

THE PROCESS OF TESTING COMMUNITY'S ACCEPTABILITY OF HIGH QUALITY EARTH CONSTRUCTED BUILDING METHODS AS A MEANS TO SUPPORT LOCAL ECONOMIC DEVELOPMENT.

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ABSTRACT

Purpose of this paper – To disseminate some of the research done on the process of making earth construction more acceptable in providing private buildings (housing) to local communities in support of local economic development. This was part of a SANPAD project (with Dutch money and a Dutch partner) started in 2003 and is still continuing in the write-up phase.

Methodology/Scope – The study was undertaken by means of a literature study. This was followed up by identifying five target areas in the Free State and Northern Cape and doing two series of surveys on preferences on building materials and earth construction in: Botshabelo, Thaba Nchu, Makgolokeng near Harrismith, Taung/Pampierstad and Bankhara Budolong near Kuruman.

The information gathered was analysed and evaluated in terms of its influence on the use of earth construction in the study areas. Attempts to change attitudes towards the use of earth construction were made with the interventions of a play and workshops in the areas.

Findings – The final results are not finalised but as a whole earth construction is looked on as a backward technology and is as such not accepted. The shift in attitude from the first survey to the second survey is still to be statistically evaluated.

Practical implications – The research hypothesis is that proper research into understanding the present attitudes towards earth construction together with the necessary dissemination on the modern use of earth construction can change perceptions and lead to earth construction being an acceptable and sustainable alternative to conventional techniques which can enhance sustainable local economic development.

Value – As far as we know no other study has tested attitudes on the acceptance of earth construction and then tried to change these attitudes through workshops and a community play with a final survey to see what the results were.

Keywords: - community's acceptability, earth construction, local economic development, Free State, Northern Cape.

1. INTRODUCTION

The use of earth as a building material and construction technique is very old and well known in South Africa and in the rest of the world (Fathy: 1973, Fransen & Cook 1965, Frescura: 1985). Many of the old Cape-Dutch houses as well as old farmhouses were built with earth (Greig: 1971, Fransen & Cook 1965). In many rural areas of SA people are still building with earth, although the skills are slowly disappearing. These skills were both African and European in origin and changed repeatedly to suit the local situation (Frescura: 1985).

In many poor communities in South Africa e.g. Kuruman in the Northern Cape, small entrepreneurs have started to produce earth blocks based on traditional skills, but have upgraded by adding cement to adobe blocks. These groups run small brickyards, sell blocks and make a living from it. With training these brickyards can produce a higher quality block, which can be more acceptable.

The problem of consumer acceptance of a traditional approach was already highlighted when Habracken did research on using the Heineken-bottle for housing (Pawley, 1975: 34).. However the problem is not only technical but also behavioural therefore community involvement such as Hamdi and Goethert (1999) “Action planning” might help to solve the problem.

Unfortunately traditional skills of building with earth as the main building material have been lost in the rural and urban areas. In case of Government contracts, large contractors build the subsidised housing in concrete blocks or brick (Hamdi: 2000). However, the current building budget does not allow all needed dwellings to be erected with these materials. Using suitable types of earth as a building material, will not only allow for more high quality housing to be constructed with the same budget, it also is a more sustainable local economic development.

The University of the Free State (UFS) in South Africa and the Eindhoven University of Technology (TU/e) in the Netherlands are currently working on a project concerning the acceptability of sustainable, high quality, earth constructed, public and private buildings to support local economic development. Researchers from the disciplines of planning, architecture, and building technology are involved. The main research question was formulated as follows:

"How can we make earth construction both more effective and more acceptable in providing private and public buildings to local communities in support of local economic development?" (TU/e & UFS, 2002: 6)

This paper will only deal with the processes of the study and the variety of approaches being used to measure present acceptability and to measure the change in acceptability after interventions like the people’s drama, workshops and technical workshops have taken place. It is thus about the process of research and what can be learned from it.

1.1 WHAT IS THE DEFINITION OF EARTH CONSTRUCTED BUILDINGS?

There are a number of definitions and explanations of what earth constructed buildings are. Houben (1994:4) explains it as follows: It is the use of raw soil and turning that into a building element without the use of any firing. All earth building elements such as bricks are produced by making use of the natural and inherent qualities of the soil. Renewable energy sources like the wind and the sun is used in the production process of these elements. No burning of fossil fuels takes place as part of the production process of these elements. (Vale& Vale, 1996:28)

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What are the reasons for studying and investigating earth architecture?

- 1) Almost one third of the worlds’ population live in houses made of raw earth (Houben, 1994:6) and that can be increased to around 50% when living and work is combined. (Web site Auroville). This should be one good reason to consider the qualities of earth.
- 2) In the 1970’s the world was confronted with a huge energy crisis. The high cost of oil and fuel forced the world to look for alternatives. Here earth presented itself as a possibility. The production of building elements can be done by using renewable sources of energy like the sun and the wind. It was thus cheaper to produce that burnt bricks and was ecologically far more sensitive.
- 3) The material – soil- can be found almost everywhere. (with the exception of a few places on earth like the poles)
- 4) The material is cheap.

- 5) The production of bricks, or any of the other techniques like rammed earth, can provide jobs in developing countries.
- 6) Earth construction can play a role in the huge housing shortage of developing countries especially because it can provide jobs for the small entrepreneur.
- 7) Earth has the added advantage that it creates thermally comfortable spaces
- 8) The material is different in every part of the world and in this way contributes to the unique character of each place. It becomes an expression of a place and its peoples' identity. E.g. The differences can be seen in the character of the Dogon of Mali and the houses of the Ndebele in SA.

1.2 WHAT ARE THE DIFFERENT TECHNIQUES USED AROUND THE WORLD?

There are 12 different recognized techniques used around the world. (Houben,1994: 165) Looking at figure 1, these different techniques can be seen. They are divided into a number of local variations, but the main techniques are

- a) Moulded earth (hand shaped adobe, machine shaped adobe, hand moulded adobe)
- b) Stacked earth
- c) Shaped (direct shaping)
- d) Compacted (Rammed earth, tamped blocks, pressed blocks)
- e) Cut (sods, cut blocks)
- f) Filled (Fill-in)
- g) Covered (Earth Shelters)
- h) Dug (dug-out)
- i) Applied (Daubed earth)
- j) Formed (Cob on posts, straw clay)
- k) Poured (poured earth)
- l) Extruded (extruded e.g. Bricks)

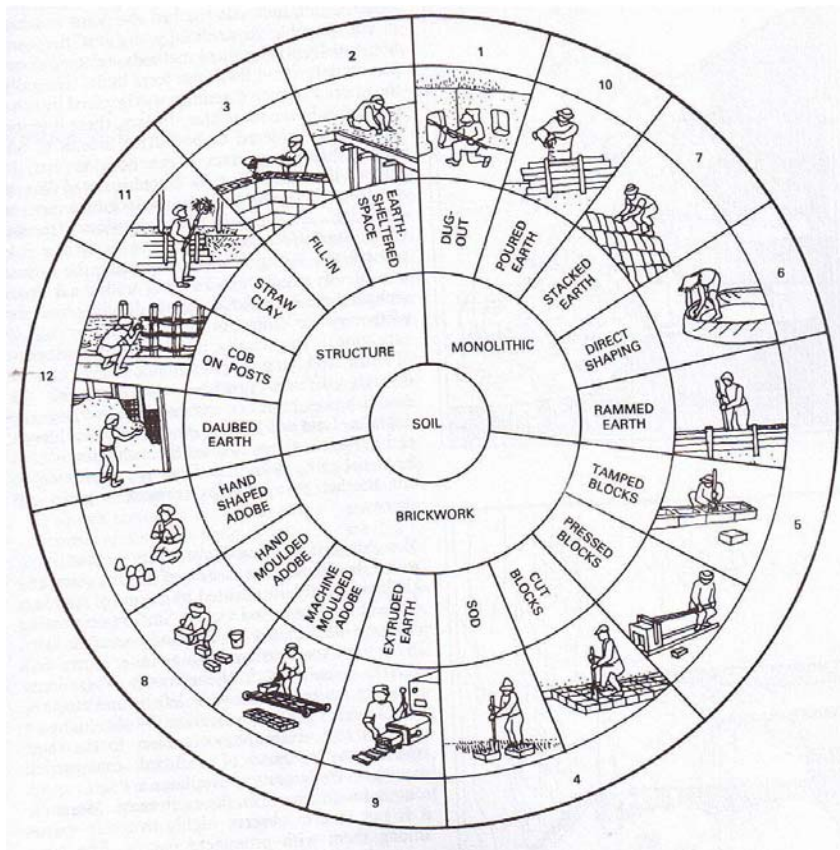


Fig 1: Chart showing the 12 different earth building techniques

These techniques are found around the world. The technique used by people are closely linked to the type of soils available in a certain region and also related to the traditions of the people of these places.

1.3 PERCEPTIONS OF CONSTRUCTION METHODS

The perceptions of what is non-durable in terms of building material are highly subjective, “often relating to the culture and conditions of the observer rather than the observed” (Oliver, 1987:221). In some developing countries “the problem is largely one of prejudice; hostility to the use of ‘bush’ or ‘backward’ methods, antipathy to certain materials and techniques, and fears of being ‘held back’ from modernizing” (Oliver, 1987:232). Pawley (1975:34) found that advertising has convinced the poor that Western forms of housing is the only solution to the housing problem. In Europe the green movement influenced architecture to be more ecological friendly, healthy and sustainable (Haas & Schmid, 1990; Papaneck, 1995). In a study in Scotland Stevenson (2006:262) found that people are more inclined to use natural materials in housing. This is an opposite trend to what is experienced in the developing world where ‘modern materials’ are in demand.

This study will try to demonstrate that with proper research into understanding the present attitudes towards earth construction together with the necessary dissemination on the modern use of earth construction perceptions can change. Eventually this can lead to earth construction being an acceptable and sustainable alternative to conventional techniques which can enhance sustainable local economic development

2. BACKGROUND

In 2002 members of the Unit for Earth Construction at the Department of Architecture as well as a staff member of the Department of Urban and Regional Planning at the University of the Free State in collaboration with staff from the Faculty of Architecture, Building & Planning at the Technical University of Eindhoven handed in a proposal for a project at SANPAD (South African Netherlands Research Programme on Alternatives in Development). The proposal was well received but needed some fine tuning and money was granted by SANPAD to improve it during a workshop in November 2002 in Eindhoven with all participants. An updated version of the proposal was submitted in February 2003 and the final go-ahead was given in August 2003. In 2004 the research commended and the final document will be finished this year.

2.1 Research question, aim and objectives

2.1.1 Main research question

How can we make earth construction acceptable to local communities in support of local economic development?

2.1.2 The overall aim of this project is:

- To research the acceptability of earth construction, as an alternative for conventional, building construction in brick, concrete and steel.
- To offer alternative building techniques as a means for local economic development.
- To research ways to change perceptions on the use of earth construction as a high quality alternative building material, especially for poor people.

2.1.3 Specific research objectives are:

- To **make an inventory and documentation** of existing upgraded earth building knowledge and skills in a number of selected target areas in SA.

- To create awareness and support for earth construction in communities resulting in job creation, capacity building and a high quality built environment as a part of local economic development.

2.2 Hypothesis

The research hypothesis is that proper research into understanding the present attitudes towards earth construction together with the necessary dissemination on the modern use of earth construction can change perceptions and lead to earth construction being an acceptable and sustainable alternative to conventional techniques which can enhance sustainable local economic development

With this as a background this paper focuses on the methodology of the research and not on the findings as that will be used for two PhD theses.

3. METHODOLOGY/SCOPE –

The study was undertaken by means of the following structured methodological phases:

- The **first** phase comprised of a literature study on three main themes namely the present acceptability of earth construction, measure to influence the present use of earth construction and how earth construction could help sustain local economic development.
- The **second** phase outlined the project by the research team. During this phase an initial survey in different areas in two provinces was explored looking for target areas where the survey and in depth research could take place. This would be communities that are living in areas where earth building skills are still practised and valued as permanent building material. The problem to be studied was influenced by the survey and the objectives of the study were articulated.

Together with the Dutch partners 16 towns were visited in the Free State and Northern Cape stretching from Philippolis in the Southern Free State to Harrismith in the north and as far west as Kuruman in the Northern Cape (see figure 1). Five target areas were identified namely:

Botshabelo
Thaba Nchu
Makgolokeng near Harrismith
Taung/Pampierstad
Bankhara Budolong near Kuruman.

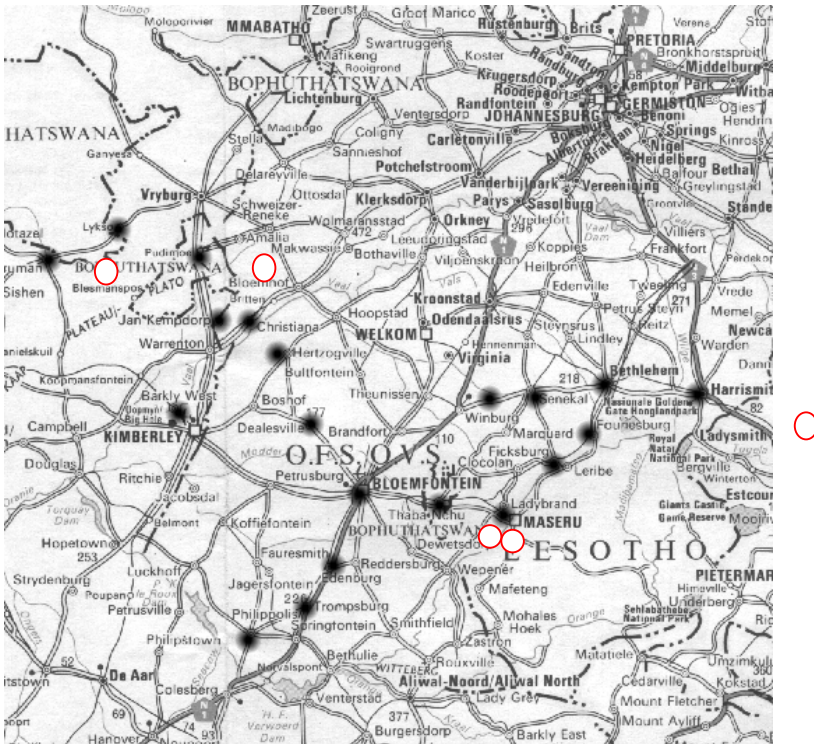


Figure 2 : Towns visited and towns selected.

- The **third** phase involved the planning of the first survey. As most of the areas are internally homogeneous (in terms of the variable or characteristic being study) it was decided to first randomly select different townships or villages in the five study areas. Both a formal and an informal “neighbourhood” were selected in each location.

In Botshabelo:	Blocks K (informal) and W (formal) were selected
Thaba Nchu:	Bultfontein Extention 4 as well as all informal settlements Thaba Nchu (these were spread out all over the town)
Harrismith	The informal section of Tsiami and the rural area of Makgolokweng.
Taung	Part of the formal and informal area of Pampierstad as well the areas known as Tsang and Manokwane ruled by the same chief.
Kuruman	The formal area of Bakara Bodolong and the rural area of Mapoteng.

In each of these the number of houses were counted and mapped (as far as maps were available because for some of the rural areas no maps or air photos were available). According to Stoker¹ (1981:13) the sample size for each of the areas were calculated, in total nearly 1 800 households had to be visited.

- The **fourth** phase involved the collection of data from the different sample areas. Information pertaining to demographics, income, present housing conditions and services available, questions on preferences on building materials and earth construction were drawn up to be asked to all households. The questionnaires were done in Tswana, English and Afrikaans as the mayor languages of the area. Students speaking all three these languages were trained to fill in the questionnaires and the survey was then done under the supervision of the project leaders. For quality control 10% of all questionnaires were checked and the coding as well as data processing were done twice and the processed data results compared

¹ $\sqrt{(N+20) \times 20}$ where N is the stratum size

and checked with each questionnaire and adjusted when necessary. Both the collaborating partners were involved in this exercise.

- Phase **five** dealt with data analyses and interpretation. In this phase all the information gathered were analysed and evaluated in terms of its influence on the use of earth construction in the study areas. A workshop was held in November 2004 at Eindhoven discussing the results and the next stages of the project.
- Phase **six** was an intervention through the use of workshops on earth construction as well as a play. This comedy called "*Hofeta Mokhukung – a story of hope*" brought forward the message to the public at large that earth could be used to build houses of a good standard. It was written for the UFS by a drama student and performed by two drama students, Gali Malebo and Godfrey Manenye in 14 shows covering the study area. It was performed on stage, on the verandas of schools or under carports in either Sotho or Tswana depending on the community. The attendance was fantastic with 5 240 people seeing it during the 14 shows. A video in Tswana with English captions was made for further distribution
- Phase **seven** involved a follow up questionnaire in the study area with a smaller sample size to get an idea whether attitudes towards the use of earth construction have improved with the interventions (play and workshop). Again the results were analysed and evaluated in terms of the influence of the intervention on the attitudes towards earth construction in the study areas. Both collaborating parties took part in the evaluation of the data and its influence on sustainable local economic development, but the final results are not yet available.
- The **eight** phase [still working on this] is the reporting phase, where all qualitative and quantitative findings are compiled into a concept report. This was discussed during a workshop in Eindhoven (Nov 2006) and the necessary adjustments were made before the final report are to be submitted to SANPAD as part of a research papers published by the department of Urban and Regional Planning at the UOVS.

4. DISSEMINATION AND FINDINGS

As far as we know no other study has tested attitudes on the acceptance of earth construction and later tried to change these attitudes through workshops and a community play with a final survey to see what the results were. The wide range of techniques used in the research from surveys, questionnaires, workshops and bringing in the performing arts as a means to convey the message might be a new kind of approach for the building sciences.

Although the final results are still to be worked on for the two mentioned PhD-studies, researchers have been busy with the dissemination of some of the findings. Part of this was done throughout the project as papers were delivered at different conferences on the results as well as published in conference proceedings and in accredited journals. A DVD was made of the play and will be used to further the use of earth construction by local people. A handbook for ordinary people on the use of earth construction is in preparation and will be published shortly.

5. CONCLUSION

In phase seven it is mentioned that the final results are not fully finalized yet but as a whole earth construction is looked on as a backward technology and is as such not accepted. The shift in attitude from the first survey to the second survey is still to be statistically evaluated, but looking at the results as a whole no meaningful shift took place. The second questionnaire was filled in two weeks after the workshops and the play but unfortunately a large proportion of the people surveyed did not attend them. However some of the small number of people who attended the play and the

workshop did change their attitudes. With the statistical processing factors influencing attitude will be correlated, factors such as: do people live in formal or informal housing; do they have a traditional or a modern attitude to life and community; income; household type; rural and urban location. The experience of the Centre for Earth Construction in other projects is that people are initially sceptic on the use of earth as a construction material but once they become involved with the modern ways of making compressed earth bricks and the construction of buildings with this material they totally change their attitudes (Smit:2008). Hopefully this information will help the Centre for Earth Construction to sell the idea of sustainable earth construction to the people of South Africa.

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