

VII-5. Development of the Masonry Industry in Developing Countries

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ABSTRACT

"The paper describes the actual situation of the masonry industry in some developing countries, dealing with the industry of all structural clay products, sand lime bricks and blocks, and light weight concrete, as well as the use of the products. Based on reports by the author for UNIDO (United Nations Industrial Development Organization) the development proposals and work are described, and some general conclusions are made, including a proposal for further international cooperation as to the development of the Brick Masonry Industry, with special regard to developing countries.

The areas particularly dealt with in the paper are: South-East Asia, and the Arabian (also called Persian) Gulf Countries."

THE MASONRY INDUSTRY

At first it should be mentioned what is understood here with "masonry industry" and with "developing countries." Further the situation in an "average" developing country is discussed, different sources and types of aid mentioned.

To illustrate the diversity of problems and aids undertaken, it is chosen to present some case-stories.

This term includes all participants and all materials necessary for making masonry construction. That means masonry contractors, bricklayers, plasterers, and their helpers, as well as the building materials industry making bricks, blocks, and tiles for walls, roofs, and floors—which should be the basic concept. Into this, naturally, mortar is included.

However, said industry cannot stand alone. In the team are also architects, consulting engineers, researchers, transport, and equipment (tools) involved, as well as other materials like cement, and other people inside the building profession. It should be clear, that the term "masonry industry" is difficult to define sharply—and further, this is not the aim here!

DEVELOPING COUNTRY

One may have some ideas about an average developing country, but it should be underlined, that such a country does not exist, and that the differences are obvious. To make the Indonesian national slogan mine, which is: "In diversity unity," a sort of model of a developing country will be discussed in the following.

Our "Developingdom" is rather poor—an exception is the rich "Araby"—the infrastructure is bad and in bad shape, migration from countryside to towns is a serious problem, which is not at all solved, creating unemployment and slum. At university level technological skill is often rather high, on a theoretical level, but implementation is lacking, and there is a gap down to the foreman and workman.

Development has been rather unbalanced and without any proper planning. The dream about and fight for a good "desk" to sit behind in white shirt with tie does not create that stuff of people to get things done on sites.

The building technique is primitive in rural areas and villages, but cheap, and based upon tradition and good

adaption and use of local materials, and the workers often show great skill. In the capital, on the contrary, new building methods are taken into use, some of the deciding people have seen prefabrication in Europe and found out, that this is the way to solve all problems. However, introduction of new building methods, without the necessary training and instruction—and control—too often has resulted in disaster.

It seems, that when people lose tradition, they at the same time loose their sense of quality and good workmanship. Thus, traditionally built houses often are of great artistic beauty, while modern construction shows any faults as to design, choice of materials, workmanship, etc.

2–3 cement plants are found in the country, situated close to the capital and other big and fast developing cities. The brick and tile industry consists of a great number of little brickworks scattered overall in the country. Production is rather primitive, however, the quality of the final product reflects the demand from the customers. Further, 2 to 5 modern plants operate making high strength bricks, one of them even blocks. By some reason (high) strength and price seem to be proportional. Due to the bad infrastructure cost of transport is high, which means that the local brickworks quite easily compete with the few more developed plants as well as the concrete industry, including concrete blocks.

However, as the initiation of the cement industry and the prefabrication industry with concrete panels has been government sponsored as part of an industrialization of the country, said industry is often preferred by government bodies, which is a natural attitude, but tends to disturb the pure, techno-economical competition. Lack of organization of the rather small brick and tile manufacturers also is a serious handicap in the competition with other industries. There is virtually no communication between most of them, and they normally do not feel any need for communication. The situation is, however, that a very little increase in productivity/quality/production volume with impact on the 90% of the total heavy building industry, which is represented by masonry, will have a much bigger effect on the total building activity than the initiation of a concrete panel plant.

It should be underlined, that no country in the world fits to the characteristics previously given. The remarks have no relation to any specific country.

Thus, it should be warned anyone to come to a developing country with a fixed idea about the situation and how to solve the problems. These often show to be quite different as to what they obviously are.

AID TO DEVELOPING COUNTRIES

Several categories exist. Here should be mentioned:

UNIDO (United Nation Industrial Development Organization), situated in Vienna, Austria. The responsibility of UNIDO is the industrial development, which in case means the development of the building materials industry.

UN Centre for Housing, Building and Planning, now situated in Nairobi, Kenya.

UNDP (United Nations Development Programme), situated in New York, but with branch offices in most developing countries.

IBRD (International Bank for Reconstruction and Development), situated in Washington, DC,

which are the more well-known international organizations, but the list is rather long.

Further there are regional and national development bodies for the developing countries.

In total, it may be understood, it is quite a job to find out which organization is the best suited to sponsor a certain activity.

Specially is worth mentioning, that no defined "border" exists between the activities of UNIDO and "UN Housing and Planning" as to the building industry. This is a serious problem, as, in practice, building materials industry and construction are—or should be—so close related, the one depending entirely on the other.

Last—but not least important—category of aid is the purely private one, where firms from a foreign country invest in the production in a developing country, often as a joint venture in cooperation with a national firm. As such enterprises are based purely on an economical point of view, they normally succeed.

CASE-STORIES

As the subject in this paper is rather huge, only a few examples are given on problems relating to the masonry industry, whilst refraining from presenting a proper report.

Superstition

On the isle of Sumatra, Indonesia you find the most beautiful, thatched roofs, but lifetime is short, so corrugated aluminum and asbestos cement sheets are introduced. Why not clay roofing tiles? Because of superstition! When you place yourself under earth, you place yourself in a dead man's position, which is offending and dangerous. And they know, that tiles are made like bricks, that means from earth. But they do not know, that the same is the case as to aluminium and cement.

Solution: As aluminium and asbestos cement have to be imported to the island, and as they are not ideal—no heat capacity, and making a terrible noise during a tropical

rain—, and further, as roofing tiles easily can be manufactured at Sumatra in a much bigger quantity, roofing tiles should be promoted through the example of well educated people using them for their houses, and through explaining the total difference between earth and the burned clay.

Religion

In Moslem countries the left hand is considered unclean, filthy. This means, that you are not supposed to give or receive anything with your left hand. In some countries the practice of the rule goes far further: Bricklayers do not use their left hand when laying bricks! They place the mortar with the trowel in the right hand as bed for several bricks, and then they lay the bricks with the same hand. Result not only low productivity, but also bad quality, as the mortar becomes too stiff, before the brick is laid.

Solution: To demonstrate how fast it goes with two hands, and to argue on why people use two hands when driving, typing, etc. Further as stated in next "chapter."

Tradition

A vicious circle exists f.e. in Indonesia as to quality of bricks and brick laying.

As the quality of bricks is poor, brick walls are always plastered and never load bearing, but used as an infilling material in a reinforced concrete frame. And as the bricks are only used for inferior purposes, there is among the manufacturers no urge to improve quality, in fact, competition on price tends to lower the quality even more!

Solution: It was proved that load-bearing brickwork was more economical than the "traditional" concrete frame system—cement being very expensive. A code as to load-bearing brickwork was elaborated, and some brickworks were suggested to make stronger bricks (to a higher price). Tests were made on properly done brickwork with the use of such bricks, and a Danish bricklayer has for one year been instructing Indonesian teachers in the mason profession the two-hand technique—and with amazing results, which means that the vicious circle is (going to be) broken.

Elementhia

This disease, not very much known amongst doctors, is found among many high level planners and politicians, also in developing countries. Symptom is a nearly religious belief in prefabrication as a means to solve all problems in construction.

However, many circumstances are against prefabrication: Unemployment, lack of experience, stereotyped design, use of materials and technique alien to the environment. Most dangerous is when such construction is initiated in thousands in one area.

Generally spoken, more advantages are obtained by "modernizing" (read: Improving) traditional technique and adapting traditional materials to new concepts.

The urge for development in prefabrication in Indonesia made it worthwhile to make a study on actual possible uses of bricks for panels (elementhia is rather con-

tagious). Demands were: Low investment in plant, transport, handling. Load-bearing in one storey. Easy technique—that means a not too sophisticated system.

Solution: It was decided to design a panel for tilting-up at the building site, and the device for tilting (locally nicknamed “The Danish sledge”) should be operated manually by two workers. Design of panel and erection of prototype house are illustrated at next page. The technique is as

follows: Mortar is spread on the form—wet bricks are laid down in mortar in normal pattern—mortar is poured on surface, filling the joints and acting as plaster—after a few minutes form is tilted up—panel is released from form—form is withdrawn and cleaned—form is placed in position for next panel to be made—etc.

This panel is claimed to be the weakest—but also the cheapest—brick panel ever made.

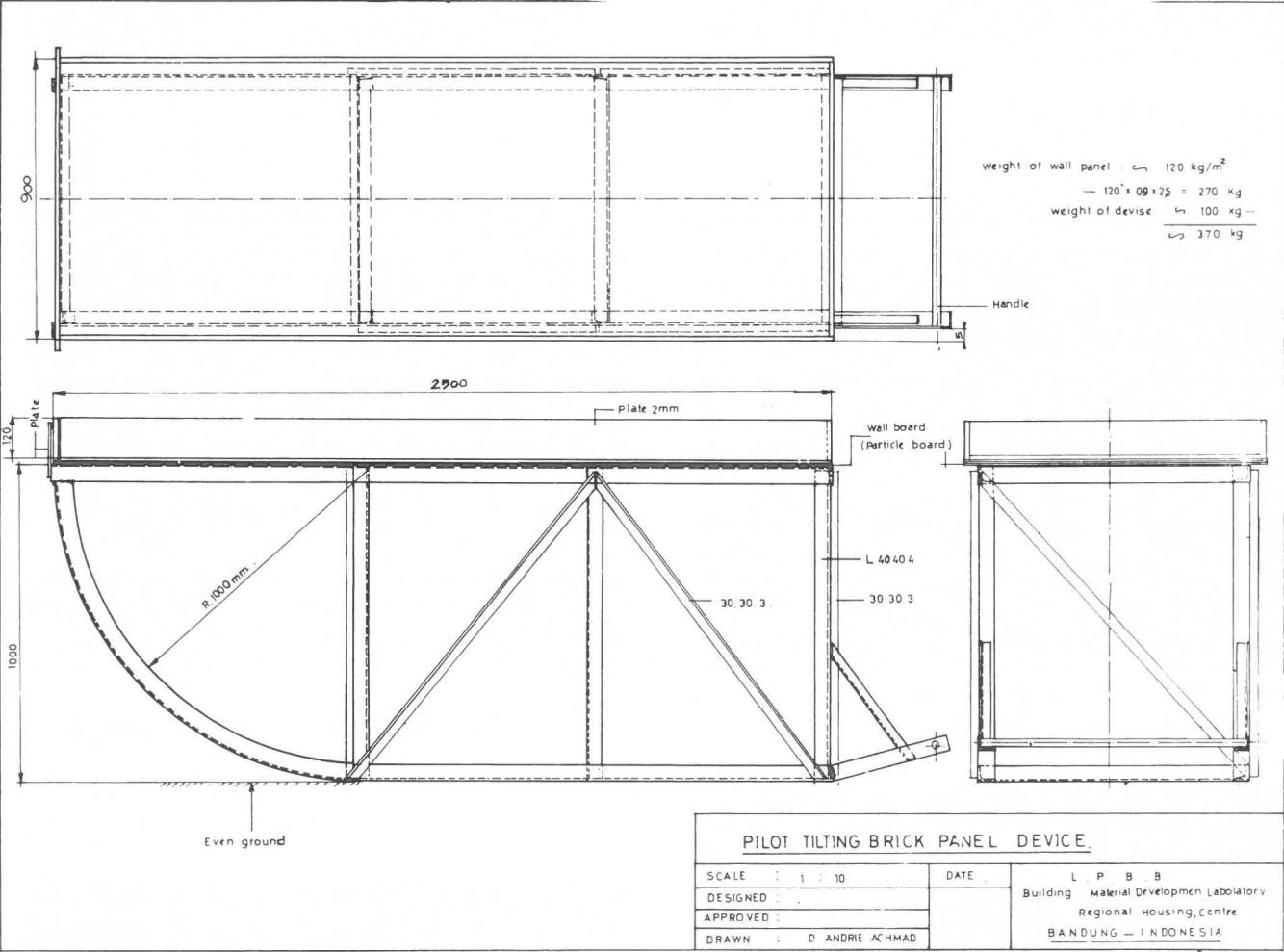


Figure 1. XYZ

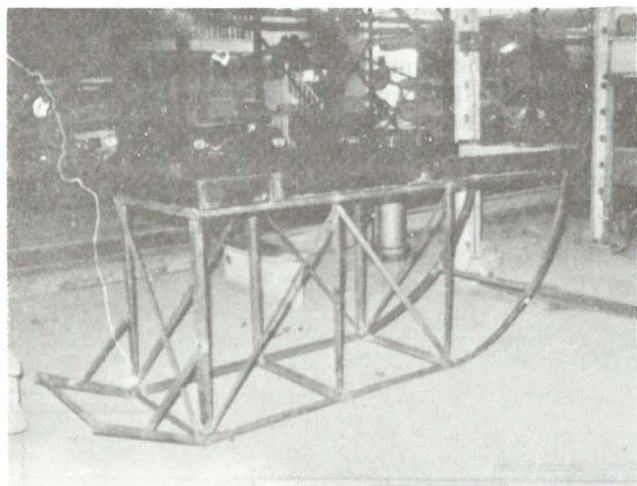


Figure 2. Tilting device.

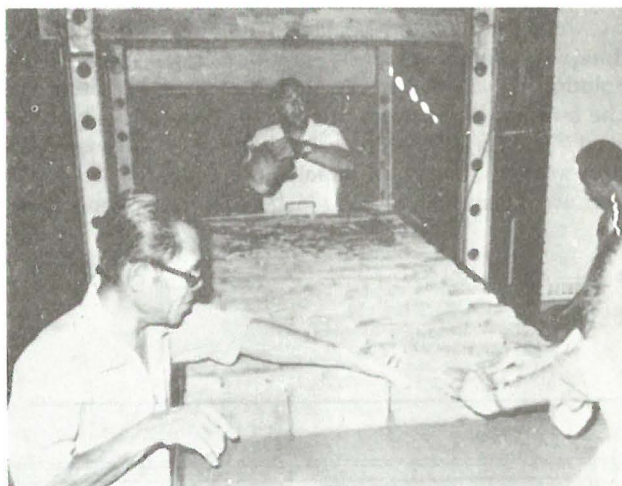


Figure 5. The panel soon finished.

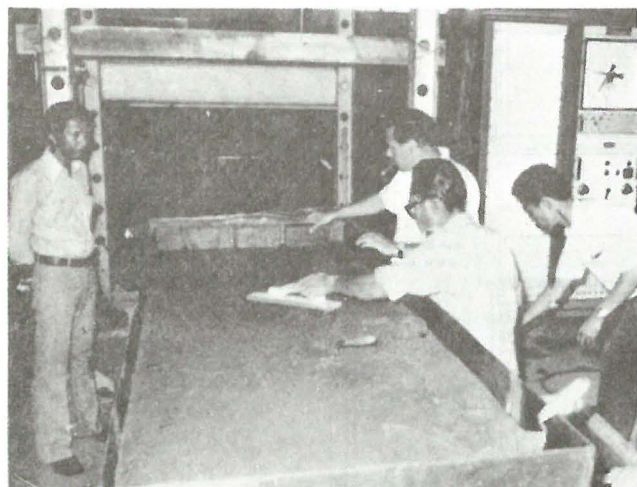


Figure 3. The first courses of bricks being placed in the mortar in the mold.

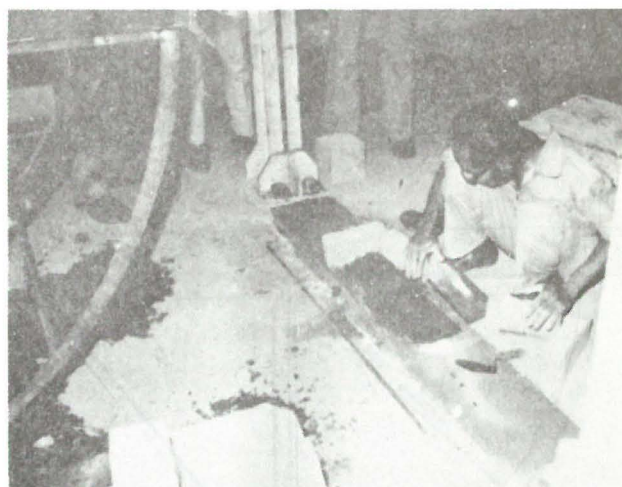


Figure 6. Mortar bed being prepared for receiving the panel.



Figure 4. Continued brick laying.

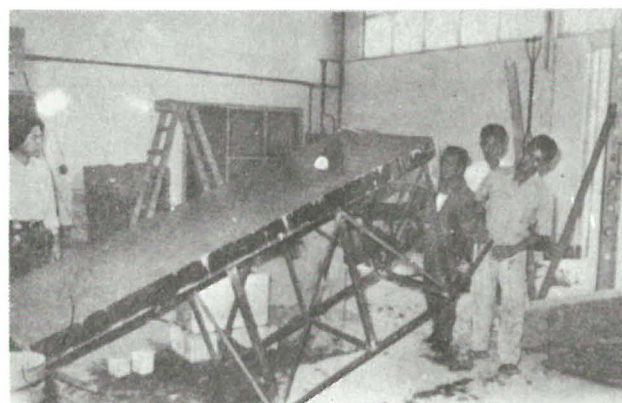


Figure 7. The tilting of the panel to vertical position.

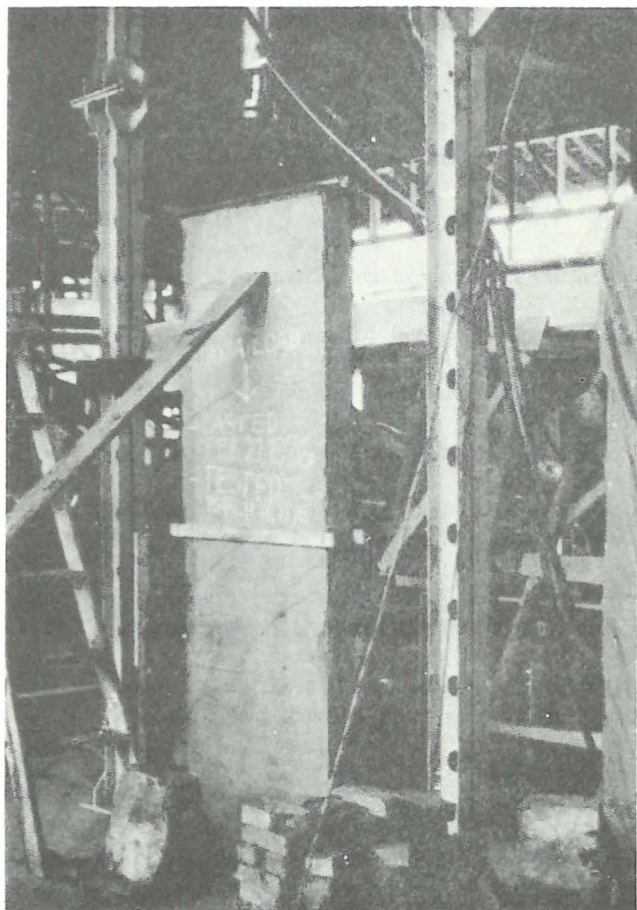


Figure 8. The test panel has been erected in the testing machine.

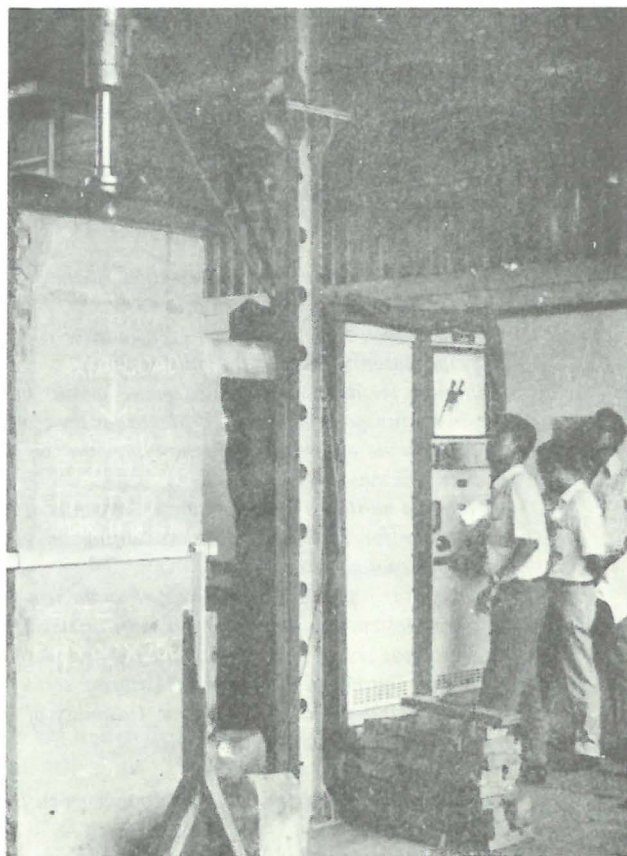


Figure 9. The brick panel during testing.