THE CHALLENGES OF EARTHEN ARCHITECTURE IN EGYPT'S FUTURE HOUSING NEEDS: IS HASSAN FATHY STILL VALID

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Abstract

Egypt's current differences in landscape and population density (7% of the Nile Valley and 93% of desert), with the crisis of COVID-19, pose a problem that should be addressed alongside what Egypt has been experiencing in economic, social and environmental changes and challenges. These challenges are bound to get prepared for starting with hosting the COP27. Furthermore, to write the future history, a national vision to gather the nation should be established. New concepts, and new technologies combined with our Egyptian Civilization with our spoken language of modernity. This paper aims to find solutions to the challenge; what type of housing should be the most appropriate when creating a sustainable desert community out of the valley using local materials and earth architecture.

New Luxor as it completes the city of Luxor is the location that possesses a special interest in the proposed developmental Corridor by Professor Farouk Elbaz. Moreover, virtual designs have started taking place in New Luxor over the past 3 years, namely Civilizations Rights, Luxor Tales and Civilizology Land.

Hassan Fathy's previous endeavour and creation of innovative social housing utilizing existing materials and technology integrating heritage and western ideas, as shown in 'New Gourna,' might serve as a starting point and a learning process and the start of a new Egyptian program to build new communities. The paper will discuss the extent to which Hassan Fathy's ideas and developmental process, combined with new trends in sustainable architecture, can be used to build a new Egypt and write the future's history.

Keywords: Earthen Architecture, Future Housing in Egypt, Hassan Fathy, New Luxor, Sustainability.

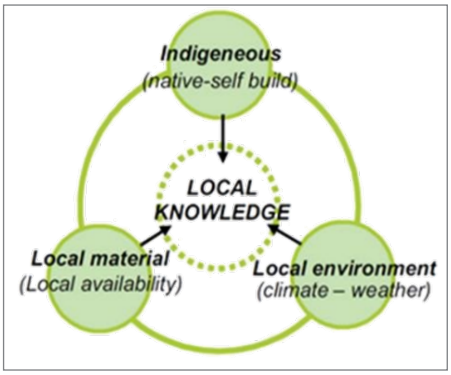

Figure 1. Framework of local concepts of knowledge in vernacular architecture. Source: Bhaswara

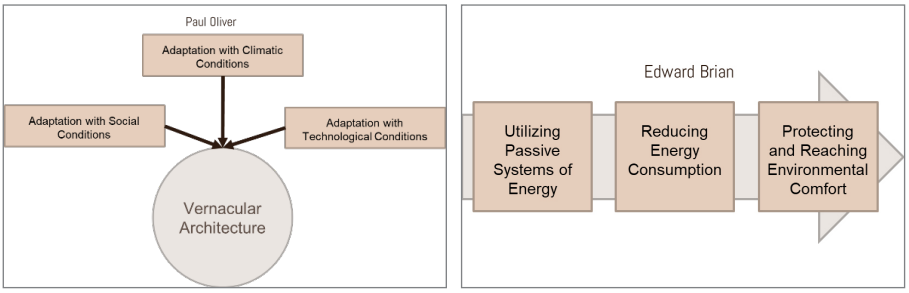

Figure 2. Different definitions of Vernacular by pioneers, developed by author.

1 Introduction

Before attempting to consider writing about whether vernacular architecture is considered important, and in what aspects this importance shows, the term 'vernacular architecture' should be defined. Firstly, 'vernacular' could be defined as 'local' and when combined with 'architecture' it leads to it meaning 'local architecture' which could be interpreted as 'architecture of the people'. Vernacular Architecture is considered the simplest form of meeting human needs in extreme conditions.

In the past years, builders had to develop and experiment with passive systems to reach maximum indoor comfort, as well as challenging extreme climate conditions with the help of available resources as no active systems existed yet. With a recent increase in energy costs, as well as environmental dilemmas such as resource depletion, vernacular architecture is gaining popularity again, but there is a distinction between the authentic vernacular and the current one. This occurred after realising the passing of master contractors without transferring their knowledge (Dabaieh, 2011). Hassan Fathy believed that technology was the solution to functional problems such as having minimum energy consumption (El-shorbagy, 2001).

2 Problem definition

The existence of unsolvable difficulties in Egyptian urban societies nowadays includes overpopulation and pollution. This requires an appropriate solution to be applied in new communities such as Vernacular Architecture. However, there are some problems concerning this style as well. This traditional rate of survival is being threatened by economic, cultural, and architectural integration factors. Vernacular communities in the Egyptian deserts are confronted with dramatic challenges. This was observed in inhabitants abandoning their homes to collapse and leaving for other towns. While others change them by using industrialized materials for their houses' construction. In addition to this, they have tendencies to move into concrete structures without respecting inherited values and having zero

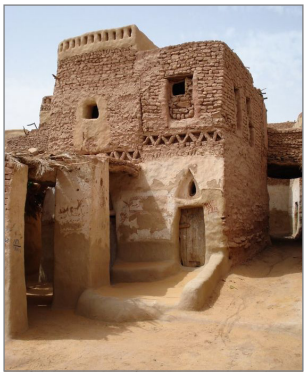

Figure 3. Old Siwa Buildings.

Figure 4. New Siwa Buildings.

sense of adaptation. This in turn led vernacular settlements to experience the danger of vanishing (Dabaieh, 2011). This shows the high importance of studying vernacular architecture as it takes up a huge percentage of the history of the building. Thus, there is a requirement for investigation on how to implement and apply to spare what is left of this architecture and how to integrate it with Contemporary Architecture.

3 Objectives

This study aims to provide a method to contribute to the continuing existence of desert vernacular architecture and preserve it. The research's primary objective is to develop a guideline to integrate vernacular building techniques with today's Contemporary, highlighting the importance of the usage of local materials, techniques and knowledge.

4 Vernacular & contemporary architecture

Extremes of temperature, aridity, and water availability must all be considered while building for desert architecture, according to Moore. He went on to say that certain design factors, such as using local materials and considering site orientation for a favourable wind, should be addressed in for people to live happily in any desert region (Moore, 1999, p. 12).

The process of design, construction and demolition of structures may have to be undertaken by the inhabitants as a result of their living environment. Both the processes are done by the users in vernacular architecture. Moreover, the locals develop their built environment according to their needs with continuous improvements in the design process. Adaptation is constant as any needs that arise and vanish can be observed directly and quickly by the inhabitants in their built environment.

Architectural practices have changed drastically in Egypt during the last decade. It's become common knowledge that substantial shifts are taking place in the fields of architecture and urbanisation. The public face of Egyptian architecture is changing considerably as a result of these transformations (Salama, 2004).

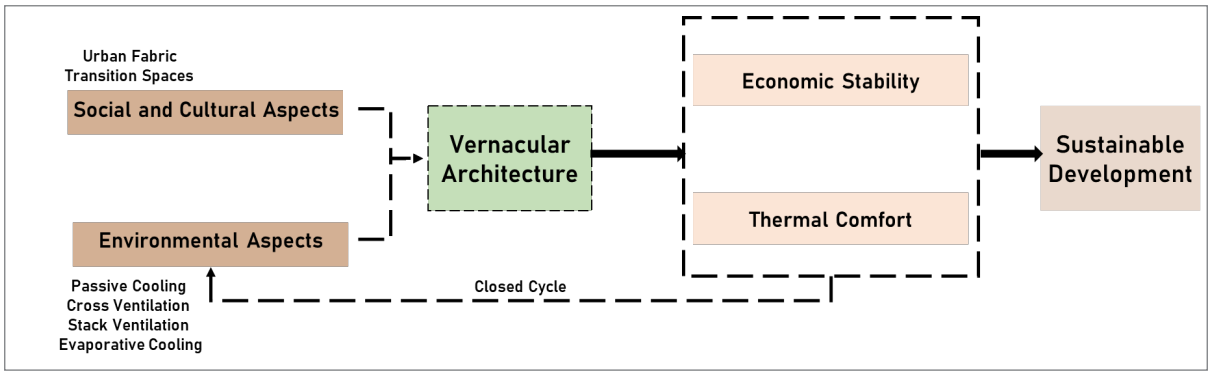

Figure 5. Vernacular architecture and sustainability. Developed by the author.

5 Sustainability

There are a variety of aspects when the goal of sustainability is set to be achieved. This varies from the economy of resources to passive design strategies. The wrong usage of contemporary architecture led to the thought of having a new type of architecture to be produced due to the wrong usage of contemporary architecture. Egypt has been working on a 2030 vision that includes sustainability as its first pillar to promote sustainable economic growth, increase reliance on renewable energy sources, embrace sustainable production and consumption habits, and reduce greenhouse gas and fossil fuel emissions, which aligns with the SDGs 2030 agenda as a preparation for the COP27 to be hosted in Egypt (Makary, 2022). Moreover, sustainability should not be narrowed to only existing for the coming hundred years but to also be a part of our attempts at defying climate change through building green, and as Egypt is one of the countries to be at risk of climate change impacts, a green code, Green Pyramid Rating System, has been created as a strategy (Ministry of Housing Utilities and Urban, 2011). This is based on the Great Pyramid which is believed to have been the application study of sustainability.

6 Civilizology of earthen architecture

Earthen Architecture has been of interest again recently. Intensive research on this architecture style should be done, as in its Civilizology, which is an emerging field underlying topics related to the idea of Civilization Rights(1) such as the history of civilizations, the origins of discoveries, heritage conservation, intellectual property rights, indigenous people's cultural rights, and community resilience. The true history of this Architecture and how our ancestors created and dealt with it should be studied. This is an international and Architectural challenge of great importance for future communities along with the challenging impacts of global climate change.

7 Research methodology

For this study to attain the set objectives, a data collection phase (Qualitative) is carried out with different methods. The first strategy was by undertaking systematic international and national research on the context of this research topic. This method has aided in the creation of a framework that can be used in the empirical study. The second strategy was achieved by an empirical study carried out in the Egyptian city, New Luxor.

Figure 6. Holes present in the wall (left) 'Bab El Hagar' (right), Source: Mahmoud R. 2016.

8 Case studies

This section describes the chosen case studies for this research. This section's objective is to highlight the main aspects of the case studies and their contribution to the paper.

8.1 Old Gourna and its housings

A village, or what remains of it, resides on the Theban hill in Luxor Necropolis. It contains old vernacular houses that were built with the main aim for it to be sustainable and withstand hundreds of years. A different plan is built for each house, this is due to the demand for the plan to accommodate its resident's needs. Most houses include two entrances. Moreover, for women to live freely inside the house an inner courtyard is present and an open courtyard connects to the 2nd level. The house contains the main terrace to overlook Luxor and its temples. There is a kind of plasticity, and this can be seen in the rooms as they have more of a free form. The level of creativity even reached their furniture as they used to mould their own (Fathi, 2010). This dwelling includes an opening 'Bab el Hagar', where the spouses sleep when it is very hot (Mahmoud, 2016).

8.1.1 Building materials and building process

After removing the big rocks from the mountain dust, while still containing very small gravel to add strength, it gets mixed with mud to produce the mud bricks used for construction. This process is done by its people. They also used palm tree trunks, leaves and mud as insulation to minimise the sun's heat effect besides having only the main façade exposed.

8.2 New Gourna and its housings

New Gourna was set to be designed as a program by the government for the reduction of Old Gournawis. This resulted in the establishment of New Gourna. This project was commissioned to be designed by Hassan Fathy (World Monuments Fund, 2011). Throughout his design process, Hassan Fathy drew inspiration from Old Gourna, by using local materials. The main objectives of Fathy's design were to make the people of Gourna live in a harmonious social structure, free from poverty, disease,

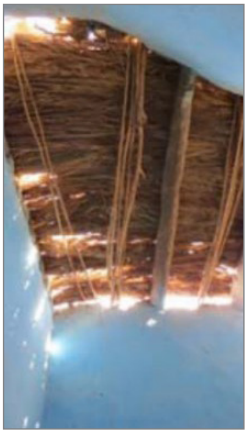

Figure 7. (left) Interior materials, Source: Mahmoud R. 2016.
Figure 8. (right) New Gourna, Source: UNESCO.

and illiteracy. To create appropriate housing for Old Gournawis, Fathy did a lot of research throughout his work on this village. Within the language of Architecture, elements related to Islamic architecture such as vaults and domes are used as the main architectural elements. Moreover, he was also inspired by old Cairo houses in the design process.

8.2.2 Building materials and building process

Fathy used the same or almost the same building techniques as the Old Gourna in the new Gourna. However, his buildings could not withstand the groundwater present so the addition of concrete buildings occurred.

9 Framework

The following figure shows the outcome of the theoretical research done on Vernacular and Contemporary Architecture with their features. This contributed to the creation of the framework and integration process.

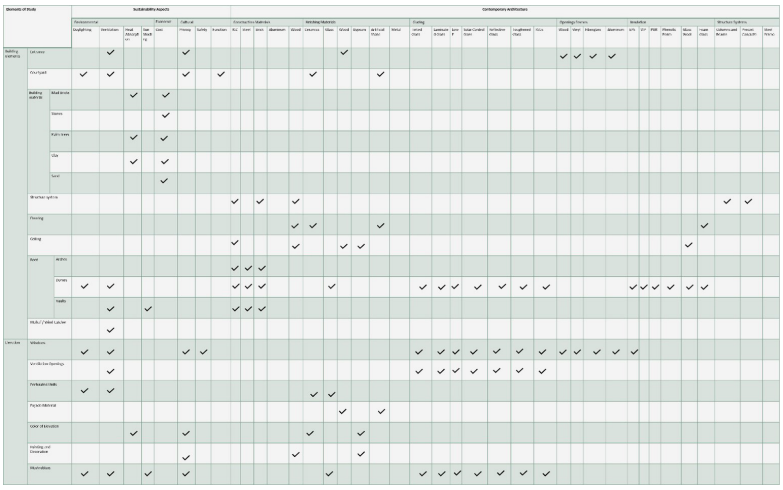

Figure 8. Guidelines for the integration between Vernacular and Contemporary. Developed by author.

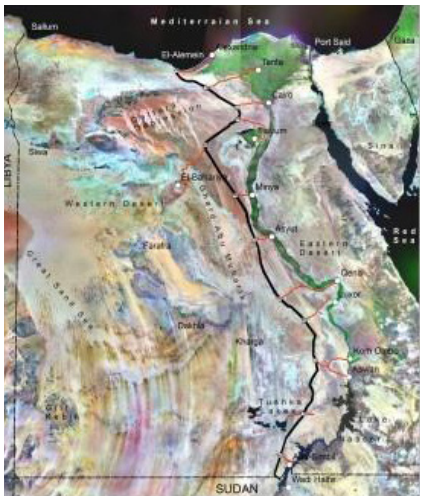

Figure 10. Development corridor proposed by Dr Farouk Elbaz. Source: news wise.

10 Applied study

10.1 Introduction

Egypt has embraced the 'Desert Development Corridor' concept which was researched and designed by Dr Farouk Elbaz, to absorb the new people and decrease the development pressure on Luxor city. The plan includes the construction of several services over a 1,200 km stretch of desert, thus a new land would open up for development. The Luxor region has witnessed a rapid expansion that could reach double in the coming 20 years (Boston University, 2011).

10.1.1 Phase One: Determining the study area

The study area will take place in New Luxor, located 15 km northeast of Luxor, and has already begun construction. A site of 700 m2 has been chosen to design the prototype.

10.2 Plan configuration

Plans were thought of and sketched in an approach to achieve the goal of constructing a model that would have the ability to address present issues in mud-brick houses while also accommodating the contemporary lifestyle the younger group desired.

10.3 Applied components in prototype

The obtained features from the theoretical study were used in the prototype concerning the guidelines table that shows the integration between the Vernacular and Contemporary architectural styles.

11 Questionnaire and discussions

This section seeks to list questions asked, which targeted experts. The aim of each section utilised in the survey questionnaire and the findings are presented. Section one was general about the background of the participants in the survey. The rest of the questionnaire was based on the participants'

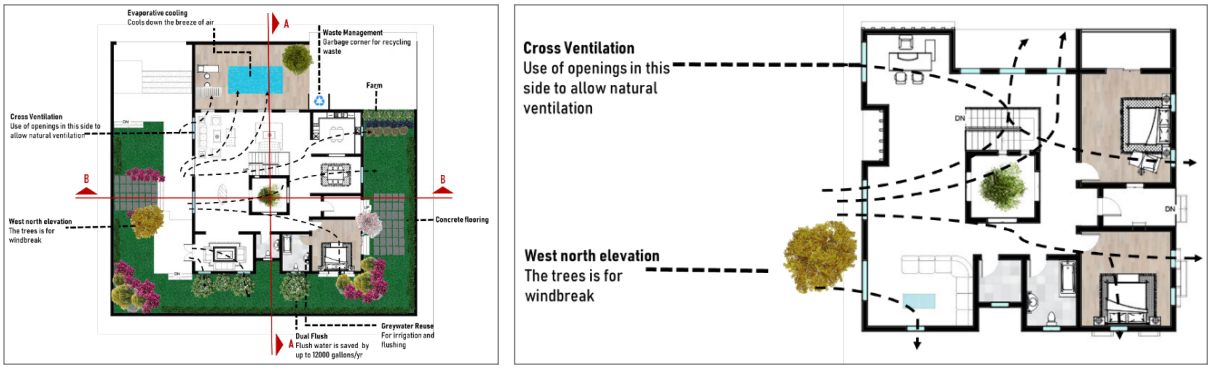

Figure 11. Plans for prototype with features used. Developed by author.

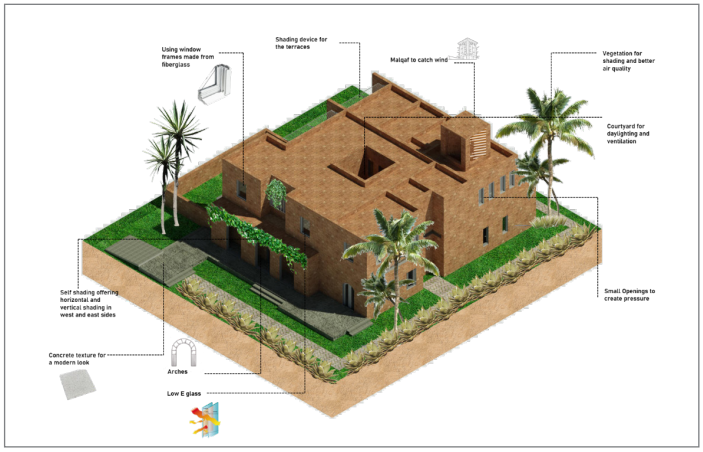

Figure 12. Prototype showing used features from Vernacular and Contemporary. Developed by author.

opinions regarding the prototype, with the following questions as an example: Q1 is regarding the material used in the prototype to see whether the choice of material was approved by other experts and architects. Alongside, further developing the model, Q2 asked what one thing you would change in the plan, and Q3 to gain more feedback on the model development and consider suggestions.

12 Conclusion and Future Development/Improvement

The research presented in this paper offered a thorough comprehension of the subject which just started to receive attention in recent years. The usage of Vernacular Architecture features along with the Contemporary materials and techniques to fulfil various sustainable aspects.

12.1 Research Outputs and Recommendations

The outputs can be concluded in various points. First of all, the development of a guideline, where vernacular and contemporary architecture can be integrated and applied for awareness of the usage of local materials and techniques. Finally, contribution to developing a residential prototype for a new society.

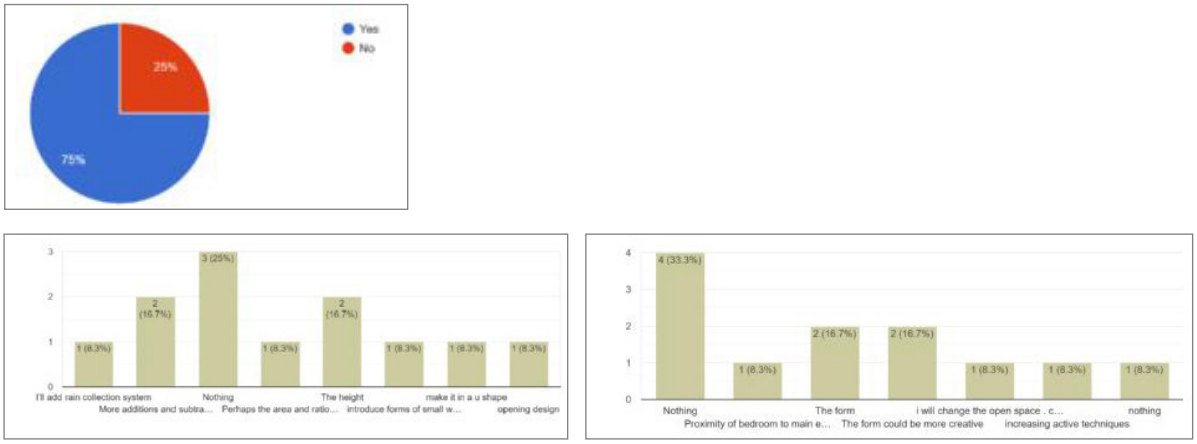

Figure 11. Results for Q1, Q2 and Q3 respectively.
Done by author.

The recommendations of the research have been divided. The first part is directed to officials where empowerment of local dwellers must be provided as an awareness method alongside the encouragement of the application of the integration guidelines. The second division is aimed at architects. Research in the field of Vernacular Architecture to offer ways of integration. Moreover, workshops, etc. should be used to spread awareness of its importance. Lastly, further research on the usage of local materials and skills to ensure the Vernacular application is of regional standards.

12.2 Future research

With the many attempts of trying to find alternatives for life on Earth, Mars is an option. Research on communities on Mars should take place. With Earthen Architecture becoming the upcoming sustainable style for construction, such dimensions, such as using natural resources, should be studied in order to be applied on Mars, starting with the local Martian materials to be used in building the communities but also using technology and integrating it in the process.

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