

A Vision for Future: Analysis of the Prominent Synthesis of Culture and Sustainability in Hassan Fathy Architecture

Tarek Abdelsalam

University of Modern Sciences and Arts (MSA)
5141 street 43, Almokattam, Cairo, Egypt, tareqslam@gmail.com

Abstract

Sustainability in architecture has become a global concern as one of the consequences of energy crisis and the calls for reliance on renewable energy resources. In the last two decades, Arab architecture has been witnessing an increasing interest in sustainability. A large number of attempts were carried out by Arab architects to present truly sustainable design solutions. Yet, most of these attempts have failed to expand the general meaning of sustainable architecture from designing environmentally friendly buildings to architecture incorporating culture and local identity into design process. Ignoring the local cultural peculiarities, while dealing with sustainable architecture in the Arab society, deprives architecture from expressing identity of the local community. The Egyptian leading architect Hassan Fathy, who passed away 25 years ago, has successfully addressed this issue through his work and left a great wealth of buildings that reflect the prominent synthesis of culture and sustainability. These buildings that Fathy designed through his fruitful and distinguished journey include numerous significant lessons for future.

Although a large number of researches and studies were carried out to investigate and analyze Fathy's work, yet the synthesis of sustainability and culture in his work has not been touched. Through focusing on this issue, this paper explores and analyzes the implications of integrating sustainability principles with cultural dimensions in Fathy's work to present an appropriate paradigm of sustainable architecture that engages culture and local identity of the community. This paradigm moves away from universal and absolute technologically based design methodologies to avoid the contradiction with cultural values of the local community. This paradigm is expected to guide architects, researchers, and decision makers in dealing with sustainable architecture in particular localities. To attain this objective, this research will discuss Fathy's thought and principles, in addition to investigate and analyze a number of his distinctive projects in Egypt.

Keywords: Sustainable architecture, Hassan Fathy, Culture, Arab architecture, Eco-culture

Article history: Received: 7 July 2014
Revised:
Accepted: 25 July 2014

1. Objectives and methodology

This research aims to introduce an appropriate paradigm that engages culture and local identity while dealing with sustainable architecture in the Arab world. To attain this objective, the research methodology will rely on; firstly: a documentary analysis of thought and principles of Hassan Fathy in dealing with sustainability issues. Secondly: in-depth analysis and investigation of examples of Fathy's work that integrate clear cultural dimensions and sustainability principles.

2. Culture

Before discussing the syntheses of culture and sustainability, we need to review the cultural dimensions in architecture. Robert Downs indicates that culture represents a mental map which guides us in our relations to our surroundings and to other people [1]. In general, culture is the predominating attitudes and behaviours that characterize the functioning of a group or organization. It is the totality of meanings, beliefs, values, customs, norms and symbols relative to society. It includes all creations, material and non-material achievements, the inherited expectations, the past and present gains as a result of living together [2]. It is important to discuss beliefs, values, and norms as key elements of culture. Beliefs are the means by which people make sense of their experiences, both personal and social. Values direct people on what should and should not be done, what is good or bad, and what, why, and how to choose. Norms are shared patterns of behaviour in a particular culture that informs its members what they should or should not do in a given situation [3].

Culture refers to material and non-material aspects. Material culture refers to the physical, tangible, and concrete objects produced by people. Behind the artefacts or material objects is the pattern of culture that came from the ideas of the artefact, its use and function and the techniques of using or applying it.

Material culture determines the physical options and opportunities of the society like the kind of foods eaten, the kind of clothes worn, the kind of houses lived, or the settling of the community in which one lives. These physical objects (art, crafts, food, costumes, and architecture) are products of culture. Technology also is a product of culture. It refers to the techniques and knowledge in utilizing raw materials to produce food, tools, clothing, shelter and means of transportation. Yet, the form of dwelling for example cannot be understood only by a consideration of the technique and material used. It is first of all necessary to be aware of how the principles of the local group are applied and what kinds of work are performed by this group, and in which rules [4].

3. Sustainability

Principles of sustainable development have three main dimensions. Firstly: the economic dimension which is based on increasing the welfare of society (household) through the optimum utilization of natural and human resources. Secondly: the social dimension which refers to the relationship among human beings and between them and nature. Thirdly: the environmental dimension and the preservation of the resources that are based upon physical, biological and ecological systems [5]. At this point, it is important to indicate that the clues for the development of a more sustainable order lay in the examination of what was. It is self evident that many ancient cultures necessarily held a symbiotic relationship with their environment [6].

The previous three main dimensions can be interpreted in detail through six principles that together could build into a sustainable architecture: (a) conserving energy; as a building should be constructed so as to minimize the need for fossil fuels to run it, (b) working with climate; buildings should be designed to work with climate and natural energy sources, (c) minimizing new resources; a building should be designed so as to minimize the use of new resources and, at the end of its useful life, to form resources for other architecture, (d) respect for users; sustainable architecture recognizes the importance of all the people involved with it, (e) respect for site; buildings should respond to site conditions and the context influence, (f) holism; all the sustainability principles need to be embodied in a holistic approach to the built environment [7].

4. Culture and sustainability

At this point, it is important to answer a crucial question; is there any link between culture and sustainability in the realm of architecture. Culture which is expressed through the community as well as the individual,

involves a system of rules, attitudes, values, beliefs and norms and conveys the sustainability of vitality of the community [8]. Guy and Farmer classifying sustainable architecture under six different categories based on the main logic and methods as: eco-techno, eco-centric, eco-aesthetic, eco-cultural, eco-medical and eco-social. The eco-cultural logic highlights the preservation and conservation of the variety of the existing cultural archetypes with a concern for cultural continuity. This logic leads to transformation and re-use of traditional construction techniques, building typologies and settlement patterns for expression of the cultural sustainability. This approach denies universal and technologically based design methodologies that often fail to coincide with the cultural values of a particular place and people [9].

This logic emphasizes the significance of sustainability of the culture to be provided through design in architecture. It argues that the existence of a critical interaction between culture and environment through which they continually redefine each other. Environmental and cultural sustainability could be achieved through adopting a regional design approach. In regional approach, design regards the climate and intends to sustain the culture of the region through considering the existing pattern of the region, the existing architectural features of the buildings, the existing lifestyles of the inhabitants and the existing cultural issues. In brief, regional design meets the goals of eco-cultural logic of sustainable architecture [10].

5. The problem definition

To explain the current problem that faces sustainable architecture in the Arab world, we need to highlight two recent projects in the Gulf States that are known as successful sustainable buildings. The first project is Qatar National Convention Centre (Figure 1), which operates efficiently with over 3,500 square meters of solar panels that provide 12.5% of the needed energy for the building. The building meets the standard for gold certification from the US Green Building Council's leadership in LEED. The second project is Bahrain World Trade Centre (Figure 2), which comprises two identical 50-storey commercial office towers overlooking the Arabian Gulf. With its three 29-meter diameter wind turbines that are supported by 30-meter bridges spanning between the two towers. The turbines generate 11-15% of the energy required in the two towers. It is clear that both of the two projects can be seen everywhere around the globe which means that they do not reflect any local identity or cultural aspects of their contexts. To crystallize the problem, we can argue that a large number of attempts are carried out in the Arab states to present truly sustainable design solutions. Yet, most of these attempts have failed to



Figure 1. Qatar National Convention Centre



Figure 2. Bahrain World Trade Centre

expand the general meaning of sustainable architecture from designing environmentally friendly buildings to architecture incorporating culture and local identity into design process. The Egyptian leading architect Hassan Fathy has successfully addressed this issue through his buildings that reflect the prominent synthesis of culture and sustainability.

6. Hassan Fathy ... Thought and principles

To analyze the prominent synthesis of cultural dimensions and sustainability principles in Fathy's work, it is important to review his architectural thought and guiding principles. At this point, it is important to indicate that architecture of Hassan Fathy is an innate product of reactions between factors of nature and socio-cultural influences, which reflects the environmental thought of this architecture. There may be said to be six general principles which guided Hassan Fathy throughout his career: his belief in the primacy of human values in architecture; the importance of a universal rather than a limited approach; the use of appropriate technology; the need for socially oriented, co-operative construction techniques; the essential role of tradition; and the re-establishment of national cultural pride through the act of building [11].

6.1. Implications of cultural dimensions in Fathy's work

Fathy's belief in the primacy of human values in architecture can be seen at many levels. He has anticipated many concerns about the destruction of the environment that are being voiced with increasing urgency today. He set himself apart from the majority of practitioners of his time by rejecting the temptation to reduce the role of the building users in the design and building process. In his design for the village of New Gournah, he astonished critics with his insistence on the

custom design of each house in a settlement intended for seven thousand people [12]. Respecting human and social values of the New Gournah community was apparent in Fathy's design by utilizing elements that reflect these values. Fathy introduces "magaz" or offset entry into not only the houses of the village, but also the mosque plan to act as a valve between the large public square outside and the quiet sanctity of the interior and prepare the worshipper for prayer (Figure 3). This magaz was provided with a "mastaba" or a large step to be used for sitting, making this a social space where people may gather after prayers to talk (Figure 4).

Fathy encouraged a deeper respect for the use of tradition in architecture as the social analogy of the personal habit. He believes that it is the responsibility of each architect to develop a heightened awareness of such habits, and to incorporate them into each design. For Fathy, the discovery of traditional form also involved the search for a missing link in a cultural chain that had been cut by the intrusion of the industrial age, especially in his own country. In his wish to keep tradition alive, and to provide a place for visitors and townspeople alike to see authentic rituals, Fathy designed an open-air "palestra" or fighting stage to be located near the gateway of the New Gournah public square (Figure 5). In addition to folkloric performances, singing, conferences, film projection, and many different kinds of gathering, the stick-fencing championships are also contested here (Figure 6). In spite of the real danger involved, it is considered as much a traditional art form as the oriental disciplines [13].

Fathy attempted to reawaken a sense of cultural pride among the Egyptians, and to make them aware of their rich architectural heritage. Because of his efforts, many young people are more informed about the Islamic architecture in the medieval part of Cairo. This new awareness is no longer confined to Egypt alone, as Fathy's name has become associated with the re-establishment of architectural tradition throughout the

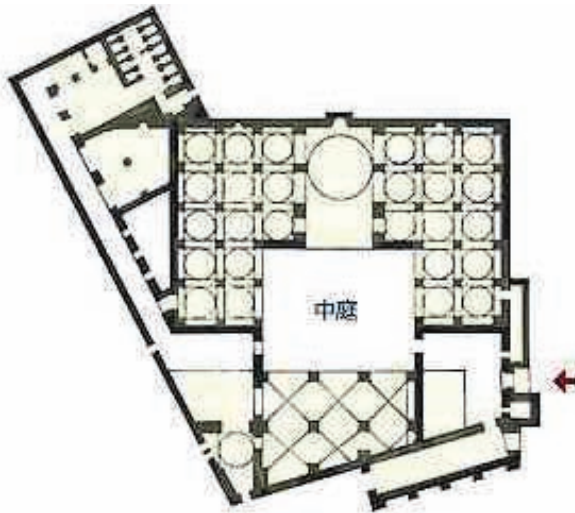


Figure 3. Plan of New Gournia mosque showing the use of "magaz" in the entrance space

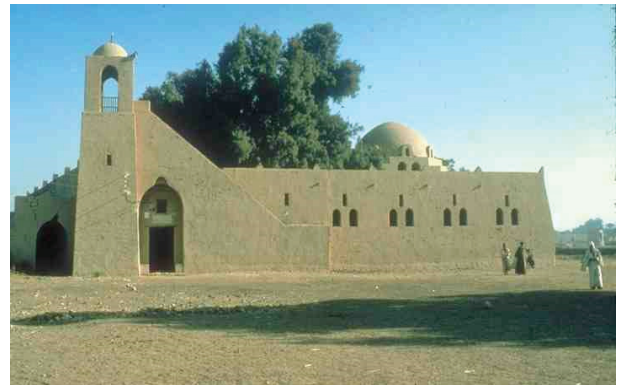


Figure 4. Main elevation of New Gournia mosque

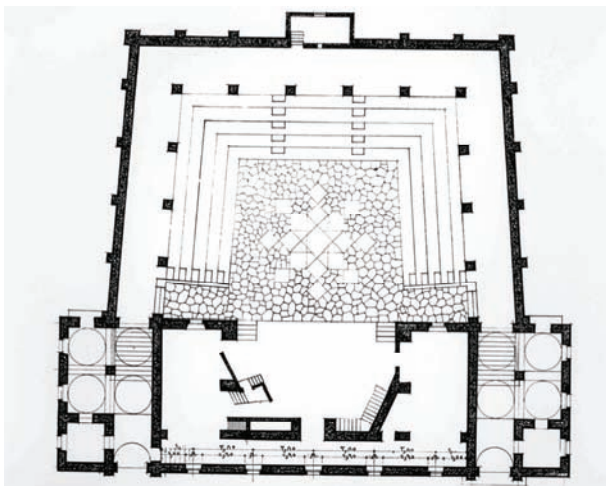


Figure 5. Plan of the theatre of New Gournia



Figure 6. Open air theatre of New Gournia



Figure 7. Heritable elements of courtyard in Fouad Riad house



Figure 8. Vaults and domes as heritable elements in Fouad Riad house

developing countries. At this point, it is important to indicate that Fathy studied the elements and vocabularies of Islamic architecture with particular focus on Ottoman houses and reused them in his designs [14]. In this way, his architecture was distinguished by its domes, vaults, internal courtyards, thick walls, small openings and mashrabiya as a contemporary expression of Islamic architecture. If we look at Fouad Riyd house (Figure 7), we find most of these elements are utilized but in a contemporary local spirit. His careful delineation of the exterior character of the house conveys a strong feeling of a distinctive local identity (Figure 8), due in part to the juxtaposition of a pigeon tower, malqaf (wind catcher) and domed qa'a (reception hall) combination and extensive turned woodwork.

6.2. Implications of sustainability principles in Fathy's work

6.2.1. Economic dimension

As discussed earlier in this research, the economic dimension as one of the principles of sustainable

development focuses on the optimum utilization of natural and human resources and the response to site conditions and the context influences. Fathy called for building with the available building materials, as he built with adobe, stone and clay and if the wood or steel was available, he would build with it. Fathy's adoption of building with the local and available building materials was not only based on his understanding of the materials specifications at all levels, but also on his special capability of dealing with forms and compositions produced from utilizing these materials [15].

At this point, it is important to indicate that "Dar Elislam Complex" in New Mexico, which is one of the prominent projects of Fathy, played a significant role in conveying messages that reflect one of the sustainability principles in Fathy's architecture. Actually, this complex contributed to propagating the concept of using adobe in building contemporary facilities in USA (Figures 9, 10). One of the American citizens who has built his house by adobe indicates that because of the limited budget that he had, he did not able to build a new house in New Mexico. When he heard about Fathy and his adobe



Figure 9. Using adobe in building Dar Elislam Complex in New Mexico

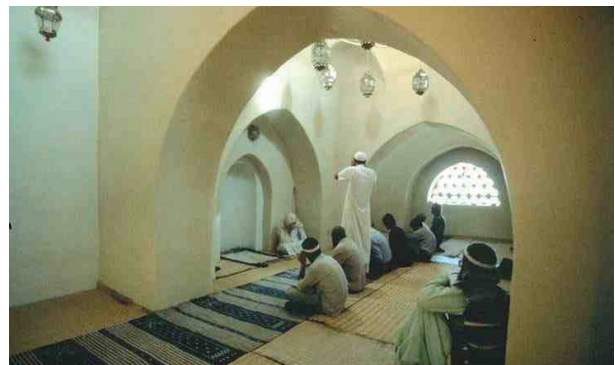


Figure 10. Internal space of the mosque of Dar Elislam Complex in New Mexico

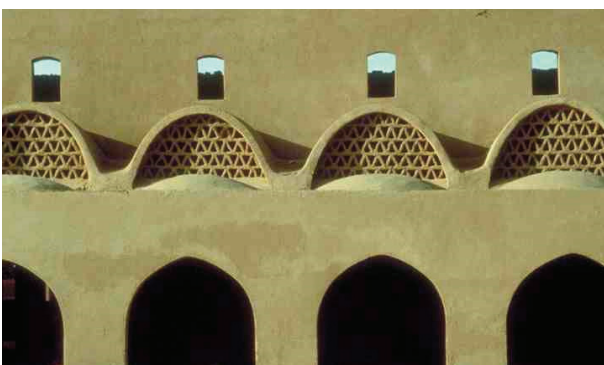


Figure 11. The use of sand brick in New Baris Village



Figure 12. The use of local lime stone in Hassan Fathy's Sidi Krir house

buildings in New Mexico he bought his book "Architecture of the Poor" and read it. He admired the architect and his works and decided with his wife to build their new house themselves by adobe [16].

Respect to site conditions and reliance on local building materials was apparent in his project of the village of New Paris in the Kharga Oasis. He decided to develop a new technique for making sand brick as an appropriate quality of sand is available in the site (Figure 11). While he built his house in Sidii Krier on the northern coast using local limestone faced with plaster (Figure 12). This house demonstrated that Fathy's formal vocabulary and spatial thesis were not restricted to the use of a single material, but could adapt to local conditions.

6.2.2. Economic dimension

At the social dimension of sustainability principles, Fathy emphasized the need for socially oriented co-operative construction techniques or what is now called "self-help". Having originally put this idea into practice in the construction of the village of New Gournas more than sixty years ago, he was finally to see it accepted in principle throughout the world. This project reflected another important social dimension through respecting the building users and involving them in the design process (Figures 13, 14). He built some twenty houses in the early stages to show the Gournas the kind of architecture he was proposing as they couldn't understand plans. It was an opportunity for him to observe the families actually living in them and consult them by seeing their needs in practice [17]. Inhabitants' participation in the design and construction process was one of the main pillars of Fathy's thought. Through this process he enhanced the people's sense of belonging and pride which led them to preserve their houses and react to them in a positive way.

Inhabitants' participation in the design and construction process provided a unique personal identity to the house. At this point, it is important to indicate that Fathy



Figure 13. New Gournas houses, example of community participation in the design process

believed that the humanistic approach in providing the housing for poor people through community participation is more appropriate than the conventional approach of producing large numbers of houses in a short time by repeating prototypes in rows of houses [18].

6.2.3. Environmental dimension

At the environmental dimension of the sustainability principles and the preservation of resources, Fathy's belief in the need for appropriate technology in architecture distinguished his work from that of the modern movement. For Fathy, technology must be applied in a way appropriate to both its users and its context, and be controlled by what he described as the "innate knowledge" that comes directly from the emotions without study or analysis. His approach to technology was closely related to the Greek meaning of the root of that word, *techne*, which stands for skill or craft, rather than the blind application of science [19]. Fathy believes that it is unavoidable for poor and developing societies to use the compatible and appropriate building technology. This technology relies on local building materials and local craftsmanship. In the meantime it addresses all the functional and environmental human needs without relying on imported western techniques.

To support his philosophy Fathy carried out valuable researches and studies on sustainability. He gave a great interest to the study of local building materials. He studied the specifications of clay and the structural capabilities of clay brick to utilize it in building domes and vaults wherever this material is available. In addition, he was interested in climatic research to demonstrate empirically the appropriateness of thick mud brick walls, vaults and domes for the hot arid climate. He also carried out researches and studies on organizing and activating the people's participation in the building process [20].

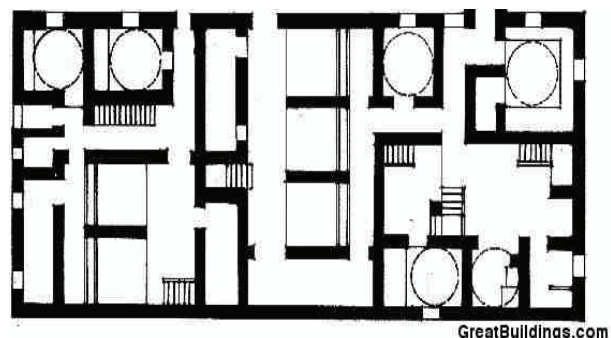


Figure 14. Ground floor plan of New Gournas housing unit

According to Hassan Fathy; "*any architect who makes a solar furnace of his building and compensates for this by installing a huge cooling machine is approaching the problem inappropriately*" [21]. Fathy indicates that successful solutions to the problem of climate did not result from deliberate scientific reasoning. They grew out of countless experiments and accidents and the experience of generations of builders who continued to use what worked and rejected what did not. They were passed on in the form of traditional, rigid, and apparently arbitrary rules for selecting sites, orienting the building and choosing the materials, building method and design. Table 1 illustrates sustainable solutions in Fathy's work that address environmental issues.

The concern for the cultural sustainability, continuity of space characteristics, use of local materials and proper responses to nature can be seen in the previous examples of Fathy's work. New Gurna Village is a new reinterpretation of a traditional urban and architectural setting. It provides sustainability both in culture through use of local materials and techniques and in environment with its extraordinary sensitivity to climatic problems. It is an outstanding example of the integration of vernacular technology with modern architectural principles. Fathy brought back the use of mud brick (adobe) and with special techniques keep building cooler during the day and warmer during the night [22]. Fathy believed that architecture was about bridging the gap between new architectural techniques and older techniques. These older techniques are sustainable and energy efficient helping the villagers to reduce their reliance on modern technologies, which are not only expensive, but have negative effects on their culture and environment [23]. Table 2 illustrates the integration of cultural dimensions with sustainability principles in Fathy's work.


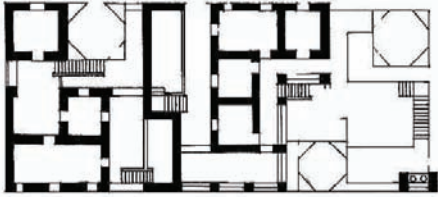




7. Conclusion

Based on the carried out analysis of examples of Hassan Fathy's work, and discussion of his thought and principles, we built a framework for a paradigm that engages culture and local identity in dealing with sustainable architecture in the Arab world. Arab architects and architects from other regions can utilize this paradigm while dealing with the issue of sustainable architecture in order to achieve the synthesis of culture and sustainability in their designs. This paradigm reflects the following principles: respecting cultural values and traditions and reflecting economic, social, and environmental dimensions. Graphic 1 illustrates the framework of the proposed sustainable architecture paradigm.

References


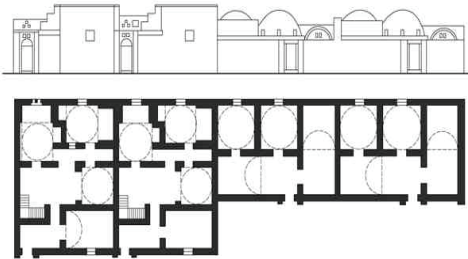




- [1] Downs, Robert B., Famous American Books, Mac Graw-Hill, 1973.
- [2] Toffler, Alvin, The Culture Consumers, Random House, New York, 1973.
- [3] Downs, Robert, op. cit.
- [4] Izkowitz, K.G. and Sorensen, P., The House in East and South East Asia. Curzon Press, London, 1982.
- [5] Edgar, Goell and Lahham, Nisreen, A Future Vision for Sustainable Egyptian Cities, Lessons Learned from the International Experience, in Architecture ... Urbanism & Time, Vision for the Future, proceedings of ARUP 2008, second international conference, Ain Shams University, Cairo, Egypt, October 2008.
- [6] Tyrrell, Roger, Culture, Climate & Place: a Cultural Perspective of Sustainable Architecture, a paper in Medio Ambiente Comportamiento Humano, 4 (2), 2003.
- [7] Vale, Brenda and Robert, Green Architecture: Design for a Sustainable Future, Thames and Hudson, London, 1991.
- [8] Matsumoto, D.R. and Juang, L., Culture and Psychology, Wadsworth Publishing, San Francisco, 2003.
- [9] Guy, S. and Farmer, G., Reinterpreting Sustainable Architecture: The Place of Technology, Journal of Architectural Education, Vol. 54, 2001, issue No. 3, pp 140-148.
- [10] Kultur, Sinem, Role of Culture in Sustainable Architecture, Archi-Cultural Translations through the Silk Road, proceedings of 2nd International Conference Mukogawa Women's Univ., Japan, July 14-16, 2012.
- [11] Steele, James, An Architecture for People: the Complete Works of Hassan Fathy, Thames and Hudson Ltd, London, 1997.
- [12] Ibid.
- [13] Fathy, Hassan, Egypt, Nou Veau Village de Gourna, L' Architecture d' Aujourd' hui, volume 39,1968, issue no. 140, pp 12-13.
- [14] Steele, James, The Hassan Fathy Collection, The Aga Khan Trust for Culture, Geneva, Swtzerland, 1989.
- [15] Ibrahim, Abdelbaki, The Arab Architects: Hassan Fathy, Centre for Planning and Architectural Studies, Cairo, Egypt, 1987.

Table 1. Addressing environmental issues through sustainable solutions in Fathy's architecture

Environmental issues	Sustainable solutions	Examples
- <i>Regulating the heat temperature</i>	the concept of courtyard with water features and plants, using thick walls externally, and using the local building materials.	 <p data-bbox="1007 591 1385 618">Courtyard of New Gurna mosque</p>
- <i>Noise insulation</i>	using double and thick walls, internal courtyards, roof gardens, and skylight all attain the desirable noise insulation in his works.	 <p data-bbox="1007 869 1385 898">Thick walls of New Gurna houses</p>
- <i>Providing homogenous day lighting</i>	this was achieved through utilizing internal courtyards and small openings covered by mashrabiya (wooden lattice screen) on the external facades.	 <p data-bbox="1043 1155 1348 1182">Mashrabiya in Nassif house</p>
- <i>Protecting the building from dusts and insects</i>	by utilizing the concept of courtyard and bent entrance (for dust) and wire mesh on the small openings and wind catcher openings.	 <p data-bbox="1027 1451 1362 1480">Bent entrance in Murad house</p>
- <i>Protecting the building from sun heat</i>	the building roof as a roof garden, domes and vaults as a roofing systems, exposed masses in the form of corbel, courtyard, arcades, and mashrabiya.	 <p data-bbox="967 1738 1430 1765">Vaults and shallow domes in Baris market</p>
- Natural ventilation	Utilizing wind catchers, mashrabiya and small openings in the external facades and respecting the orientation of the prevailing wind.	 <p data-bbox="1035 2018 1358 2042">Wind catcher in Nassif house</p>

- [16] Mortada, Hisham, Contemporary Architecture of Desert Sustainable Living: The American Southwest as a Case Study, proceedings of the International Conference: Urban Development in Arid Regions & Associated Problems, Ministry of Public Works & Housing, Riyadh, Saudi Arabia, 11/2002.
- [17] Fathy, Hassan, Architecture for the Poor, University of Chicago Press, Chicago, 1973.
- [18] Ibrahim, Abdelbaki, op. cit.
- [19] Steele, James (1997), op. cit.
- [20] Ibrahim, Abdelbaki, op. cit.
- [21] Fathy, Hassan, Natural Energy and Vernacular Architecture: Principles and Examples with Reference to the Hot Arid Climate, University of Chicago Press, Chicago, 1986.
- [22] Schoeman, A., Hassan Fathy: An Early Visionary of Sustainable Architecture, <http://www.theinnovationdiaries.com/2613/> (20.03.2012).
- [23] UNESCO WHC, Safeguarding Project of Hassan Fathy's New Gournaa Village, <http://whc.unesco.org/en/activities/637/> (20.03.2012).

Table 2. Integrating cultural dimensions with sustainability principles in Fathy's work

Building	Cultural dimensions	Sustainability principles
New Gournaa house		
	Courtyard as a place for social interaction	Domes protect the building from sun heat
Fouad Riad house		
	Small openings in facades to ensure privacy	Using stone as a local building material
Nassif house		
	using mashrabiya as a heritable element	Skylight to provide natural day lighting

Graphic 1. Framework of sustainable architecture paradigm

