Use of local building materials and building techniques in providing affordable housing

Concise Summary: Help us pitch this solution! Provide an explanation within 3-4 short sentences.

Conventional building materials are tied to international market forces which often render housing unaffordable to low-income groups and marginalized populations. Furthermore, these materials are climatically inappropriate especially in hot arid regions. Traditional materials sometimes have poor resistance to erosion, are prone to pest/insect infestations, or have poor structural properties rendering multi-storey construction impossible and therefore, housing less affordable. We use local materials available on or near the site for construction including stone and granite, but also mud or clay stabilized with rice straw, iron ash and/or cement dust to improve resistance to erosion and structural properties. New material designs (mixes) are approved by relevant authorities. That coupled with the revival (sometimes modified) traditional building techniques and training of youth in producing and building with these materials gives communities more independence in constructing their own homes and makes these houses more affordable. At minimum, they save transport of material costs, and the overhead of a contractor. Collective housing (3-5 stories sometimes including commercial space) incorporating socially and climatically appropriate design elements and raw or treated local building materials were built by our offices extensively in Algeria and spontaneously imitated by local communities. This methodology is potentially applicable universally applicable wherever conventional building materials do not provide climatically and socially viable and affordable housing.

Description of housing product/service offering:

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Description of innovation:

Some programs supporting earth construction attempt to mass produce alternative materials, ultimately defeating their own purpose since the
objective is to make low-income and marginalized communities independent of market forces. Other programs adopt certain alternative materials and techniques and attempt to apply them universally. We believe that each location has its own solution. We do not build with a single material, mix of materials or construction technique. We search for viable building materials on or near each location we build on. In more recent years we have often used the expertise of qualified soil mechanics labs to develop new mixes for bricks and other construction elements. While mostly composed of a local raw material, we may add sand, rice straw, cement dust or iron ash to the local clay or mud. Bricks are always cold-pressed using a mobile hydraulic press. Once the building materials are determined, appropriate construction techniques are identified. These may be currently used or revived local techniques (such as the H?eba in Upper Egypt), techniques which are modified to improve structural properties, or techniques imported from other similar regions (such as the flat dome from Tunisia). Local youth or construction workers then participate with trained master builders in constructing a model in the local community (often a community facility). They can then use their new skills to build for themselves or for others.

Benefits to clients:

After identifying areas or regions in need of intervention (sometimes we are invited, sometimes we identify them), we first establish a dialogue with the local community and administration. Through this process we establish trust, we understand the construction needs and priorities of the community (housing, service facilities, social space, etc), we understand local conditions (potential sites materials and microclimate, local lifestyles and traditions, etc) and we identify youth who are willing to participate in training through the construction of the first model(s). With the support of the local administration or grant agency sponsoring the project, we then test local materials, select or develop these materials, develop the building design with local partners (often after completing a participatory community or urban plan), and then construct the model(s). Depending on the project, we may supervise further training and construction. To implement this process, our staff is trained in establishing local dialogue, site analysis, participatory planning and implementation. We collaborate with master builders who are trainers in traditional building techniques and we work closely with soil mechanics labs with a capacity to test properties of materials and help us design new building material mixes (bricks, beams, plastering & flooring materials, etc)

Key operational partnerships:

In Algeria, the local technical and administrative authorities were the main partners once they were convinced of the environmental and economic advantages of using local materials, labor and construction techniques. We worked mostly in remote desert areas and the oases. The majority of staff in local municipalities were natives of the region and readily understood the difficulties involved in producing locally?ed housing. The authorities would approve the site layouts and models, issue needed permits, then finance or arrange for financing the project. Were projects were in or extensions of existing communities, the natural leaders, youth and master craftsmen/ builders of the area were vital in the planning and implementation process. They helped set priorities, set the plan, work out implementation details, manage the site and implement the project. In Egypt, NGO?s in informal areas, natural leaders and master builders of the community are main partners and are key to achieving acceptance by and cooperation of the local community. Investors willing to produce building materials which were cheap (plastering mix for the finishing of building facades) enabled us to quickly carry out large-scale projects quickly (e.g. Imbaba, Giza). The Ministry of Culture, through its new Urban Rehabilitation Agency, financed numerous opportunities to demonstrate different models and techniques in informal urban areas including Luxor; Imbaba, Bahr El A?azaam and El Mouine areas in Giza. Again, local master builders were crucial in implementation and the training of local construction workers.

Impact

Financial model:

Virtually eliminating costs for transporting materials, specialized construction equipment and general contractors ensures that costs are kept below that of conventional housing (c. 30% less). When communities imitate a model, this indicates that they found the buildings affordable and appropriate. In Egypt we are coordinating with the Center for Housing and Construction Research to offer housing models dispersed on a national scale. Coupled with local development funds available to beneficiaries directly from the municipality, this would be a step towards making affordable housing possible on a national scale. It is also important to note that housing in the informal sector in Egypt is mostly self-financed by the community. Alternative lower-cost housing extends affordability to lower-income groups within the community. To date, the majority of projects were financed by the government/ municipalities. Usually ADAPT provides the know-how and the government finances implementation. In some instances, were local quarries or material production units were established (in Algeria), the building process did become sustainable and communities were spontaneously extended through the community?s own means. Sometimes communities provide labor for building the initial models. In addition to donor funding, the activities of ADAPT are primarily financed through the consultations it provides to municipalities, government and donor agencies in the field of appropriate building technology. The proceeds finance research, travel expenses, and staff.

Costs as percentage of income:

80

Financing:

In Algeria many of our housing projects have been spontaneously imitated and extended by the community. The original 400 houses in El wad were eventually expanded to expand the community to 8500 housing units. Similarly, the initial projects of 400 and 200 units in Oulad Djalal and Sidi Khaled expanded to some 1600 units and the agricultural communities of Ma?adar and Feliache eventually grew from 100 to 400 units. An estimate two years ago showed that some 20000 units were built using our approach in Algeria; either directly through the program or by the communities without external intervention. This represents more than 110,000 people who have benefitted from the program. In Egypt were most of our work is more public in nature (public spaces and community facilities, etc.) our work has benefited communities exceeding 100,000 in population.

Effectiveness:

Project outcomes: In the past year we have been working with universities and building research entities to disseminate our concepts in order to engage decision-makers and deliver the concept to students of architecture and planning. We are also working on the rehabilitation of a historical area in Riyadh, Saudi Arabia which would directly benefit a population of 1600 in addition to revitalizing local micro-enterprises. Similarly, a project with camel trading Bedouins on the Southern Red Sea coast in Egypt would provide two small marginalized communities (pop. 9000) with improved housing and community facilities. In the past year we have been working with universities and building research entities to disseminate our concepts in order to engage decision-makers and deliver the concept to students of architecture and planning. We are also working on the reh. Percentage of clients that are poor or marginalized: The potential demand for appropriate building technology would include any low-income, remote or marginalized, community. Our experience is mostly in arid urban and desert environments, but the concept is applicable anywhere in the world where there is a need to lower cost of housing for the poor, or improve the quality of such housing, and were
there are architects willing to test and develop appropriate materials and techniques.

**Scaling up strategy:**

**Stage of the initiative:**

<i>Scaling Up</i> stage.

**Expansion plan:**

In the next three years we hope to conclude the Riyadh and Red Sea projects. We also hope to be able to construct models in several environments in Egypt in cooperation with government entities in order to convince them of the viability of the approach. We will continue to try to establish municipal local funds to make housing financing more accessible to low-income groups; and we are continuing to disseminate the concept in academic circles to help shape the attitude of the next generation of architects and planners.

**Origin of the initiative:**

The general concept of appropriate architecture is not new. However, for me, the initiative began in 1976 when I left my graduate studies in Germany for a summer internship in Algeria. There, I met the late architect, Hamdi Diab, who introduced me to the concept of appropriate architecture and building technologies. I stayed in Algeria, and after he died in a car accident that same year, I decided to stay on in the desert of Algeria and continue with the work that Hamdi Diab had started. I was joined by my brother, the architect Abdel Rahman El Miniawy and we continued our extensive work in the desert for the next twenty years. In Egypt, we were joined by my wife, Sanaa Tobah, who has the same convictions as we do, and currently manages our private consultation office in architecture and planning. Here, we concentrated on the upgrading of informal and remote areas.

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