

## Informal<sup>1</sup> small brickyards in the Free State townships are enhancing local economic development

Peer reviewed

### Abstract

This article explores the role that small scale informal brickyards can play in providing bricks to the local housing market and in doing so create jobs for the local people. Most of these bricks are burned in kilns. The authors look into the possibility of introducing the manufacturing of raw earth bricks to these existing brickyards. Earth has a long tradition in South Africa (SA) and around the world. Many buildings such as mosques and houses were built with earth. Today an estimated 30% of the world's population still lives in buildings made of earth. This is also the case in many townships around Bloemfontein. The poorest people live in self made earth houses.

The production of raw earth bricks can play an important role in the development of the local economy. Case studies provide examples of the impact that such small and micro enterprises have on development. The impact on the environment and land use factors of the location of the brickyards are discussed. A scenario is sketched in which the economic impact of earth bricks are compared with other bricks like burnt and cement bricks and cement blocks. Some suggestions on how these brickyards can be supported by local government and planning policy to make them sustainable are discussed.

Keywords: informal brickyards, Free State townships, economic development

---

<sup>1</sup> For the purpose of this article, informal means not within formal regulations or laws while 'formal' means 'location on a formal site' but without formal approval for what is being done on the site or permission to mine the clay.

---

Prof Das Steyn, Head of Department Town and Regional Planning, University of the Free State, PO Box 339, Bloemfontein, 9300, South Africa. Tel: +27 51 4012893. Email: <SteynJJ.sci@mail.uovs.ac.za>

Petria Jooste-Smit, Lecturer, Department of Architecture, University of the Free State, PO Box 339, Bloemfontein, 9300, South Africa. Tel: +27 51 4012658. Email: <JoosteP.sci@mail.uovs.ac.za>

### Abstrak

In hierdie artikel word die rol van klein skaal informele steenwerwe in die voorsiening van stene aan die plaaslike behuisingsmark ondersoek asook die werk wat daaruit geskep word vir die plaaslike bevolking. Meeste van die stene wat deur die werwe vervaardig word, word in oonde gebrand. Die outeurs kyk na die moontlikheid om die vervaardiging van rou grondstene deur hierdie werwe, bekend te stel. Grond het 'n lang tradisie in SA en in die wêreld. Baie geboue soos moskees en huise is van grond gebou. Vandag woon 'n geraamde 30% van die wêreld se bevolking in geboue van grond. Dit is ook die geval in baie nedersettings om Bloemfontein. Die armste mense woon in grond huise wat hulle self gebou het.

Die produksie van rou stene kan 'n belangrike rol speel in die ontwikkeling van die plaaslike ekonomie. Presedent Gevallestudies voorsien voorbeelde van die impak wat sulke klein en mikro besighede op ontwikkeling kan hê. Die impak op die omgewing en grondgebruik faktore van die posisies van hierdie steenwerwe word bespreek. 'n Scenario word geskets waarin die ekonomiese impak van grondstene vergelyk word met die van gebrande stene, sement stene en ook sementblokke. Aanbevelings word gemaak oor hoe hierdie steenwerwe deur die plaaslike regering en beplanningsbeleid ondersteun kan word om hul meer volhoubaar te maak.

Sleutelwoorde: informele steenmakery, Vrystaat dorpsgebied, ekonomiese ontwikkeling

## 1. Background

Jobs and housing are needed in most towns and cities to which people have flocked in the Free State, South Africa. One of the factors increasing rural migration is that more than a million jobs were lost in the agricultural sector alone in the past decade. Millions of houses (1,5 million subsidised units from June 1994-Feb 2003) were built by the government and private individuals (Gardner, 2003: 7). Most formal housing used different types of bricks for the walls. This article explores the role that small scale informal brickyards play in providing bricks for the housing sector and in doing so creating jobs for local people. At present most of these brickyards burn bricks in local kilns. It also explores the use of earth as a building material by many of the very poor. Small brickyards which burn such bricks can play a role in the production of good quality earth bricks for the poor. Earth bricks are derived from an environmentally friendly production process which does not burn the bricks but uses sustainable energies such as the sun and wind.

Local brick production has the potential to grow into a large market, providing such businesses are supported by government and placed at appropriate locations. In this way these small brickyards can be sustainable small businesses and can enhance local economic development.

## 2. Introduction

In some townships around Bloemfontein many houses are built of raw soil. The poorest people live in these houses which are made of earth bricks that they produce themselves. The tradition of making and using earth bricks is thus well known in these townships.

Small brickyards are found in Thaba Nchu and Botshabelo outside Bloemfontein, South Africa. These small brickyards produce thousands of fired bricks per month and create jobs for the local people. They can extend their practice to include raw or stabilised soil bricks. The raw earth bricks can be produced and sold at a very low price of about 35 cents per brick as compared to 55 cents per brick when burned, thus providing for a poorer sector of the market. The stabilised earth brick (adobe) is produced using a little

cement (7%)<sup>2</sup> and making a product that is priced between the raw adobe and the fired brick (see descriptions of the process below).

To understand where and how one can increase the production of earth bricks by these brickyards and the use of these bricks, one needs to understand the current situation regarding the use of earth as a building material in the Free State.

### 3. Earth construction in Africa

Earth has been used for centuries in Africa as a building material. Towns in north to southern Africa have different buildings such as houses, mosques, palaces, graneries built of soil bricks. As used in North Africa this material has wonderful sculptural and expressive qualities. It can be moulded by hand and forms part of the ritual of creating place. The maintenance of the buildings forms part of the annual festivities in which communities participate (Houben & Guiland, 1994: 6-11). In most of these parts of Africa, the materials closest at hand are used for these socially important buildings (Houben & Guiland, 1994: 6-11).

South Africa also has an old and proud tradition of earth buildings all over the country. Many of the nineteenth century vernacular buildings, such as churches and houses, were constructed with bricks made of earth, for example in Genadendal and Tulbach. Cape Dutch houses were constructed with adobe blocks rendered with lime. Settlers moving to the Eastern Cape are said to have used rammed soil as a method of constructing walls (Lewcock, 1963: 140). The indigenous people of the country such as the Ndebele, the Sotho, Zulu and others developed their own distinctive style of earth constructed buildings. The buildings, the construction methods and the decorative methods are all well documented (Frescura, 1981: 123-130). The forms of these buildings are closely linked to the culture of the people. As in the rest of Africa, the maintenance and decoration of these buildings formed part of an annual event. Buildings were re-plastered and painted with new patterns.

---

<sup>2</sup> Note that this 7% may vary depending on the type of soil in different areas; it can be less or more.

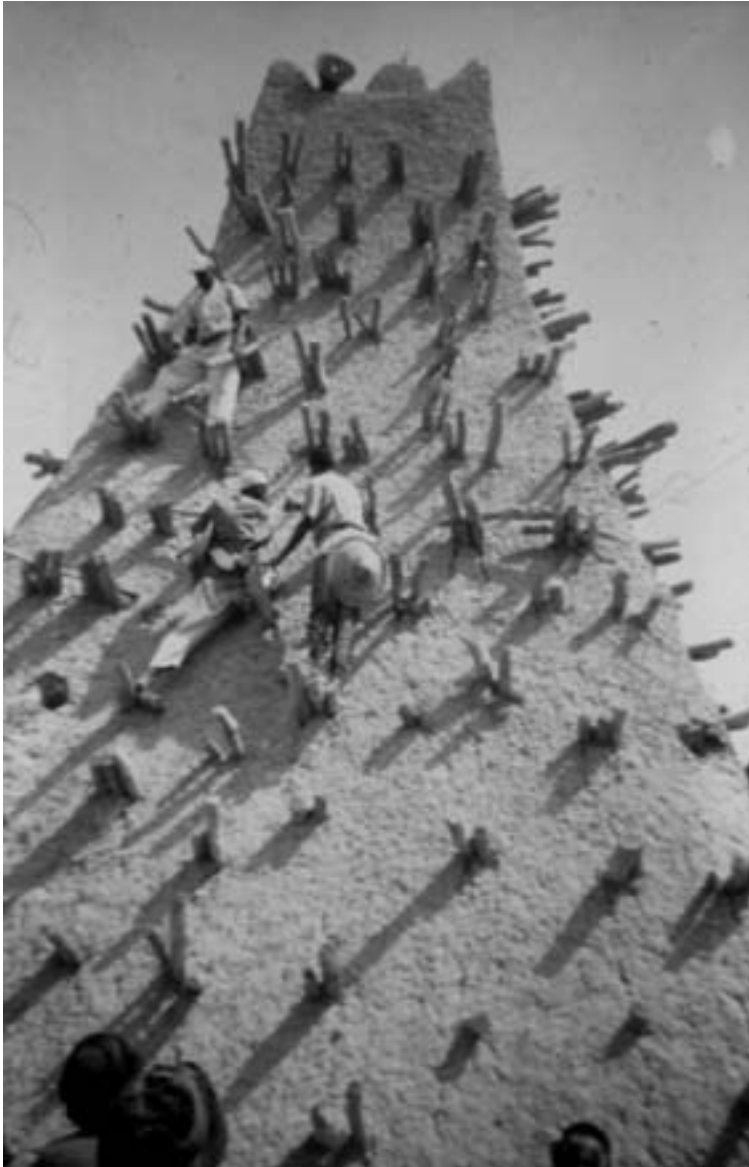


Photo 1: Tower of a mosque. North Africa  
Source: CRATerre-EAG library

### 3.1 The scene today

An estimated 30% of the world's population still live in buildings made of soil. In the developing world, of which Africa is a part, this figure can be as high as 50% (Houben & Gullaad, 1994: 7) Rodney Harber a lecturer and practising architect in Durban, estimates that about 70% of all informal houses in Durban and surrounding areas are made of soil (Harber, 2004: personal communication). This method is used in both rural and urban areas.

However, a problem emerging over the past years is that soil became associated with houses for the poor. Mathissen (1995a: 14) states: "Adobe buildings can be found in Burundi, too, particularly as simple housing, but only for want of a better alternative". So earth has a negative reputation as "a building material for the poor." Those who cannot afford cement blocks or fired bricks live in earth houses and produce the bricks themselves, which stigmatised earth as a building material. Mathissen (1995: 26) writes about perceptions in Chad: "...traditional methods of construction are looked down on and considered to pertain to the poor whereas concrete and cement blocks are welcomed as symbols of development." Nonetheless soil remains a frequently used building material in the construction of self-built houses in South Africa. This self-built market is huge (where and in what sense?). The knowledge and skills available in this market is a potential source of job creation and alleviation of the housing shortage, and offers an unexploited opportunity (Smit, 1998: 72).

Elsewhere, earth has undergone a renaissance since 1948 with the work of the Egyptian architect Hasan Fathy (1975) and his town of New Gournah where every building in town was constructed of adobe blocks. In France a revival of these building methods is taking place with the help of scientific research (Gerneke, 1992: 38). Australia is building with rammed earth as with any other conventional material (Fromonot, 1995: 152). This is also the case in New Zealand, where one can find about 600 modern buildings, with earth walls mainly of rammed earth, adobe bricks or compacted soil cement blocks. New Zealand has Earth Building Standards, which accommodate the techniques most popular in that country (Solid-earth, 2004: online). In many countries it is the material of choice for those concerned with the environment, and not just material solely for the poor. South Africa needs to start, like other places in the world, to value its earth block building tradition. This is not only

important culturally, but also in terms of ecological sensitivity and job creation potential.



Photo 2: Contemporary three storey block of flats of Compressed Earth Blocks on the Island of Mayotte  
Source: CRA Terre-EAG library

From an environmental point of view earth used as a wall element is a very good insulator and provides a comfortable internal temperature. It creates internal space that is cool in summer and warm in winter, and is thermally far more effective than corrugated iron, which is the material used by many squatters in informal settlements in South Africa. Earth walls act as a heat battery in the day during winter, absorbing the heat of the sun and then slowly radiating it into the house during the night. In summer, with a small roof overhang, the sun does not shine on the walls and thus a thick insulator is created against the heat, leaving the building cool inside (Stula & Makerji, 1993: 144). Other advantages of earth buildings include locally available raw materials and renewable and recyclable resources, which are non-toxic and low in energy costs. Furthermore it regulates air humidity as well as inside temperatures and has huge potential for personal creativity.

### 3.2 What does earth construction mean?

When one refers to earth as a building material or construction method, it refers to 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 and the use of renewable energy sources like the sun and the wind. No burning of fossil fuels takes place as part of the production of this building element (Houben & Guillaud, 1994: 4; Vele & Vele, 1996: 28).

The earth building techniques mostly used in South Africa are adobe, cob and wattle-and-daub. Each is traditionally linked to the areas where the appropriate soils are found. The first well known technique, adobe, a sun-dried block, is made of a clayey soil which is wetted to form a muddy substance. This is then placed in a mould to form a brick, and when the mould is removed, the brick is left in the sun to dry for a few days. These blocks are found all over the country where clayey soils are found, as for example in the Free State, Lesotho and Mpumalanga. Raw adobe walls need to be plastered with soil or a soil-cement or soil-lime mix. A variation on the raw adobe is stabilised adobe. To produce stabilised adobe, some cement ( $\pm 7\%$ ) is added to the raw soil and the resultant brick dries much quicker than the raw adobe and can be used without rendering.



Photo 3: Adobe bricks. (Raw bricks [red] and cement stabilised bricks [yellow]) Albert Luthuli near Bloemfontein  
Source: Petria Smit



The second type of earth building technique used in South Africa is cob. In this method, clayey soil is packed in horizontal layers. Each layer is left to dry before the next layer of wet soil is placed on top of it. This way of working creates walls that are angled from the bottom up, thick at the base and narrowing to the top. This method was used together with adobe bricks in Tulbach (Fagan, 1974: 5). It is seldom used today. At Harrismith in the Free State a variation of this method, which is a mix between cob and straw-clay mix, was found. The owner made a shutter and placed the soil in it and left it to dry. The shutter was then moved upwards and another layer of soil was placed on the dry layer.



Photo 4: A mix of cob and straw-clay technique near Harrismith in the Free State  
Source: Wolf Schijns

The third technique, wattle-and-daub, is well known in Natal. Here a load-bearing structure of wood is used to carry the roof of the building. A lattice made of thin wooden sticks is woven between the load-bearing elements. These lattice walls are then packed with clay and rendered. All the above techniques use raw soil, with the sun and wind drying the blocks or the walls (Frescura, 1981: 123-130; Doat et al., 1991: 95, 101, 106, 220 & 222).

In earth construction, attention needs to be given to the source of the soil. Surface soils are not suitable for building as they contain organic matter. Such top soils should be used for agriculture. When soil is removed to produce bricks for a house, a hole is left on the site. When somebody is building a single house, the hole is not very big. It may be about two x three meters and about 300-500mm deep and soon disappears. If, for example, adobes are to be produced for several houses and a bigger market, soil has to be brought from a quarry to prevent both erosion and the excavation of soil for agricultural use.

### 3.3 The role of earth construction in small business development

Earth and especially the production of earth building elements, such as bricks, can play an important role in development. Two case studies provide examples. One is the production of micro-concrete roofing tiles in India (Pozak, 2001) and the other is the production of compressed earth bricks in Mayotte (Guilland, 1992: 11-16). These two studies show what impact small and micro enterprises producing building materials can have on development. The lessons learnt can then be related to the small brickyards found in South African townships.

Micro-concrete roof tile production is a labour intensive technology using locally available raw materials (sand, cement and water) to make roof-tiles (Pozak, 2001: 19). This tile production is particularly suited to small, informal, family businesses. Jobs are created for unskilled workers and the making of tiles is also particularly suited for women. In a place like Honduras, micro-concrete roof-tile making occupies close to 10% of the market for roof covering. A survey done in Honduras revealed that most tile manufacturers sell their product within a radius of 20km. The local impact is thus considerable. The tiles need not be transported over long distances, and reducing the distance that a product is transported brings both ecological and economic benefits (Pozak, 2001: 19). In rural India more than 250 micro-concrete roofing tile enterprises were set up between 1996 and 2001, with private investments of Rupees.90, 000 (US\$2 000) each. Each enterprise produces 43 000–54 000m<sup>2</sup> of durable roof covering material per year, employs 5-8 people, uses 40-60% less energy than its nearest competing product, fired-clay roof tiles, and is profitable (Niazi, 2001: 18).

Another example illustrating the role that earth building elements can have on local development is that of a housing programme that started in 1978 to improve the lives of citizens on the island of Mayotte, a French Territorial Collectivity in the Indian Ocean (Guilland et al., 1992: 11-16). This programme was to last 20 years. Ninety percent of the inhabitants live in rural areas and have little or no financial resources. The programme therefore relied on self-help, assistance to local craftsmen and the creation of a local building industry producing earth bricks. A survey was done on the country's housing stock as well as the materials used. Different housing options were proposed (e.g. serviced plots and 'help in kind' - type, where some form of help is given to build a 40m<sup>2</sup> house and the occupier is expected to finish it). Earth was indicated as one of the local resources available for this task of upgrading and new building. Over a period of two years, 20 quarries and 19 brickworks were set up throughout the island. They were producing stabilised compressed earth blocks. Launching this production of blocks initiated a small local industry, creating and distributing wealth and numerous jobs. By 1982, 176 000 blocks had been produced and by 1989, 3 500 000 had been produced. This project succeeded because of genuine commitment from all people involved, including government, financial institutions, small contractors and the people from the community.



Photo 5: Housing on Mayotte  
Source: CRATerre-EAG library

These examples show the impact that production of elements for the building industry can have on local people and local economic development. The production and use of earth bricks can play a similar major role in development in South Africa. Earth bricks are used as building materials for walls in South Africa. In other parts of Africa, such as Egypt and Mali (Schijns, 2005: 112), the roofs of buildings are also made of earth, but the rainfall in South Africa is too high for that, and thunderstorms releasing a lot of water over a short period of time mean that earth roofs are not a viable option. The focus should thus be on the wall element and its role in economic development. The production of bricks for walls can play a role because it:

- can create jobs;
- is suitable for small production units (e.g. families);
- uses local resources and can be performed by unskilled labourers;
- is labour intensive;
- has a low capital investment; and
- delivers a product that is suited and close to the client base.

All these issues are important for local development.

#### 4. Local economic development policy in South Africa

To create better conditions for generating economic growth and employment generation, Hall (2002: 7) emphasizes the need in developing countries to build on the strengths of the informal sector. This suits the South African government's policy of local economic development, where jobs should be created at local level. This is a bottom-up approach to job creation and development in an age of globalisation. The White Paper on Local Government put the obligation on local governments (among others) for:

- "the creation of liveable, integrated cities, towns and rural areas, in which the spatial legacy of apartheid is addressed
- the achievement of local economic development, in which local government can play an important role in job creation and in boosting the local economy through the provision of business-friendly services, local procurement, investment promotion, support for small businesses and growth sectors

- community empowerment and redistribution.”

Each local government has to produce an Integrated Development Plan (IDP) which provides a mechanism “to ensure a consistent and conducive set of measures to promote visible local economic activities and employment generation” (RSA, 2001). With the Integrated Development Plan in place, municipalities theoretically have the capacity to link development to their budget and to implement it locally. Stapelberg (2003: 91) shows that all the components of the IDP are obligatory and must be used in conjunction with the Spatial Development Framework (SDF). Municipalities must also be agents for Local Economic Development (LED) by being coordinator, facilitator, stimulator and entrepreneurial developer. In a Local Economic Developmental Programmes, at least 35 new programmes for grants and subsidies are introduced. The aim is that “Local Economic Development (LED) is outcome-based on local initiative and driven by local stakeholders.” Informal brickyards serve as instruments for local economic development as described in LED policies.

## 5. Survey of brickyards in use

A survey on the use of earth construction in informal housing in 14 townships across the Free State, revealed the existence of a large number of informal brickyards as well as two semi-formal locations where agglomeration of brick yards exist. Some of these are first making an earth brick using a mixture of clay and other material which is sun-dried and, in a second phase, burned. The chosen areas represent small towns as well as the fringes of cities. In terms of numbers or layout, they can be classified as urban but in terms of diversification or higher order services they belong to rural as these are only very “large villages”. It seems that, for building their own houses, people use earth construction either through the medium of sods, rammed earth or stabilised earth bricks, but burned bricks seemed to dominate once a choice of material become affordable.

These burnt bricks are made from a mixture of clay that is sun-dried before packed into a ziggurat-like (staggered tower) form with coal pieces in between, sealed off with clay and then this home made kiln is set to fire to burn the bricks.

Steyn & Jooste-Smit • Informal small brickyards in the Free State

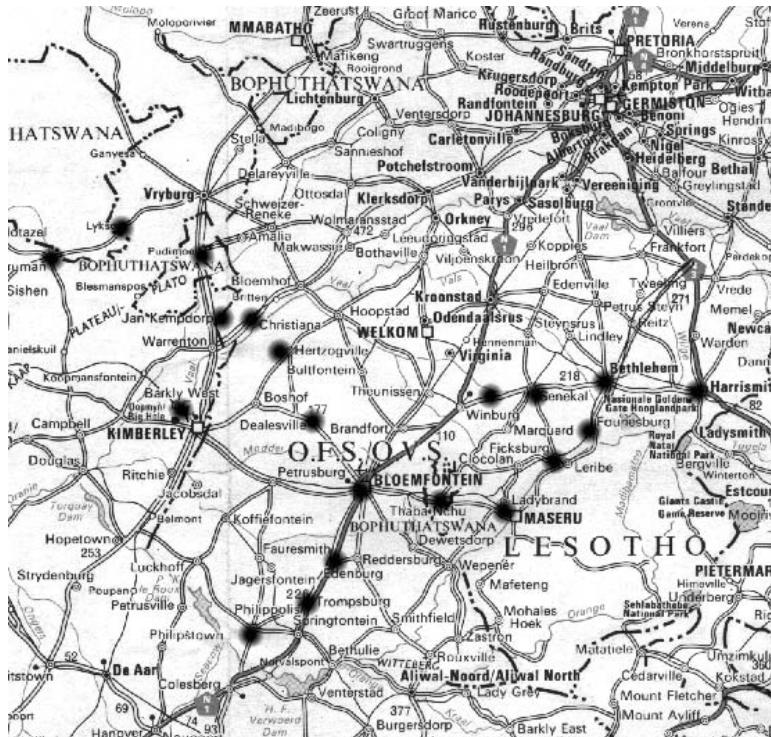


Photo 6: Map of places visited



Photo 7: Brick kiln near Thaba Nchu  
Source: Wolf Schijns

Table 1: The output of semi-formal and informal brickyards  
(Shows the number of brickyards as well as number of workers and the brick production of each brickyard)

Number of workers	Brick production per month	Output per worker	Type of bricks	Reason for location
Semi-formal				
1	15 000	1 500	Burned bricks	Municipality "allocated" lot
2	25 000	1 250	Burned bricks	Municipality "allocated" lot
2	15 000	7 500	Burned bricks and cement blocks	Water available
4	10 000	2 500	Burned bricks and cement blocks	No reason
5	No information	N/A	Burned bricks and cement blocks	Municipality "allocated" lot
6	35 000	± 6 000	Burned bricks and cement blocks	Municipality "allocated" lot
6	60 000 (+ 4 000 blocks)	± 10 000 ± 700	Burned bricks and cement blocks	Municipality "allocated" lot
12	60 000 bricks 20 000 blocks	5 000 ± 1 700	Burned bricks and cement blocks	Municipality "allocated" lot
16	67 000 bricks	± 4 000	Burned bricks	Bigger site
16	60 000 bricks	± 3 750	Burned bricks	Bigger site
Informal				
1	15 000	15 000	Burned Bricks	Municipality "allocated" lot
1	6 000	6 000	Burned Bricks	Municipality "allocated" lot
1	10 000	10 000	Burned Bricks	Municipality "allocated" lot
2	15 000	7 500	Burned Bricks	Larger space
2	20 000	10 000	Burned Bricks	Near home
2	10 000	5 000	Burned Bricks	Municipality "allocated" lot
2	20 000	10 000	Burned Bricks	Water nearby
2	10 000	5 000	Burned Bricks	Water nearby
3	20 000	10 000	Burned Bricks	
3	15 000	± 7 000	Burned Bricks	Municipality "allocated" lot
4	12 000	3 000	Burned Bricks	Inherited site (?)
4	10 000	2 500	Burned Bricks	Near markets
4	20 000	5 000	Burned Bricks	Municipality "allocated" lot
Total 133	387 000 ( 24 000)		Burned bricks Cement blocks	

## 5.1 The location of brickyards

The production of building materials, in this case the production of burnt bricks is in many of these places already a small scale economic activity. A strange anomaly however, was found in what is happening with the brickyards in some towns in the province namely:

- a) small businesses at the clay-sites;
- b) clay being transported to market related sites, that is places where one can sell the bricks; (Single businesses near the markets might be scattered in the townships or in two cases as agglomeration of bigger semi-formal brickyards in certain locations, for example near markets in Thaba Nchu and near water in Botshabelo); and
- c) bricks being burned where it is needed on site, thus the production is where the building is erected (found in one place only where due to the scale of the township and the high unemployment rate a private brickyard had to close down and this form evolved as a sporadic business which operates when needed).

According to the economic least cost theory of Weber, bricks that are a material orientated product should be produced where the bulk of the material (the clay) is found, but this does not happen in the cases of (b) and (c) above (Greenhut, 1996 : 5–17). Weber's basic principle is that a businessman would choose a location where costs were lower and he analysed three cost factors, namely: transport costs, labour costs and agglomeration advantages. He uses a material index to determine whether an industry is material orientated or market orientated.

Weber's material index (Glasson, 1985: 127–132) = (weight of Local Material Inputs) (weight of final products).

If the index is greater than 1 (one), the form or industry is considered to be material orientated. If the index is lower than 1 (one), it is deemed to be was market orientated.

For the production of bricks, clay and water are needed for making the bricks while coal is used for burning the bricks. As the burnt brick loses the water content of the clay, it would seem to be material orientated. That is why the larger brick industries are found around suitable clay pits.



Most of the brickyards in this survey are in areas with high unemployment, so labour costs are the same in all these areas. However the agglomeration of groups of brickyards in both Thaba Nchu and Botshabelo indicates that there is an agglomeration advantage in these respective locations, as most of the individual brick yards in these groups are much bigger than their competitors elsewhere. In both groups it seems that the location is near their client market, with water available, but the traditional material (clay) has to be transported to the sites.

## 5.2 Land use and environmental factors

As these brickyards are all informal or semi-formal land uses, the local land price or rent, as an input factor in location theory, do not play any role because and the brickyard owners did not buy land or pay any rent for it at all.<sup>3</sup> Any attempt to formalise these brickyards will have to take land use into consideration and will have an effect on the price of land or the rent thereof.

The brickyards in the survey could be classified into two groups namely:

- the smaller brickyard with one kiln burning at a time and where one to five people work to make sun-dried bricks. These businesses produce fewer than 20 000 bricks per month each.
- the larger establishment where agglomeration factors have an influence and where more than one kiln burns at a time. These produce more than 30 000 bricks per month each and have 5 to 10 full time employees.

In terms of environmental impact, all these brickyards irrespective of size:

- mostly use clay from informal clay pits where no environmental impact studies have been conducted;
- are located mainly in green areas (parks) or catchment areas; and

---

<sup>3</sup> Survey conducted in Botshabelo and Thaba Nchu in May 2004 and 10 semi formal as well as 13 informal brickyards were found.

- are all noxious industries, which normally would not be allowed to operate in green areas or in residential or business areas.

### 5.3 The economics of different kinds of brick

To establish the impact that earth bricks can make as a building material, a scenario is sketched, based on information gathered from Botshabelo, Thaba Nchu and old Mangaung around Bloemfontein. The following table gives comparisons as to the cost of one square metre of wall built with different materials. These analyses were done for Bloemfontein based on projects in the area, so they are mainly urban.<sup>4</sup> The materials were bought from commercial suppliers. The costs will differ for other parts of the country.

Although the sun-dried bricks produced for burning can be described as good adobe blocks before they are burnt, very few producers sell them at this stage in the process. A few individuals do sell them, and Table 3 shows the price difference.

Using these figures, one can start to estimate and project the economic potential that these brickmakers can bring to a local economy.

A 40m<sup>2</sup> house needs around 2900 bricks (220 x 110 x 75) for the wall element, with the cheapest brick selling at 35c. One manufacturer said that he sold 20 000 bricks per month thus having a turnover of R7 000-00 per month.<sup>5</sup> This shows that a brick manufacturer can make a reasonable living even from a very small brickyard. He thus provided enough bricks for 3 houses every month and four after every third month. He contributes to the building of 12 houses every year. It is clear, therefore, that a few of these small brickyards, as to be found in places like Botshabelo and Thaba Nchu, can make a measurable difference to the local economy. Producing earthen blocks creates jobs and helps to build houses, and most of the money stays within the community.

---

<sup>4</sup> Figures obtained from unpublished projects done by the Unit for Earth Construction, Dept of Architecture, University of the Free State in Bloemfontein from 1997 – 2002.

<sup>5</sup> Survey conducted in Botshabelo and Thaba Nchu in May 2004.

Table 2: Cost comparison/m<sup>2</sup>: Raw materials obtained from commercial suppliers, Bloemfontein

	Cement brick 220x110x75 104 blocks/m <sup>2</sup> for external wall (both skins)	Hollow cement block 390x90x190 13,5 blocks/m <sup>2</sup> single skin	Hollow cement block 390x190x190 13,5 blocks/m <sup>2</sup> single skin	Baked Clay plaster brick 220x110x75 104 bricks/m <sup>2</sup>	Baked Clay face brick 220x110x75 104 blocks/m <sup>2</sup> internal skin plaster bricks external skin face bricks
Supplier 1		R4,95/block R66,82		R1380,00/1000 R143,50/m <sup>2</sup>	R2590,00/1000 R206,44/m <sup>2</sup>
Supplier 2	R915,00/1000 R95,68/m <sup>2</sup>		R4,28/block R57,78/m <sup>2</sup>		
Supplier 3				R1175,00/1000 R112,72/m <sup>2</sup>	R1900,00/1000 R160,16/m <sup>2</sup>

Table 3: Comparison of prices for bricks produced by local brick makers in Bochabelo and Thaba Nchu

		Raw adobe 220x110x75 (Plaster needed)	Fired bricks by local producer	
			Internal walls	External walls
Producer 1	Total	35c		55c
	Nr of blocks /m <sup>2</sup>	104		104
	Cost/m <sup>2</sup>	36,40		57,20
Producer 2		none	35c	45c
	Nr of Blocks /m <sup>2</sup>		52	52
	Cost/m <sup>2</sup>		18,20	23,40
			41,60	
Producer 3		none	80c	1,20
(brick size bigger- single skin wall	Nr of Blocks/m <sup>2</sup>		34	34
	Cost/m <sup>2</sup>		27,20	40,80

## 6. Formalising these brickyards

These brickyards are like islands of employment in a sea of joblessness. They are run by entrepreneurs without subsidies or government support. Any formalisation of these businesses will have to keep their role as work creators and economic role players in mind. They have already proved their viability if not too many town planning and environmental restrictions are brought to bear on them.

All clay pits are supposed to be developed in terms of the Minerals and Petroleum Resources Development Act (Act 28 of 2002) and an environmental impact assessment is needed before any work can begin. Where brickyards occur next to dry water arteries or perennial streams, these locations will have to be controlled. The local municipalities can, as part of their Local Economic Development, identify areas with suitable clay and have some clay pits proclaimed as public clay pits where individuals can buy clay at a minimum tariff.

On the production side, local government could identify locations for kilns in conjunction with existing brickyard owners and with public participation from the surrounding local inhabitants. These sites would have to be (i) rezoned for noxious industrial use or (ii) given

a consent use for a period of ten years or (iii) looked at as existing land use even in cases where they are located on land that belongs to local government. Most brickyards could be seen as tacit approvals of occupation by the municipalities, which allowed them there. If the sites are at clay pits, the first will most probably be best while the latter may be more suitable for those brickyards which are situated near the markets. For the rejoined areas land ownership could either be privileged or rented sites are recommended.

### 6.1 Local Economic Development can be of benefit

Local governments and users need to become aware of the positive role of these informal brickyards because they are found in the rural areas, small towns and in townships around cities (Steyn, 2004: 10-12). These people are entrepreneurs who should be assisted to formalise their businesses and make them sustainable.

The Integrated Development Plan (IDP), which regulates all changes to land use, needs to be adapted by local government. In the Spatial Development Framework the permanent sites (clay pits) could be classified as Local Development Areas. This would mean that the Local Agenda 21 as well as the Environmental Sector Plan should be amended to accommodate it. The Financial Plan of the IDP should also provide for a long term association with these clay pits and brick yards. This plan should make provision for prospecting for clay pits, determining a viable price for the clay and determining the rent for the brickyard sites. It should also provide for long-term funds or means to rehabilitate both types of sites once they are not used any more.

A Local Economic Development strategy is needed, showing how to be pro-active in accommodating these land uses within the future Town Planning Schemes. As the old Town Planning Schemes are only used in traditional white towns, new schemes have to include all townships as well as all rural and farm lands in a 'wall to wall' coverage of municipalities. The drafting of these control mechanisms must keep in mind that no present rights could be taken away as in the case of existing land uses. As these are transparent policies, all the role players including the brickyard owners, but also the surrounding communities will have to take part in the drafting the strategy.

Local building contracts procured by the government, especially housing contracts, can as far as capacity allows it have stipulations that bricks have to be bought from local small and medium size brickyards if their price and the quality are competitive.

## 6.2 The potential expansion of the brick market into a variety of products

Most brickyards in the surveyed areas burn their bricks in kilns. This creates pollution and uses fossil fuel in the form of coal. An alternative to burnt bricks is to convince brickmakers to place a second product on the market in the form of an adobe block. This sun-dried product is what they have, before they burn the brick. It would cater for poorer clients, while fired bricks can be sold to wealthier clients. Another viable option would be to teach brickyard owners them to produce a third type, namely a stabilised adobe, where a little cement is added to the block so that it dries much quicker and does not need plastering. This would add to the repertoire of a brick product somewhere between the raw adobe and the fired brick, both in terms of quality and price. It has the added advantage that it uses only sustainable resources for production. Such brick yards exist around Kuruman. The percentage of cement that they add is around 18% which is very high and a more economical brick can be made using less cement, about 7-8%.

## 7. Conclusion

Small brickyards play a role in developing the local economy in the areas in which they are located. The owners of these brickyards provide jobs and a livelihood for their workers. They supply bricks for the very poor people who build their own houses. They are thus playing an important role in their communities, and are examples of the entrepreneurial spirit that is needed in South Africa to tackle the housing challenge of this country as well as unemployment.

Local governments must play their role as agents for Local Economic Development by supporting these entrepreneurs to formalise their businesses and by giving business-friendly services and helping to empower them.

## References

Binns, T. & Nel, E. 2002. Devolving Development: Integrated Development Planning and Developmental Local Government in Post-apartheid South Africa. *Regional studies*, 36(8) p. 921-932.

Department of Provincial and Local Government. Integrated Development Plan Guide Pack: Guide III Methodology.

Doat, P. et al. 1991. *Building with Earth*. India: The Mud Village Society.

Fathy, H. 1975. *Architecture for the Poor*. London: University of Chicago Press.

Frescura, F. *Rural shelter in Southern Africa*. Johannesburg: Ravan Press, p. 123-130, 165.

Fromont, F. 1995. *Glenn Murcutt: Works and Projects*. London: Thames and Hudson.

Gardner, D. 2003. *Getting South Africans under Shelter: An overview of the South African Housing Sector*. Houghton: Housing Finance Resource Programme.

Gerneke, G. 1992. The Return to earth. 2 Reinstating earth Building. *Architecture SA*, p. 38, May/June.

Glasson, J. 1985. *Introduction to Regional Planning*, Hochinson, Linder.

Greenhut, M.L. 1996. Integrating the Leading Theories of Plan Location. In: Thisse, J.F., Button, K.J. & Nijkamp, P. (eds), *Location Theory I*. Glos, UK: Edward Elgar Publishing Co.

Guillaud, H. et al. 1992. "Is Mayotte a Model for Development?" *Gate*. No. 1, p. 11-16.

Harber, R. 2004. Personal communication. 10 May, Durban.

Houben, H. & Guillaud. 1994. *Earth Construction: A Comprehensive Guide*. London: Intermediate Technology Publications.

Lewcock, R. 1963. *Early Nineteenth Century Architecture in South Africa*. Cape Town: Balkema, p. 140.

Mathissen, H. ed. 1995. *Building with Earth in Burundi*. In: *Earth as a Construction Material for development work*. Bischöfliches Hilfswerk Misercor. Aachen.

Mathissen, H. ed. 1995a. *The Cefod Library in N'Djamena Library in Building with Earth in Burundi*. In: *Earth as a Construction Material for development work*. Bischöfliches Hilfswerk Misercor. Aachen.

McCann, P. & Shepperd, S. 2003. The Rise, Fall and Rise Again of Industrial Location Theory. *Regional Studies*, 37(6 & 7), p. 649-773.

Steyn & Jooste-Smit • Informal small brickyards in the Free State

Niazi, Z. & Patara, S. 2001. Technology, Habitat and livelihoods. Basin news, No. 21. p.18, June.

Pozak, K. 2001. Ecomaterials create local jobs, Basin news. No. 21, p.19.

RSA (Republic of South Africa). 2001. Local Economic Development: LED Financing national government programmes, Local Economic Development manual series (vol. 5). Farneset Printers Cape (Pty) Ltd for Government Printers, Pretoria, Farneset.

Smit, P. 1998. Earth Construction: A changing tradition. Acta Structilia, 5(1&2), p. 55-80. Bloemfontein: UFS.

Solidearth – 2004. Solid Earth Adobe Buildings. [online]. Available from: <<http://www.solidearth.co.nz/earthbuilding.htm>> [Accessed: 15/09/2004]

Stapelberg, H. 2003. Unpublished Masters in Urban and Regional Planning dissertation, Free State University, Bloemfontein, p. 91.

Steyn, J.J., 2004. The Challenges of Localism. In: Hady's (ed). Conference proceedings of the Regional Studies Association Annual Conference Nov 2004. Regional Studies Association, Seaford, United Kingdom.

Stulz, R. & Mukerji, K. 1993. Appropriate Building Materials. A Catalogue of Potential Solutions. 3rd ed. Switzerland: SKAT and IT Publications.

Vale, B. & Vale, R. 1993. Green Architecture. Design for a sustainable future. London: Thames and Hudson.