

Building technologies, local resources and empowerment: A low cost housing project in East London, South Africa

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Abstract:

The poverty and housing problems of the black, coloured and Indian communities of South Africa did not disappear with the end of the apartheid era. Besides a housing backlog of 1,5 million and a demand for 220 000 new houses every year, South Africans are suffering from underdevelopment at economic and social levels. This situation is not disconnected with the recrudescence of violence that is happening now in South Africa. Besides the persistence of the tensions between the different groups inherited from the former regime, the poor seem to be weary of waiting for a fairest redistribution of the wealth that is too slow to happen.

Housing is only a part of the problems faced by developing countries. It should not be treated independently from the whole. The choice of a material, a technology is everything but innocent. It reflects political choices, values and cultures. In front of tremendous housing of developing countries, cost criteria often weight much in the balance. For that reason and in situation of emergency, project stakeholders often borrow models and technologies from overseas which are not suited to their new context. Beside not being adapted to the local climate and culture, these models often prevent the housing project to bring positive socio-economical impacts on the community.

This paper is about a low cost housing project in East London, South Africa. Through the introduction of the compressed earth block technology, the project succeeded to reintroduce the use of a traditional material, and to bring it into urban areas. In maximising the use of local (material and human) resources, the project aimed to use housing to be a lever for local development and to bring positive socio-economical impacts on the community and the less possible negative impacts on the local and global environment. By modernising the use of a material that could be found almost anywhere in the world and that shelters more than a third of the humanity, the project succeeded to valorise earth as a noble local material, helping the communities to reduce their dependency on external materials, components and technology.

The paper attempts to contribute to the development of local solutions to the universal housing problem rather than universal solutions to local housing problems. It also tries to present housing as a lever on which other local needs such as health, education and economy could find support to develop. It aims to propose economical solutions and building details that maximise the use of local (human and material) resources, that are simple enough to facilitate a technology transfer but not simplistic since it also wants to serve educational purposes. For these reasons, it tries to favour solutions that are respectful and correspond to the local know-how, and the cultural values of the communities that will benefit from such projects.

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**Note: Images are by the author unless otherwise indicated*



Duncan Village, East London – South Africa



Masonry training at the *C.C. Lloyd Community Centre*; Haven Hills South Housing Project, East London – Republic of South Africa

This paper is about a low cost housing project in East London, South Africa. Through the introduction of the Compressed Earth Block technology, the project successfully reintroduced the use of a traditional material in housing built in urban areas. By maximising the use of local (material and human) resources, the project aimed to use housing as a way of promoting local development and of bringing positive socio-economical changes to the community, while having a minimal negative impact on the local and global environment. By using earth, a substance that shelters more than a third of humanity, in the creation of modern buildings, the project introduced the notion of earth as a noble local material. This new perception of a humble and easily obtained building material is helping the communities to reduce their dependency on foreign and/or manufactured materials, components and technology. This project attempted to contribute to the search for local solutions to the universal housing problem, rather than looking for universal solutions to local housing problems. It also tried to demonstrate how housing, if well understood, could be a powerful agent in support of other local needs such as education, health and economy. It aimed to promote solutions that would maximise the use of local (human and material) resources. These solutions would be simple enough to facilitate a technology transfer while being rooted in a sound methodology that would serve educational purposes. For these reasons, it tried to favour solutions that are respectful and correspond to the local know-how and the cultural values of the community that will benefit from such project.

For most of their history of cohabitation with Whites, the Black, Coloured and Indian peoples of South Africa were prevented from directing their own destiny. Despite the optimism that followed the 1994 election, South Africa began a process of *healing* and *reconstruction* at many levels. The result of April 1994's first democratic election in South Africa was the beginning of an important challenge for the Black (75% of the overall South African population), Coloured (8,6%) and Indian (2,6%) peoples of the young Republic of South Africa.

In addition to the tremendous challenges facing these groups as a result of the lack of attention to education, health-care, water and sanitation, the provision of adequate housing is another cause of major concern for the new South African Government. The new administration inherited a deficit of 1.5 million houses from the former apartheid regime. Moreover, there is a demand for 220,000 new houses every year in order to meet the regular growth (2,26% annually) of the South African population of 42,5 million inhabitants; 66% of which are found in the cities and their peripheries. Approximately 61% of the urban households live in formal housing, or share formal housing with other families; an estimated 13.5% live in squatter housing nation-wide, and approximately 5.2% live in private sector, grey sector (privately owned hostels constructed on public sector land) and public sector hostel accommodation (Department of Housing White Paper, 95). The project was the result of an agreement between *the Van der Leigh Habitat Foundation* (VLH) from Amsterdam, *the East London Municipality* (ELM) and *CRATerre-EAG* (International Centre for Earth Construction-École d'Architecture de Grenoble) from France, establishing a Technology Transfer Program to pass on and disseminate the French earth building expertise to the local partners in East London.

East London is situated at the mouth of the Buffalo River and is the second most important city of the Eastern Cape, after Port Elisabeth. Its railroad links to King William's Town and Johannesburg recall East London's past as an important port city on the Indian Ocean. Sparsely populated at its founding in 1847, it served as a port for the imperial troops during the War of the Axe (1846-47). Today, the municipal area of East London has 560,000 inhabitants and its projected annual population growth of 5% could mainly be attributed to the migration from the Ciskei and Transkei, two former Xhosa homelands on the western and eastern sides of East London, respectively created in 1981 and 1976. The non-European population of East London, of whom 80% are Xhosa (and include Nelson Mandela and Thabo Mbeki the two first presidents of the new democracy), is highly politicised. It is not surprising to learn that East London was involved in the first battles against apartheid. As the *Central Business District* (CBD) of East London deteriorates, newer, more profitable buildings and developments spring up in the inland outskirts. It is in this protected environment that the White population and the new Black bourgeoisie live. They are shielded from the extreme poverty that is so evident in the downtown area, where *hawkers* (informal itinerant dealers) travel in from the townships and giving life to the sidewalks.

Although there have been some improvements in the lives of East London residents, only 2/3 of the town's active workforce of East London is employed. Of this group, 16% find work in the informal sector. In 1997, the need for houses among all residents, including those in the informal settlements, rose to an estimated 30,000 (Makalima, 97). Other, more realistic reports which counted other forms of informal housing such as rented rooms and *back yard shacks* (informal dwellings in the grounds of a house, for which residents pay rent to the landowner), revaluated the 2002 housing need as 50,000 (City of East London, 98a). It was found that as many as 30% of the households in the periphery of East London do not have a legal title of ownership. The downtown and industrial sector areas are overcrowded and even the urban cemeteries are often occupied by illegal settlements. The local authorities are very tolerant of these temporary housing arrangements, particularly since the formal housing delivery process is not able to make up for the existing housing backlog or even to contain the growing demand.

The new South African housing policies are unable to produce unanimity among the Black, Coloured and Indian populations because each group sees itself as a loser to the others groups. The dimensions and the quality of the subsidised houses are, however, no longer related to the race, but to the income of the beneficiaries. The unfortunate perception of each group as being less favoured than the others works directly in opposition to the new government's objectives of

reducing animosity among the groups. The groups who are being slowly integrated in the townships return to their own racial groups to denounce and fight the new measures. The attempt to achieve equality would mean that everyone, regardless of race or ethnic background would be entitled to a small starter house measuring between 15 and 25 square metres. For Coloured people, the subsidised housing would be smaller than the size allocated during the former regime. The Black people, on the other hand, were offered a bare minimum of housing space (so-called Sites and Services), and facilities that amounted to no more than a toilet and a tap. This group is understandably, upset to have been denied the privileges enjoyed by the Coloured people during the apartheid years.

East London is certainly one of the most dynamic regions applying the *Reconstruction and Development Program* known as RDP (ANC, 94). As one of the poorest regions of South Africa, East London is one of the RDP's priorities. Although many housing projects have been implemented in order to provide better housing conditions to people living in the townships of East London and its surrounding area, most of them never addressed the quality of the space in architectural and in urban terms. The architects seem to have been ejected from the design process long ago by the engineers who often see the housing part of such projects as a by-product of the infrastructures to be built. It is not uncommon for infrastructure costs to count for more than 50% of the overall budget for such projects. Also, it seems that every increase in cost translates into smaller, inferior quality housing, while the scale of the infrastructure costs are never questioned. This situation reflects the fact that, for many years, the living conditions of South Africa's poor were looked at in terms of what was the minimum that could be provided—the existence of the ¹*hostels* being a testimony of that period.

In South African urban areas like East London, subsidised houses are most commonly made of concrete blocks. For the beneficiaries this modular industrialised building material represents a high level of development. It reassures the dwellers that they have made a successful transition from their country homesteads to the city. It tells them that they have completed the journey from the rondavel (*rontawuli*) – a thatched cone-on-cylinder hut built of adobe (sun-dried mud bricks), wattle-and-daub, sod or stone, depending on the region – to the shanties made of discarded materials, and finally to a government subsidised starter house made of concrete blocks roofed with galvanised metal or asbestos sheets. Despite the diminished levels of insulation and comfort compared to the thatched, round huts they built in the country, the residents are proud of their new town dwellings and the important image of success that it carries. The stark contrast between the humble local material that is well-suited to the climate, and the poor quality concrete blocks with their inferior masonry and plaster-work, is of no consequence to the newly-settled town dwellers.

The fascination for cement and maintenance-free concrete premises does not in itself account for the lack of critical awareness of the bad workmanship by the residents. A gradual erosion of traditional building know-how that is particularly prevalent in South Africa since apartheid, has undoubtedly contributed to this attitude.

¹ The importance of the *hostels* in the South Africa's history is undeniable. These huge dormitories where migrant workers were living away from their families for most of the year appear as sad witnesses of the apartheid era. They are partly responsible for the rejection of the row housing schemes and other forms of densification by the population who claim the right to live in a house in the middle of plot. Today, it is not without problems and indignation from the population that the South African Government is trying to rehabilitate these buildings, even in imaginative ways, to turn them into family housing or rooming houses, offering the poorest alternative shared housing accommodations.

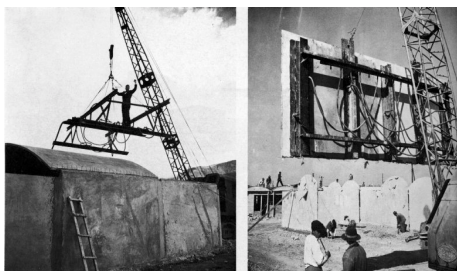
The deteriorating condition of the existing housing stock in the country villages illustrates how, even when traditional houses are constructed knowledge of traditional building methods is no longer taken for granted. An example can be seen in the straw roofs that used to last seven to ten years, but due to inferior workmanship, will now only last approximately two years.

Sometimes new and foreign materials add more confusion and even danger, when mixed with existing local ones. Even in the country it is not unusual to find peasants making adobe to build their houses as they have for generations, but using cement as a stabilising agent for the raw clay bricks, which are allowed to dry in the sun. Of course, one could argue that these details are not so important in view of the tremendous housing needs faced by these groups. There are, however, serious safety issues and this method of building sometimes has disastrous consequences. When the materials and their inherent techniques are incompatible, it is possible to cause as much damage as an earthquake. It is difficult to convince the builders of this, however, because they believe that cement will add strength to the structure.

This situation is not only restricted to South Africa. In many developing countries the vanishing of traditional know-how—the process of cultural loss—began a long time ago with the arrival of the first missionaries who "regarded the abandonment of traditional economic practices and material culture, including architecture, as a visible signifier of conversions, and strove to promote it" (Japha, 97: 8).

Previous identification and feasibility studies took into consideration the availability of materials and the specific local needs of this urban context. Noting the moderate level of industrialization and the very high rate of unemployment, it was found that the Compressed Earth Block (CEB) technology was the most suitable for East London because it was believed that the CEB would respond the best to the common objectives of the three groups (Garnier, 97).

The critically high level of housing need has forced governments to seek external, technical and financial assistance to help them develop and implement housing programs. Although most politicians know that lack of housing is never an isolated problem, their craving for keeping the power leads them to seek short-term, visible results. Pressure from foreign aid institutions forces accelerated production of houses. This in turn encourages government administrators to choose foreign materials and technologies, and even to model their housing and building standards on those in industrialised countries. The consequences are devastating social, economic, and environmental impacts. In addition the existing miserable housing conditions are worsened because the finished product is unaffordable to the target groups and discredits the local (human and material) resources (UN, 76; UN, 90).



Foreign Materials

+

Foreign Technology

= *Fast Construction ≠ High Productivity*

Photo: Galaor Carbonel, (1989)

Versus



Local Materials

+

Local Know-how

= *Fast Construction but = Strong Productivity*

The goal behind this project was to offer a training and housing programme involving the CEB technology that would not only help to reduce the dependency on foreign materials and technologies, but also to demonstrate a viable alternative model for Low Cost Housing programs. The ideal would be houses of better spatial, material and craftsmanship quality than those normally found on the market. They would be offered at a competitive cost and would create more jobs for skilled labourers within the communities. Use of local materials containing fewer pollutants and/or lower embodied energy than ordinarily used, reduce the negative impact of the housing industry on the environment. In this project, we used the local material, the *Sabunga* earth which is an inert material, directly found underneath the topsoil. The topsoil being useless for building was put aside for the extraction and then put back in its place where it could find its former agricultural use. The *Sabunga* soil could be manually extracted. Beside being manually passed through a sieve to clear the bigger pebbles and stones, the soil does not require any more transformation to become the main component of the Compressed Earth Blocks.



From the countryside to town, the landscape, the density, the materials and technologies change drastically the dwellers' lives

With few exceptions, newcomers are reluctant to use traditional materials and techniques when they move from the countryside to the towns. Their traditional way of building reminds them of the misery they left behind. However, when looking closely at the salvaged rubbish and scrap shacks that comprise the informal settlements, it is possible to see the remains of the traditional peasant building culture. These settlements, although different in density and size, share similarities with the latter in terms of space layout or use, building details or solutions to different problems or needs. For example, a two-panel stable door is a useful addition to a country hut. The closed lower panel prevents the animals from escaping, while the upper panel allows the light and air in, providing a draught for the fire. It does not, however, seem such an obviously useful addition to housing in the informal townships. The small numbers of animals found in the squatter settlements would not justify the use of such doors for the township shacks. On the other hand, this type of door is enormously useful to facilitate ventilation, helping to evacuate paraffin fumes that would otherwise accumulate inside. The lower door panel, when closed, prevents the unpredictable and strong rain from flooding the shacks, in the same way as it does for the country dwellings. These and many more examples seem relatively unimportant but are part of the group's building culture, which through time, has adapted to respond to new problems and needs. To the dwellers these were always significant enough for them to spend time designing constructive and efficient solutions. Architects or engineers who pretend to design healthier and more environmentally-friendly houses for the people living in so-called substandard housing should consider such details in their design. If through their study they don't find solutions, they will at least have a clearer idea of the problems.

Although earth is probably the oldest building material used by man—it still shelters a third of humanity—the Compressed Earth Block is associated with the idea of a new and industrialised product. In an urban context such as East London, this played a key role in its acceptance, as much by the workers as by the residents.



The Compressed Earth Block is associated with the idea of a new and industrialised product.

The first intervention took place between September and December 1997 in six different townships of East London and its periphery, that is to say *C.C. Lloyd, Cambridge, Duncan Village, Scenery Park, West Bank* and finally, *Mdantsane*, a homeland township outside East London that was created in the early 1970s, being the second major township of South Africa, after Soweto. From these six townships 30 unskilled men were selected to participate in the CEB (Compressed Earth Blocks)-making and masonry training programme. The location of the *C.C. Lloyd Community Centre Township* became our headquarters and first training site. They provided us with a roof under which we could teach the making of CEB (Compressed Earth Blocks), and accumulate CEB for the masonry training. Sharing the space of the *C.C. Lloyd Community Centre* with one of our local partners, Buffalo Flats Community Development Trust, a very active NGO in the communities, grounded us very much in the reality of the townships everyday life and needs.

As part of our strategy to involve as much as possible local partners in our projects, the trainees went to the *East Cape Training Centre*, based in East London to receive the basics of masonry construction. A few weeks later, the trainees came back to the C.C. Lloyd Township for their on-site training, erecting their first permanent masonry walls, closing the existing open steel structure of the *C.C. Lloyd Community Centre*. Beside accommodating the thirty trainees at the same time, this was an opportunity to consolidate the infrastructures belonging to the community. After the completion of the community centre, the 30 trainees were ready to split into smaller groups to build demonstration starter houses in the five remaining townships.



Masonry training at the *C.C. Lloyd Community Centre*



Building a starter house in *West Bank*

At the end of this four-month first stage of the overall project, we had built only three of the six *starter houses* that were previously planned. From the first on-site interventions it was evident that the local population were beginning to accept that the *Compressed Earth Block (CEB)* was a superior building material to concrete. People experienced a greater level of physical comfort in the houses built with earth blocks, which do not become uncomfortably hot in the midday sun, as do the concrete block houses. Because of the high quality of the block-laying work, and, as a result, the fact that the CEB (Compressed Earth Block) masonry walls don't need plastering, people tend to compare the CEB houses to fired brick houses. These houses are more prestigious, with a higher standard of workmanship. In addition, the material itself is a symbol of permanence that can be traced back to the Boer pioneers' settling patterns (Hilton, 98: 226).

In order to guarantee the permanence of the project, we brought the Compressed Earth Blocks through a series of tests, necessary steps to have the new material approved by the South African Government. This would mean that houses built with the Compressed Earth Block would be eligible for the Government Housing Subsidy scheme, opening the market to the new local industry. After building a demonstration *Compressed Earth Blocks* wall, the latter underwent and successfully passed a series of tests performed under the supervision of the *South African Bureau of Standards (SABS)* in the C.C. Lloyd Township in East London in December 1997. This was a significant step in gaining approval for CEB housing all over South Africa.



Tests performed by the South African Bureau of Standards (SABS) to obtain the *Compressed Earth Blocks (CEB)* approval for all the regions of the country.

As a consequence of the positive results of our incremental approach, the project followed subsequent phases of implementation. A new, semidetached house prototype was built in May 1999 and was then evaluated and re-adapted. A few houses later, the project, by now divided into two components—Compressed Earth Block production and the House Building—has now attained a capacity of more than 150 houses a year and is expected to eventually attain its full capacity of 450 houses per year.



In June 2001, there were 150 houses built by the trained masons.

These numbers might not be impressive when compared to the tremendous need or to mass housing programs in other regions of developing countries. Having in mind long-term goals, this housing project has the potential to give the communities greater independence from foreign materials and technologies as well as from foreign aid. Many mass-housing projects claim to produce houses more efficiently than local enterprises, but the technology used by our project is, in fact, better suited to being adopted by local builders and contractors. It is important to stress here that, generally speaking, salaries in developing countries are too low to justify a building approach involving high-tech methods. In this context, the use of machinery should be reduced to the minimum this, generating more job opportunities for manual labourers within the communities. In the same way, the size of the building components should be thought to fit the existing local building components which the majority uses. Following this idea houses should be designed and built in a way that facilitates modifications by the users over time. A complicated building system does not offer this possibility. (Spence, 93)

Providing shelter alone to the poor who live in squatter settlements is not enough to alleviate the problems that come with poverty. If we insist that most of the money involved in a housing project stays in the community where the project is taking place, it is as though we were

investing four times the initial amount in the local economy. Money invested in the community will multiply and will generate an economy within it, and helping the residents to function as an autonomous group. In this project, the product is not only houses but also a mechanism that strengthens the community. It initiates a movement through which the real people in need are not only passively receiving a house but in some way, they become partners of the housing industry, as they are not kept away from benefiting from the low cost housing business. Housing for them, stops to be something for which they are begging for and becomes an opportunity for well-remunerated work, gaining professional qualification and pride of the good workmanship.

The importance of the user participation has been highlighted over the last thirty years. From the passive receiving end he was standing, the user was promoted to the active role of building his own shelter. Without being against this position we believe that it should be carefully looked at according to the context. Although self-help found lots of supporters in the sixties and seventies (Turner, 72; 76), it is hard to believe that self-help could find a place in the urban context of developing countries today (Ward, 82). Already in the sixties Charles Abrams questioned its efficiency, arguing that the urban dwellers would always be caught in an endless cycle of searching for job opportunities and working, and consequently, the shelter would never be fully constructed (Abrams, 64: 164-181). Sharing this line of thought, training people as self-help builders was out of sight for our project. It is unlikely that it would be cost-effective to spend money on expensive training programmes for self-help builders who will each produce only one or two houses in their lives. Our position is that in an urban context, it would have a greater impact on the local economy if the time and skills used in training programmes were invested in teaching building techniques to, perhaps a lesser number of people, but to concentrate energy on helping them to become contractors or subcontractors. We don't feel uncomfortable with our position as our experience with the formal and informal sectors showed us that, beside the fact that this is the best way to bring positive impacts on the local economy, this option carries a strong probability for a large dissemination of the know-how in the community. For instance, we know that the new contractors or subcontractors will train their helpers, mostly coming from the community. Chances are that after awhile the helpers will appropriate the technology to build their own houses, to the point they will start to work on their first contracts on weekends or holidays, and eventually, they will become subcontractors and/or contractors.

Another important aspect of this argument concerns training and/or housing programmes and the choice of technology to use in development projects. Many architects and engineers involved in housing projects for developing countries work very hard to develop and design very sophisticated building systems to "facilitate" the life of the workers who according to the designers' prediction, will not have to know anything about building because they will only have to "fit the pieces together" like a kid's game until the house is built as if by magic. We believe that this approach is wrong. It is our responsibility to develop training and/or housing programmes that make people more skilled and knowledgeable, which helps them to appreciate good workmanship. We prefer to invest in people by enabling them to do good work, and to be proud of it. If for some reason the project ends abruptly, the workers who are trained to do conventional masonry work will be adequately qualified in order to find a good job on the conventional market. In this way the investment in teaching the people is not wasted as it sometimes happens in many housing and development projects that use fancy and impractical technologies.

Working with the informal sectors showed us how it is hard to set up long-term goals for people who are constantly struggling for their day-to-day survival. A way to ensure permanence of the project and to meet the goals that were set up, is to plan its implementation in many autonomous stages so the participants have always a definite level of qualification, for which they received

gratification by the certificate awarded. This type of short-stages training is particularly tailored on the needs of the majority of the participants coming from the squatter settlements. With this approach, the trainees, who had to stop the training programme for economic reasons as they sometimes find a temporary job with a better salary, are given incentives to reintegrate their training when they can, and this, without having to start over again.

As well as discussing a housing and training project in South Africa, through this paper we also tried to demonstrate the importance of greater involvement by architects in the choice of technology and materials used in the design of their buildings. This applies to housing and, indeed, to any other type of building constructed. Although the importance of being efficient architects might be more clearly evident in the developing environments where the needs are so tremendous and the resources so scarce, we believe that this is also sound in the context of wealthier environments. The architects wherever they are, should not have their choices of materials and technologies only limited by the shapes, colours, textures, or the imagery they evoke. If they really want to play an active role in a development that is meant to be sustainable, architects must also take their inspiration in practical elements such as the structural, economic and environmental qualities of the system they choose. While discussing the empowerment of the poor in developing countries, this paper reflects the notion of empowerment as a general principle. It also points to the importance of the architects' knowledge, which should be used to the benefit of those who do not have an architect's expertise. It is important that they remember also that the choice of a material or a technology is never without impact but always affects a country, a region, a community, someone's life or the environment.

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