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DEVELOPMENT OF BUILDING MATERIALS
INDUSTRIES IN THE DEVELOPING COUNTRIES

Paper presented by C. E. Rydeng at the Interregional Seminar on
Building Operations in Low-Cost Housing Construction,
Rotterdam, Netherlands, 5-16 April 1976

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I. BACKGROUND INFORMATION

The development of low-cost housing in the developing countries is an important support to social and economic growth and helps to improve the general welfare in all developing countries. Low-cost housing, however, cannot easily be realized in densely populated areas where the need for such housing is most urgent, because public health may suffer.

A simple shelter can be built with local materials such as adobe bricks, woven mats or wood, but as soon as just a little comfort is required, higher costs will be involved (see figure).

The basic shelter needs maintenance work, and the first desire of the residents may be to cut down on the maintenance by using more durable building materials. Use of durable materials would enable people to spend more time on providing for other necessities such as food and clothing or an education, either producing the items they need through farming and home production or working to buy what they need.

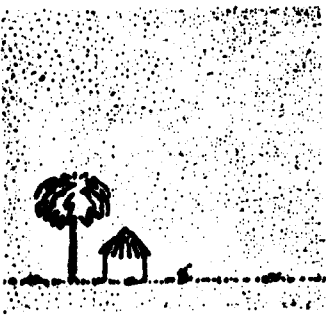

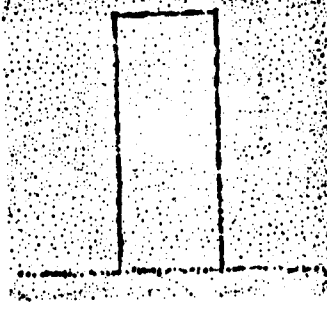
The need for systematic low-cost housing is most apparent where people are attracted by urban centres and decide to move into the vicinity of the centres giving employment. The absence of a systematic approach to the housing problem around urban centres leads to unhealthy living conditions in slum areas without sanitary facilities and appropriate supplies of water and electricity.

Once it is accepted that basic housing should include sanitary facilities as well as water and electricity, however, housing is no longer low cost since the investment requirements are greater for preparation of the land. The establishment of low-cost housing for low-income-families almost invariably depends on the availability of financing to get the housing scheme started.

The building materials required for the infrastructure and the housing scheme also govern the cost of housing. It is clear that the more sophisticated one wants to build, the more expensive the house will be.

One way of constructing low-cost housing with reasonable facilities is to prepare appropriate land without an expensive sewage system, with water piped into the area and distributed to central points and with electricity

Systematization of the technical solutions to requirements in areas having different social and economic structures

REQUIREMENTS			
	A	B	C
DRINKING WATER	<ul style="list-style-type: none"> - communal well - private well 	<ul style="list-style-type: none"> - tank truck - water tap - communal water system 	<ul style="list-style-type: none"> - communal water system
HEAT FOR COOLING AND FOR HOT WATER	<ul style="list-style-type: none"> - open fire - stove (wood or coal) - solar heater - primus 	<ul style="list-style-type: none"> - stove (wood or coal) - solar heater - primus - oil or gas stove 	<ul style="list-style-type: none"> - primus - oil or gas stove
DISPOSAL OF FAECES	<ul style="list-style-type: none"> - bucket; contents buried - WC + septic tank + infiltration 	<ul style="list-style-type: none"> - bucket; communal collection - toilet slab and septic tank; communal collection - toilet slab and "Multrum"; individual collection - WC + sewer 	<ul style="list-style-type: none"> - WC + sewer - vacuum system - incineration
DISPOSAL OF WASTE WATER	<ul style="list-style-type: none"> - infiltration well 	<ul style="list-style-type: none"> - infiltration well 	<ul style="list-style-type: none"> - sewer
DISPOSAL OF REFUSE	<ul style="list-style-type: none"> - compost 	<ul style="list-style-type: none"> - compost - bucket; communal collection - "Multrum" 	<ul style="list-style-type: none"> - bucket; communal collection - incineration
PERSONAL HYGIENE	<ul style="list-style-type: none"> - bucket 	<ul style="list-style-type: none"> - watertap + bucket - washbasin - shower 	<ul style="list-style-type: none"> - watertap + bucket - washbasin - shower - communal bath (hot water) - bath tub (hot water)
LAUNDRY	<ul style="list-style-type: none"> - communal washing place - bucket 	<ul style="list-style-type: none"> - watertap + bucket 	<ul style="list-style-type: none"> - watertap + bucket - communal laundry - washing machines
LIGHT	<ul style="list-style-type: none"> - paraffin lamp 	<ul style="list-style-type: none"> - paraffin lamp - electricity 	<ul style="list-style-type: none"> - electricity

Source: Soan Plan Coordinator A/S, Copenhagen and Stockholm.

wired to every plot in order to avoid home-made wiring through the area. Land preparation without the establishment of a sewage system depends on the acceptance of other methods for dealing with the refuse. Household refuse and faecal matter can be disposed of through aerobic biological decomposition or through old-fashioned means of removing refuse and night soil.

The first method needs practically no attention whereas old-fashioned removal is labour-intensive. For the individual houses that should be built in a low-cost housing area, expenditures should be kept down by leaving as much of the building as possible to the inhabitants. Depending on the climate, a basic structure could be built before the residents arrive or a simple mobile shelter could be put at their disposal for a month or two while they are building their houses.

In addition to common facilities such as water and electricity, depending on the size of the development area, clinics, schools and sports facilities could also be included in the long-term planning. In the first phase building advisers should most certainly help the residents in building or expanding their own houses according to existing building codes or with sufficient security. Housing schemes should be started with the idea that they be low cost; after several years' development attractive and comfortable houses could be built by individual initiative and economy.

II. NEED FOR DIVERSIFIED BUILDING MATERIALS INDUSTRY

Housing, building and planning are normally dealt with by local authorities, sometimes with the assistance from a centre. UNIDO has previously worked with such centres in different seminars and meetings and in the field where national and regional housing centres have been established. The work of UNIDO is complementary to housing, building and planning in the sense that UNIDO assists in making the building materials, whereas the centre assists in putting them to use. The dividing line between the activities of the two is flexible. Further co-operation should be encouraged in order to provide continuity in the assistance activities of UNIDO.

The development of a diversified building materials industry is a prerequisite to both low-cost housing and construction in general. The success of

a building programme depends on the availability of building materials. Building traditions are of course different, but certain materials are always needed.

A check-list of some of them follows:

Building blocks and bricks

Burned-clay bricks
Sand-lime bricks
Concrete blocks
Light-weight concrete blocks
Lime pozzolan blocks
Natural stones
Lime laterite blocks

Roofing material

Burned-clay roofing tiles
Corrugated asbestos cement sheets
Corrugated steel or aluminium sheets
Wood roofing materials
Straw and other natural materials
Concrete roofing tiles
Prefabricated elements

Floor material

Clay-based floor tiles
Concrete floor tiles
Magnesia cement tiles
Wood

Sanitary installations

Stoneware sewer pipes
Sanitary porcelain
Glazed wall tiles

Doors and windows

Wood
Glass
Steel

Miscellaneous

Door handles, hinges
Locks, nails
Steel or plastic pipes
Electric wiring
Insulators, switches
Joinery and furniture
Cement and lime

On the basis of this check-list and with the necessary resources a diversified building materials industry could be established. Besides the types of building materials required, the quantity is also important; many development programmes include both expansion of existing building materials industry and the establishment of new industry.

The work of UNIDO at times concerns only strengthening and expanding clay-brick production and at times the establishment and start-up of new cement factories. UNIDO is also helping to develop appropriate technology for the manufacture of cement and lime, so that least developed countries and areas can start efficiently with small-capacity plants of modest requirements.

UNIDO anticipates that building materials industries will develop in accordance with the priorities and plans elaborated by national experts and authorities. The ability to improve depends on the existing natural resources, their quantity and nature, as well as the skills available for their utilization.

In most cases various United Nations organizations have already been active in improving health, agricultural output and industrial development. This does not mean, however, that the possibilities for accelerating the development are exhausted.

There may also be imbalances in the development; certain industries are often forgotten or neglected until the symptoms of real shortages indicate an imbalance. The building materials industries belong to the group of industries that are frequently neglected.

The developing countries, all of which need building materials for the development of their infrastructure, houses and production facilities, should give priority to the development of a diversified building materials industry, because unlike the situation in some industrialized countries, this is not a marginal sector but a pace-maker for other industries. It has a great impact on employment since both production and use of building materials involve a paid labour force. In addition, the availability of building materials at reasonable costs encourages private construction and repair with durable materials, which in turn helps inhabitants to spend more time on other social and economic pursuits.

III. ROLE OF UNIDO

UNIDO has assisted developing countries in the establishment, expansion and improvement of different building materials industries. The following list indicate some of these industries: clay bricks; burned lime; window glass and bottles; roofing tiles; glazed wall tiles and sanitary ware; portland cement; prefabricated building elements and components; sand-lime bricks; wooden components and joinery; gypsum components and plasters; natural stones; graded aggregates for concrete; light-weight aggregates; and plastic pipes and components. In some countries UNIDO assists in work towards the integrated development of a number of the above-mentioned industries. The UNIDO project in Indonesia is the largest and was the first to be established. Preparatory discussions started in 1972. The scope of the activities were defined by Indonesian officials working with a UNIDO building materials advisor for six months. The terms of reference for the advisor are attached as annex I.

The principle on which the Indonesian and similar projects are based is the maximum utilization of national skills. No activity is started without the prior approval of the Government, and all activities are administered by national personnel. Most UNIDO experts are only fielded for short periods as advisers so that the national personnel become used to the daily administrative routines in the development of industry.

UNIDO assistance in the development of building materials manufacture in Indonesia is channelled further through at least three institutes at Bandung, namely the Regional Housing Centre, the Ceramic Institute and the Materials Testing Institute, which have full responsibility for the initiation, establishment and follow-up of activities that they and the Government agree on activating with or without UNIDO support. (Annex II gives additional information about UNIDO activities related to housing, building and planning.)

Annex I

REQUEST FROM THE GOVERNMENT OF
FOR TECHNICAL ASSISTANCE

Job description

Post title: UNIDO assistance adviser to the construction and building materials industries

Durations: Six months

Date required: As soon as possible

Duty stations: with travel in the country

Duties: The expert will be attached to the Government of to assist and advise in selection of priorities for development of construction and building materials industries. Specifically, he will be expected:

- (a) To examine the existing construction and building materials and collect statistical information concerning production units and outputs;
- (b) To evaluate building plans and estimates and convert future material requirements into production figures;
- (c) To advise in development of the existing construction and building materials industries and indicate relevant priorities for international assistance;
- (d) To define the assistance requirements in training, time and personnel, and to prepare project documents, job descriptions and, if needed, substantive terms of reference etc. for government consideration for inclusion in the country programme;
- (e) To assist in evaluation of urgently required short-term assistance, and to prepare the necessary documents to establish official requests for assistance.

Language: English

Qualifications: Industrial engineer with experience in production and administration in the building materials industries, and relevant experience in establishment of technical assistance through international organizations.

Background information: Many countries have had a minimal share in UNIDO assistance to industrial development, because the major accents have been put on agriculture, health and education.

The industrialization process necessitates that up to 50% or more of the developing countries' fixed capital formation be devoted to civil engineering work or building of factories and homes.

It therefore follows that the supply of building materials, such as cement, bricks, tiles, building ceramics, glass, timber products and so on, and the establishment or modernization of the construction and building materials industries are most important starting points in industrialization.

..... has therefore decided to request UNIDO assistance in establishing the status of the present building materials industry, and to make recommendations for both short- and long-term development.

Annex II

UNIDO PROGRAMME AND ACTIVITIES RELATED TO HOUSING, BUILDING AND PLANNING

The UNIDO programme related to housing, building and planning is concentrated on assisting developing countries in analysing their needs for building materials and in establishing the various branches of the building materials industry deemed necessary for a continuous development of countries or regions.

UNIDO assistance in 1973 and 1974 promoted the establishment of or helped to rehabilitate industrial processes and use or manufacture of cement, expanded clay aggregates, glass, gypsum, fine ceramics, fillers and extenders, heavy clay building materials, industrial waste, lime, natural stones, plastic components, refractories, volcanic materials and wood products.

The trend in the operational activities of UNIDO is to establish and support national projects for development of building materials manufacture including all important building material branches to be set up, extended or improved. The advantage of this integrated approach is a well-balanced development of all building material branches in harmony with national priorities and plans. While such an approach requires long-term planning, UNIDO deals at the same time with short-term advisory and trouble-shooting missions which continue to be needed in the industry.

UNIDO assistance related to housing, building and planning may be illustrated by a few examples taken from the present operational programme. In Bolivia, a pilot asbestos-processing plant has been established and put into operation. The plant is expected, with continuous UNIDO/UNDP support, to develop and improve upgrading processes for locally available asbestos minerals. In Zaire, a complete 1,000 ton-per-day cement plant has been established and put into operation with UNIDO assistance in planning, erection and commissioning.

Bricks, hollow blocks and other structural clay products are in great demand, and in a number of countries UNIDO is involved in the planning and establishment of brickworks. In Burundi, for instance, a centre training artisanal brickmakers has been operating for a couple of years and a semi-industrial brick plant will start operation in early 1975.

A similar interest is shown in establishing local manufacture of glazed tiles. UNIDO is involved in this process in countries such as Bolivia, the Central African Republic, Dahomey, Jamaica, Madagascar and Malta.

In the Midwestern State of Nigeria, UNIDO is assisting a sheet-glass factory in the difficult period of production start-up. Other countries, including the Libyan Arab Republic, Madagascar and Mali are being assisted in the planning of similar installations.

The development of new and less conventional building material industries has been inspired by the local abundance of certain raw materials. In Somalia, UNIDO has for some years been involved in plans for exploitation of the high-quality gypsum deposit near Berbera and a project for establishing a pilot plant for gypsum products eventually leading to full industrial manufacture is now well under way.

UNIDO is assisting the Government of Iceland in establishing a broad range of building materials manufacture based on the country's extensive reserves of volcanic raw materials such as perlite, basalt and pumice.

In Indonesia and in several other countries, integrated projects are being considered for a number of sectoral activities for the promotion and establishment of the building materials industry on a nation-wide basis.

Methods of co-ordination and co-operation and suggestions for improvements

UNIDO assistance to industry is adapted to serve at all stages of industrialization and special emphasis is given to promotion of appropriate technology as well as to helping the least developed countries. Project activities are established on the request of Governments and are closely co-ordinated with national plans and priorities.

The most important contribution of UNIDO to industrial development in the past years has been a substantial transfer of technology and know-how provided during short and long advisory missions in projects for upgrading local skills as well as in fellowship-training programmes. Further acceleration of industrial development could be realized if UNIDO, besides providing know-how, could obtain substantial financial support to establish and develop industries in accordance with the Lima Declaration. Co-ordination of industrial development is the main function of UNIDO and a first step would be the circulation to UNIDO of industrial projects in the field of housing, building and planning.

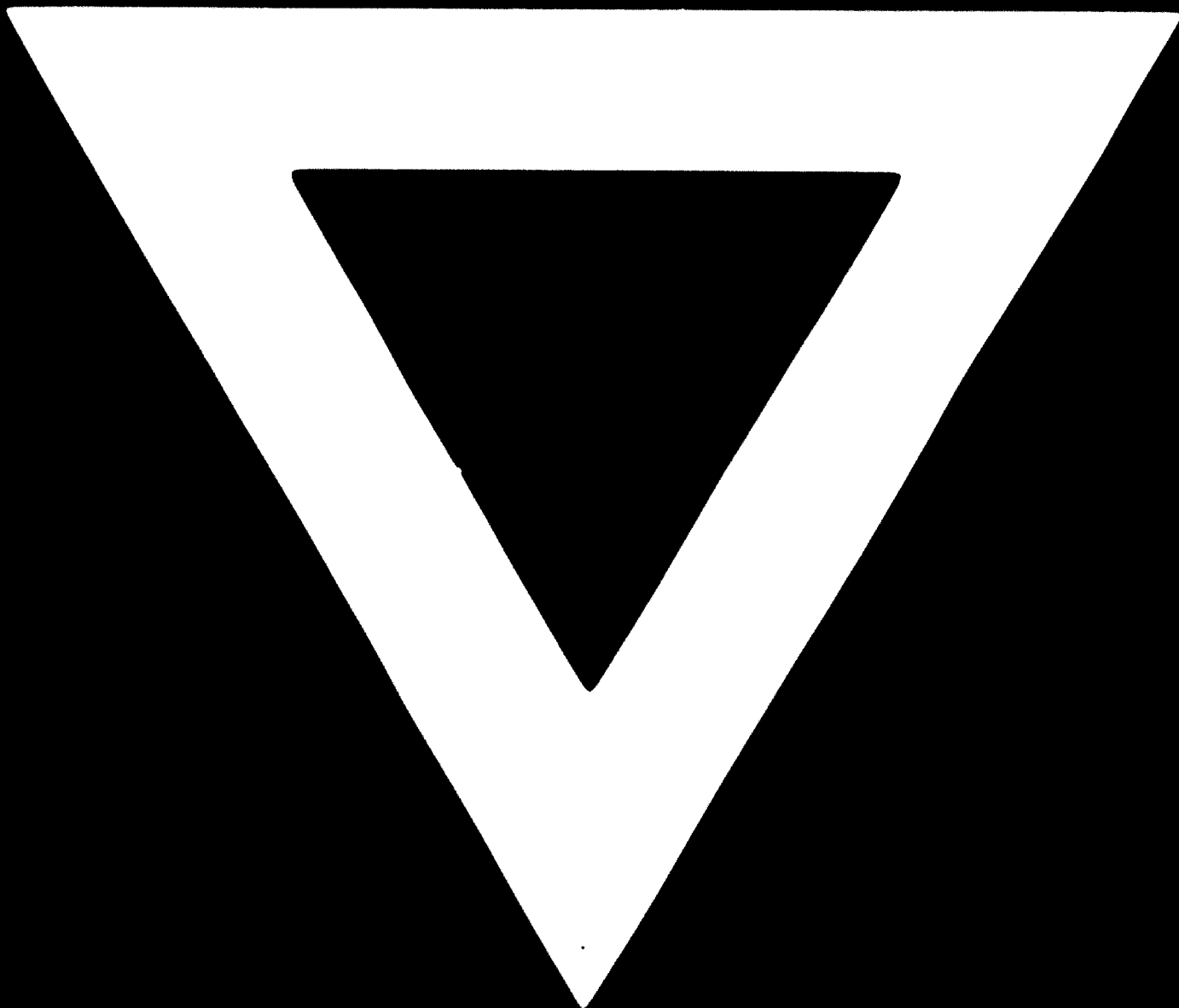
Role of various United Nations organisations
in housing, building and planning

Developing countries are establishing infrastructure, employment, health and other services according to natural resources and housing in harmony with national priorities. Such national development is, however, dependent on planners as well as on executors. Various United Nations agencies contribute to the planning. Industrial planning is referred to UNIDO, housing to United Nations Centre for Housing, Building and Planning (UNCHBP), infrastructure to United Nations Office for Technical Co-operation (UNOTC) and so on. In the execution of plans, UNIDO is the obvious agency to which to refer the establishment of factories and provision of building and construction materials. It is therefore essential that UNIDO continue to be informed about the activities of other United Nations bodies in areas related to natural resources, housing, building and planning.





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