may be necessary.

The standards reached by housing thus improved will undoubtedly be below those of new housing; but it must not be forgotten that such improved housing would help to meet the minimum needs of a much greater number of families, and at a much lower cost to the country's economy in terms of capital invested. As already pointed out, this aim is in conformity with the requirements of the region's countries at their present stage of economic development.

3. Utilization of under-employed labour

One of the most promising aspects of the housing question in Central America and Panama is the possibility of utilizing the region's under-employed labour potential existing in the agricultural sector, and to a smaller extent in the services and small retail trade sectors of the urban areas. As the marginal productivity of this potential is negligible, its transfer to the building industry would help to increase the general productivity of the labour force.

^{9/} La Vivienda en El Salvador, op.cit., pp. 12 and 17; and Gestión desarrollada en el ramo de economía en el ejercicio 1955-1956 (San Salvador, November 1956), p. 35.

For reasons already explained, it might be advisable to transfer this under-employed labour to the manufacturing industry, rather than to house-building. However, available data on the distribution of the economically active population show that, even on the basis of the most optimistic assumptions about the rate of industrialization in coming years, the manufacturing industry will not be able to absorb more than a small part of the surplus agricultural labour. It should be noted that the proportion of the population employed in the agricultural sector varies between 55 per cent in Costa Rica and 83 per cent in Honduras, whereas the manufacturing industry absorbs only between 11 and 11.5 per cent in most of the countries of the Central American Isthmus, the lowest proportion being 5.8 per cent in Honduras. The proportion employed in the building industry does not exceed 3 per cent, except in Costa Rica - the Central American country with the lowest percentage of population engaged in agriculture - where it is 4.3 per cent (see table 35).

It is therefore unlikely that any limit to the use of under-employed labour in the building industry is set by the employment opportunities in more productive industries. Such a limit will tend, rather, to be established by the amount of additional resources (mainly food, clothing and accommodation) that will be needed to meet the demand created by the new workers in the building industry when they receive incomes higher than those which they obtained in the rural areas.

It follows that the housing programme should be planned with the utmost care, regard being had to the potential growth in the supply of food, clothing and other basic consumer goods. If the limits thus set are exceeded, the results will be inflationary pressure and balance of payments difficulties.

The foregoing observations apply more especially to the construction of urban housing, any transfer of workers to the building industry for that purpose being, necessarily, more or less permanent. The limiting effect of the supply of consumer goods can be avoided by employing agricultural workers on the building of houses intended mainly for their own use in the area where they are living, and this is the traditional method used in the construction of rural housing. The main difference between this method and the system known as "aided self-help" lies in the granting of financial assistance by the Government for the purchase of building materials not available in the area, the co-operative use of certain building equipment, and guidance by government experts in regard to site development, layout, use of local materials and installation of essential sanitary services.

Table 35

Central America and Panama: Gross domestic product at factor cost and economically active population, by selected sectors and by country a/

(Percentages)

| Country | <u>Agriculture</u> | | <u>Manufacturing</u> | | <u>Building</u> | | <u>Other sectors</u> | |
|-------------|--------------------|--------------------------------|----------------------|--------------------------------|-----------------|--------------------------------|----------------------|--------------------------------|
| | Product | Economically active population | Product | Economically active population | Product | Economically active population | Product | Economically active population |
| Guatemala | 56.7 | 68.2 | 13.8 | 11.5 | 1.3 | 2.7 | 28.2 | 17.6 |
| El Salvador | 53.0 | 62.3 | 7.5 | 11.2 | 4.1 | 2.8 | 35.4 | 23.7 |
| Honduras | 54.1 | 83.1 | 9.5 | 5.8 | 1.2 | 1.0 | 35.2 | 10.1 |
| Nicaragua | 39.9 | 67.7 | 13.9 | 11.4 | 5.2 | 2.6 | 40.9 | 18.2 |
| Costa Rica | 45.8 | 54.7 | 11.8 | 11.0 | 3.4 | 4.3 | 39.0 | 30.0 |
| Panama | 33.8 | 59.1 | 8.8 | 8.1 | 1.7 | 3.0 | 55.7 | 29.9 |

Sources: Statistics of National Income and Expenditure, Statistical Paper, Series H, No. 10, United Nations Publication, Sales No.: 1957.XVII.4, El transporte en el Istmo Centroamericano, United Nations Publication, Sales No.: 1953.VIII.2, and Compendio Estadístico Centroamericano, United Nations Publication, Sales No.: 1957.II.G.8.

a/ The figures for the gross product of Guatemala are for the period 1947/1948; those for Honduras are for 1952; those for Panama for 1954; and those for the other countries for 1950. The distribution of the economically active population by sectors is based on the 1950 censuses.

In 1955 an experimental programme for the construction of rural housing on the basis of aided self-help was initiated in Panama, and has since been extended. Government assistance was supplied in the form of loans of 250 balboas for the purchase of materials not produced in the area, and the provision of technical supervision. A similar programme is to be undertaken in Costa Rica, while a programme on the same lines has been established in Guatemala with the technical co-operation of the Government of the United States.

The system of aided self-help appears in fact to supply the best if not the only means of solving the problems of rural housing, since, at bottom, it eliminates all labour costs save those of supervision. In addition, the benefits to the community far exceed the value of the new houses built, since the psychological stimulus to the agricultural workers and their families resulting from the individual effort made, and the increased comforts enjoyed through improved living conditions, lead to an increase in productive capacity and provide new incentives to attain still higher living standards.

4. Building materials

Probably the main obstacle to an accelerated housing programme in Central America and Panama, in the immediate future, is the limited supply of building materials produced locally. This aspect of the housing problem is examined in another report prepared by the ECLA Secretariat for this meeting.^{10/} The present report, therefore, will merely deal, shortly, with some of the more general features of economic policy suggested by the restricted domestic supply of building materials.

The first arises from the circumstance that building materials constitute the major factor in the cost of low-price housing. The Instituto de la Vivienda Urbana (Urban Housing Institute) of El Salvador has calculated that building materials represent 51.4 per cent of the total cost of an urban house costing 6,000 colons, compared with 40.7 per cent for labour and 7.9 per cent for fixed general costs and the use of building equipment.

From the foregoing it is clear that, in the planning of a housing programme, high priority should be assigned to research and design, with a view to reducing the cost of building materials. Achievement of this aim will require close co-operation with the industries concerned, so that the best possible use may be

^{10/} See chapter VII.

made of the limited resources available for the study. The paramount considerations should be the maximum use of materials available locally, in order that the high costs of transport may be reduced; the standardization of such items as doors, windows, sanitary equipment etc.; and the prefabrication of certain types of equipment whenever this is economically justifiable.

Possibly, however, the principal aim may be the reduction, to a minimum, of the imports of building materials which are required because the building materials industry of the region is far from being able to meet the present demand. It is even probable that, as a result of the present pace of building in the various countries of the Central American Isthmus, there will be a substantial increase in imports during the coming years.^{11/}

Given the abundance of the necessary natural resources to be found in the region, the prospects for the development of the building materials and related industries are good. Since the end of the war satisfactory progress has been made towards self-sufficiency, particularly with regard to cement and its derivatives and, in some countries, plywood, sanitary porcelain ware and tiles.

The replacement of imports by building materials produced domestically is necessary not only because of the need to reduce the costs of housing programmes, but also because it is highly desirable to encourage the establishment of additional building materials enterprises and to increase the productivity of existing concerns. In the pursuit of the latter aim the programmes of the official housing bodies can make a more positive and much more direct contribution than by the usual methods of establishing protective tariffs or granting subsidies, since these bodies can regulate the proportion of imported building materials to be used in new dwellings, and by long-term planning can ensure a growing market for the Central American industries.

5. Summary and conclusions

The resources available in Central America and Panama for the building of low-cost housing are very limited compared with the vast social needs created by the high rate of population growth, the pace of urbanization and the overcrowded and unhealthy conditions obtaining in a great many dwellings, both in urban and in rural areas.

The root of the problem is the large gap between the cost of a low-priced dwelling and the poor paying capacity of the great majority of the population.

^{11/} Ibid.

This is essentially the result of the low productivity of capital and of the labour force. Consequently any realistic housing programme should be conceived in terms not only of a reduction in construction costs, but also of its potential contribution to the various countries' productive capacity.

This cannot be achieved without the establishment of new industrial concerns or the expansion of those already existing - which implies the building of additional housing sufficient to accommodate the workers needed to ensure those concerns' productivity.

However, there appears to be a margin of under-employed labour, especially in the agricultural sector, adequate to make an extension of housing programmes beyond that essential minimum possible. In this connexion, the transfer of under-employed workers to the building industry is limited by the additional supply of basic consumer goods that will be required to attract new workers from the agricultural sector.

This additional financial burden on each country's economy can be reduced to a minimum in the case of rural housing through programmes of aided self-help. The real costs of such programmes are confined to the cost of the materials that the small farmer cannot produce for himself, and the cost of expert supervision provided by the authorities.

The most serious factor on which the expansion of housing programmes is dependent is probably the extent to which building materials are available in Central America. These materials constitute the major element in the cost of housing, and the building materials industries of the region do not have the capacity to meet present needs. The experience of the post-war period shows that this branch of industry can be developed further, provided there is a sufficient demand for its products. Consequently, housing programmes can provide a stimulus to expand the productive capacity of the countries of the Central American Isthmus through a reduction, to the minimum, of the imports of building materials used in the construction of new dwellings, and thus through the provision of a growing market for the region's industries.

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