

# STRATEGY OF ADVANCEMENT IN INTERFACES SLUMS AFTER THE REVOLUTION OF JANUARY 25 (RICE STRAW AS ONE OF THE ARCHITECTURAL SOLUTIONS ENVIRONMENT FRIENDLY INTERFACES IN EGYPT)

أستراتيجية الارتقاء بواجهات المناطق العشوائية بعد ثورة 25 يناير  
( قش الأرز كأحد الحلول المعمارية لواجهات صديقة للبيئة المصرية )

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## ملخص:

هذا البحث يناقش من خلال المدخل النظري مشكلة العشوائيات وأسباب نموها وانتشارها في مصر ، وكذلك التأثيرات المختلفه لهذه العشوائيات علي البيئة الحضرية المحيطة ، دورالمجمعات السكنية المصممة في الحد من ظاهرة البناء العشوائي وعدم التجانس في المشهد الحضري للمناطق السكنية المشيدة , من خلال التعرف علي ظاهرة البناء العشوائي في المناطق السكنية بصورة عامة ، وفي القاهرة بصفة خاصة ، وعرض مجموعة من النماذج لمجمعات سكنية ( عالمية ومحلية ) التي تحقق وحدة شكلية متجانسة علي مستوي المشهد الحضري وتوصل البحث إلي تحديد مقومات وعناصر مشهد البناء السكني وأسسه التنظيمية التي يمكن اعتمادها بديلا عن البناء العشوائي ، وعدم تجانس مشهد الحضري في المناطق السكنية المشيدة ، لذلك تطرق البحث إلي فرض حل مقترح يساهم في حل المشكلة والعمل علي التنمية والارتقاء بالمنطقة. وقد تمت دراسة البحث من خلال ثلاثة جوانب وهي:-

-السكن العشوائي، -واجهات صديقة للبيئة، -نماذج تجريبية.

## Abstract:

This paper discusses through the theoretical approach the problem of squatters and its growth in Egypt. The impacts of these squatter areas upon the urban environment also have been indicated. The role of designed residential projects to reduce the phenomenon of informal building and heterogeneity in the urban escape of built residential areas, by identifying the phenomenon in residential areas, in general, and in selected area in Egypt, in particular, and present a designed housing projects (global and local), that achieve homogeneous formal unity at the level of the urban escape, the research identified the principles and the elements of building scene and the organization bases that can be a substitute for the informal building and the heterogeneity of urban escape in built residential areas. The paper proposed an urban planning project in order to solve the problem of visual pollution and share in developing and upgrading the total area. This research has been studied from three sides: -

- slums building.
- environment friendly interfaces.
- experimental prototypes.

## .1. Introduction

Slum' is an umbrella concept' under which fall numerous categories of settlement, for example, decaying inner-city tenements, squatter settlements, informal settlements and shantytowns. The coverage of settlement types is even more complex when we consider the variety of equivalent words in other languages and geographical regions, such as Favelas, Kampung and Bidonvilles.[ 1]

To date, defining what constitutes a slum is a controversial issue. The term 'slum' not only suggests indecent and miserable living conditions but also implies other important aspects such as informality. Informality also implies more than one meaning; it can mean substandard, illegal or disrespecting building laws and planning regulations.

Within the Egyptian context slums have been known as 'Ashwa'iyyat', which literally means 'disordered' or 'haphazard'. It refers to informal areas suffering from problems of accessibility, narrow streets, the absence of vacant land and open spaces, very high residential densities, and insufficient infrastructure and services.

This research addresses the problematic issue of slum definition and how current definitions create confusion around what counts as a slum, focusing on 'Ashwa'iyyat' in Egypt. The majority of conventional housing designs relied on the use of mechanical operation; the architects had freedom in designing façade to express aesthetic quality and their architectural attitudes. Hence, external designs had very poor connections with indoor environments because the buildings

were supported by active strategies such as air-conditions or artificial lights.[ 2]

However, along with global task of responding to climate change, housing buildings have more responsibility on energy saving and need to rely on passive design to create internal comfort. Moreover, in modern life, the time people spend at work is comparable with the time they spend at home ; therefore, the spatial standard for workspace quality is rising continuously over time.

Those prove that, the role of façade design- one of the main elements of architectural design, becomes more and more important in manipulating indoor environment for users. Meanwhile, the building envelope still has to encompass its role of contributing harmonically to surrounding visual environment.

These facts require more effort in designing façade to well fit with inside and outside, ingeniously adapt with building context and provide internal comfort in the same time.

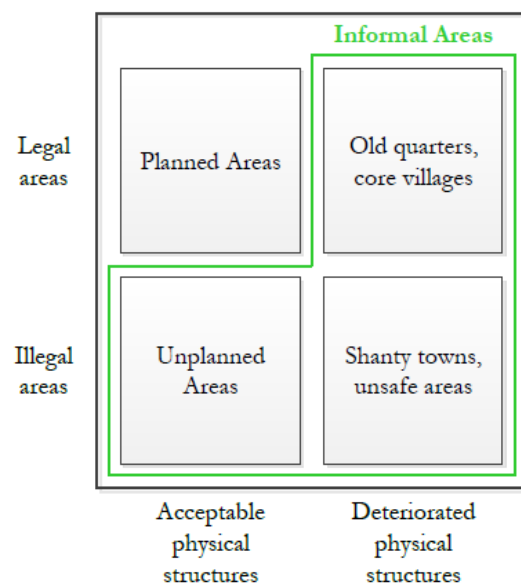
## **.2. Definition of slums and informal:-**

The obstacle of measuring informal settlements or slums appears with a lack of an agreed definition. “A slum is

generally defined as a contiguous settlement where the inhabitants are characterized as having inadequate housing and basic services. A slum is often not recognized and addressed by the public authorities as an integral or equal part of the city” [ 3].

The Cities Alliance gives the following definition: “Slums are neglected parts of cities where housing and living conditions are appallingly poor. Slum range from high-density, squalid central city tenements to spontaneous squatter settlements without legal recognition or rights, sprawling at the edge of cities”.

Thus, it is important taking into account that slums/informal settlements are complex constructs which cannot define just by one single parameter. Moreover, the whole concept of informal

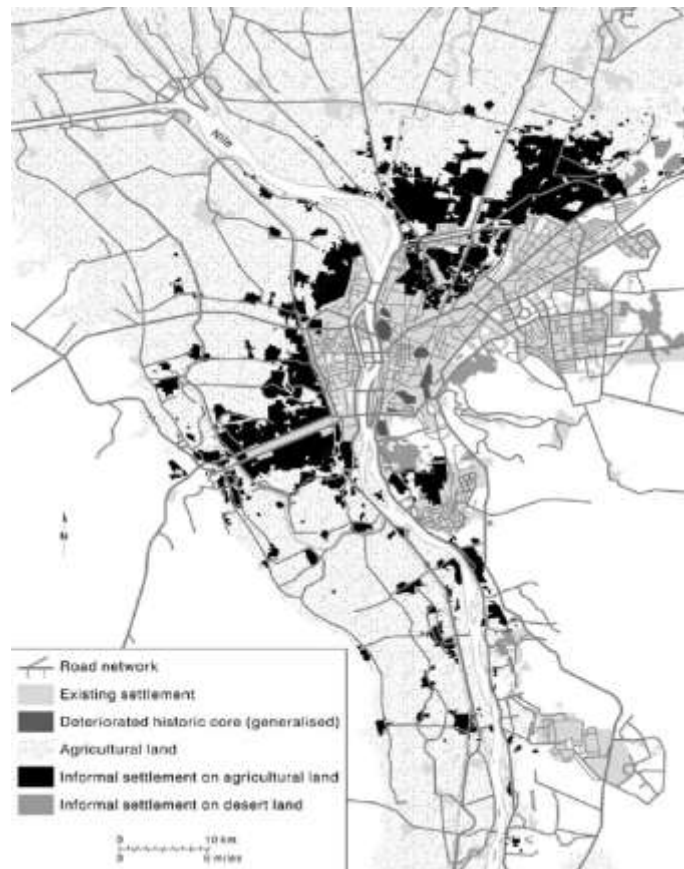


(Fig.1.) Classification of urban areas - legal status and physical condition (Abdelhalim 2010, p.3). [ 4]

settlements/slums is a relative one and local variations of these areas co-existing. Informal settlements are quickly changing appearances; that is why it is not appropriate to apply on only one categorization of a long period of time. “Spatial forms and the physical location of informal settlements vary from region to region, from city to city and even within the same city”. [ 4]

### .3. Ashwa’iyyat profile in Egypt:-

This section aims to provide background information on “Ashwa’iyyat” in Egypt. It explains briefly their origins and evolution, summarizes the main types and problematic issue of definition arises not only at the global level but also at the national one. In Egypt, the recent Building



(Fig.2.) A map of the informal settlements of greater cairo ( source :sims 2003,p.5).

Unified Law # 119/2008, which includes all definitions related to planning and

urban development, the term Ashwa’iyyat, otherwise known as slums

or informal settlements, does not exist. Instead the term unplanned areas is used which is defined as: “Areas developed in contradiction to planning and building laws and regulations”. A more operational definition is used by municipal authorities to define Ashwa’iyyat, as “Residential areas characterized by being developed in contradiction to planning and building

#### **4. Objectives of slum upgrading:-**

The objectives of slum upgrading in Uganda are;

- 1- To develop affordable and participatory measures for upgrading housing conditions and related support infrastructure in slum areas.
- 2- To plan and implement in collaboration with stakeholders programmes and pilot projects to minimize, eliminate and curtail the growth of slums.
- 3- To harness central government’s and urban authority (ties)’s resources in enhancing the contribution of slums to the urban economy.
- 4- To ensure an appropriate institutional framework and mechanisms for effective implementation of slum upgrading programmes by different stakeholders.

laws and regulations in the absence of state’s supervision. They, in essence, might lack services and/or infrastructure” .

As can be clearly noticed, emphasis in official terminology is on settlements which infringe planning law i.e. are informal, rather than slums in the sense of poor living conditions. [ 5]

#### **.5. Strategies for slum upgrading:-**

##### **.5.1. Design strategies for sustainable housing:-**

Placing new house types, building systems and technologies by parties and interests from outside which are not normally used there with the firm conviction that those products will be immediately accepted and adopted.

We cannot examine housing on its own, isolated from the larger context. In Egypt, the rate of migration from rural to urban areas is rising rapidly due to the poor conditions and work opportunities in countryside regions. This shift looks set to increase in the immediate future. Architectural concepts need to create chances for better living conditions in rural areas as well as in the urban areas to strengthen people’s relationship to where they live.[ 6]

Architectural concepts have to offer answers that respond to the specific situation and resources in Egypt for sustainable and long-term development by reinforcing the living and working environment instead of eroding it.

One answer is to use locally available building materials and practical construction techniques that make use of or improve on existing skills and knowledge. Another criterion is the way land is used for housing even in wider and open countryside outside of urban areas. The creation of two storey houses, for example, would provide greater density, compact neighbourhoods and maintain social interaction while preserving the wider landscape for agriculture purposes.

## **.6. Design patterns for Egypt:-**

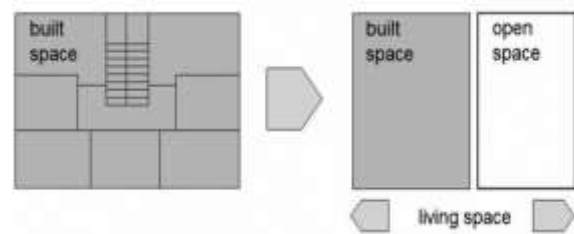
In the context of the housing situation in Egypt we present various design patterns which we have investigated over the last three years.

### **.6.1. Pattern: “Open space versus built space:-”**

Open space in housing – semi-private outdoor areas that are sheltered and partially concealed – must offer similar qualities to enclosed space defined by walls. Rural cultural activities are characterized by outdoor living and

working with only small built enclosures that are suitable for the respective climate.

Consequence: Provide a housing arrangement with a much larger proportion of open space and a smaller amount of enclosed space. The open space should directly adjoin the private enclosed space, be able to provide shelter from rain and sun, be flexible in its construction and offer the possibility for further (built) extension.

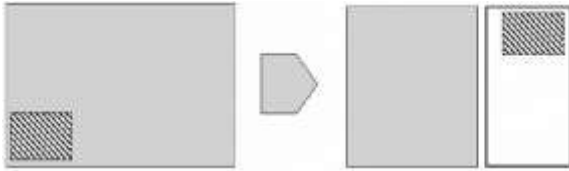


(Fig.3.) A housing arrangement with a more equal proportion of enclosed and sheltered open space.

### **6.2. Pattern: “Let the water out” :-**

In Egypt housing culture and tradition, sanitary installations are not as ubiquitous as they are in the West. The quality of these installations is often poor resulting in damage to the adjacent construction and in health and hygienic hazards.

Consequence: Relocate the sanitary installation out of the core of the house. Make them robust, easy to access and to maintain. Provide models of shared use with enough privacy for individuals.



(Fig.4.) Placing sanitary units out of the core of the house

### .6.3 Pattern: “Improved and innovative use of natural materials” :-

People like what they know. People like modern innovations too.

Consequence: New technologies and converted materials processing methods can help improve on local methods while employing locally available materials.[ 7] The creation of new materials and principles based on traditional, available and affordable raw materials and knowledge can also act as a ‘technology bridge’. Straw, for example, is a natural product that is well known and used by rural people but would never be accepted as a new and modern material for housing. The same problem applies to earth construction (*chicka*) or thatched roofs on vernacular houses too. People believe in modern construction methods, despite the fact that concrete and corrugated iron sheeting is neither appropriate nor sustainable.



(Fig.5.) Traditional and modern building materials: strawboard, resource: (STRAWTEC ©)

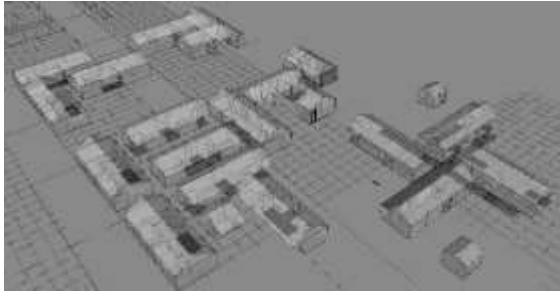
### .6.4 Pattern: “Modularized and prefabricated building elements” :-

Using new techniques for on-site construction without the necessary skills, tools and experience can lead to quality problems, misuse and misunderstandings that can undermine the construction.

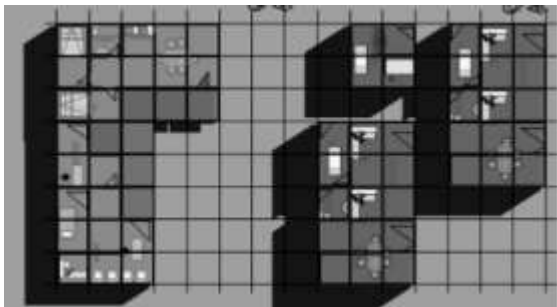
Consequence: Build on traditional techniques improved using modern technologies or products. Provide pre-prepared templates and guidance, easy to make prefabrication - lines and flexible and modular systems.[ 8]

These patterns for the design of housing have the potential to contribute to making housing liveable, comfortable and even affordable. Most of the condominiums are densely built-up. While this may be beneficial in terms of using urban land

(Fig.6.1.2) Fusing traditional and modern systems: prefabrication and modularization



**(Fig.6.1.)** Design matrix – Typology of a neighborhood made up of standard elements 1.2m × 1.2 m, EiABC 2011.



**(Fig.6.2.)** Design matrix – Basic modules (one to three stories). The dark gray blocks are open space units, EiABC 2012.

economically, it lacks adequate open spaces. Aside from the advantage of attaining maximum density, the neighbourhood design and upward direction of growth has its own impact on the socio- economic status of the dwellers. Because most condominium dwellers are middle- to high-income families the social mix declines .

The reach this again has its negative impact according to Adamassie “the feeling of separation between the ‘us’ and ‘them’ and between ‘those who have’ and ‘those who have not’ will create an atmosphere of envy and resentment that

ferments criminality in its most vicious forms.” .

## **.7. Experimental prototype for housing in Egypt made out of straw panels:-**

In Egypt, straw is a locally available material won from agricultural production. It is produced on site and normally tilted down or burned. As an organic, renewable material, it is inherently environmental friendly and recyclable.

However straw alone is not well suited for contemporary housing construction. Modern production technologies such as oriented strawboard offer a possible alternative: the straw is minimally processed and compacted into a board, in the process reducing the environmental impact of burning, e.g. on air quality and combustion fuel. The straw is reduced in a chopping mill for 25 minutes, highly compressed (250 bars) and heated up to 300 °C. Wheat or bale straw can be used, as can any other plant such as banana leaves. The production does not use any glue or bonding agent. The lignum instead acts as an adhesive and the pressed mass is then faced with two layers of cardboard (or another sheeting material such as a textile). In the context of rural houses it can be used as non- loadbearing and loadbearing elements.



At present we are undertaking tests and experimental prototypes using strawboard for housing applications in Egypt. The prototype SECU (SUSTAINABLE EMERGING CITY UNIT) is implemented in April and May 2012. SECU is a testing and experimental research project for fast emerging settlements and rural areas that examines alternatives to the standard housing concepts.[ 9]

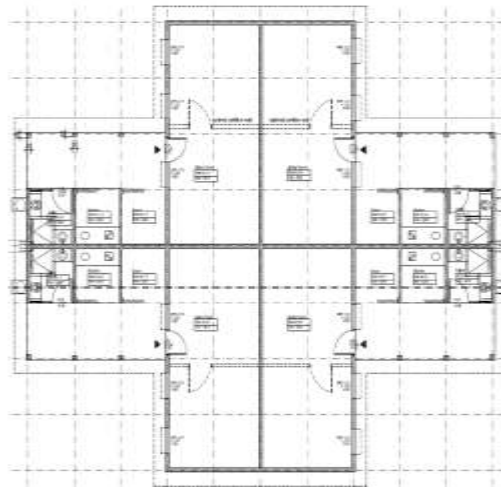
The basic research and related realization include:

- Standardized connections and construction details (foundation walls, roof, open space etc.),



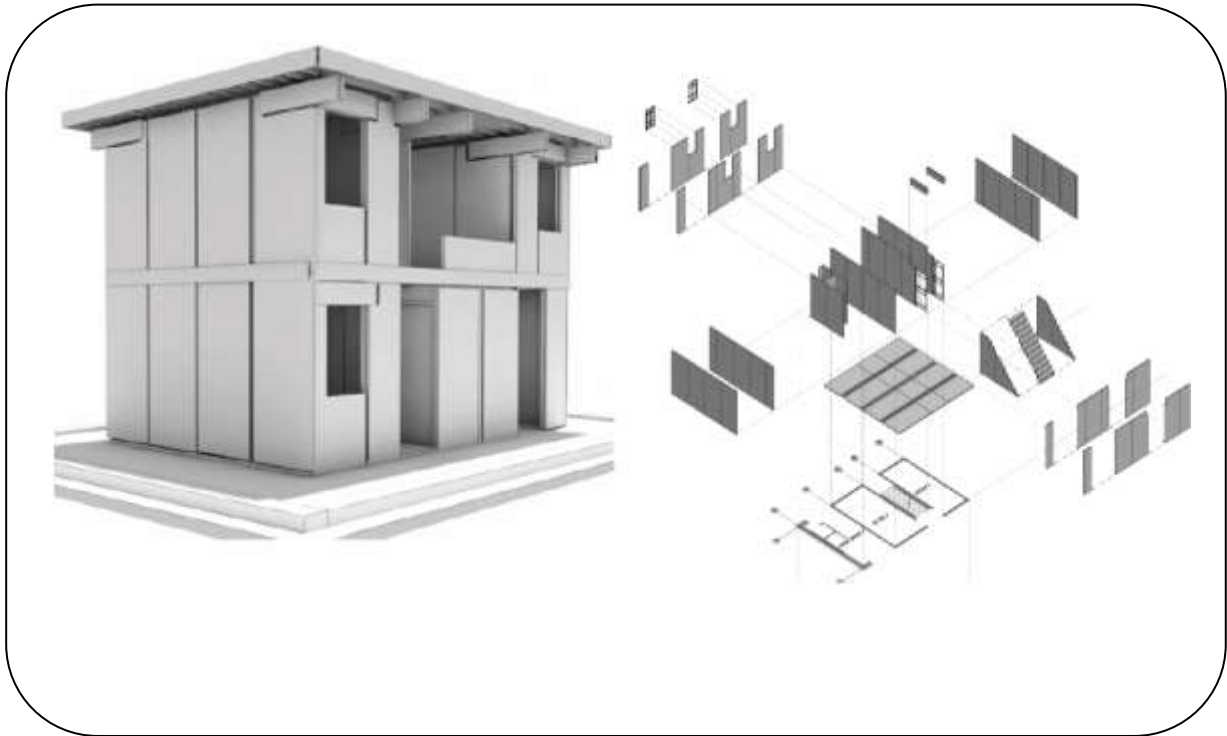
(Fig. 7.1.) Floor plan of one of the house 3.

- A construction system and building elements with modular dimensions,
- Integrated typology design matrix for the floor plan layout,
- design principles and criteria for cultural and social identification,
- Constructed from affordable and recyclable materials to reduce dependency on imported materials,
- Affordable and achievable on-site realization.



(Fig. 7.2.) Aggregation of house 3.

(Fig.7.) model compound for small settlements,  
Resource: GIZ-IS 2010, Donath.



**(Fig. 8.1.)** SECU – emerging city unit out of prefab straw boards Resource: (realised in April 2012).

**(Fig. 8.2.)** SECU – building system.

**(Fig. 8.1.2)** SECU – design and construction concept.

For the accomplishment of this work the following methodology was used:

- Suitable design pattern and construction details were identified and selected by an on-site survey to assess typical houses and living forms in Egypt;

- Intensive research studies by consultation and exchange dialogue were carried out to get the level of skills, affordability and identification with new materials and techniques for reasonable housing and comfort.[ 10]

- The material behaviour and parameters under the climate of Egypt were gained through experiments and laboratory tests;

- The construction of loadbearing walls out of strawboards took place after various structural long term and crash

tests, waterproofing test beds and a field analysis with a full scale model.

During the construction all steps are monitored and documented. There is a clear procedure to evaluate the developed design and details. Prepared questionnaires and templates help to figure out the problems and open questions to which we are confronted. A series of interviews and protocols will help to improve the design in the post construction phase. First improvements are figured out already like the connections for the pre-assembled building parts, cladding systems for the outer wall and the roof construction overall.

## .8. Conclusion:-

There have been many proposals, locally and globally, for this task of providing adequate and sustainable housing in Egypt. Theoretical proposals and research are necessary as well as practical tests and monitoring them. The SECU project represents a series of full-scale experimental prototypes aimed at investigating the practical implementation of theoretical ideas and solutions for housing proposals.[ 11]

Future and more extensive tests will provide a better basis for evaluating the validity of this approach, and whether it could contribute to improving the housing situation in Egypt. A next step has to bring them outside of the academic campus and test them in a real environment. Further steps have to come up addressing beside principal design and construction question the level of involvement and identification by the user. This is often the basis of social acceptance and sustainable adoption of innovative low- cost solution.

## 6 - References

1. **Al-Malky, R. (2009). Editorial: The slums of Cairo. Daily News Egypt: Egypt's Only Independent Newspaper in English.**
2. **Carrie. (2009). Slums around the world.** My several world. Retrieved 23.08.09, from [http://www.myseveralworlds.com/2009/04/05/slums-around-the-world/..](http://www.myseveralworlds.com/2009/04/05/slums-around-the-world/)
3. **CAPMAS. (2008).** The final results: Population and housing census 2006. Retrieved 05/09/ 2009, from <http://www.msrintranet.capmas.gov.eg/pls/fdl/ab2?lang=0&lname=..>
4. **UN-HABITAT. (no year available).** Kenya Slum Upgrading Project (KENSUP) [Online] Available from: <http://www.unhabitat.org/content.asp?cid=668&catid=206&typeid=13&subMenuId=0> [Accessed 20.05.2010].
5. **El-Jesri, M. (2009b). Cairo and Giza Governors: ongoing challenges. In R. Kipper, & M. Fischer (Eds.), Cairo's informal areas between urban challenges and hidden potentials.** Cairo: GTZ Egypt and Participatory Development Programme in Urban Areas (PDP).
6. **Nails, Amazon** "Information guide to straw bale building for self-builders and the construction industry" Amazon Nails, Todmorden, England. 2001. [www.strawbalefutures.org.uk](http://www.strawbalefutures.org.uk)
7. **Donath, D. (2010) design – panels - more.** In: The Second International Conference on Sustainable Architecture and Urban Development“, The Center for the Study of Architecture in the Arab World (CSAAR), 2010, p. 312-324.

8. **Donath, D. (2012) Scaling Down. - Affordable constructions for affordable living space.** Research by the Chair of Building Construction. In: Building Ethiopia, ed. by Helawi Sewnet, EiABC, Addis Ababa.
  
9. **Kuchena Jabulani, C., Usiri P. (2009) Low Cost Construction Technologies and Materials - Case Study Mozambique.** in: Proceedings of the 11th International Conference on Non-conventional Materials and Technologies, NOCMAT, Bath, UK
  
10. **Schreckenbach, H. (1980) Construction Technology for Tropical Countries - Ghana GTZ 1980 STRAWTEC (2012) retrieved from: [www.strawtec.com](http://www.strawtec.com)**
  
11. **Technical manual for low cost housing (2003).** prepared by Ministry of Ethiopian Affairs, GTZ and low-cost housing project, Addis Ababa; Ethiopia