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ATI's Brickmaking Projects

5. Author(s)  
1. Carlos Lola  
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3.

6. Contributing Organization(s)  
Appropriate Technology International

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This paper describes three ATI brickmaking projects. Since 1977, ATI has been testing new strategies for small-scale brickmaking in three African countries: Mali, Botswana and Tanzania. The principal elements in the Malian project were: the use of locally available soils, the adaptation of an innovative roofing technology (brick domes), and the creation of producers' cooperatives, including providing skills training to Malien artisans. The project in Botswana included the introduction of a permanent kiln based on the Hoffman design principle, manual pressing technologies, and improvements in the drying process. The project in Tanzania compared three types of clay crushers and three types of manually operated brick presses.

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## ATI's BRICKMAKING PROJECTS

by Carlos Lola

Fired clay bricks date back thousands of years. Spence and Cook claim that the earliest known bricks, found in excavations in the cities of Mohenjo-Daro and Harappa in the Indus Valley in present-day Pakistan, date between 2500 and 1500 B.C. Other authorities claim that the world's oldest brick, exhibited in the Museum of Ancient Bricks in Johnson City, Tenn., comes from Kalibangan, an area in what is present-day India, and is 5,000 years old.

In the brickmaking industry in LDCs today, large, sophisticated plants that use tunnel kilns and extruders compete with small backyard operations that use batch kilns and slop molding. Large scale plants require high capital investment, imported machinery, high energy consumption, and expensive permanent kilns. These large-scale plants have a rigorous quality control process and produce bricks which have a high compressive and shear strength, a low absorption rate (less than 10%), a crisp appearance and a relatively high cost.

Traditional brickyards require low capital investment because no imported machinery is needed. These backyard operations use field clamps (temporary kilns), exercise no quality control and have only a rudimentary process control. The bricks that result have a low compressive and shear strength, a high absorption rate (up to 40%), and superficial deformations but they are low cost. ATI has found that it is extremely difficult for large scale plants to match the selling price of the bricks made in traditional brickyards.

Appropriate Technology International's business is to get productive technologies, that are commercially viable and economically sustainable, into the hands of poor people in rural areas of developing countries. Since 1977, ATI has been testing new strategies for brickmaking in three African countries: Mali, Botswana and Tanzania. Field notes from these projects are attached.

### MALI

In Mali, beginning in 1977, ATI worked with ADAUA (Association pour le Developpement d'une Architecture et d'un Urbanisme Africains) to facilitate low cost construction techniques based on adobe and a Belgium made manually operated press (Terstaram). The principal elements in this project were: the use of locally available soils, the adaptation of an innovative roofing technology (brick domes), and the creation of producers' cooperatives, including providing skills training to the Malien artisans (1982). ADAUA's multi-disciplinary staff consisted of African engineers, architects, social promoters, head masons, local artisans, and administrative staff. The masons and brickmakers received financial and management support to establish independent enterprises; later they supplied building

materials to other ADAUA projects. The Malien artisans were selected to make the bricks used to build health clinics in the rural areas of Mali under a World Bank project.

#### BOTSWANA

In 1984, ATI began supporting another brick project in Africa with the Minerals Holding Trust in Botswana. MHT is a wholly-owned subsidiary of the Southern Rural Development Association (SRDA), a non-governmental organization recognized in Botswana as the model for small-scale mining and minerals processing enterprises. MHT organizes rural people into commercially viable production units which produce building materials and industrial minerals to sell on the local market. In addition to producing clay bricks, MHT mines and processes lime, slate, and pigments (red oxides and yellow ochres). Approximately 300 people, many of them women, are employed by MHT to mine or gather stone or clay, transport the materials to the processing site, and process the minerals.

ATI's project at the Moshaneng brickyard, near the town of Kanye in Southern Botswana, introduces a new brickmaking technology which upgrades the traditional slop molding process. Innovative elements of this project include the introduction of a permanent kiln based on the Hoffman design principle, manual pressing technologies, and improvements in the drying process.

Introducing manually operated presses in Moshaneng was not an easy task. Development groups often presume, incorrectly, that in rural areas, new technologies will be eagerly accepted by the community. ATI's experiences at Moshaneng, and at many other project sites, confirm that a training component, a follow-up program, and simple documentation illustrating the use of any new equipment, are essential if any technology transfer activity is to be successful. At the beginning of this project, the presses were incorrectly used. The workers were untrained and did not assemble the presses correctly. ATI staff demonstrated the use of the presses; implemented an alternative, much more cost effective, organization of labor; and also suggested the introduction of incentive schemes. In seven months, the output per press, using a five person crew, went from 300 bricks/8 hours to 1300-1600 bricks/8 hours--a remarkable achievement.

#### TANZANIA

Since January, 1983, ATI has been working with CAMARTEC (Center for Agricultural Mechanization and Rural Technology) in Arusha, Tanzania to determine the most suitable technology for the small scale village-based manufacture of clay bricks. Three types of clay crushers and three types of manually operated brick presses are being compared. Although it is too early to provide a thorough assessment of this project, ATI expects to include the

assessment in a technical service package to be made available to prospective brickmakers/entrepreneurs in Tanzania and neighboring countries.

It is worth mentioning that since 1984 the North Koreans in collaboration with the Tanzanian government have been building a modern brickmaking plant with extruders and a continuous tunnel capacity. This plant has a capacity of 7.5 million bricks and employs 110 people; its estimated cost at the official 1987 rate was \$4.8 million dollars. This amount of money invested in several smaller and simpler plants--ATI's approach to brickmaking in Africa--would have generated far greater employment based on an analysis of capital investment/employment creation.

UNDP's latest press release states that a quarter of the world's people--1,250 million persons--do not have adequate shelter. One hundred million people have no housing whatsoever. By increasing the availability of low cost building materials, such as clay bricks, ATI is attempting to help solve this problem in rural areas of the Third World.

The rural poor in the Third World must not only be the users of appropriate technologies but also must be employed to produce the products consumed. Through increased productivity and locally owned and operated profit-making, small enterprises, such as the small-scale brickyards, appropriate technology can respond to the challenges of rural and semi-urban development.

NOTE: This article was submitted to VITA NEWS for the April 1987 issue; however, due to space constraints the article was not included in that issue.