METHODS OF ADAPTIVE REUSE IN ALEXANDRIA'S BUILDINGS WITH HERITAGE VALUES

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Abstract

Due to the rapid progress in the digital technology, using 3D modelling and augmented reality in architecture, now we can transform, create qualitative and sustainable changes in the interior architecture of our architectural heritage, to achieve sustainable cities, this study of the interior architectural solutions developed between architectural heritage, digital registration processes, and parametric construction and fabrication systems. Also using of Information Systems in recording and documenting buildings and archaeological areas.

It helps in designing through computer systems "Virtual Reality" to determine methods of conservation and dealing with archaeological areas and buildings. Using information networks to exchange information globally and locally on urban heritage and methods of preserving and dealing with it this progress in the digital technologies, minimize the construction, adaptive reuse and conservation costs.

This study describes the different ways and benefits of using the digital technology, which can tailor materials, styles and functions into bespoke building components with a new notion of materiality, style and function in interior architectural transformation projects of buildings with heritage values. The study addresses the adaptive reuse of interior architecture of our architectural heritage through the latest digital technology methods in treatment of the architectural heritage while maintaining the relationship between the technical value of old and modern.

1. INTRODUCTION

Building with heritage values significance embody particular values and feelings, because of the way they express times of power and prosperity of because of the way they are invested with religious, spiritual and emotional values. The interest exhibited by different ways to preserve these valuable symbols and to keep them vivid in people's memory. Building with heritage values endow the cities in which they are found with great importance, thus leading to strengthening ties between each generation and its historical roots, and deepening feelings of authenticity and belonging.

In the stories of the early civilizations ever since the time of the Ancient Egyptians to the times of the Assyrians, Persians, Greeks and Romans through medieval European and Islamic countries, and reaching the modern era, there were unchanging facts, that told the story of man over different ages, and showed his way of life and culture.

One of these fiats is manifested in the art of architecture, which has always been an authentic and accurate portrayal of human civilization and development.

Human civilization and architecture ran parallel to one another in a harmonious evolution, without missing any of their distinctive features. Architecture has always been characterized by two inseparable features: Besides the concrete presence that derived from construction materials and methods, there is always the sensuous, contents of the building, which is a technical feature for the building in a particular manner and means of expression.

Since the area of the Mediterranean basin in particular had always witnessed different civilizations, and accordingly it contains a wide variety of those buildings that are liable to be rehabilitated and reused, whether for touristic, cultural, social or economic purposes – it becomes worthy of serious study, in an attempt to reveal the obstacles and problems that these buildings encounter. Coastal towns in general, and Alexandria in particular, are rich in those buildings.

Alexandria in particular had been frequented and inhabited by different nationalities and cultures that stayed in it for several years. Alexandria both influenced and was influenced by these foreign communities such as the Greek community, which was one of the largest communities in Alexandria, the Swiss, Italian, Armenian and English communities the latter was via British colonialism as well as the Turkish, and French communities, among many others. Each of these communities had its own unique and distinctive style in internal and external architecture. All those cultures had their impact on the design of Alexandria's buildings. As a result, there emerged districts and neighborhoods with different styles. For example, the Turkish neighborhoods, which include the Bahari area. One of the oldest in Alexandria, and the European neighborhoods, which is comprised of El Mansheya, and Ramleh station among many others. (http://awad-associates.com/)

The Main Problem Issued that:

Most of the Alexandria's buildings with heritage values underwent many modifications that negatively influenced them, leading to destroying them, as a result of vast spaces and high buildings, they were randomly used as shops, which led to losing the main purpose behind their construction, and to be fully aware of their design and distinctive existence in those buildings. hence, using digital technologies in adaptive reuse of interior architecture in Alexandria's buildings with heritage values.

The Objective this paper presents different ways of using digital technologies for the adaptive reuse of interior spaces of heritage buildings and also local and international examples through:

1 - Retain the old interface with changing function.
2 - Mixing modern materials with old materials of the main building.
3 - Mixing modern styles with old styles of the main building.

2. ADAPTIVE REUSE

Due to changes in demography, industry and production methods, many local communities are challenged. Protecting the heritage of our increasingly ageing building stock is becoming more important but difficult, particularly as citizens look for ways to minimize their impact on scarce resources and fragile environments in the context of impending climate change. Adaptive reuse is an efficient way to reuse existing buildings that have become obsolete by 'recycling' them in-situ through giving them a new functional purpose.

Buildings of local cultural importance are abandoned as a result of changes in production methods within agriculture and industry (Hansen, 2013). The architectural heritage is often an important carrier of identity, especially in rural areas that have developed around a monoculture and where the economy is based on one primary activity, such as fishing industry, trade, mining or a fabrication of a specific product type (Proshanky, 1983).

Heritage buildings in such communities are decaying and being demolished in favor of new buildings that are more functional. This means that a loss of identity and history takes place. To counteract this mechanism, we suggest adaptive reuse of these historic buildings. Often, restoration of these functionally obsolete buildings is relatively costly, and a key challenge is to find methods that economically can compete with demolishment of the architectural heritage and subsequent realization of new buildings using industrialized building methods.

In this paper the adaptive reuse of interior spaces in heritage buildings can take place through different methods as below also this study will show local and international examples for these methods of the adaptive reuse of interior spaces of heritage buildings:

1- Retain the old interface with changing function.
2- Mixing modern materials with old materials of the main building.
3 - Mixing modern styles with old styles of the main building.

Also, working strategies in the field of preservation and conservation of antiquities are determined either through international conventions UNESCO in accordance with international standards set by UNESCO or through the publications of the ICOMOS Center issued by the International Council of Archeology and Agreements issued by the International Center for Heritage (ICCROM) for the preservation of cultural property where it was developed The global definitions of methods of preserving cultural property (WHC) and the international standards for each of them will show some of the obvious criteria as follows: (Zorek Thoraya, 2006).

1. **Structure criteria:** The Style of the building, the height of the neighbor's building compared with the historical building height and the width of the street, Architectural elements, Commercial use, Distortion by electrical wires.
2. **Material criteria:** The painting material, the material used for the shop's facade in the building.
3. **Color criteria:** Painting the facades or part of it, the colors of the shops facades in the building.
4. **Signage criteria:** Style, material, height and prominence of billboards and banners.

3. TRESPASSING ON BUILDINGS WITH HERITAGE VALUES IN ALEXANDRIA

- **Structure criteria**

Fig.1: Trespassing structure criteria by heights, commercial use and electrical wires.
Reference: Photographed by the author.

- **Material criteria**

Fig.2: Trespassing material criteria by using materials, not consistent with the old building.
Reference: Photographed by the author.

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- **Color criteria**

Fig.3: Trespassing the color criteria by painting the facades and the ornaments.
Reference: Photographed by the author.

- **Signage criteria**

Fig.4: Trespassing the signage criteria by using Style, material, height and prominence
of billboards and banners not consistent with the old building.
Reference: Photographed by the author.

4. PRESERVING HERITAGE THROUGH INFORMATION SYSTEM

In the past, information was rigid and arranged in ways that are difficult to modify or alter, but thanks to advanced information systems, information has become part that can be grouped in different ways to give complete images and different concepts depending on need.

It is necessary to reconsider how to use the information age and the use of information systems to preserve heritage. Some useful suggestions in this field are:

1. Use of Information Systems to record and document buildings and archaeological areas.
2. The use of design and computer systems "Virtual Reality" in determining methods of conservation and dealing with archaeological areas and buildings.
3. Using information networks to exchange information globally and locally on urban heritage and methods of preserving and dealing with it. (www.elservier.com\locate\autcon).

5. CLASSIC BUILDINGS ARE USUALLY TARGETED BY 3D ENGINEERING

The current time is witnessing very rapid progress in obtaining digital photos, as in computer systems and modeling and multimedia with many benefits of the powerful graphics that have created new methods for spatial digital documentation. There are some three-dimensional functions with respect to digital modeling and it is a new term in the field of architecture, interior architecture, engineering and information because the three-dimensional engineering CAAD that can be considered as an approach for living historical systems and documents (meta data or metadata).

These extensions are introduced through the digital documentation of the tangible and intangible heritage and the definition is defined as a procedure of digital documents on the basis of metric and non-metric modeling (qualitative data) and three-dimensional and semantic information.

- These extended digital documents are a comprehensive set of traditional architectural and simple digital documents.
- Digital documentation is defined as a systematic structure for metadata on intangible aspects such as history, anthropology, economics, religion, sociology, psychology, etc. to obtain such a vast amount of different data, that must be worked on to collect them.
- The great development in vocational education and training in the areas of computer sensing and modeling allows the acquisition of digital data and the design of subsystems in integrated digital drawing stations and computer subsystems.
- In this field, the goal lies in documenting education and making data acquisition easier and faster to create three engineering and semantic dimensions while allowing visualization of architectural processing as an easy way.
- So this method should be able to obtain images as well as data operations with a large level of operation and pass the results to useful structures through modeling. This can be achieved using sensors and semi-automatic or automatic measurement techniques. (www.elservier.com\locate\autcon)

6. LEARNING REQUIREMENTS

The basic learning requirements for extending and expanding e-learning are related to the digital documents of 3D model as follows:

- The ability to identify potential problems during the modeling process and suggest alternatives.
- The ability to continue the efforts of students in understanding complex historical structures through three-dimensional models
- The ability to maintain the architectural approach test in coloring, installation, lighting and presenting 3D models of interior spaces in historical buildings.
- The ability to understand behavior emerging from complex structures by following the structure and knowledge of behavior and separate subsystems.
- The ability to determine objective levels in the metadata function as in the methodology for documenting living historical systems (hierarchy of modeling records).
- Designing the proposed digital documentation methodology for e-learning functions while examining the results of statistical analysis through CAAD e-learning courses and the VR lab research project.

7. HIERARCHY OF HISTORICAL DATA RECORDS (METADATA FUNCTIONS)

After defining the meta requirements, the hierarchy of historical data records is defined in several levels of abstraction, the primitive level where the data is obtained on the site, so that they are complete and original,not derived and must be specifically described or classified in the way that they can be used by new methods for possible future analysis and modeling.

The second level where the records are drawn directly from the primary ones. In digital documentation, this data is necessary as a first stage in the modeling procedure. It can be in the form of numerical data resulting from mathematical transformations of primary data, in form and structure through graphical elements.

8. 3D PROCESSING STEPS USING DIGITAL ARCHITECTURAL IMAGING TECHNOLOGY
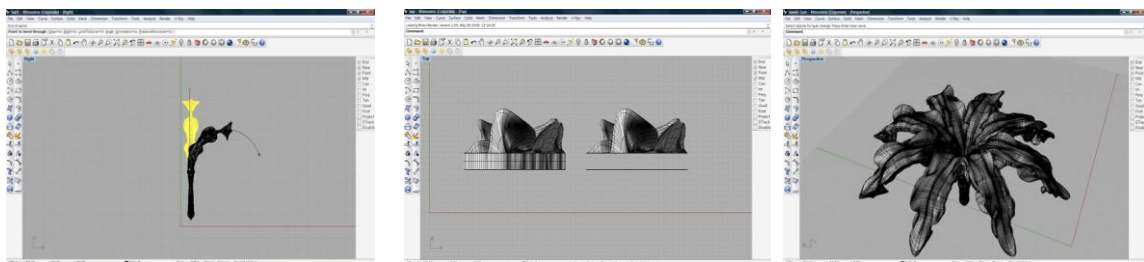
First: Designing

Fig.5: Shape design by using modern computer software.
Reference: http://ar3dprinter.com/3dprinting/

Second: Converting the design into a code that the printer understands (G Code).
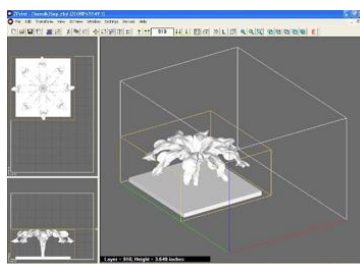
Fig.6: Transform the design to a code that is understood by the printer.
Reference: http://ar3dprinter.com/3dprinting/

Third: equipping the printer and downloading the G code to the printer

Fig.7: Heat the printer to insert the raw material (Filament threads) and load the G-code and
upload it to the memory card.
Reference: http://ar3dprinter.com/3dprinting/

Fourth: The printing process itself

Fig.8: Cleaning and extracting shapes.
Reference: http://ar3dprinter.com/3dprinting/

Fifth: Finishing the printing

Fig.9: Portable laser scanner.

9. LASER SCANNER IS AN URGENT NECESSITY FOR URBAN HERITAGE PRESERVATION WORK

Globally and in recent years, Laser Scanning technology has been employed in documenting architectural and urban heritage in a broad manner for the purpose of creating high-resolution 3D Models.

The points resulting from the work by the laser scanner is an important and basic type of information source required for urban documentation with rich and dense data, in addition to the feature of the speed of technology in collecting information and its accuracy in the final results. (http://www.bonah.org/)

10. LASER SCANNER IS URGENT FOR RECREATING MISSING ELEMENTS

It is also possible to perform a stereoscopic reproduction process identical to that of real objects, or the process of recreating missing or damaged pieces of historical building elements (such as an arc or historical column, for example) through the use of laser scanning and with the help of 3D modeling techniques and devices or 3D printing. Which adopts the mechanism of extrusion of foam or plastic material in the space of the device to form the reproduced element, which facilitates its wide use in multiple conditions, especially with valuable, sensitive or delicate heritage items. (http://www.bonah.org/)

Fig.10: urban heritage preservation work.

The International Augmented Med (I AM) in Bibliotheca Alexandrina

Augmented Reality means overlaying virtual, digital elements on reality. It refers to the innovative multimedia techniques that make reality interact with digital constructions and reconstructions, thus modifying, enhancing and enriching the perception.

Its uses for cultural and natural heritage are numerous, ranging from educational and informative applications by overlapping virtual images and information onto reality, to simulation of virtual reality elements, to artistic applications that are implemented through performances, video projections and installations.

One of the most famous European Union projects with the collaboration of seven countries in the Mediterranean was named as "Seven I AM Pilot Projects":

Egypt: The Library of Alexandria, reconstructed in 1995 as a modern monument representing tangible and intangible heritage, will be the location of a video mapping performance. The tangible and intangible heritage aspects will be reflected in the contents of the 3D video projection performance.

Italy: Archeological site at villages of San Imbenia and Flumenelongu in the Natural Park of Porto Conto in Sardinia, including the Protected Marine Area of Capo Caccia-Isola Piana. Video projections, 3D reconstructions and AR installations and interactive media will develop a virtual itinerary based on the relationship between sea and land, and the different phases of the Phoenician era.

Jordan: Dar-es-Saraya, a historical building that is currently serving as a museum, in the Irbid region. A 3D model of the historic building and Augmented Reality products of a number of selected exhibits of the Museum.

Lebanon: Jbeil old city (Byblos). As UNESCO World Heritage recognized it to be highly important but not very visible to the visitor as so little remains. A 3D archaeological reconstruction model will be developed to assist in visualisation and understanding.

Palestine: Video projection performances on El Khadr (Saint George Church), a Greek-Orthodox church in Al Taybeh. The contents may be historical, cultural, artistic, with large visual impact. In addition, the possibilities for an Augmented Reality book related to the site are being studied.

Spain: Greco-Roman archaeological site at Empuries in Catalonia. An application for mobile phones on the contents of the archaeological site will be developed and combined with video mapping on the cultural and natural environment.

Tunisia: Development of a virtual museum, showing the visitor through the landscapes of the Cap Bon region (citrus production, wine growing), accompanied by interactive installations located on the territory, such as animations, films, and "augmented reality" interaction with webcam.

The New Library of Alexandria, the Bibliotheca Alexandrina, is dedicated to recapture the spirit of openness and scholarship of the original Bibliotheca Alexandrina. It is much more than a library. It contains a library that can hold millions of books, an Internet archive, nine Specialized Libraries and four Museums, a planetarium and ten academic research centers, in addition to fifteen Permanent Exhibitions, four art galleries for temporary exhibitions and a Conference Center. Today, this vast cultural complex is receiving about 1.5 million visitors per year.

The New Library of Alexandria is located within the city center of the city. It overlooks the historic Eastern Harbor, where remains of underwater archaeology dating back to the times of Cleopatra exists. The Library of Alexandria is a cultural center, a major tourist destination and a landmark of Alexandria. The theme of the projection will be the history of Alexandria from its establishment until the end of the Classical period, with special focus on main attractions of the city and its historical milestones. (Alex Med)

Fig.11: The International Augmented Med, Video mapping for the ancient Alexandria
on the Bibliotheca Alexandria's Façade.
Reference: Photographed by the author April 2014

11. ARCHITECTURAL REUSE OR ADAPTIVE REUSE

The process of re-employment or adaptive reuse can be defined as the set of processes that employ a new type of use for an old building or site other than the one for which it was designed for the purpose of prolonging its career by adapting its performance to contemporary job needs. The process of adapting a new and specific type of use for a historical building includes a set of criteria and principles to be taken into consideration that contribute efficiently in determining the best type of use for such buildings, which requires not to negatively affect the architectural and heritage value of the building and its interior spaces, also works to ensure the permanence and continuity of its performance and functional life for the longest period possible parallel to its physical life.

It is necessary to adopt criteria that positively affect the efficiency and appropriateness of the new use of the interior spaces in the historical building and its various values, which can be employed in protecting and preserving the heritage buildings and the urban environment of the centers of ancient and sustainable cities.

The benefits of re-employing historical buildings, are many. In re-employing the building and using it again, that's a guarantee of its continuity. When there are people occupying the building, they will work on maintaining continuously, especially if an economic benefit is used for the purpose of renting, such as leasing to cultural associations or using as a house or museum etc. The continuity of the historical building, brings many benefits such as:

1. Social benefits: People and cities maintain their identity and social bonds, while keeping pace with the times.
2. Cultural benefits: It preserves art, architecture, and antiquities, and this benefit may be very important when talking about conflict on the ground, so each of the contestants seeks to prove that he is right to refer to historical material evidence.
3. Economic benefits: Reusing the existing building is more economical than demolishing and rebuilding, and the costs associated with clearing debris, establishing new health services and facilities, and consuming energy and building materials.
4. Environmental benefits: Old buildings are more compatible with the environment. Traditional materials that were built from them, such as clay, lime, stone and natural construction, are natural materials that do not cause harm to the environment and their preparation does not cause pollution, except for the fact that the internal environment is more suitable for human needs than in concrete buildings. The traditional thermal and acoustic structural elements and constructions, unlike modern buildings that lack all of this. (http://www.arch-news.net)

12. STAGES OF RE-EMPLOYMENT OF HISTORICAL BUILDINGS

The process of re-employing the building passes through several main stages, starting with studying, gathering information, and ending with drawing up plans and implementation. These stages are not separate but are inter-related and interrelated with each other - and can be summarized as follows:

1. Collecting information from historical and architectural documents, from history books, government records, any pictures or plans available about the building and what was transferred to know the value of the historical building.
2. Evaluation of the current construction status of the building, with accurate description of the weaknesses in the building materials, such as cracks, damage, and others.
3. Evaluate the architectural and symbolic condition of the building: strengths, weaknesses, elements that give the building a historical value, the stages the building has gone through, additions and missing elements, the original building's function and other functions that passed through it.
4. Develop the proposed re-employment scheme, taking into account the local code used in the country or any laws and regulations imposed by the municipality, and review the publications that contain the rules and guidelines for each case. This plan includes the important elements that will be preserved, the additions that distort the building and must be removed, the elements that will be rebuilt, and the interior design, for example, the removal of interior partitions that have been added inside the rooms, or the reconstruction of an internal staircase that has been removed and has special significance etc. Missing spaces are needed, for example: bathroom, toilet, maintenance room.
5. Conducting tests and monitoring results before taking any action, and then executing the plan. (The Old House Web, 2006)

The previous stages are characterized by being variable and no firm foundations can be laid to assess the building's structural, architectural or symbolic condition, but rather it depends primarily on the viewpoint of the relevant team and its previous experiences. However, the re-employment scheme differs from the architectural plan for modern buildings, as it is bound by many international and local directives and laws that ensure that the historical value of the building is not compromised upon re-employment.

What ultimately rules the amount of success or failure of previous re-employment schemes - from the researcher's point of view - is the extent of their ability to provide four basic requirements in the historical building after the completion of the project and are somewhat similar to the requirements that must be met in any project in architecture in the form of: Architectural (Vitruvius) - According to Vitruvius.

1. Preserving the aesthetic and symbolic values: The re-employment scheme must preserve the architectural and symbolic aesthetic values present in the building represented by architectural details, the distribution of spaces, and the general heritage atmosphere.
2. Providing structural strength: With regard to physical strengthening, as well as the durability of the building to the new job, in order to provide a requirement for sustainability in the building, which is a prerequisite for the success of any architectural re-employment project.
3. Choosing a new job and distributing spaces that correspond to the value of the historic building and the modern era in which we live, because the success of the project after the completion of the re-employment is largely dependent on the successful choice of reuse. This will be done by studying the location and social environment of the building while preparing a re-employment plan.
4. Economic feasibility: Today, restoration projects are often linked to the economy, for a successful project is one that provides an employment benefit equivalent to the costs of its adaptive reuse and includes funding for its periodic maintenance. This is achieved through renting the building or using it in the services, tourism and other sectors. (Mohamed Alam Fawzy, 2007)

13. INTERNATIONAL AND LOCAL EXAMPLES FOR ADAPTIVE REUSE

• **Changing the Original Function**
• **Material Mix**
• **Style Mix**

1- Changing the Original Function:

Cathedral of St. John the Baptist in the Dutch City of Zwolle

One of the most beautiful Cathedrals of the 19th century (Dominican Church) designed by the Architects Baldwin & Price 1976 Gothic style and changed the function to Library by bkpunt for Architecture and added 3 levels. (http://www.bkpunt.nl/)

Fig.12: A balanced design relationships that link the ancient design of St. John the Baptist Cathedral in Zwolla, The Netherlands, to the modern design of the new library function.
Reference: http://www.bkpunt.nl/

The Royal Jewelry Museum (Princess Fatma El Zhraa Hedar)

In the era of Khedive Ismail (1863-1879) Zizenia was the most important districts in Alexandria for the princesses' palaces and this palace was designed by Architect Antonio Lasciac, Neo baroque style. (Dr. Ali Raafat, 2016)
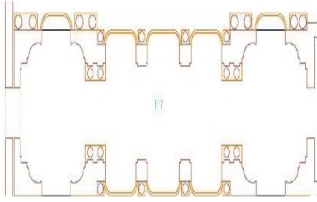

Fig.13: Plan of the corridor on the first floor shows the west wing connection to the east wing.
Reference: Dr. Ali Raafat

Fig.14: Corridor facade after the adaptive reuse.
Reference: Dr. Ali Raafat

Fig.15: Interior space of the corridor after the adaptive reuse.
Reference: Dr. Ali Raafat

2-   Material Mix:
Old Office Building in Boston Transformed into a Grand Multi-Family Residence
CUBE Office Changed the office building to a residential house.
(www.som.com/projects/us_court_of_appeals#sthash.iRhJRG6v.dpuf)

Fig.16: Use modern furniture units and metal windows to enter the light to combine the old and the new in the materials such as the electric fireplace and the ceilings of Gibson board also modern led lighting.
Reference: www.som.com/projects/us_court_of_appeals#sthash.iRhJRG6v.dpuf

Greek Orthodox Patriarchate of Alexandria

The Greek Orthodox Cathedral in Attarin, Alexandria, it was created in 1854 AD on the land donated by Mohamed Ali. Construction of the entire building was completed in 1890 CE and was designed by architect Nicolas Paraskevas. (http://awad-associates.com/)
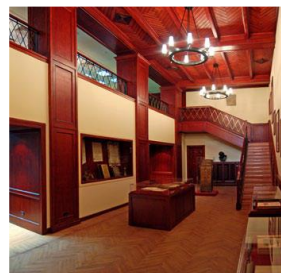

Fig.17: Re-employing the inner space of the cathedral by combining modern suspended ceiling tiles, lighting and air conditioning units, old ones of Cathedral, etc.
Reference: http://awad-associates.com/

3- **Style Mix:**

Le Bon Marché, Paris, France

In 1838 AD, businessman Aristide Boucicaut established Haberdasher's Shop within a group of his commercial projects, which later turned to the first department store Le Bon Marché in 1852 AD and it was re-employed by combining different styles (Style Mix). (www.som.com/projects/us_court_of_appeals#sthash.iRhJRG6v.dpuf)

Fig.18: Design of the Le Bon Marché building after being re-employed by combining its architectural style with modern materials in the sign, lighting units and neo baroque of the building. Reference: www.som.com/projects/us_court_of_appeals#sthash.iRhJRG6v.dpuf

Alexandria National Museum

The museum building is a former palace of one of the wealthy timber merchants in the city and it is the "Asaad Basile", he constructed the palace on the Italian architecture style affected by the eclectic direction and the sold the palace to the American embassy by 53 thousand Egyptian pounds, and then it bought by the Supreme Council of Egyptian Antiquities by 12 million Egyptian pounds, Which in turn changed it into a city national museum.(http://www.alexandria.gov.eg/services/tourism/alextourism/museums/alexmusuem.html)

Fig.19: The palace was re-employed to become a museum by merging old style of the palace with modern designs for the units of the museum which is different from the palace classical design also the use of flying metal vitrines and lighting system.
Reference:
http://www.alexandria.gov.eg/services/tourism/alextourism/museums/alexmusuem.html

14. CONCLUSIONS

The existence of heritage buildings gives their cities special value, documenting generations' relevance to their historical roots and deepening a sense of authenticity and belonging. Especially the city of Alexandria which has acquired the status of cosmopolitism.

- The continuous technological development in the field of architecture and interior architecture and the emergence of modern materials of a special character, color and texture and their lack of optimal use have led to the encroachment of many heritage buildings and the destruction of the heritage character.
- The change in environmental, social and material conditions has led to a change in requirements, resulting in the encroachment of many heritage buildings.
- The lack of awareness and ignorance of heritage values and heritage preservation laws has led to the destruction of heritage.
- There is no doubt that innovation and creation in interior architecture is the reality of the scientific study of how to use the detailed, collected and varied parts, to give a complete new picture in its entirety.

- The interior architecture plays the main role in achieving the actual function of each unit of the building also the composition fits any renewed needs, and these needs branch to the suitability of interior architecture for several external and internal factors:
  - The surrounding environment and the area and whether it is urban, mountainous or coastal, i.e. the surrounding exterior should be the first source of inspiration for the designer.
  - The nature, character and style of the building, because the design of the interior spaces depends on whether the designs are all included, such as a hotel or museum, or are limited to a unit of the building such as a residential apartment or a shop.
  - Digital technology showing the dimensions of the place, openings, entrances, exits, traffic routes and internal divisions. And how to exploit it all to achieve the purpose of the place. As well as how to coordinate furniture and accessories, and to take into account the spaces and spaces occupied by these pieces and how to use them perfectly.
  - The nature of the material used in the interior spaces, where the material varies in the strength of stress.
  - We must also realize that each era has a special style of life, customs and traditions formed under the circumstances and resulted from all the forces and influences, making the whole era common general features and the modern era represents the infinite variations of these influences.

Therefore, beauty arises from the realization of the unity between the material and the forms of aesthetics it imposes aware and the realization of the functional needs of interior architecture, studying modern solutions and design treatments for the adaptive reuse of heritage buildings:

- Keep the old interface as the function changes (Changing the Original Function).
- Combining modern materials with the spirit of place (Material Mix).
- Apply the latest methods of design in old buildings by combining modern designs and the historical style of the building. (Style Mix).

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