FULL LENGTH ARTICLE

The impact of sustainability trends on housing design identity of Arab cities

Tarek Abdelsalam [a,*], **Ghada Mohamed Rihan** [b]

[a] *Dept. of Architecture, University of Modern Sciences & Arts (MSA), 6th of October City, Egypt*
[b] *Dept. of Architecture, Helwan University, Cairo, Egypt*

Abstract   Previous researches and investigations on the area of green cities and sustainable architecture lack the study and analysis of the impact of sustainability principles applications on the city image. At this point, a critical question is raised; to what extent the architectural identity of the city could be influenced by the adoption of the different sustainability trends? This question represents the main research question that the paper will address. The adopted sustainability trends vary in their forms and contents. Some trends employed sustainability principles inspired from the vernacular architecture, which not only give a tested and reliable model, but also enhances socio-cultural and economic values of the local community. Another trends employed sustainability principles that are based on the most modern and advanced technology which expresses the culture of globalization. While a third trend integrates both of the two trends to introduce a contemporary interpretation of the vernacular thought within the framework of modern advancements trying to bridge the gap between the local and the global. From this point of view, this paper focuses on two key issues; firstly: study and analysis of the mentioned sustainability trends in housing design, secondly: assessing and analyzing the impact of these trends on shaping the identity of the Arab city.

Introduction

Planning and designing green cities has been one of the most significant interests for planners and architects. Yet, most of the efforts that were carried out at both the theoretical and practical levels focused on the applications of sustainability principles rather than the impact of such application on the city image and its architectural identity.

The crisis of architectural identity is a global dilemma. This crisis emerged as a result of the phenomenon of globalization.

In this sense, Albrow points out the dilemma that non-western societies face due to the devastated invasion of

* Corresponding author.
E-mail addresses: tareqsalam@hotmail.com (T. Abdelsalam), ghadarehan @yahoo.com (G.M. Rihan).

the western culture to the local societies and its negative impact on local cultures [1]. Roxana Waterson emphasizes the same dilemma as a result of the application of western norms to address the problems of other regions instead of dealing with the local needs [2].

The local–global conflict as a manifestation of high modernity results in transformations in self-identity. This fact is workable in the case of architectural identity. High modernity resulted in great and extensive changes that affected the local societies. These changes are related to the establishment of social connections of very wide scope. Accordingly, localities and state organizations are affected negatively. These changes and impacts are reflected on architecture and resulted in deepening the identity crisis. This discussion emphasizes that the local–global conflict and its consequences, dominance of western thought and high modernity, have the major role in the identity crisis. We can look at Berlin as an example of the identity dilemma in western cities. In his book "Capital Dilemma", Michael Wise indicates that the German Government decision to move its seat from Bonn to Berlin by the year 2000 has set off a remarkable debate concerning the character of the appropriate official architecture to express the national identity of unified Germany [3]. In contemporary Arab architecture, do we face a crisis of identity? The review of thoughts and writings in this context demonstrates that there is an agreement among scholars and theorists regarding the crisis of identity that we have been facing for decades.

Methodology

This research attempts to answer the following key question: to what extent the architectural identity of the Arab city could be influenced by the adoption of the sustainability trends?

To answer the research question, the research methodology will rely on:

- Review of related literature on the concept of sustainable development and green cities ending up with an identification of sustainability principles that influence the emergence of sustainability trends in housing design in the Arab city.
- Documentary analysis of the emerged sustainability trends in the region through analyzing and assessing a number of sustainable projects in the Arab cities to explore the impact of these trends on the architectural identity of the city

Kidentity of Arab city: the current situation

Arab cities have suffered major setbacks since the beginning of the 18th century, and clearly, by early in the last century, these cities have been denied their own identity due to the occupation by other cultures. Arab cities have passed through four phases as follows:

1. Development that resulted from foreign interventions during the 19th century.
2. Development that resulted from technology transfer influenced by industrialization.
3. Development that resulted from the fast rural–urban migration after the 2nd World War.

4. Development that resulted from the sudden inflow of oil wealth during the 1970s.

This brief view helps us in understanding reasons for the historical and cultural detachment that the Arab cities witnessed. This detachment played the major role in leading to the current crisis in Arab architecture.

Many scholars have dealt with the current situation in Arab architecture. Khalid Asfour discusses the impact of inappropriate imported trends. He claims that a process of "cutting and pasting" was introduced as a cultural mechanism. The process involves cutting ideas from its original cultural field, the European, and pasting them with their logic in the new Arabian field [4]. The imported ideas and theories should be revised before employing them in the new context. Not all the good ideas in a specific context are appropriate for a different one, especially if these ideas are related to social, cultural, and climatic considerations as in the case of architectural thought. The essence of the architectural work is the creativity, so the absence of this factor evacuates the architecture of its meaning. Udo Kultermann underlines the phenomenon of copy and paste in Arab architecture as he indicates that the majority of new buildings in the Arab States remain within the vocabulary of western architecture [5].

Sustainability: principles & approaches

The last two decades have brought significant changes to the architectural profession. In the wake of traumatic escalation in energy prices, shortages, blackouts, embargoes, and war, along with heightened concerns over pollution, resource depletion, environmental degradation and climate change, awareness of the environmental impact of our work as building design professionals has dramatically increased [6]. Architects with vision have come to understand that it is no longer the goal of good design to simply create a building that is esthetically pleasing. Buildings of the future must be environmentally responsive as well.

As the case is with most developing countries, contemporary buildings in the Arab cities are not considered as climate-responsive. Excessive use of glass and concrete and heavy reliance on mechanical space conditioning is a common feature. It is imperative that architects in the Arab world start designing climate adaptive, energy efficient buildings. Designing sustainable buildings has become a great challenge that faces architects nowadays. Since the building industry started to move toward the promotion of sustainable building in the late half of the 1980s various techniques and approaches took place by architects worldwide [7].

At this point it is important to indicate that this research will not focus on discussing and analyzing the sustainability concept, as the main concern is to discuss and analyze the emerged sustainability trends in the Arab city at the level of housing design. To do so, we need to explain the main sustainability principles in architecture.

Review of the related literature unfolds that principles of sustainable development have three main dimensions. Firstly; the economic dimension which was based on the principle of increasing the welfare of society through the optimum utilization of natural and human resources. Secondly; the social dimension which refers to the relationship among human

Table 1 main principles of sustainable house design.

Approach	Principles	Means
Active design	Producing energy by using renewable sources	Photovoltaic system, wind turbines, waste recycling, glass technology
Passive design	Reducing energy consumption through building form	Compact layout, passive ventilation and thermal performance

Fig. 1 Features of the modern technology trend in a residential building. www.greendiary.com
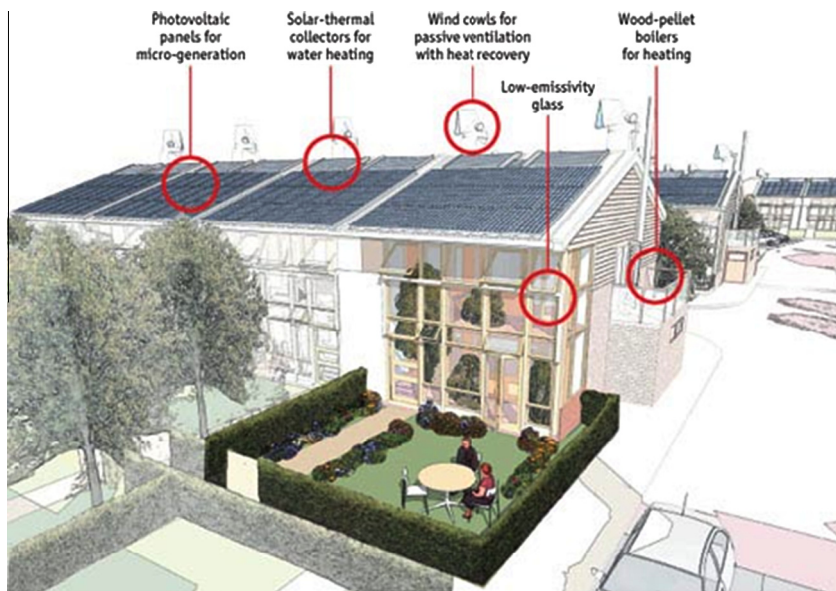

Fig. 2 Features of modern technology trend in a single family unit. www.greendiary.com

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 and their reproduction and advancement [8]. Yet, for the sake of discussing the impact of sustainability trends on the architectural identity and image of the Arab city, we need to focus on principles of sustainable design.

Principles of sustainable house design while serving to attain the comfort and requirements of the building users, work to significantly reduce the building's impact on the environment. These principles focus on the following factors: energy efficiency, daylight strategy, indoor air quality, water systems, and building materials and techniques [9]. These principles are classified through two themes: the first theme indicates design principles that serve the production of the required energy by using renewable energy sources, which is called "active design". These principles reflect the reliance on photovoltaic systems, wind turbines, micro power generation, waste recycling, gray water systems, and glass technology. The second theme indicates design principles that serve to reduce the energy consumption through the building form and elements, which is called "passive design". These principles reflect the reliance on compact layout to reduce heat gain and loss, passive ventilation (wind catcher and courtyard), and passive thermal performance (domes and vaults, double thick walls, and mashrabiya). Table 1 shows principles of sustainable house design.

Sustainability trends in Arab architecture

As a result of the socio-cultural and economical transformations in the Arab world during the last few decades, and the cultural and intellectual openness to the western thought, sustainability became an inevitable trend in the region. In architecture, application of the sustainability principles on contemporary housing designs took different expressions. These expressions produced architectural trends that are different in their forms and characters, while they have the same principles and content. Multiplicity of sustainability trends has a great impact on the architectural identity and image of the Arab city. Accordingly, investigating and analyzing the archi-

tectural reality in the Arab city would be deficient unless these trends are investigated. We need to define these trends, reasons of their emergence, their features, and their impacts on the architectural identity in Arab world. In this research we focus on the following trends: the modern technology, the neo-traditional, and the contemporary interpretation trend.
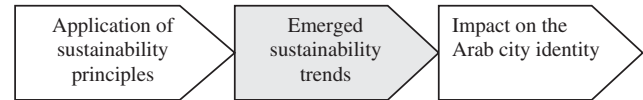
The modern technology trend

The modern technology trend indicates the application of the advanced western technology in dealing with the sustainability principles. The followers of this trend call for the universality of sustainable architecture as a result of their admiration of the global awareness of sustainability. Followers of this trend in the Arab world adopt the most advanced technological solutions in their designs. They used to copy the western technology, and then copy the revised and modified version, and so on without giving appropriate attention to the local conditions. They are just receivers of what the west produces. Dogan Kuban looked at the positive side of this issue and denotes, "*the mass of knowledge which comes from the west can not be ignored, nor its impact be neglected. But this does not mean that we have to be subservient to the bigotry and cliché' of modern jargon*" [10]. The appropriate way to react to the western technology is to examine its advances, filtrate it, and then take what is applicable in terms of its appropriateness for the social and cultural context.

To understand the impact of this trend on contemporary Arab architecture and it features, we need to define reasons of its emergence during the last few decades. The most important reason is the unlimited openness to the west, which the Arab states witnessed. The doors were open in these countries to receive and absorb western thoughts and technology. The good welfare and luxury life that most of the Eastern Arab states witnessed especially the Gulf States, resulted in increasing the admiration of the western civilization and its technology. Most of Arabs believed that adopting the western

بيت حلاوة في العجمي

Fig. 3 Domes and vaults in Halawa house, Egypt. Aga Khan Award [15].

Fig. 4 Traditional wind tower in Gulf states. Steele, James [16].

Fig. 5 The traditional mashrabiya. Steele, James [16].

technology is the perfect evidence of civilization. With the great and rapid cultural and economic transfer that these countries witnessed, there was not enough time to study and analyze, to identify, and define what is suitable and what is not among the numerous contradictions. For many decision makers and professions, the best solution to overcome the problem of time tightness and attain the required developments was to import ready technological solutions. The intellectual vacuity that Arab architecture was suffering from facilitated the dominance of western technology and led to build a fertile land for this trend.

At this point, it is important to indicate that most of the adopted modern technology in the sustainable housing projects in the region is employed at the level of producing the required energy by using renewable energy sources. Features of this trend in the Arab city vary according to the project budget and local context. Yet among these features we can confirm the use of photovoltaic systems as an effective mean for utilizing solar energy which is one of the most significant sources of renewable energy in the region. We cannot also ignore the importance of utilizing wind turbines in residential complexes in some Gulf cities, where the wind speed and direction are appropriate to run energy turbines. Glass technology has become a trend in the region where a high thermal performance glass with photovoltaic system is used to integrate the concept of generating renewable energy with a system of reducing energy consumption. Reliance on modern technology in the sustainable housing is manifested also in the gray water and recycling water systems where the water consumption could

be reduced to an economical level. Figs. 1 and 2 show some of the most common features of the modern technology trend.

Features of the modern technology trend

In residential buildings that adopt the modern technology trend, the integrated photovoltaic roof is commonly used and represents a dominant feature along with wind turbines. Roof greenery, bio-walls and thermal glass panels are significant features of the trend.

In single family units that adopt the trend of modern technology, the most commonly used elements are photovoltaic panels for micro-generation, solar-thermal collectors, wind cowls and low-emissive glass.

The NEO-traditional trend

Before discussing the neo-traditional trend as a sustainability trend, we need to shed some light on this trend in its absolute meaning in architecture. Olfat Hamuda defines authenticity in architecture and denotes "*authenticity in architecture means investigating and studying the architectural values of the past and then take advantage of their lessons without copying the models*" [11]. Hamuda calls for understanding the values of the architectural past rather than copying its elements. At this point, we need to indicate that there are two approaches for the neo-traditional trend. The first approach is based on the absolute adoption of the traditional model without any intervention. The works of Abdelwahed Alwakeel reflect this approach. The second approach relies on researching and studying the architectural legacy and learning from its experiments. The works of Hassan Fathy are a clear manifestation of this approach.
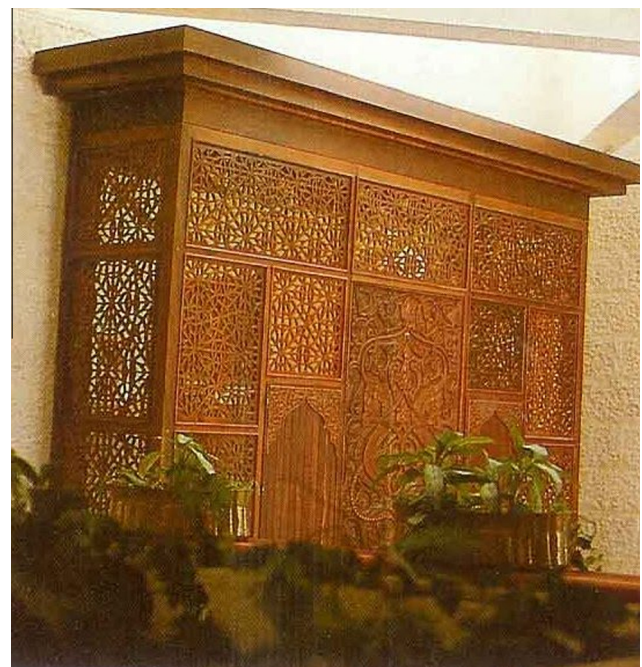

Fig. 6 Traditional mashrabiya, elevation. www.carabfund.org/aohq.com

Fig. 7   Traditional mashrabiya, interior. www.carabfund.org/aohq.com

Fig. 8   Institute Du Monde Arab, Paris. www.campusfranceindiablog.com

Fig. 9   Main elevation of Mashrabiya house, near Jerusalem. www.europaconcorsi.com

For both of the two approaches, the architectural legacy is the main reference for this trend whether it is copied or

Fig. 10   Institute Du Monde Arab, interior. http://www.campusfranceindiablog.com
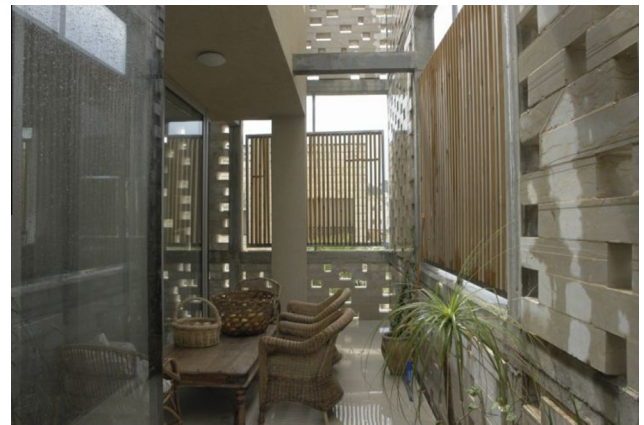
Fig. 11   Interior of Mashrabiya house. www.europaconcorsi.com

researched. This emphasizes the importance of this legacy as a source of inspiration. Charles Jencks denotes to the inevitability of memory and history in the city as positive catalysts for invention [12]. Canizaro defines authentic trend as an attempt to penetrate what is of lasting worth in the present culture and in tradition [13]. In this view, authenticity does not mean the absolute adoption of the traditional model. It includes implications and lessons from the present and the past. This view coincides with the philosophy of Hassan Fathy as indicated before.

Followers of the neo-traditional trend believe that the adoption of this trend leads to address the cultural crisis and the loss of identity. The great international recognition that Hassan Fathy, as a pioneer of this trend, has received during the 1970s and 1980s of the last century encouraged many Arab architects to follow this trend. Although their interpretations of the trend were different compared to the original interpretation by Fathy, but the main principle was fixed, which is taking the lessons from experiments of the past. It is important to denote that Fathy adopted this approach to express the community rather than creating a trend for its own sake. He claims,

"there must be neither fake tradition nor faked modernity, but an architecture that will be the visible and permanent expression of the community" [14].

As a sustainability trend, the neo-traditional trend relies on a passive design process to reduce energy consumption through the building form, technical proficiency in using materials, passive devices and ventilation, and design elements such as courtyard, mashrabiya, and roof systems. Reliance on passive design helps in regulating energy to be more efficient as well as employing ecological design techniques which considers aspects associated with cross ventilation inspired from heritage to be adopted vernacularly and show sustainability. The construction methods with their different forms inspired from the Egyptian heritage dominate an overlap of sustainability images naturally, technically and culturally which have been adopted in vernacular Architecture.

Features of the neo-traditional trend

Domes & vaults which are represented in terms of construction methods used historically, allow more natural ventilation in the higher space. It creates 24 h comfort inside. It also transfers heat more efficiently (Fig. 3).

Wind tower as one of the most significant elements of traditional architecture in the Gulf states gives a good example of the passive ventilation system. It also works as a dominant feature in the sky line of the traditional city image (Fig. 4).

Almashrabiya (carved wooden screen) is an efficient passive design element that controls the passage of air current to reduce temperature. It also reduces the reflected heat and solar radiation and allows air to pass through freely. In addition, it regulates the amount of day lighting passing to the internal spaces (Fig. 5).

Contemporary interpretation trend

This trend represents an attempt to express the traditional approach in a contemporary manner through utilizing the appropriate modern technology. The contemporary interpretation trend is located in the mid way between the neo-traditional and modern technology trends. It seems to be a compromise between the two approaches. Its intentions are the most appropriate for the current dilemma of Arab architecture. Followers of this approach need to understand perfectly the heritable values in traditional architecture as well as the aspects of the modern age with its generalities. Then, they need to recruit these values and elements and fuse them together to create the appropriate regional identity. While in the case of modern technology or neo-traditional trends, the followers used to adopt a ready and examined model without any intervention.

Universal civilization and local peculiarities have equal significance in defining the regional identity. Their impacts on forming this identity are the most important challenge that faces the followers of the contemporary interpretation trend. It means that this trend relies on the advanced generalities in the universal balance and the local or traditional aspects from the ancestors' balance. The architect creates the modern spatial composition, and then fills it with the selected heritable aspects. These heritable aspects become framed by modern compositions and the general image is a blend of modernity and heritable aspects. By this way, the design acquires the peculiarities of the place and the generalities of universal civilization. As this trend is a blend of tradition and modernity, its features are a combination of the features of both the modern technology and neo-traditional trends. However, the features of these examples represent an attempt to respond to local climate and the use of traditional vocabularies and motifs as a reflection of traditional implications on one hand. On the other hand, the modern building materials and techniques are employed within a modern composition as a reflection of the modern implications.

The most obvious feature of this trend in the sustainable housing projects in the region is the re-use of the traditional mashrabiya through a contemporary interpretation of its concept and form. At this point, it is important to denote that almashrabiya is presented through the contemporary sustainable designs at three levels: firstly; it is presented in its original traditional model by utilizing the traditional form, materials, and features. Secondly; its concept is presented through a high tech. solution where the main function is attained by utilizing technological means. Thirdly; a contemporary interpretation of the traditional model is introduced by reliance on new materials, form, and features, while keeping its concept.

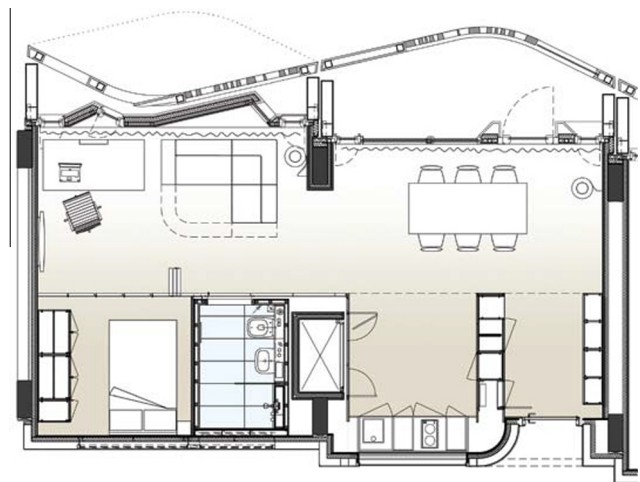**Fig. 12** Elevation of the residential units. www.masdar.ae/

Fig. 13 Plan of the residential unit. www.masdar.ae/

Fig. 14   Wind tower in the housing courtyard. www.masdar.ae/

Almashrabiya concept

Traditional mashrabiya: the original model

(Figs. 6 and 7).

High-tech interpretation of the original model

One side of the building has an intricate geometrical design of
Islamic influence based on mashrabiya made up of panels that
are reactive light screens that control the amount of light.

Each panel has 21 irises which open and close dependent on
sunshine levels, and so the overall design alters depending on
light levels which reflect a high-tech approach (Figs. 8 and 9).

Contemporary expression of the original model

The concept of mashrabiya is employed in this contemporary
house as it is wrapped in a mashrabiya screen.

Stone as a sustainable building material was used in con-
structing the screen, while RC was used as a conventional
material to frame the stone panels (Figs. 10 and 11).

*Sustainable housing in the Arab city: examples and experiments
– Masdar City Institute Housing, UAE: the modern technology
trend*

Considered as the first sustainable city in the region, Masdar
city introduces perfect examples for utilizing the advanced
modern technology in sustainable housing design. The first

Fig. 15   The main housing courtyard. www.masdar.ae/

Fig. 16   Main elevation of Almakkiyah residence. the author

phase of the institute campus has 102 residential apartments
spread between 4 residential blocks. High density low-rise liv-
ing is a major component of this low impact development and
is vital in achieving a balance, socially and economically sus-
tainable campus. The residential concept focuses on the crea-
tion of a lively animated neighborhood (Fig. 12).

Apartments are accessed via a fully shaded atrium space
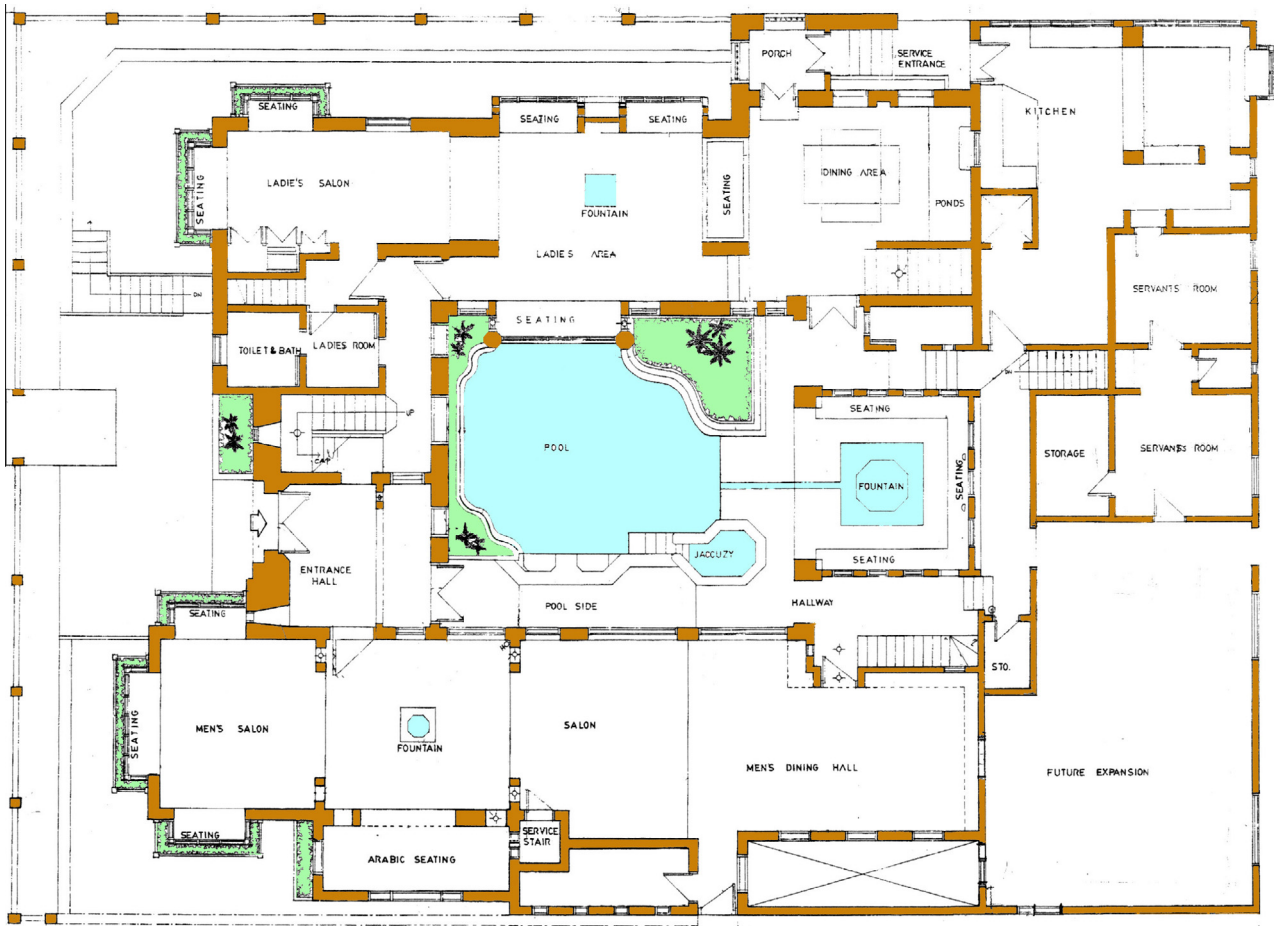that exploits thermal mass and natural ventilation to provide

Fig. 17 Ground floor plan. the owner

Fig. 18 View of the internal courtyard. the author

Fig. 19 The main entrance. the author

Fig. 20 Main elevation of Almashrabiya house. www.greenprop het.com

free cooling – atrium. Roof lights allow diffused daylight, blocking direct sunlight and providing additional roof area for PVs. FSC timber-framed high performance low-e double

glazing system, with openable windows positioned to maximize the effectiveness of natural ventilation. The apartments have screen shield windows and windows located near the ceiling to maximize natural light (Fig. 13).

Features of the modern technology trend are manifested through the spread of photovoltaic panels on the roof of residential blocks, and the wind tower in the housing courtyard, in addition to glass technology introduced in the residential units. The project includes also dedicated potable and recycled water supplies, with separate gray and black water drainage, and latest low-energy lighting specifications (Figs. 14 and 15).

Almakkiyah residence, Jeddah, S. Arabia: the neo-traditional trend

Almakkiyah is not just a residence for an architect who is deeply attracted to the Islamic architectural heritage but more of a unique architectural experiment that reflects the potentials of adopting the neo-traditional trend as a sustainable approach in housing design in the region. The design gave a special interest to the natural ventilation, daylight, internal courtyard, and local building materials. Such interest is reflected through utilizing elements of passive design [17] (Fig. 16).

The two-storey residence is built around a central courtyard and includes a full array of modern facilities that fulfill the

Fig. 21 Ground floor plan. www.greenprophet.com

Fig. 22   Side elevation. www.greenprophet.com

Fig. 24   Residential complex, Doha.

Fig. 23   Interior view. www.greenprophet.com

occupants' expectations of modern comfort. The bedrooms, living and library rooms are stretched along the north façade and are cooled by prevailing winds. The spaces location and their articulation around the courtyard allows cross ventilation thus enhancing the quality of the internal microclimate naturally [18] (Fig. 17).

Fig. 25   Dubai Tower, UAE. www.archicentral.com

Features of the neo-traditional trend and reliance on passive design are manifested in the project through the use of internal courtyard as a climate modifier, and the excessive use of mashrabiya in the external façade as well as the courtyard. The vaulted roof, the building form and the use of local building materials are all features of the trend (Figs. 18 and 19).

Almashrabiya house, Jerusalem: the contemporary interpretation trend

The house, which is located near Jerusalem, beats the heat with traditional Arabic technique. It was designed as a contemporary re-interpretation of traditional elements of Arab vernacular architecture. It provides at the same time new and imaginative solutions for the transforming social and cultural landscape of town on the brink of urbanization. The contemporary house is wrapped in a mashrabiya screen, which keeps the house nice and cool even in scorching hot days (Fig. 20).

The house is a high density low rise residential building of 4 residential floors, each floor comprises three apartments. The apartments are articulated around an open courtyard which enhances the climatic performance of the building although it is opened from two opposite sides. The courtyard covers the main entrance hallway which leads to the central staircase. The house is surrounded by a small garden with elements of hard and soft landscape (Fig. 21).
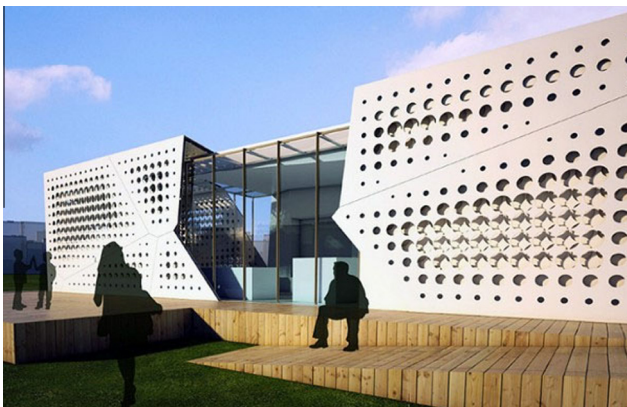

Fig. 26 Slide House proposal. www.archicentral.com

In a dialogue with the natural landscape using classical Muslim elements as well as contemporary technology the house was an interpretation of a ''Mashrabiya'' that shaded the entrance glass wall facing south (Figs. 22 and 23).

Spread of Almashrabiya concept in high-rise residential buildings in the Arab city

Residential complex, Doha

The concept of this project is inspired by traditional courtyard planning, and the facades are designed as a response to the environmental conditions. The facades of the various components are inspired by traditional mashrabiya designs. The facades are designed to handle the transformation of patterns, protection from the sun's rays, and privacy. The concept of mashrabiya is re-interpreted in a contemporary manner through this residential tower to reflect environmental, social, and cultural influences in the heart of Doha city (Fig. 24).

Dubai Tower, UAE

This office, retail, and residential building is an attempt to balance three major factors: to reflect Arabic culture and Islamic vernacular architecture; to create a building with multiple functions in a contemporary way, and to give an intelligent response to hot humid climate. As a response to the first and third factors it adapts the vernacular mashrabiya screen and incorporates the principle of having controlled openings and internal squares that maximize benefit from day lighting without being subject to the sun's heat (Fig. 25).

Slide house proposal: Almashrabiya based concept

It is a design proposal by students of the American University in Cairo. The house structure takes the shape of a matchbox, with wall segments that can slide in and out to regulate the amount of solar gain and shade. A double-layered perforated facade fits over the structure, regulating sunlight and resembles a contemporary mashrabiya screen, controlling the amount of light and heat that enters the building (Fig. 26).

Discussion

The previous analysis of the three sustainable trends in the Arab cities reveals that the three trends introduce successful solutions for the sustainability issue in contemporary Arab
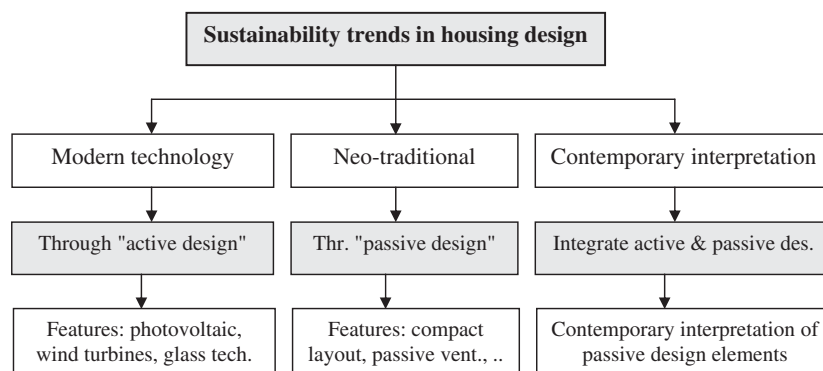

Fig. 27 A structural diagram for sustainability trends in housing design.
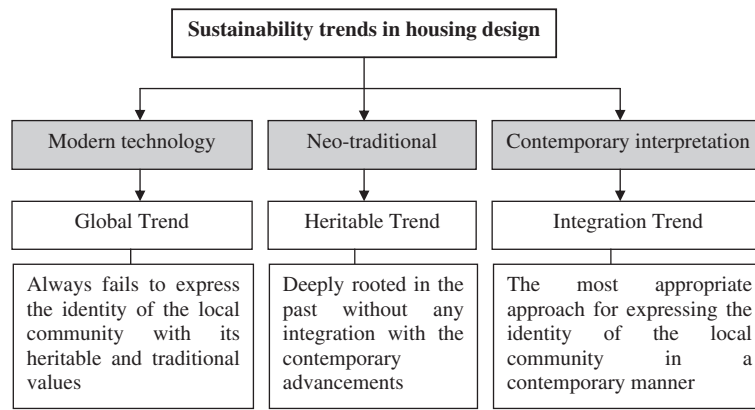
Fig. 28   A structural diagram for the impact of sustainability trends on Arab city identity.

architecture. Yet, at the level of architectural identity and city image, we need to discuss the implications of these trends. Fig. 27 shows a structural diagram for the analyzed sustainability trends in housing design.

The modern technology trend, which is distinguished by utilizing the advanced modern technology in producing a sustainable building, is a global trend [19]. It could be applied with the same principles and features everywhere and attain the same success at the environmental level. But this trend always fails to express the identity of the local community with its heritable values. The neo-traditional trend, which relies on the absolute adoption of the traditional and vernacular solutions in addressing the sustainability issue, reflects a heritable trend. Although this trend introduces a distinctive local identity, yet it is deeply rooted in the past and linked to the heritable elements without any integration with the contemporary advancements. At this point, it is important to denote that most of the applications of this trend took place in a low-rise single family houses which is not the common demand of the Arab cities.

The contemporary interpretation trend which introduces a successful approach for the marriage of traditional Arabic building practices and modern technologies represents an integrated trend. In producing a sustainable design, this trend takes the advantages of latest advancements and fuses them within the framework of heritable elements. Accordingly, this trend introduces the most appropriate approach for the contemporary local identity. The concept of mashrabiya, which is discussed in this research through a number of projects in the region, is a perfect example of the creative reinterpretation of the traditional and vernacular elements. It is important to indicate that the concept of contemporary mashrabiya is an appropriate solution for high-rise residential buildings in the Arab cities where a high density built form is needed. Fig. 28 shows a structural diagram that summarizes the impact of the sustainability trends on Arab city identity.

Conclusion

The research discussed the identification of sustainability principles that influence the emergence of sustainability trends in housing design in the Arab city through analyzing a number of sustainable projects in the Arab cities to explore the impact of these trends on the architectural identity of the city. The main findings of this paper could be drawn at three levels: The three emerged sustainable trends in the Arab cities introduce appropriate approaches for dealing with the issue of sustainability at the housing design level, Both the modern technology and neo-traditional trend are inappropriate to express the contemporary identity of the local community in the region and the contemporary interpretation trend is the most appropriate sustainability trend for expressing the identity of the local community in a contemporary manner.

References

[1] Martin Albrow, The Global Age: State and Society Beyond Modernity, Stanford University Press, Stanford, CA, 1997.
[2] Roxana Waterson, The Living House: Anthropology of Architecture in South-East Asia, Oxford University Press, Indiana University, 1990.
[3] Michael Z. Wise, Capital Dilemma, Germany's Search for New Architecture of Democracy, Princeton Architecture Press, New York, 1998.
[4] Khaled Asfour, Cultural crisis: cut and paste leads to disaster in the Middle East, The Architectural Review (1213) (1998) 3.
[5] Udo. Kultermann, Contemporary Architecture in the Arab States: Renaissance of a Region, McGraw-Hill, New York and London, 1999.
[6] Strong, Steven and Ingemann, Hugo. Solar Electric Building, Photovoltaic: Ideal Solution for a Sustainable Future, in Architecture +, Vol. 03, 2003.
[7] Richard Levine, Michael Hughes, Sustainability Over Time: the New Imperative for Future Urban Development, in Architecture Urbanism & Time, Vision for the Future, proceedings of ARUP 2008, second international conference, Ain Shams University, Cairo, 2008.
[8] Goell Edgar, Nisreen Lahham, 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, 2008.
[9] Edgar, Goell. Becoming Sustainable: Suggestions for Local Sustainability Initiatives. Thesis; Federal Education and Networking Congress for Local Sustainability Initiatives, Federal Ministry for the Environment, Berlin; 2007.
[10] Kuban, Dogan. Modern versus Traditional: A False, Conflict, Mimar, issue no. 9, 1983.
[11] Olfat. Hamuda, Architectural Character Between Authenticity and Modernism, Al-Dar Al-Masriah Al-Lubnaniah, Cairo, 1987.

[12] C. Jencks, Propositions of Post-Modern Architecture, in: C. Jencks, Karl Kropf (Eds.), Theories and Manifestoes of Contemporary Architecture, Academy Editions, London, 1996, pp. 131–132.

[13] Vincent. Canizaro, Architectural Regionalism: Collected Writings on Place, Identity, Modernity and tradition, New York, 2007.

[14] Hassan Fathy, Architecture for the Poor, University of Chicago Press, 1973.

[15] Agha Khan Award for Architecture, Architecture in Continuity, Aperture, New York, 1985.

[16] Steele James, The Architecture of Rasem Badran, Narratives on People and Place, London, 2005.

[17] Abdelsalam, Tarek. Unity in Architectural Composition and Language, Almakkiya Residence, in, Architecture + Vol. 2 Oct. 2002.

[18] Tarek Abdelsalam, Courtyard Housing in Saudi Arabia: in Search of Contemporary Typology, in: B. Edwards, M. Sibley, P. Land (Eds.), Courtyard Housing: Past, Present & Future, Taylor & Francis, London, 2006.

[19] Peter. Smith, Architecture in a Climate of Change, a Guide to Sustainable Design, Architectural Press, Elsevier, Oxford, 2005.