Rehabilitation of historical buildings
“Evaluation of policies and project outcomes in the Middle East: the case of Egypt”

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Abstract

Arab Countries, which compose the majority of the Middle Eastern countries, faced an essential challenge since they started to lose their local and national identity under the pressure of advanced construction technology and economics. Urban patterns for many countries have been reformed in the last twenty years, gaining what can be named “the global identity” erasing any special character of the cities. Dubai, Beirut, and Cairo are very clear examples of Middle Eastern cities which have lost their local identity. Scholars in the region have been called to maintain the presence of local identity of national culture by the conservation of cultural heritage. They want to build bridges with the past to preserve the especial character of these cities in the age of globalization. Hence, Conservation of historical buildings has become one of the targets of the national security of many developing countries.

Rehabilitation projects, for instance, are usually considered as transplant surgeries, which need a high level of accuracy, well planned, completed studies of used materials and structures. They need special experience and abilities for the persons who will handle these projects.

Unlike developed countries developing countries commenced many projects prior to establishing the trained and experienced professionals for these projects. The French government, for example, has special rules and standards for those people who are working on such projects. These workers should be trained, specialized, and approved by the governmental authority beside the responsibility of the government in partial funding and complete supervision [1].

Many conservation projects have started to rescue historical buildings all over the region. Some of these projects have been used today, performing their activities just as a new building, regardless of their historical value. But some questions that need to be raised are “Does that building still have its historical and original value or not? Is that building still considered historical?”
1 Conservation strategy in the Middle East

Middle Eastern countries don’t have that large experience in conservation planning like developed countries, although it contains similar and some times more historical buildings like Egypt. In the last two centuries no maintenance had been made to old buildings, which had been used continuously for centuries, the officials had left these areas for poor people accommodations and trade activities beside haphazard occupation what easily sped up deterioration possibilities. With the realization of the importance of conservation of these historical buildings, countries had started such projects immediately.

By the beginning of the 1990s conservation projects can be divided into two sectors; the first: was handled by the UNESCO annual programme for the preservation of cultural heritage. These projects were for buildings listed in the international world heritage list and were funded by UNESCO and its sub-organizations.

They, moreover, have provided these projects with qualified teams and studies with incorporation of local governments. Most of these projects completed successfully like the Temple of Hatshepsut, Upper Egypt; and other projects did not complete due to shortage of fund what causes major damage to the building like Bait Arrazzaz, Fatimide Cairo.

However, the second division was handled either by local authorities or by private sector owners. These projects mainly focus on the re-usage and rehabilitation of these historical buildings for economical purposes. Local architects and local contractors, who are, in most cases, not specialized in such works. These projects had been tendered as per other normal projects, and assigned to the suitable designs and prices for the owner’s benefits, regardless of the suitability of the company staff to work in such projects.

![Figure 1: Bait, Alrrazzaz, failed restoration project, American Research Center](https://example.com/baitarrazzazfailedrestorationproject.png)

![Figure 2: Temple of Hatshepsut, one of the successful preservation projects.](https://example.com/tempelhoofdstutsuccesfulpreservationproject.png)

2 Rehabilitation of historical buildings: traditional policies and new trends

2.1 Historical background

Rehabilitation of historical buildings is an old process in Egypt, a country of Hundreds of historical sites, especially in Cairo. These various buildings when
exist inside the active urban context of a town, they are, naturally, subject to many upgrading process to satisfy the requirement of the contemporary life of each age.

Many examples of that process started with Saladin’s Castle in Cairo, which had been constructed on 1176 AC, and used by many rulers of Egypt until Mohammad Ali 1820s, to Abdeen Palace (the Royal Palace, then Museum currently). These buildings and so many others had been upgraded with new requirements each age of time to suites the modern life of an age. It was a continuous process until the western occupation in 19th century, when people attentions and priorities had been changed to other issues.

Since then, some buildings were being upgraded their owner for usage purpose only, such as: Bait Arrazzaz, Khan Qonsouh AlGhory, Bait Asseheimy, and many others. Most of these buildings were upgraded in haphazard and chaotic manner, what causes a lot of deterioration to some of these building elements. Maintenance at that time means the replacement of collapsed elements.

2.2 Contemporary approaches in Egypt

In the last two decades, especially when the UNESCO started to fund and supervise the conservation of historical buildings in the third world, the system of conservation in general; and rehabilitation in specific; gained a new dimension that concerns with the survival of the building in respect of its value. That new dimension aims, for the first time, to keep building active in priority of having the building in its original image in all aspects of value.

That direction with its complicated and sensitive operations has divided the architectural enhancement of the process into two approaches. I call these approaches from my own perspective as: The first: Traditional Approach, The Second: Modern Approach.

**Traditional Approach** aims to conserve the original elements of the building and remove all additional elements that are not related to the building history and/ or value. It is limiting the modifications required for newly added services, keeping it invisible as much as possible in order to avoid any effect on the building historical image. Systems’ selections are based mainly on its effect on traditional and historical elements. Consequently, the success of that approach is judged according to how much the building is returned to its original value with a new ability to withstand its new loads, systems and requirements of the new function.

**Modern approach**, rather than traditional one, aims to conserve the originality of the building as a part of new image based on current life and modernity. In that approach, the historical value and historical elements of the building are used as background context for the architect to add his object inside. History will be a part of the image, not the image itself. Services systems are exposed to humans who are using the building with the addition, in some cases, of additional structural elements or modern ornaments that are in contrast with historical ones. The concept of that approach is in focusing on historical elements by contrast.
3 Technical difficulties in rehabilitation projects in the Middle East

3.1 Services’ systems implementation

Due to the fast progress in the technological aspects of human life today, a lot of difficulties are being experienced in rehabilitation process in order to impose the new requirements that became essential to operate an active building in contemporary activities. For example, when we are going to use a 100 years old building in the year 2005, you have to implement systems that had never been considered when the building was first constructed. These systems could be classified into two categories: Normal systems, and Hi-tech systems. First: Normal Systems are these systems that are usually being used for centuries such as lighting, power supply, drainage, water supply, heating. These systems were subject to major technological upgrading in the last decades what added new requirements to upgrade an old building’s systems.

Second: High technological systems are these systems started to appear in the last two decades and mainly depends on digital and computerized technology in its daily operations such as, fire alarm and fighting, security, audio visual, CCTV (close circuit for TV), Central Air conditioning, Elevators. These systems are imposed completely inside the historical buildings when we need to operate it in 2005. However, these systems usually require major changes in space distribution and internal decoration of these buildings what affects the historical values and consequently the overall value of the historical building itself.

In the most recent projects for rehabilitation projects in the middle east, an entire area is usually is being used for these systems plant room and control room, most probably it is in the basement if exists. That area is more like the Central processing unit of a computer. All operations and control are being processed from inside, then distribution networks are spreading inside the building what is causing the direct interaction between the modern systems and the valuable elements and ornaments of the building.

Major effects due to that interaction are determined by the Air conditioning systems, especially their requirements of duct lines with large cross sections in
certain cases, what usually lead to those AC systems that avoid long duct line networks and depend on pipe lines with Fan coil units in certain locations.

Critical decision is being made during design process due to the nature and value of all building elements. But, unfortunately, these decisions were left to the designer and in some case the owner if he has consulting bodies. No interpretation of the local authorities or governmental specialists if the building belongs to private organizations or individuals ownership.

3.2 Structural stability and consolidation process

Historical buildings’ stability in the Arab world varies due its long and variable historical period which produced several kinds of buildings. Some of these buildings suffered from continuous destruction by the effect of age, nature and man-made causes of decay without maintenance and others which had received many maintenance, restoration, and repairing modifications through time. As such, rehabilitation process starts with a detailed study to all structural modifications and both original and additional elements of the structural body.

In recent projects structure stability was analyzed by professional structural engineers who are analyzing the building stability and structural elements and loading systems independently from the building material analysis which is being done in exceptional cases, when internal destruction was explored in several elements inside the building.

Major problems affecting structural stability in these projects are divided into:

A. Existing Problems:

1. Under ground water level and soil inconstant compaction.
2. Cracking of the structural retaining walls in basements.
3. Different settlements in certain portions of the building what causes sloped slabs.
4. Several cracks in columns and beams due to the improper distribution of existing loads.

B. Newly added problems due to the project:

5. Big openings for the new added AC systems. And networks.
6. Holes through very weak slabs for vertical rises.
7. The effect of heat and cool on the original materials

Due to the repetition of underground water problem in old cities of the Arab world especially Egypt, it became a normal process for dewatering and water proofing the foundation and injection of solid soil with distributed gravel below the foundations, as happened for many restoration and rehabilitation projects.

But for cracking and different settlements problems, each case were analyzed individually and solved by either adding additional supports such as steel columns and beams that have been inserted inside the structure critical locations, or by replacing the structural elements itself in case found it hard to withstand with the new elements. However this replacement process is controlled by the architect and art historian to avoid changing the character of the building.

As a part of the new trends in rehabilitation process, some architects had assigned the approach of inserting new and very modern elements inside the
historical envelope of the historical building giving a new image of the building respecting its value in the background focusing on the new and added elements.

4 Analysis for contemporary rehabilitation projects in Egypt

4.1 Project: rehabilitation and maintenance of Egyptian Diplomatic Club
[2] Down Town, Cairo

4.1.1 Historical background
Originally, the building was constructed to be a Ruling family members’ club on 1895. It was constructed on the river Nile beside the ruler palace in Abdeen. It was built on the classical French style while the designer was Italian.

The building was nationalized after 1952 revolution and transferred to the ownership of the Ministry of foreign affairs on 1963, since when, many trials were made to upgrade building services, but they are limited to systems and exposed painting only. Though, many elements of the building suffered from continuous deteriorations, especially due to its location in down town with very heavy traffic and construction of new projects.

4.1.2 Value of the building
The building is considered an icon of its time art and architecture, as it was built to compete with similar rich palaces of France and Italy at that time. It contains internationally recognized paintings and magnificent pieces of arts. The building interior consists of round marble columns with classical tops and walls frames, cornices and original marble flooring with wooden doors, beside the colored artificial double height glass and marble staircase. It also contains a musical wooden staircase.

4.1.3 Project targets, strategy and team work
The main target of the project was emphasized by the owner in getting the building equipped with all modern systems and facilities inside the original and unique historical spaces and building.

In order to achieve that target, there was urgent need to provide the building with all advanced facilities and the most progressed security systems to suite its function as official reception palace for international diplomats.

The strategy depends on three directions:
- Removing all unoriginal elements, investigating any missing original elements if any, and parallel to restoring the defected elements.
- Consolidation of the existing structure, supporting its weak points.
- Very tight selection of services systems that have minimum interference with architectural and structure aspects of the building.

That strategy was handled by an assigned working team presented by 1 Owner representative’s technical department they are all civil engineers and doesn’t contain architects, 2 Consulting firm team which contains a Full team of architects, structural and MEP engineers. They technically qualified but they are not specialists in rehabilitation or conservation projects. 3 Contractor who has qualified staff, but their workers are not specialized in such works. The working team does not include a material analyst or art historian. In addition, there were no supervision from National Authorities concerned with historical projects and sites. The choice was completely in hands of the Consultant with some respect to the owners’ engineers.

4.1.4 Rehabilitation process

It was decided by the architect that all spaces should be returned to its original functions, removing all additional elements and functions that had been added earlier. Basement floor was occupied by all electrical and mechanical systems’ large size equipment and controls besides the master kitchen. The basement was recommended as its original function was as storage and kitchens. Hence, central boiler, Chillers, Generator rooms, and Main Air Handling Units were located in the basement.

4.1.4.1 Structural analysis and solutions  The most important problems were, one side settlement what affects all structural slab and columns level. It happened due to natural increase of underground water level. Major cracks due to the change in distributed loads. Large openings through the 50cms load bearing stone walls were required for the Air conditioning ducting at the basement.

A long process of excavation and dewatering made along with treatment to the sub-soil. Additional L shape section of reinforced concrete walls was made adjacent to a settled side of the building in the basement to support that weak and deformed structure. Many steel columns and beams used to create large openings into stonewall at the basement. Some times these openings reached to 1800mm X 2000mm.

Many openings had been made through floor slabs to provide risers point for services, what required addition supports in some cases that made by steel beams at the basement.

4.1.4.2 Electro mechanical systems  All old systems had been replaced, as most of these systems were very primitive and totally unutilized today by modern systems. Most of floor finish had been removed and reassembled again to replace electrical conduits and to install chilled water pipes.

Team work had chosen a combined air conditioning and ventilation system to avoid the clear exposure and interference of normal systems. The chosen systems
depend on two sectors: the first is for basement and ground floor, which is centralized air handling units controlling the temperature and the humidity of the supplied air through large size ducting networks below basement top slab. That network supplied ground floor with conditioned air through floor grills at spaces’ edges that connected to basement ducts by penetrating the slab. The other is for all other floors above ground. It depends on supplying fan coil units with cold and hot air (4pipe system).

4.1.5 Project outcomes
The Building was officially opened in the year 2000, and had been utilized successfully since that time. The biggest advantages of the project is that most of the building elements especially in the exposed areas had been kept as original design of the building, with minor changes of course. Most of original materials like marble flooring; wooden doors had been treated and re-installed again in the same location. On the other hand, the most important weak points is the usage of cement mortars internally for repairing stone joints and cracks, what results in some separation in these cracks later, due to the inconsistence of adjacent building materials. Also, the absence of Art historian appeared clearly in the final presentation of the interior due to the concentration of the final decision in the hand of interior designer who had copied the recent treatments in similar French palaces regardless of detailed study of the building it self.

For the public, the building is considered as a master piece in the heart of the Egyptian capital downtown, But for specialists, many points had not been treated properly, such as the location Fan Coil units, modern models of wall and ceiling lighting units rather than specially manufactured ones.

4.2 Project: rehabilitation and maintenance of Mohamed Mahmoud Khalil Museum, Dokki, Giza

4.2.1 Historical background
The building was built in the beginning of the twentieth century as a palace for the Head of the Egyptian Parliament at that time by a French architect on the European style. At a very important time in the history of Egypt it was used as the president office during the seventieth of that century. The building was the house of very unique artistic masterpieces of the whole world as it was interesting to the original owner. Its ownership has been transferred to Ministry of culture after the owner death. It was used as a museum of art in the last two decades.

4.2.2 Value of the building
The building is designed on the European style of the late nineteenth century style. It depends on the Eclecticism of classic elements. For example it has a baroque style columns and wall ornaments, beside Art Nouveau style in steel and glasswork [3]. Most of wall and ceiling ornaments were covered by golden coat. The building have a big two icons of angles models on the top of the building, who had been modified earlier.
4.2.3 Project targets, strategies and team work
As the building need to be improved to fulfill the requirements of a safe and workable museum that contains pieces of billions of US dollars, it was needed to improve all the services inside the building with special consideration to security systems. Restoration of deteriorated elements and supporting the structural weak elements were a must. Then, the priority sequence was:

1. Upgrade all services systems inside the building to match international standards of museums, especially Air conditioning, security, and lighting.
2. Coordination of the exhibiting of art pieces with the rich and dominate ornamental elements of the building interior.
3. Supporting the weakness of the structure.
4. Removing all additional elements that do not match the original style of the building.

In order to achieve that target and to implement the strategy, Ministry of culture, the owner, had assigned the biggest consultant and contractors in the country who had previous experiences in such projects. The Architect was a famous one with large experience, although, he is not specialist in such project. On the other hand all technical staff of the project have previous experience but not specialists. As per the first project, the process went on with the absence of Art Historian, Material Engineer, and the national Authority full supervision.

4.2.4 The rehabilitation process
Due to the New utilization of the building from local and limited exhibition halls to international museum for arts, it was a normal decision to change the whole spaces function to be divided into three categories: Storages and maintenance workshops and services in the basement and some portions in each floor; main exhibition halls for arts which occupies bigger and central areas; Special collections and master pieces in separate rooms with special security.
4.2.4.1 Structural Analysis and solutions Due to the very bad structural situation of the building some structural elements had been replaced, or supported with additional elements. For example, many steel beams that were supporting roof slabs had been replaced. Many concrete foundations had been added.

![Figure 7.](image1)

The building basement walls were injected with chemical additives to stop water leakage that penetrate these walls.

Due to the fact that these modifications were majors in the building compositions, many architectural elements were added or modified in order to overcome the differences in nature and shape of these newly added elements to match the originality of the building fabric.

![Figure 8.](image2)

4.2.4.2 Electromechanical systems The architect and system designer concentrated into finding a proper solution to provide systems that serves properly the exhibition purpose. Major systems in that case are: Fire alarm and fire fighting, Security system and its requirements of CCTV networks, very special distributed and concentrated lighting units, and air conditioning systems with special controls.

In the project, all these systems are majors and could not be compromised. The proper functioning of these systems required a wide spread networks
everywhere. The architect decided to provide most of his networks through walls such as ducting for AC systems, lighting conduits. AC Grills had been provided through slab openings connected with ducts’ risers through walls.

4.2.5 Project outcomes
Generally the building has a new look, which is different from the old one, especially, for the interior due to the major change in its function and internal circulation. Although, most of internal cornices, wall and ceiling panels and ornaments had been either preserved or returned to its original look, the building will give you a different spirit of that one for historical building due to the many modern elements that are spreading inside spaces such as lighting units.

The architect had used the historical fabric of the building as a frame for the exhibited works, what really enrich the exhibited objects, but in the same time it is reducing the value of the building as a part of history.

5 Conclusion: targets versus projects and policies outcomes
Rehabilitation projects in the Middle East, Egypt Specifically, are generally processed as normal projects with special consideration to its nature as historical building. The major attention is being made to exposed historical elements and ornament rather that the spirit and the content of the building. Architects and contractors are not experts in such projects. One can emphasis that historical buildings had been treated as old patient that has deterioration in his body that had been replaced by metallic spare parts, not natural bones insertion. These parts will work, but it will not grow, interfere or integrate, beside it has a lifetime. These buildings need to be treated as originally created, and special systems need to be designed specially for it.

The contemporary process for rehabilitation of historical building is a gradually slow process of transformation into a modern building in all aspects.

The international Report on the situation of Cultural Heritage for the year 2000 had criticized one of the biggest projects in Egypt, which is Al-Azhar Mosque. The Web page of Heritage@ Risk Report on Egypt commented as follows:
“Regrettably, the mosque was a field for experiments of unqualified architects and contractors.” [4]

References