Self-sufficiency and its role in the sustainability of exhibition buildings

Zainab Saad Mahdi
Engineering Construction office, Baghdad, Iraq.
E-mail: zaineb_saad92@yahoo.com

Abstract. The exhibition buildings are characterized by a great functional importance due to the profitable results they obtain through marketing, cultural exchanges, and other activities. Through the increase in competition, which accompanied by promotional and innovative methods to achieve greater revenue, it was found that the exhibition design began to be affected architecturally. Many attempts were made to reduce the consumption and operational cost of the exhibition, and environmental impacts to create an interactive environment through advanced technologies as an advanced method of presentation. As a result of sustainable exhibitions, the previous knowledge touched on the dimensions of sustainability and how to achieve them for the self-sufficiency of the exhibition buildings, nonetheless, the insufficiency of comprehensive knowledge emerged about the relationship of the concept of self-sufficiency with the sustainability of the exhibition buildings, so the research problem focused on "the need to clarify the role of self-sufficiency in achieving sustainability within the exhibition buildings", and focuses on the goal of searching to clarify that relationship, which requires a three-stage approach. The first is to build a theoretical framework on the concept of self-sufficiency and its indicators within the exhibition buildings and explore the dimensions and concepts of sustainability associated with self-sufficiency, including (off-grid building, pre-manufacturing, interactive technologies and virtual reality, etc.). The second examines the vocabulary extracted within selected samples of sustainable exhibitions, to be a third discussion the findings and conclusions that enhance the theoretical framework for the concept of self-sufficiency.

1. Introduction:
Exhibitions are considered buildings that perform a very important job. They are necessary to interfere with different fields. Exhibitions deal with very diverse exhibits, and they are mostly buildings with an economic investment goal that achieves the principles of sustainability and makes the building self-sufficient in several aspects. The buildings of the exhibitions appear in two categories according to its relationship with the site, so they include both fixed exhibitions and temporary exhibitions on site. The research deals with the study of exhibition buildings in terms of the extent to which they achieve. The concept of self-sufficiency is in achieving the buildings of sustainable exhibitions. The research begins by studying the main concepts within the first axis and then mentioning the proposals that addressed sustainability in the exhibition buildings to arrive at the text of the research problem; Then form a theoretical framework through the proposals that have been addressed. Then measure the possible values...
by selecting samples from the exhibition buildings, after which a set of results, conclusions and recommendations can be reached.

2. The first axis (basic concepts in research)

2.1 The concept of sustainability:
Linguistically defined sustainability: The source of sustainability, the sustainability of the well-being: its perpetuity, its continuation (the glossary of all meanings), which is the use of a resource in a way that does not lead to the exhaustion or destruction of the resource [1], non-damage to the environment or long-term damage to the environment [2].
The concept of sustainability in architecture: "As an architect, you are designing the present, knowing the past, for a fundamentally unknown future," says British architect (Norman Foster). This is done through sustainable architecture that deals with the use of environmentally conscious design techniques in the field of architecture.
Designing buildings in an environmentally friendly manner taking into consideration reducing energy consumption, materials and resources and reducing the effects of construction and use on the environment, in addition to achieving harmony with nature. Simply, the idea of sustainability is to ensure that our activities and decisions do not prevent opportunities for future generations.

2.2 Exhibition concept:
Linguistically defined as the place where the commodity models are displayed. [3] and its various types are considered one of the effective communication channels in transferring knowledge and displaying skills to unlimited groups of people with different types of them, whether they are farmers, makers, artists, teachers or students.
And it differs in that it is fixed or mobile, for the fixed exhibition goes to the pioneers from every direction to see it where it is located, while the mobile exhibition works to deliver the exhibits to the audience where it was found. [4]
The concept of sustainability was defined in terms of language and terminology and in the field of architecture. Also, the exhibition was defined linguistically and its types including the (fixed) and (mobile) exhibition . In the following paragraph, the previous knowledge that spoke about sustainability in the exhibition buildings is covered and reached to the research problem.

3. The second axis

3.1 Previous studies that dealt with the concept of sustainability in exhibition buildings with the aim of arriving at the research problem:
This paragraph aims to extract the research problem by analyzing a set of studies that touched on the concept of sustainability and its application in the exhibition buildings, to reveal the knowledge gap, and therefore the following studies can be addressed:

3.1.1 Al-Kinani Study 2015:
The study examined the concept of sustainability in the buildings of exhibitions. In particular the "International Expo" exhibitions, which constitute one of the largest international activities in terms of economic and cultural impact. It also attracts millions of visitors from different countries, so it was necessary to observe the principles of sustainable design. And from here, one of these exhibitions, which is the Milano Gallery was studied in Italy where the general site was studied. The distribution of green areas and water surfaces, energy generation and waste disposal. In addition to a study of the project’s legacy and how to achieve the maximum benefit from the project after its completion. The research concluded that the exhibition is a clear example to take into account the principles of sustainability In its
planning and design of its various elements. Also to find renewable energy sources such as the use of solar panels on the roofs of some buildings and others. Thus, the study emphasized the sustainability of the site through the distribution of green areas and water bodies and the improvement of energy use through the production of energy that the project needed by solar cells. As well as water conservation through the re-use of gray water for irrigation of green spaces and the sustainability of materials through recycling of building materials for the project [5].

The importance of the study is highlighted by emphasizing the principles of environmental sustainability in the exhibition buildings as important buildings that attract large numbers of visitors, the design must take into account the dimensions of sustainability and the principles of green architecture to make the building achieve its designed function from its solution.

3.1.2 Muhammad Ali Study 2015:
The study dealt with the dimensions of sustainability and the aim of framing the scientific applications of sustainable design in architecture. Also seeking to find clear scenarios for practical applications of sustainable design in Arab architecture. It addressed the issue of sustainability within the exhibition buildings that focused on the idea of sustainable development. It also focused on aspects of reconciliation between economic performance and social responsibility with the behaviors of conserving different resources and the possibility Recycling construction materials and adopting renewable energies. As a study emphasized on other aspects than the environment, and highlight the issue of conflicts between the dominant productive cultures and the consuming culture; it encourages Exhibitions that support sustainability. It is an idea of offering local solutions to global problems and is an opportunity to revive local cultures by encouraging developing countries to participate in exhibitions and provide new knowledge additions and a return to the cultural heritage with a modern template.[6]

The importance of the study is highlighted by emphasizing the economic dimension of the sustainability of the exhibition and the social dimension, which transcends the building to be environmentally friendly only, but also includes the quality of the exhibits and exhibits that support the cultural and social aspects of the exhibition.

3.1.3 Karl Abeyasekera & Geoff Matthews 2007 study:
The study aims to increase the knowledge of exhibition designers, and enables designers to make decisions, taking into consideration their environmental consequences and how to reduce the harmful environmental impact. In general, the study focuses on highlighting the problems that must be taken into account during exhibition design. The initial research of the study showed that information about sustainable practice in designing exhibitions is rare. The study also showed the principles of sustainable design through, Reducing resource consumption and pollution. The sustainable strategies mainly relate to one or both principles, and to reduce resource consumption through the recycling and the use of renewable raw materials and products derived from them. It is a strategy to reduce resource consumption as well as considering energy as a resource that can be derived from biomass or solar energy, wind, waves and others, for pollution and reducing its impact. It reduces the production of pollutants in the power generation and use industries, and manufacturing industry, services, waste management and choosing the type of materials that do not emit harmful gases during burning or mound. Which means that the study confirmed the self-sufficiency property and its importance in the design of the exhibition sustainable. It also helps designers to adopt sustainable practices throughout the design process and in every aspect of the exhibition design by specifying the selected materials; and how they can be obtained and manufactured. It also helps how to build a gallery, and how they can be used and disposed of. also helps to know the type of energy used in the exhibition ... etc., which achieves a sustainable exhibition.[7]

The importance of the study is highlighted by what I mentioned about two main principles within the strategy of achieving building sustainability, which is reducing both the consumption of pedestrians and
the harmful environmental impact. The study also mentioned the characteristic of (self-sufficiency) and its importance in achieving sustainability in buildings in general and exhibitions in particular.

After analyzing and critiquing the previous knowledge and clarifying the most important of what each study focused on and its main concepts such as self-sufficiency, sustainability and its environmental, social and economic dimensions, renewable energies and others, and after identifying the importance of sustainability in the exhibition buildings and its dimensions in the application; the research problem was identified through research In sustainability within the exhibition buildings and how to achieve them. Thus the text of the research problem is, "The knowledge needs to clarify the role of self-sufficiency in achieving sustainability within the exhibition buildings."

3.2 Vocabulary of theoretical framework

In the second part of this axis, the theoretical framework is built around the concept of self-sufficiency of exhibition buildings, and achieving the dimensions of sustainability in them.

3.2.1 The concept of self-sufficiency:

(Sufficiency) defines the source (sufficiency) as dispensing, and being satisfied with something, dispensing it with others. (Glossary of meanings combined), which is dependence on internal resources and capabilities, and is defined economically by the state dispensing its production from importing from others, which is for the country to live in self-sufficiency with a system of self-sufficiency [8]

It is defined as: the ability of an organism to cope with its problems exclusively by itself. In the economic field, it means the policy pursued by a country with the aim of achieving its sufficiency by relying only on its own resources. Self-sufficiency may be natural, as in some regions that live on the products they produce themselves without dealing with the outside world. Or self-sufficiency may be economic when there are geographical areas that are valid in nature to be economic sufficiency zones, and without the connection with the outside world [9].

According to what was mentioned, Self-sufficiency can generally be defined as the ability of an object to meet its needs through its own resources.

In architecture: The self-contained building is a building designed to be an independent operator in terms of infrastructure in providing services such as electrical energy, etc., as well as sewage treatment, the communication network and in some cases public roads and corridors. Those who advocate self-sufficient construction describe its positives as including reducing environmental impact, increasing safety, and lowering the cost of ownership [10].

3.2.2 The relationship between self-sufficiency and sustainability in architecture (exhibition buildings):

The concept of sustainable architecture is one of the concepts that have been widely circulated due to the energy crises that affected human life. As an architecture constitutes, it is one of the most important fields that contribute to energy depletion, which has resulted in a great interest in methods and strategies for rationalizing energy consumption, researching the possibility of generating it by adopting renewable energy sources. According to [11] about the advantages of sustainable architecture which provides the needs of its users with energy and satisfaction and increase their productivity in addition to maintaining health and satisfying the spiritual needs [12] added to this energy efficiency and adoption of environmentally friendly materials and waste recycling, which makes waste. The building is self-reliant in operation, i.e. (a self-contained building), as BARTON defines the principles of sustainable urban planning through several aspects, including the importance of achieving self-sufficiency as a principle that achieves sustainable architecture in its various dimensions. [13]. Through what has been proposed about the definitions of self-sufficiency, it was found that the concept of self-sufficiency is the ability to manage the building in terms of operational energy inputs and its generation in addition to controlling the
building's outputs of waste, sewage and gray water recycling, etc. It stems as one of the manifestations of sustainable development, because the ultimate development goal is to achieve the adequacy of the building to achieve its long-term sustainability.

**Figure 1.** illustrates the hypothetical conception of the concepts related to the self-sufficiency of the exhibition buildings (the researcher).

### 3.3 Extracting the vocabulary of the theoretical framework from previous studies:

**Table 1.** The vocabulary of the theoretical framework (the researcher).

| code | Self-sufficiency in sustainable exhibition buildings | Secondary words | The main word |
|------|-----------------------------------------------------|-----------------|---------------|
|      | Possible values                                     |                 |               |
| X1   | solar energy                                        | Self generation of operational capacities | Building economic performance during and (before works) |
|      | Wind power (turbines)                              | Of the building Renewable (energies) (Self-sufficiency) |
|      | Biomass energy                                     |                 |               |
|      | Water power                                        |                 |               |
| X2   | Reducing the environmental impact (environmentally friendly materials) | Self-cleaning systems for building output | Building economic performance during and (before works) |
|      | Waste disposal systems                             |                 |               |
|      | recycling Gray water                              |                 |               |
| X3   | Pre-fabrication and unit system                    | Strategies to reduce losses during design and the ability to transfer to another location | Achieve social interactivity |
|      | Sustainable planning of the exhibition site        |                 |               |
| X4   | Virtual reality technologies                       | Effective display methods | Achieve social interactivity |
|      | Blend natural viewing environments (3D stereoscopic images) |                 |               |
| X5   | Temporary exhibitions on site (high building utilization rate (and interaction with multiple groups) |                 |               |
| X6 | Temporary exhibitions on site (high building utilization rate (and interaction with multiple groups) |
|----|-----------------------------------------------------------------------------------------------|
| X7 | Add the plant element inside to purify the atmosphere Psychological user comfort Enhance the quality of the (indoor environment) |

### 4. The third axis:

#### 4.1 Practical study

This paragraph consists of several axes:

#### 4.1.1 Determine the measured vocabulary:

All secondary vocabulary for the self-sufficiency item was chosen for the purpose of applying it to the samples selected from the sustainable exhibition buildings.

#### 4.1.2 Sample identification:

Three projects were selected for exhibitions that support sustainability in order to measure the extent to which they achieve the concept of self-sufficiency.

#### 4.1.3 Determine the measurement method and method:

The research adopted the comparative analytical descriptive measurement based on the analysis of a set of selected samples and the measurement of verification or non-verification of each of the values for the theoretical framework vocabulary for each sample. The following is a description of each of the samples selected for measurement:

#### 4.1.3.1 The first project: Expo Milan - International exhibition in Milan - Italy:

A global exhibition was held in the city of Milan in 2015 on an area of 1.1 km2 entitled (feeding the planet with energy for life). 145 countries participated in the exhibition and visited 5.21 million visitors. The theme of the exhibition is evident in the exhibition planning by choosing a structure of wood and steel, with a height of 37 meters, in the form of a tree that grows (the tree of life) in one of the main entrance to the exhibition as a symbol of the exhibition. (National Institute of Building Sciences) . Also, the Zero Pavilion booth, located on an area of 7500 m², which contributed to immersing visitors in the main exhibition topic and its sub-themes through establishments that narrate the history of humankind's relationship to food by analogous to the natural size of livestock and architectural tools used over the period of time. The Biological Diversity Garden “built on an area of 14,000m² is one of the places that contribute to communicating the exhibition theme to visitors of all ages by providing a comfortable walkway between gardens and agricultural nurseries. (bie-paris.org) The exhibition also surrounds a water channel with a length of 5,4 km and a width of 5,4 m in its narrowest width and with a depth ranging from 30 to 70 cm . With a green belt of trees to define the exhibition visually, in order to reduce pollution and noise. [14] . Green spaces and open spaces accounted for 45% of the exhibition area, which are public parks and a green belt. Open spaces such as the Lake Arena, the Mediterranean hill, the Italy square and the children's garden. Thus, we find that the exhibition planning took into account the principles of sustainable planning through open spaces, green spaces and water channels, which achieved an acceptable percentage of the total project area. Also, choosing to put a water channel surrounding the exhibition floor was not only a design idea for functional and aesthetic goals only, but was set within a sustainable plan For the development of the waterways project, the Expo exhibition was linked to the Filursi Channel, thus feeding the exhibition with a renewable water source, in order to achieve sustainability. [15].
Figure 2. shows the different uses of the exhibition and the ratio of each of them [16].

The exhibition designers have worked to find alternative energy sources and implement sustainability in the energy used for the exhibition, whether during the construction of the exhibition or during the period of its operation through renewable energy sources such as the use of solar panels on the roofs of some buildings, as well as finding waste management systems by turning them into compost and recycling water. Gray and filter the used water and filter it for re-use for a variety of purposes [17].

Figure 3. diagram showing gray water recycling, waste, and water filtering techniques.
As for the interior design related to the display style, a series of interactive elements and methods were used in the display through virtual world techniques and blending natural worlds in the show by adding a natural environment inside the exhibition. As in the Ecuador Pavilion, which adds a sensory experience where visitors can feel and perceive a culture and the country’s traditions through three-dimensional images that combine nature, technology, reality and virtual worlds. The main feature of this pavilion is that visitors can feel the display through holograms and with a system of scents and technological elements that allow for a sense of biodiversity. [18]

![Figure 4. Various interactive interiors of Expo Milano](image)

![Figure 5. Method of dealing with waste at the Milan Expo.](image)
As for waste management and recycling, the authority established to create the exhibition provided guidelines for the participants in the exhibition in the form of reports on the sustainability of the project to work to avoid waste and preserve the environment and try to find design and implementation solutions to reuse as much of the building components after the completion From the exhibition and removal of buildings. The analysis below shows the ideal method for waste minimization [19]

4.1.3.2 The second project: Taiwan Tower - Finland Pavilion 2010 at Expo Finland Pavilion

The location of the building and the perimeter affected the formation of the building through the use of treatments in the facade that suit the surrounding environment and the adoption of the main lighting from the Atrium that mediates the exhibition pavilion. Solar panels were also used on the roof to generate electricity for power supply for cooling in the summer and greening the surface. Environmentally friendly building materials were chosen to reduce CO2 emissions and natural ventilation was adopted to reduce the need for mechanical ventilation, as well as using the white color of the building body to reflect sunlight and reduce Temperature, using a thin layer of water to cool the air flow around the wing, Design thinking is linked between the design philosophy and the principles of sustainable development, where design provides a vision of a better life for humanity, through six pillars which are freedom, creativity, innovation, group spirit, health and nature, where the pavilion was designed to express Finland as a small city that tells the stories of Finnish society and how to build it For better cities according to the principles of sustainable development that combines creativity, high technology and culture.

From this point of view, the wing was distinguished by the free form, without symmetry. The pavilion was designed as an island surrounded by water that visitors reach by a bridge to achieve the idea of a quiet life away from the city's crowd, and its surface is covered with panels resembling fish scales and a small entrance and shade, and an internal hall that opens towards the sky. The interior is like a light and one of the natural lighting means. The entire wing is also designed by a computer, using the latest 3D modeling techniques to design the structural structure, and the materials are reused and recycled for the entire life cycle of the building. it used strips of paper and plastic that could be recycled and attached to a scales or peel of fish for ease of disassembly and installation, which could be transparent when necessary to create small windows and allow light to enter the wing. The central cavity helps draw air through the spaces to cool visitors. [20]
Nature and especially the local natural environment provide inspiration for all wing shapes: strong sunlight that creates bright light and planning to guide visitors on a path to discover the place, such as the path that travels between several solitary islands in the Gulf of Helsinki.

The unity of these blank white spaces indefinitely contrasts with the high-tech content that companies have brought to the pavilion: The exhibition area on three levels represents an interactive path in which screens interact with visitors by displaying images and videos that illustrate scenarios of lifestyles that will be possible in the future near thanks to the technologies now available to the community [21]

4.1.3.3 The third project 2001 Eden Project

The Eden Project is a good example of borrowing the nature of ideas from biology, which can make a huge increase in the effectiveness of using resources by offering the same efficiency and consuming less amounts of resources. Which is a huge industrial environmental complex from places that welcome hundreds of thousands of visitors every year. Not only to see the extent of the beauty distinguished by the gardens and varieties offered to visitors from different plants, but also to enjoy the view of the art gallery, as various exhibition events are held under the domes of the building, as well as activities such as skiing with a series of popular concerts called sessions and Aden sessions. This complex is made up of several domes, each of which dominates a specific biological environment that contains many different varieties of plants for different parts of the world. These domes are made up of hundreds of hexagonal parts with some five-pointed parts. These domes are made of plastic (ETFE), which is the first material that dominates the tropical environment. The project is located in the city of Cornwall. It is an advanced technology that shows the areas that will benefit most from the solar crop. The Eden Project uses several sustainable strategies such as the use of a rainwater harvesting system and wind turbines to generate electric power. The project does not need to use a large amount of water to maintain that many conscious plants live there, where a rainwater purification system is used and a heating system in each bubble as a way to "properly organize" the natural self-system. Also, rain water is recycled for moisture and even groundwater is transferred to a positive source, as it has been distributed within the water network for irrigation purposes from high-cohesion polymers [22].

Figure 7. the exterior and interior design of Eden Project [23]
4.1.4 Search hypothesis test:

The research hypothesis states: (The exhibition buildings are buildings that are self-sufficient in environmental, economic and social terms, according to their functional nature, which requires them to be economic and investment, and because they are often temporary in the location that they are built on). Of the projects, a form was implemented to test whether or not the vocabulary of the theoretical framework was verified on the samples sampled with (1) meaning verified and (0) unverified meaning to find out the values that are taken into account when designing the exhibition. As in Table (2).

Table 2. represents the achieved ratios of the possible values for the theoretical framework (researcher)

| Variable code | Sum of the values in percentage | The third project | The second project | The first project |
|---------------|---------------------------------|-------------------|--------------------|------------------|
| X1-1          | 100%                            | 1                 | 1                  | 1                |
| X1-2          | 33.3%                           | 1                 | 0                  | 0                |
| X1-3          | 0%                              | 0                 | 0                  | 0                |
| X1-4          | 100%                            | 1                 | 1                  | 1                |
| X2-1          | 33.3%                           | 0                 | 0                  | 1                |
| X2-2          | 66.6%                           | 1                 | 0                  | 1                |
| X3-1          | 100%                            | 1                 | 1                  | 1                |
| X3-2          | 100%                            | 1                 | 1                  | 1                |
| X3-3          | 100%                            | 1                 | 1                  | 1                |
| X4-1          | 100%                            | 1                 | 1                  | 1                |
| X4-2          | 66.6%                           | 0                 | 1                  | 1                |
| X5            | 100%                            | 1                 | 1                  | 1                |
| X6            | 66.6%                           | 1                 | 0                  | 1                |

4.1.5 Analysis of results

Through Table (2) to test the verification of the variables within the elected projects, a set of results for the self-sufficiency item was reached. As the percentage was divided by the number of samples, so each realized variable represents 33.3% and 0% when it is not achieved, according to what. After applying the measurement, we find that (8) of the variables out of (14) variables for the individual self-sufficiency in the exhibit evidence have been achieved at a complete rate (100%) and (3) variables have achieved an average rate of (66.6%) and thus we find that a large number of the vocabulary that was derived from the term self-sufficiency was achieved in the exhibition buildings and produced sustainable exhibitions as close to the integrator, as it was found that the self-generation of operational capabilities achieved a high rate in the design within the elected projects as well, in terms of economic performance achieved a single environmental impact reduction a complete percentage of the elected projects which indicates the adoption of environmentally friendly materials, also the pre-manufacturing strategies and the unit system achieved a (100%) for the elected projects. This supports the economy of the building by reducing losses and the possibility of recycling the use of the building and its materials, as well as with regard to social interaction, which achieved a high rate through the use of exhibitions of effective display techniques and virtual reality, as well as blending natural environments embodied in the Arab Z, and this achieves the research hypothesis, as the job for which the exhibitions are designed makes them self-sufficient and often temporary in the site, their need to be linked to the site's supplies and services is reduced and that they are investment and promotional projects that are sought to reduce operational and other costs and raise the desired profits and achieve the primary goal of the offer.
4.1.6 Conclusions:
A set of conclusions were reached through project criticism and through the results obtained:
The role of self-sufficiency within the concept of sustainability is achieved by achieving a sustainable building with economic, environmental and social dimensions, as follows:

- Within the economic dimension: The exhibition buildings include profitable promotional goals, so there is a great importance for the exhibition to be economically sufficient, through adopting self-contained systems to get rid of the building’s outputs by reducing the environmental impact through environment friendly materials, as well as adopting systems to dispose of waste and use them as fertilizers and others. One of the treatments and the adoption of gray water recycling techniques for reuse in a variety of uses. In addition, since most of the exhibitions are temporary on site and transferred to different locations, we find them that depend on pre-industrialization strategies.

- Within the environmental dimension: The exhibition buildings take into account in their design the approval of self-generation of operational capacities so that the building is not restricted to a specific location as well as reduce the operating costs of the exhibition and the adoption of renewable resources (solar energy, wind energy, water energy).

- Within the social dimension: The social interaction is achieved by finding effective methods of presentation that make the exhibition achieve social interaction through them such as virtual reality techniques and mixing natural environments for the display such as stereoscopic images. We also find that the exhibition in general and according to its function encourages social interaction and exchange of cultures and interaction with different groups And multiple sites. There is also a group of treatments that enhance the interactive atmosphere and encourage staying to watch the exhibits as long as possible, by adding a plant element to purify the atmosphere and enhancing the quality of the internal environment.

Thus, we find that the self-sufficiency of the exhibition buildings within the social, environmental and economic dimension achieves a sustainable building that meets the functional need in an integrated manner.

5. Recommendations:
- The research recommends the importance of adopting the self-sufficiency feature to make the exhibition building come close to being completely self-sufficient, as it is one of the projects that are often temporary on site and may be constructed in any region according to the event or event, so it is necessary that the exhibition not bound by network supplies and other energies that limits the freedom to construct the exhibition in various locations.

- The research recommends the importance and necessity of adopting local and environmentally friendly materials that make the building perform its function of displaying the lowest emissions and is compatible with the natural environment and reducing waste as well as recycling of wastewater for the maximum economic benefit of the building.

- The research recommends the importance of effective display style using advanced technical methods such as virtual reality techniques and three-dimensional embodiment, etc., so that the exhibition is renewed in the display style and achieves social interaction by relying on its display techniques.

References
[1] merriam-webster
[2] www.dictionary.com
[3] Glossary of Inclusive meanings
[4] Abdul Rahman, Adel. 2002 Exhibitions of Art Education: Types - the foundations of their establishment - their educational role." Cairo: Al-Taqwa Press.

[5] Al-Kanani, Hassan Abdullah 2015 Monitoring the applications of sustainability in planning international expo exhibitions, case study of the Milan Expo, College of Architecture and Planning - King Saud University - Saudi Arabia.

[6] Muhammad Ali Masoud Naeem 2015 Sustainable Design from Theory to Practice, Sana'a University, Faculty of Engineering, Department of Architecture, Yemen, Sanaa.

[7] Karl Abeyasekera & Geoff Matthews 2007 Sustainable exhibit design Guidelines for designers of small scale interactive and travelling exhibits.

[8] ontology.birzeit.edu

[9] Arab Encyclopedia, Edition: The Syrian Arab Republic, Damascus, Volume Three "Legal and Economic Sciences" p 102.

[10] Vale, Brenda and Robert 2000 The New Autonomous House. London.

[11] coldhamarch.coldham,b. 2001 what is green arch " www.coldhamarch.com/green/what.html . last visit at 22-9-2008.

[12] Abda, Safaa Mahmoud Issa 2005 Legislation and sustainable architecture, the most important pillars of an attractive environment for people in desert cities, Menoufia University, Egypt. 

[13] Bushandy, Souad Younes Hassanein 2005 Entrance to sustainable urban design and the formation of urban societies in the desert", a study of traditional oasis societies - the Western Desert of Egypt

[14] www.expmuseum.com/ Accessed Jan 2018

[15] www.expo2015.org.

[16] www.archdaily.com/40816/finland-pavillion-for-shanghai-world-expo-2010

[17] www.sustainableideas.it/ Accessed Aug 2017.

[18] www.digitalavmagazine.com

[19] blog.urbanfile.org/ Accessed Jan 2017

[20] Environmental Report, Expo 2010 Shanghai China", Bureau of Shanghai World Expo Coordination, Shanghai Environmental Protection Bureau, (2009), p.84.

[21] www.floornature.com/finnish-pavilion-at-expo-shanghai-2010-5329/

[22] www.almrsal.com

[23] www.edenproject.com