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07283



Distr.
LIMITED
ID/WG.237/5
12 November 1976
ENGLISH

United Nations Industrial Development Organization

Meeting of Top-Level Industrialists
on Factory Establishment Projects
in Developing Countries

Vienna, Austria, 18 - 20 November 1976

ESTABLISHING LOW-COST HOUSING MANUFACTURING PLANTS^{1/}

by

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(with 07283)



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Corrigenda

- Page 1, line 9, delete "adamantly," insert "somewhat."
- Page 1, line 19 - before last sentence - insert "Briefly, he states that small factories employing few people are often superior in solving local production needs."
- Page 2, paragraph 1, line 4, delete part of sentence starting at "and I regard ourselves . . . dangerous thing." and insert instead "operate a fully qualified engineering and construction company. Together we like to regard ourselves as problem solvers."
- Page 3, at the end of paragraph 1 insert: "But the Sahara and its inhabitants have a high priority in Morocco. Therefore we shall do what we can in this vast area."
- Page 4, paragraph 2, line 5, delete "quarter-inch".
- Page 4, paragraph 2, line 7, delete "soldering" and insert "welding."
- Page 8, paragraph 2, line 4, delete "some three hours" and insert "a relatively short time."
- Page 8, end of paragraph 2, last line, change "short" to "shorter" and continue sentence "than it takes to construct most housing nowadays."

ESTABLISHING LOW-COST HOUSING MANUFACTURING PLANTS

A factory is defined in Webster's Dictionary as "a building or buildings in which things are manufactured." Simple enough; but did you note the insidious tendency toward growth which even this short definition displays -- "building or buildings" indeed! In Morocco, we are attempting a solution to the problem of the construction of multiple housing by keeping our parent building as small as possible. Let me explain. We at Euro-Industries, an essentially American-based firm which forms associations with partners in other countries, are adamantly opposed to the traditional concept of "factories" as such. Is it not true that man's dream in the aftermath of the Industrial Revolution has been that of large factories belching smoke and usually acting as a backdrop for a proud owner? Perhaps we should modify the vision somewhat. In view of the cries of today's environmentalists, belching smoke is out, but, and we say alas, the ever-increasing sized factory is definitely in. E.F. Schumacher, in an imaginative book, Small is Beautiful,¹ has, totally independently, outlined the long-standing philosophy of our organization. Now back to housing in Morocco.

This North African country, situated on both the Mediterranean and the Atlantic, is endowed with a climate ranging from temperate to desert, with a distinctive and gifted people. Under the leadership of their monarch, Hassan II, Moroccans, official and unofficial, have undertaken the task of constructing housing to meet the needs of a population which is expanding in

1. Schumacher, E.F., Small is Beautiful, Harper & Row, Publishers, New York, 1973.

means and numbers at a rapid rate.

Our group is one of many working on the project of housing in Morocco. Before I am arrested for fraud, let me quickly state that I am neither architect, engineer, or city planner. However, my colleagues and I regard ourselves as problem solvers and we do not feel that a little ignorance is necessarily a dangerous thing. This is how we proceeded.

We first made studies on how housing was built in Morocco, that graceful, sturdy and practical architecture which is known throughout the world as "Moorish". We studied, we observed, and we concluded that in design and construction, in beauty and robustness, Moroccan architecture still has a proud place in the world. However, and there was a big however, it took a long time to build, and by taking too long, it became too expensive for the average Moroccan to afford. Conclusion one: we must find a way to build houses more quickly. That turned out to be our simplest conclusion. I mentioned earlier that Moroccans are individualistic. They are. I did not mention that the rules concerning housing, particularly if you are a foreigner in the business, are complicated. They are. To respond to Moroccan individualism we were obliged to develop housing designs which pleased local aesthetic tastes. Because we were obliged to use a method of construction which complied with a local law limiting the use of materials not found in Morocco, we had to reject methods which used wood, plastic, or even cardboard honeycomb insulating elements as bases for our construction.

Positive criteria:

Since we now were getting closer to notions of what was

not acceptable on the Moroccan architectural scene, we set out to find criteria which were desirable. By the way, I am not suggesting that all of this addition and elimination necessarily reflect the wisdom of the ages, but perhaps a review of the steps which we took before proceeding to actual engineering and architectural studies might prove useful for others. All right; what was wanted in Morocco? It developed that to be acceptable under this program, a house must be cheap but sturdy, attractive yet not monotone, rapidly constructed with highly mobile equipment. Finally, and very important, it should, where possible, be labor intensive, and thus, not too complicated in concept. After reviewing all of this, our group agreed that we did not have an easy assignment, but that we at least had the satisfaction of knowing what was and what was not wanted. To keep us from becoming complacent with the problems which we already faced, we were informed that our first study should involve the preparation of a project for the Sahara desert. I am perhaps a minority in that, unlike many people who are drawn to the mystery and beauty of the desert, I sincerely detest it. I regard the desert as man's agricultural enemy, consuming as it does hundreds of acres of arable land annually. As a person involved in building projects, I dislike it for the terrifying problems of heat, cold, and dryness to which any housing or construction is exposed when building is undertaken on desert sands.

Planning an extensive housing program has many of the same elements as planning a battle in a war. Although the aims of the former are beneficial, the difficulties of supply, of over-extended lines, of maintenance of a working force in remote areas all caused us to adopt strategies of factory construction which would dismay the complacent owner standing in front of

his belching or non-belching traditional twentieth-century factory. Before we get to that, however, let me tell you about the type of housing upon which we finally settled after so much experimentation with traditional, new, and sometimes eccentric methods. Finally, by using a method for which we have a patent pending in the United States, we devolved to the use of concrete sprayed under heavy pressure on insulated wire mesh and galvanized steel elements. Let me elaborate a bit.

Eurocrete.

The cold forming of sheets and rolls of galvanized steel into building elements such as beams and studs has become an increasingly accepted method in the housing industry of today. By this means, for example, an easily transported roll of quarter-inch steel can be cut and shaped into a large quantity of strong, lightweight elements which, when combined with wire mesh by screws or soldering, can form the skeleton of a structure. Additionally, these elements have great flexibility and thus can be converted into round, square or eccentric shapes at will. They are then combined with an insulating material such as styrofoam and all elements are sprayed with concrete through a cannon at high speed. By using this method, it is easy to see that many houses could be constructed in a single day, if all conditions are ideal.

Establishing the factory.

Because I believe that conditions for starting a housing or other factory in Morocco reflect similar conditions in other countries, I will go into a bit of detail concerning our

Moroccan experience.

After we had conducted exhaustive tests with the system which eventually became known as "Eurocrete", we presented our dossier to the Moroccan housing authorities. Concurrently, we began the process of forming a company with Moroccan associates. In Morocco, as in most countries of what is loosely called the Third World, foreign participation of less than fifty percent in any company is the rule. This is a proviso which we not only respect but greet, and our company policy is actually to avoid, where possible, any owner involvement on our part with buildings or real estate. After the Eurocrete system was subjected to a number of tests and theoretical studies, and I might add for any prospective city planners that the statistics requested for such studies are enough to make strong men quail and engineers weep, it was granted a brevet or patent for use in Morocco.

At the same time, extensive explanations and demonstrations of our Eurocrete system were given to our Moroccan associates. Another hint for those wishing to set up factories in developing countries: you will likely become associated with people who are not experts in the field in which you will engage. This may seem odd at first glance, but reflection will show that the only reason why you, a foreigner, could be interesting to a country which has likely had a history of colonization, is that you are bringing something which is new and beneficial to the country itself. Also, it has been our experience that the number of entrepreneurs in such countries is relatively few. It takes no great historical or psychological insight to divine why this might be so. Colonized peoples were generally not engaged in the bureaucratic endeavors which constitute the formation of large enterprises. Those who did, following

independence, were the courageous, gifted, lucky, or even perhaps those who got there first. Another hint I would give to anyone wishing to establish a factory in a Third World country: learn patience. Learn a patience which you have never experienced before. To help you gain experience in this patience, learn as much as you can, before you come, about the country with which you deal. Hundreds of enterprises have foundered, often amazingly just at the moment when they were to be consummated, when the European or American or other proffering participant lost patience. This is perhaps the biggest consideration in doing business in developing countries. We of the other continents tend to forget that these people practice a method of democratic (which often means lengthy) participation which we can often not understand, but which we must respect, or move on.

The Housing Factory.

Let us assume that the housing process has passed all tests devised for it by the Ministry of Housing or its agencies. Let us assume that the question of financing has been arranged to everyone's satisfaction, (and of course this is a key point). Then one comes to the equipping of the factory itself. Where should the factory be located? Here, in one sense, we find the proof of our philosophy of housing in Morocco, for the answer to the question "where?" is -- it doesn't really matter, as long as there are adequate communications and transport facilities. I expect to get a demurrer from one of our fiscally sensitive colleagues; I can imagine him saying "It is economic folly not to station your factory near the site of your housing activities." Normally, he would be right and we should be reprimanded for making such a suggestion. But, and this is the but we present: our other factory is not really a factory at all; it is rather

a maker of elements. Thus, in the mother factory we will cut and stack the metal. We will mix and ship the cement, but actually our working "factory" will be in the field and will be, in effect, self dissolving, for when we are finished with on-site construction, we might convert it to a school or maybe a gymnasium. How do we do this? In the following fashion. You recall that our basic method of construction was through the spraying of cement. (By the way, you might also be interested in the fact that the cement which we use will be dry; it is combined with water in the actual cannon which applies it; think what that means in terms of transport. I mean no disrespect when I suggest that we may be in the process of eliminating those lordly elephants of cement trucks which nobly roll along our highways bearing their slowly revolving loads of wet cement, someone else's idea of "progress".) But back to our factory in the field. Our first step is to pour, or more accurately to spray the floor for our factory. If the weather is dry and warm, we will not even need a roof. This factory will have as its function the final cutting, shaping, erection and joining of the skeleton of the house or structure which has been carefully designed by the engineer and architect in advance. Now let us get to the business for which this field factory was made. Let us assume that one's goal is the erection of twelve houses a day. For our system to work at optimum, the houses should have a uniform appearance. May I now digress for a moment? At this point I am prepared to hear a suppressed groan. Someone is sure to say "Those poor people, forced to live in a series of identical boxes." My response, not made in anger, of course, is that multi-unit complexes need not be ugly; quite the contrary. Much of the grace of Moroccan architecture lies in the impact of a series of dwellings essentially monotone in individual appearance which achieve nobility

in their collective effect and different muted colors. My quarrel with the "boxes" which mass-housed people are forced to live in is that they are usually designed by engineers, architects, or technicians who think in terms of space and not of human beings. But let us return to our factory. We will assume that water, sewage, and electrical facilities are already on site. If they are not, we make provisions for plastic or other septic tank facilities before we go to the step of pouring a cement base for house number one. We have devised a method of pouring a base which has a lip on the outer edges. It is cheap and quick and sturdy to place on leveled land, which is the kind of territory we are talking about.

Let us assume that the twelve bases have already been laid. Three men can then take the skeletal elements, including plumbing and electricity, of one house and put it together in some three hours. This does not call for highly skilled labor, but rather for practice. Multiply your team and you can visualize the twelve dwellings being erected simultaneously. As soon as skeleton one is ready and backed with its insulating material, sprayer number one begins to apply the forced cement to the exterior walls of the house. He or a team of cannon welders proceed to make the rounds of all twelve houses. Because it is fast-drying, team two can proceed to spray the interior of house one, etc., after a short delay. It is not magic, but with the proper conditions it could be a fact that the twelve houses, complete with bathroom, electricity, and certain kitchen facilities could be ready for occupancy in a short time.

Obviously, it is not as simple as all that. Planning, supply systems, training, all are very important elements in

the successful running of the mother and field factories.

In our view, multi-national / multi-purpose large factories certainly have their function and undoubted benefits. However, we hope that we, by this rather modest experiment of meeting a part of Morocco's housing needs, can demonstrate something that we believe: that people of modest training can participate with dignity in solving housing problems on the spot in their own countries, something that large factories are just not equipped to do.

One perceptive Englishman, in analysing what is called the malaise of Britain, explained:

"It is perhaps not surprising that Britain, the first country to be industrialized, should be the first to want to be deindustrialized."

In our view, there is a lurking danger in thinking big to find the solutions for the Third World. In a sense, the Third World is one of our greatest endangered species, for it is there where craftsmanship and communal endeavor are still prized. To preserve these qualities, should we not attempt to build small factories which employ involved humans, rather than large factories where humans are but the char force to production?

Sampson, Antony; Newsweek, November 1, 1976. Page 16,
"Decadence-- or Maturity?"



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