



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

08237

Distr.
RESTRICTED
UNIDO/IOD. 206
14 August 1978
ENGLISH

UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

RECENT TRENDS IN THE DEVELOPMENT
OF
BUILDING MATERIALS AND CONSTRUCTION
INDUSTRIES

Paper to be presented at the Symposium
"Construction Policies and Industrial
Building Systems in the Arab Countries
and Iran"

To be held in Vienna on 11 - 12 September 1978

by

The World Association for Element Building and
Prefabrication (WAEP)

Prepared by the Chemical Industries Section, Industrial
Operations Division - Sector Building Materials, Con-
struction, Ceramic and Glass, Non-Metallic based Industries

id. 78-5170



CONTENTS

	page
INTRODUCTION	3
I. OBJECTIVES OF UNIDO ACTIVITIES	4
II. EXAMPLES OF UNIDO ACTIVITIES.....	6
III. TYPES OF UNIDO ACTIVITIES.....	9
IV. CONCLUSIONS.....	12

INTRODUCTION

1. During the first years of industrial development, little attention was given to the building materials and construction industries in most developing countries. The emphasis was placed on other industries and most non-traditional construction was carried out using imported materials and technologies.
2. Gradually, the economic significance of the sector in a country's economy, illustrated, for instance, by a share of 4.8% of the GDP, and its importance as a producer of housing and shelter for institutions and industries and as an employer, is becoming more and more widely known and accepted.
3. Consequently it is not surprising that a growing number of organizations and agencies, international as well as national and non-governmental, are engaging in the accelerated development of this vast and important field.
4. The growth and structure of the industry in developing countries has hitherto largely followed the pattern of industrialized nations and a modern industrial sector has emerged in most of these countries. However, in most cases, this sector is only small and the benefits in terms of income and employment as well as consumption of its products have been restricted to very small sections of the population. There has, therefore, been growing misgivings whether the present pattern and structure of industrial growth is wholly appropriate to meet the basic socio-economic and technological need of developing countries.
5. The satisfaction of basic needs, sound environmental management, reduction of income disparities, appropriate technology and self-reliance are important factors in global development, and gradually the activities of most bodies involved in development are being directed towards achieving these objectives.

I. OBJECTIVES OF UNIDO ACTIVITIES

One of the major targets of the Lima Declaration and Plan of Action, adopted by the Second General Conference of UNIDO in March 1975, was to increase the share of the developing countries in the world industrial production to 25 % by the year 2000. The target of 2 % for the African Region will require a minimum average annual growth rate of 11.6 % which will necessitate an immense effort of all African Governments.

UNIDO has been assigned a central role in the implementation of the Plan of Action as well as in the establishment of a New International Economic Order. Among the measures outlined in the Plan of Action, which may be considered as objectives for the work of the Organization, the following are particularly relevant to the building materials and construction industry sector:

At the national level

- (a) The formulation of industrialization policies in which social justice is a guiding factor in setting objectives of raising living standards and eliminating extreme social disadvantages and unemployment;
- (b) The intensive use of national resources, infrastructural development and interregional development;
- (c) The encouragement and support of small, medium-scale and rural industries that fulfil the basic needs of the population and that contribute to the integration of different sectors of the economy;
- (d) A higher degree of efficiency in import substitution processes;

At the subregional and regional level

- (a) Promotion of direct trade among developing countries;
- (b) Creation of the necessary institutional machinery for consultation and co-ordination in order to obtain better terms for the acquisition of technology, expertise, licences, equipment etc.

- (c) Introduction of more intensive and innovative programmes for transmitting relevant technology and technical and managerial skills, particularly to the less industrialized countries in the region, through the establishment of regional and subregional institutional machinery;

Related particularly to building materials and construction industry

The main objective is to contribute to the satisfaction of some of the most basic human needs through (a) the provision of building materials and construction methods at a cost and of a quality that will bring adequate housing within reach of the greatest possible part of the population; (b) the facilitation of the widespread establishment of schools, hospitals and other public buildings as well as industries; and (c) the creation of a maximum number of jobs in the mining, manufacturing and construction sector.

The manufacture of building materials can never be an end in itself. Only when the materials have been combined in a construction successfully serving the purpose for which it was designed will all objectives have been fulfilled. This, in turn implies that certain criteria for the types, qualities and quantities of the building materials produced have to be met.

In the planning and execution of UNIDO activities, and particularly in the implementation of technical assistance projects in the field of building materials and construction industries, priority is given to the satisfaction of one or more of the following requirements:

- (a) Within a given geographical area (urban centre, region or country) a balanced supply of a full range of building materials should be available so as to avoid delays in construction owing to the lack of one essential material;
- (b) The manufacturers should make optimum use of available resources. This usually involves the following :
 - (i) Maximum use of local natural resources, especially raw materials that are not required for other purposes or that are otherwise regarded as wastes;
 - (ii) Maximum use of local (unskilled) labour or, in other words,

- application of labour intensive technologies;
- (iii) application of low-energy consuming technologies or use of inexpensive local fuels such as agricultural wastes;
- (c) Production units should be simple to operate and maintain, thus reducing dependence on external assistance and imported spare parts;
- (d) The choice of products and construction technologies should be based to the fullest possible extent, on indigenous traditions and building habits suitable within the given social and climatic environment, from a functional as well as from an economical point of view;
- (e) When the minimum economic production units size exceeds the requirements of one country, a subregional agreement or subregional co-operation should be arranged to allow local manufacture with a sufficiently safe market.

VI. EXAMPLES OF UNIDO ACTIVITIES

The objectives of the technical assistance programme of UNIDO in the field of building materials and construction industry may be regarded as the foundation on which most of the Organization's activities are based. Experience shows that this programme coincides well with the policies and development strategies adopted by the countries with which UNIDO co-operates. The reason for this is that they are based on the Lima Declaration drafted and adopted by these very countries. It is satisfying to see the emphasis on building materials and construction industry project move from the prestigious and sophisticated projects of earlier times to projects that respond to actual needs and that are designed in keeping with local requirements and factor endowments.

Small-scale lime manufacture

A typical feature of such projects is the small production size, at least compared to conventional, advanced technology plants normally offered by equipment and turn key plant suppliers.

A recent example of a successfully developed and introduced small to medium-scale technology is found in lime burning where, until recently, there was no alternative between the traditional beehive kilns, still in use in most parts of the world, and shaft or rotary kilns with a minimum daily output of about 70 tons.

Only a few developing countries have a demand exceeding 20 tons per day even when the increased replacement of cement (especially when imported) by burned lime is a realistic possibility, and they have thus in most cases been limited in their choice to either low-quality lime produced under poorly-controlled conditions in artisanal lime kilns or high-priced cement. A UNIDO expert has developed a simple shaft kiln that requires a minimum of imported material for its construction and produces only 10 tons per day with an excellent fuel economy (1150 kcal/kg lime). Two prototypes have been erected and put into operation in Indonesia with the assistance of the expert. A contribution is thus being made to fulfil the Government's policy of decentralizing the building materials and construction industry. The kiln can be adapted for firing with any type of gaseous, liquid or solid fuel, whichever is more easily accessible at the plant location.

A third kiln of the type described above is now being constructed (in an African country) and the trend to satisfy high-quality requirements, which hitherto placed a strain on cement supplies, by lime of adequate quality is showing more and more clearly. The greater availability of good lime also allows and promotes the small-scale production of lime stabilized blocks based on laterite, pozzolanas etc.

In this case, UNIDO, at the request of interested governments, is introducing a technology that allows a country to be self-sufficient in a building material that could otherwise only be procured at high cost through importation.

Assistance to the industrial development of building materials manufacture

The assistance to the industrial development of building materials manufacture is intended to concentrate on the improvement of existing industries by supporting and accelerating the construction industry in order to execute government housing programmes. Also carried out under this plan are research and development activities, strengthening the support of institutes, laboratories, information centres etc., and providing expert advice, feasibility studies, training, demonstration activities and provision of equipment.

The assistance will through the main participating institutes establish demonstration activities, including demonstration plants in selected industries and geographical locations to ensure a direct transfer of the appropriate technology and new production methods.

The assistance will include the planning of an accelerated integrated approach on pre-fabrication elements with particular emphasis on low-cost housing.

Sheet glass manufacture

The previous examples are all of small-scale or even rural technologies or, at any rate, industries that may find their total market within the boundaries of a single country satisfying a local demand with a 100% domestic manufacture based on local materials, local labour and a technology adopted to local conditions.

An entirely different problem, but a no less challenging one, concerns products that, even for a minimum economic production size, require larger markets than can be guaranteed by one country.

Typical of this category of products are sheet glass glazed floor and wall tiles, sanitaryware and, at least for the smaller countries, cement. At present only one sheet glass factory is operating in West Africa - in Nigeria, where it only covers about one third of the market - while no plant exists in central Africa or East Africa. The rest of the region south of the Sahara imports all sheet glass in spite of the abundant availability of raw materials and the existence of a technology that is well adapted to requirements i.e. the Fourcault process.

A plant, such as the one in Nigeria, with two Fourcault machines, which is the minimum operating size of a factory, produces up to 7,000 - 8,000 tons per year of saleable glass. This is just about right for the market of some of the subregional groupings, and the preparations for a Fourcault plant in East Africa have reached an advanced stage.

The first question is, in which of the countries that together provide the necessary consumer base should the plant be located. The ECA and UNIDO can facilitate the decision by collecting the information on raw materials, infrastructure and market, and presenting an analysis of these data to the countries concerned. It is better to follow this rational approach than to let chance decide the future locations of such plants on a first come, first served basis.

Any plant requires careful planning, particularly a sheet glass plant that, even in its smallest economic version (the two machine Fourcault plant), will require an investment of at least US\$ 20 million.

III. TYPES OF UNIDO ACTIVITIES

Experts

Expert assignments represent the most important form of assistance and can, under optimum conditions, be a very efficient means of technology transfer. The duration may range from two weeks (often a so-called exploratory mission) to several years, with an average, probably, of six months.

Frequently, the process requiring expert assistance is of long duration, as for instance in the case of the establishment of a production plant through all the stages of feasibility study, tendering, engineering, erection and start-up, but requires only the expert's presence during its crucial phases. Considerable savings can then be made by splitting up the assignment into a number of shorter missions and the availability of the expert at short notice can be much improved if the assignment (or project) is combined with one or two other assignments, preferably in the same region to be carried out by the same expert.

The expert, for instance a specialist in glazed ceramic tiles or gypsum components, may then travel from one country to another dividing his time between maybe three assignments. The economy thus achieved, and the expediency with which urgent requirements can be met in the projects concerned, are obvious advantages of this combination project.

Fellowships

Fellowship training, which brings the technicians of the developing countries into direct contact with the industrial environment of another country, is receiving increasing attention. With the increasing emphasis on the use of appropriate technologies and co-operation between developing countries, a growing number of these fellowships are being organized in other developing countries, and recently UNIDO has been successful in organizing study tours for a few decision-makers to visit their counterparts in a number of related countries.

In this context, also, the group training programme of UNIDO, often organized as in-plant workshops, offers the participants the possibility of exchanging views and establishing personal contacts with colleagues from other developing countries, which is highly appreciated.

Equipment

Unfortunately, the funds available to UNIDO or the UNDP are not sufficient to allow larger purchases of equipment and in order to economize, procurement is normally limited to laboratory, pilot plant and demonstration equipment.

A newly-established source of funds, the United Nations Industrial Development Fund, should, however, when eventually it reaches its full funding level, be sufficient to finance fairly large equipment components and it is hoped that it will become a significant factor in future projects.

One feature of this fund is the large proportion of non-convertible currency and often a certain influence of the donor country on the selection and implementation of projects - especially when these are financed by special contributions. There will therefore probably be a growing number of projects tailor-made to the requirements of the recipient country as well as to the capabilities of the donor, but governed by the same principles and objectives that apply to all other UNIDO projects.

Thus it will, for instance, be possible to facilitate the transfer of second-hand equipment from an industrialized country, where the need for larger capacity or more sophisticated technology has made it obsolete, to a developing country where it represents a design well suited to the prevailing conditions but may be unavailable from conventional suppliers. In the case of ceramic tile presses this contact between receiver and donor has already been successfully established and the transfer of a second-hand brick plant to an African country is now under serious consideration.

Subcontracting and raw materials testing

Certain projects or project components are frequently carried out under subcontract when laboratory or semi-industrial testing and product development is a significant aspect of the assistance.

Often, it is also required to have a number of raw material samples tested quickly during a normal expert assignment or independently of any established project, but in such cases the subcontracting procedure has been found too slow to allow the testing results to be efficiently utilized.

However, UNIDO will shortly be able to offer a quick and efficient service when the Joint UNIDO Czechoslovakian Programme for Ceramic Building Materials and Non-Metallic Minerals is officially established. This centre will, among other things, be prepared and equipped to receive and analyze raw material samples at short notice and without any great formalities, so that the results may be quickly available to the expert or the government body needing them.

The programme will be active in training as well as research and development and will, it is hoped, play a gradually increasing part in the overall development and promotion of the building materials industry.

Integration

In practice, most or all of the activities referred to above will be applied within one and the same project, which will, in the ideal case,

be engaged in a number of different subsectors of the building materials and construction industry. In this way a maximum of co-ordination of activities can be achieved resulting in more and better harmonized outputs from a given volume of inputs.

This kind of integrated project not only helps to economize the scarce financing resources available but above all responds well to the country's need for a well-balanced industry with strong and relevant linkages both between the individual branches and between such sectors as mining, housing, research and development.

It is beyond the scope of this paper to go into any detail on this subject but it should be pointed out that UNIDO is executing a large integrated project in co-operation with the Government of Indonesia which exhibits all the characteristics of such a project as is outlined above. The experience gained by UNIDO is already being utilized and will be available to other governments as required.

IV. CONCLUSIONS

The need is stressed to shape the future growth of the building materials and construction industry to meet the newly identified and generally accepted objectives of the overall development process, and the role UNIDO is playing in achieving this has been outlined.

However, the possible impact of the activities of UNIDO, or for that matter of any similar body, is modest measured by the development potential and socio-economic importance of this industrial sector.

A high degree of co-operation and co-ordination of activities between those who are involved at the national, regional or global level in the promotion and development of the building materials and construction sector, and a determined effort to translate plans, studies and programmes into action are required in order to meet the target of self-sufficiency for this industrial sector of the developing countries by the year 2000.



F - 656



78.10.31