

**Use multi-criteria analysis MCDM, to determine the most appropriate funding for the adaptive reuse of heritage buildings  
(Case study of the Champollion Palace)**

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**Abstract:**

Reusing heritage buildings needs to consider several critical criteria in order to determine the optimal use alternative, as the improper use of the heritage building leads to a loss of one or all of the heritage values and sometimes to the loss of the building.

Reuse is a very complex and delicate process, as it is directly related to the heritage values on the one hand, and the sources of funding and investment on the other hand so choosing the unsuitable use may lead to a loss of heritage values and cases threaten the survival of the building in some, and the unsuccessful selection of funding sources may cause a halt in use, Hence the importance of management and maintenance plans.

Preserving heritage buildings is a delicate process based on three main axes, namely defining the values to be preserved and choosing appropriate preservation methods in accordance with the adopted conservation policy, and then determining the available funding sources in a sequential process with multiple criteria and determinants, and here appears the main problem facing most Heritage buildings is the optimal choice for solutions and decisions related to the preservation process and the link between value standards, use of alternatives, and funding sources

The research used AHP hierarchical analysis in the case study (Champillion Palace) through the use of Analytic Hierarchy Process Software (Software 2022) and the analysis was done in two stages, the first to determine the optimal use and the second to determine the appropriate funding.

**Key words**

Investing in heritage, adaptive use, heritage buildings, funding sources

**Research problem**

Heritage management and investment is one of the multi-criteria decisions that require great accuracy in determining the optimal solutions to ensure the sustainability of the investment

The lack of information and data available on similar experiences as a result of the association of these projects with political decisions

**Research aims**

Using an appropriate evaluation methodology to support the efficiency of choosing the appropriate use and appropriate investment for the values of heritage buildings using AHP hierarchical analysis as one of the multi-criteria decision-making tools MCDM, which is in line with the manifold criteria (main criteria and sub-criteria)

This paper aims to provide an appropriate evaluation tool to support the efficiency of selecting the optimal alternative in conservation projects by linking value, reuse, and investment sources in heritage.

This research is a deductive analytical work divided into three parts

**First:** The theoretical part and general concepts related to the research

**Second:** Evaluate the relationship between heritage values and alternatives to reuse through hierarchical analysis to reach the optimal use

**Third:** assessing the relationship between the goals of optimal use and sources of funding

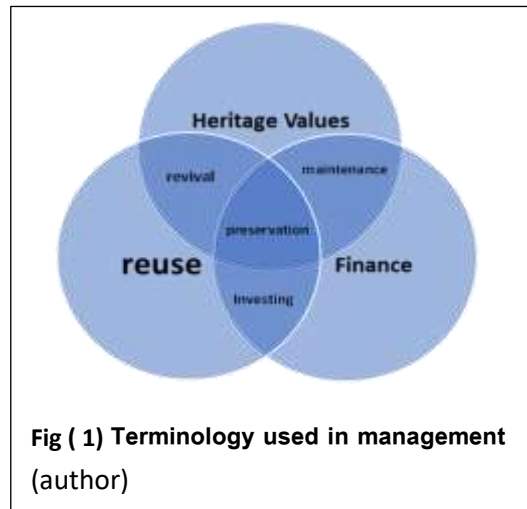
The research allows, through the results, a visualization of the indirect relationship between historical values and the most appropriate sources of funding

### **Hypothesis**

- Heritage buildings have multiple values (cultural, economic, social, historical...) capable of increasing the development of the surrounding area.
- Reuse of heritage buildings proper use prevents recurring deterioration
- The use of hierarchical analysis helps in choosing the best alternative for use and financing in light of the criteria of heritage value.

### **1. Introduction**

Many of the world's cities need to accommodate population growth and activities that may extend within existing historical areas. Even the buildings whose cultural value we cherish may face increasing pressures for demolition and redevelopment to accommodate growth. This requires looking at these areas and buildings with a close look to ensure their life and participation in the increasing urban growth in a way that preserves them on the one hand and ensures their integrates into society and increases Their impact on the civilizational and cultural side and the economic side,Hence the importance of economic feasibility studies restoration, technical and for investing in heritage buildings to revive cultural values that may disappear over time and which must be preceded by a scientific method for managing investment and financing to ensure that money pumped into the suitable use, as under the directions of funding sources and in a sustainable manner.



## 2. Heritage management

The process of heritage management has developed significantly during the past few years, and international conventions have helped to develop policies and mechanisms to help countries and bodies determine the most acceptable means and protection for the heritage under their management.

Despite the many different terms used in the field of heritage management, **Fig ( 1)** they ultimately lead to one goal, which is the preservation of cultural property.

The trends of European and American schools in heritage management.

Both schools (European and American) have the same interest in heritage management and preservation, but there is some difference between them in terms of terminology, and there is almost agreement on what should not be done more than on what should be done.

The European school is the most consistent with the charters issued by international institutions such as Icomos and Icom.

Therefore, the definition of heritage resource management in the European school is an integral part of the process of preservation and restoration, while the American school makes its main title the management of heritage resources and makes preservation and restoration a part of it. (Muhammad Shawqi Abu Laila 2019) As for the term “Conservation”, for example, it is the most used in the United Kingdom, Australia, Canada, and also China;

It expresses the activities and actions taken to ensure the protection of different cultural property, whether it is sites, buildings, cities, or museum holdings, while the most used term in the American School is Preservation or Preservation Historic. (Craig 2009)

And despite the multiplicity of concepts, all of these terms now fall under the umbrella of a new and comprehensive term or concept, which is Heritage Cultural Management or Management Sites Heritage. and ultimately directed towards one goal, which is the preservation of cultural property Accordingly, the process of managing investment in heritage varies according to the trends and policies of conservation schools that Adopted. (Jamal December 2005 )

### **3. preservation**

The concept of preservation: “Conservation means maintaining and taking care of things to perform their function for which they were found with high efficiency, and then preserving their material value despite the expiration of their lifespan.

According to the aforementioned schools, there are two concepts of conservation, one of which deals with conservation operations as proper management and planning with the optimal use of natural and human-made resources in order to conform to the requirements and needs of the future (American School) and the second is the concept that considers that conservation operations carried out For historical buildings or areas of archaeological value, it deals with preserving what they contain buildings of importance or distinguished facilities to remain for future generations and then managing them (European School).

Therefore, the concept of conservation may change based on the trends and policies used for conservation. (Muhammad Fikri December 2006)

### **3.1. preservation policies**

#### **3.1.1. mummified look ( the passive preservation)**

A trend that prevailed in the advanced stages of the twentieth century, and its only goal was to preserve the features of the past as they were, without “desecrating” them with new jobs that might deprive them of their “sanctity” and make them live in an era that is not theirs.

#### **3.1.2. sustainable development (positive conservation)**

At present, dealing with heritage has gone beyond a "mummified look" Today, we are discussing heritage as a source of economic and social development. A set of concepts and terms emerged, including re-employment, heritage development, and other concepts that deal with a heritage as a living organism that interacts with its environment and resists forgetting and neglect.

### **3.2. types of preservation**

#### **3.2.1. urban preservation**

It means the conscious management that determines the strategies for the care and maintenance of the urban fabric with a heritage character or what is known as the heritage environments, which is represented in the heritage building formations, urban spaces, and public squares, in order to ensure the effective use of the inherited urban fabric (Urban Heritage Preservation Guide, 1426).

#### **3.2.2. Architectural preservation**

It is the process of protecting, maintaining, and repairing architectural facilities with distinct historical, cultural, or visual values, in an effort to remove distortion as a direct result of changes in the surrounding environment, in order to restore and improve their condition and rehabilitate them to do their role in the society . (Rashid , February 2007)

And preserving its materials, construction methods, and creativity in the building, its decorative elements, its interior design, and preserving its functions, and its relationship with its external surroundings. Preserving its distinctive characteristics (heritage values), each building has something that distinguishes it from others, and thus the process of dealing differs from one building to another. (Al-Mahari 2017)

Preserving in general, whether urban or architectural, means preserving ancient values in the heritage environment, whose survival contributes to preserving social and historical values of importance to the city and society, as a means of sustainability.

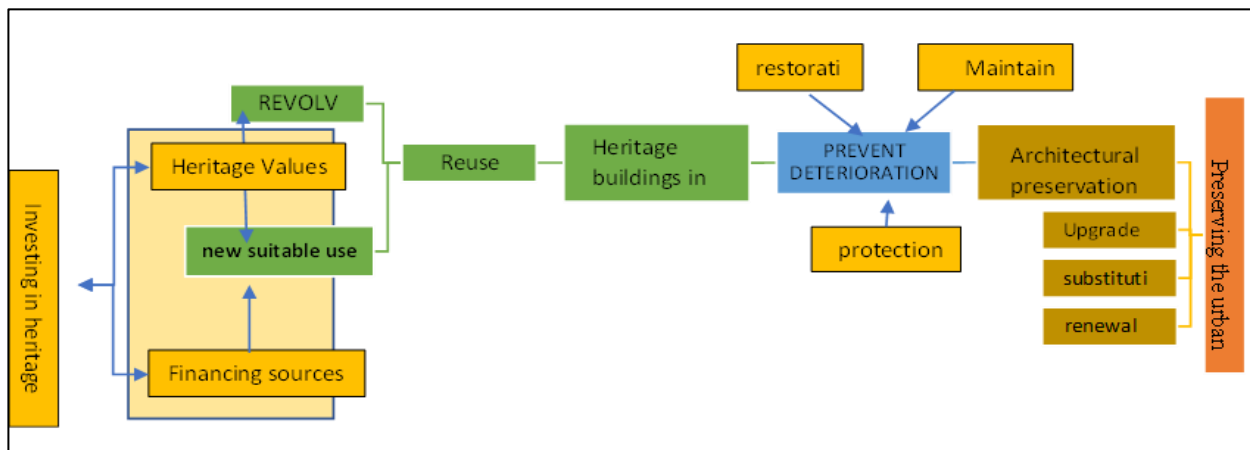


Fig (2): Stages of preservation and investment in heritage (author)

#### 4. Preserving heritage values

The process of preserving historical buildings stems from their possession of values that made them of importance that require preservation and protection. Whether they are historical, social, or political values found as a result of their association with an important social, political or historical event, aesthetic values resulting from artistic or architectural excellence, or even spiritual and religious values resulting from a spiritual and religious connection, or even the economic and tourism value resulting from the material return of the property. All of these goals and motives represent strong reasons, urging man to preserve his heritage, and pass it on to future generations. (Judson June 2010)

#### **4.1. the Value**

International charters indicate that the process of estimating the value of heritage property is carried out according to the content of heritage values, which are an important resource for human development, and part of sustainable development.

Therefore, understanding the importance and value of heritage is at the heart of heritage preservation practices and is the basis for decisions about its management, which is referred to by the Burra Charter and the Venice Charter (1964) as well as the Athens Charter (1931).

The process of monitoring and evaluating the values of heritage buildings is a very important stage in restoration projects, because values are the main criterion on the basis of which all restoration decisions are made. However, valuation methods are not specific and sometimes subject to personal goals, which makes the decision-making process a complex issue due to the multiplicity and sometimes conflicting of specific criteria for value. While the architect sees great importance in architectural values, design and decoration, governments tend to favor cultural, social, and economic values over other values.

The difficulty of evaluating values stems from several factors, including:

- The diversity of the nature of values

There are many types of values - cultural, economic, political, aesthetic .... (Some of them overlap).

- Values change over time and according to surrounding influences (e.g., social forces, economic opportunities, cultural trends),
- Sometimes the values conflict,
- Values assessment tools and methodologies are inconsistent (when used across a variety of disciplines and professions).



However, the way society views heritage and how it is appreciated has changed over the past 150 years, (fig 3) from focusing on the historical, architectural, and characteristics of buildings, to a broader view that includes economic aspects and social values, which is what made the recognition of the impact of the urban environment an important matter included in conservation decisions as demonstrated by the Bora Charter (ICOMOS Australia 1999: 2) where it refers to the importance of culture as “the aesthetic, historical, scientific or social

value of past, present and future generations. However, others take a broader perspective, in terms of integrating the site's values entirely with other values which was adopted by the English Heritage Charter (Mason2002; English Heritage 1997, 2008)

## 5. Reuse concepts

### 5.1. reuse

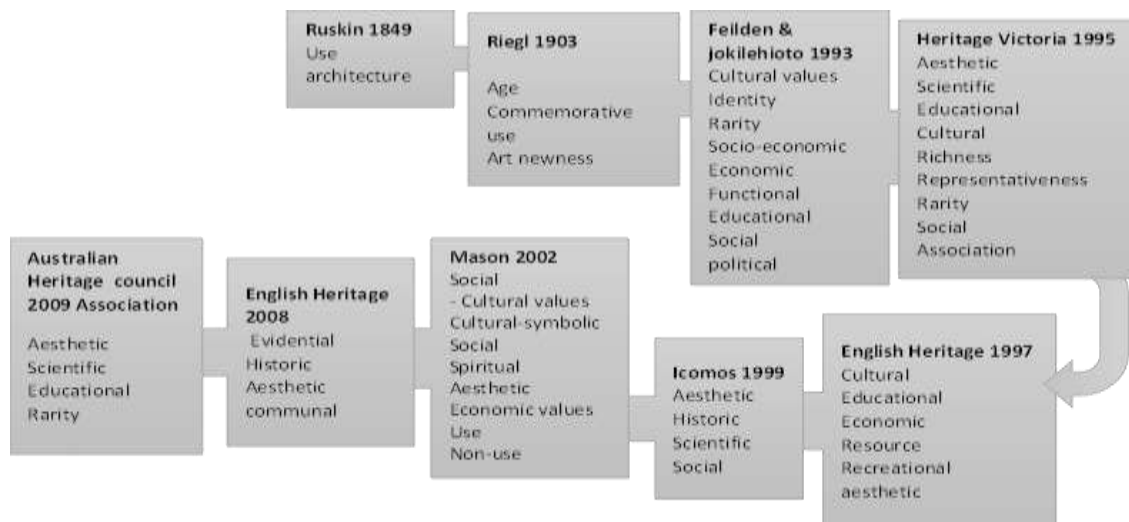


Fig ( 3 ) The evolution of the concept of values during international conventions and treaties (author)

Some researchers pointed out that the concept of reuse means reusing the building in its original function completely, for which it was established without making any modification or change in its buildings (Ahmed 2008), with carrying out the necessary rehabilitation operations, as is the case in the majority of Islamic and Christian religious buildings that have been restored in Egypt (Othman June 2008),

because reusing the building in its original function is appropriate to its situation, engineering and capabilities without the need for modification.) (Muhammad 2022)

### **5.2. adaptive reuse**

Some researchers added the word (Adaptive) to the original word to become Adaptive reuse in the sense of re-use with the building adapting to the new function without disharmony, and thus became a term for buildings that changed their original function to another new function that suits the current needs and ensures the protection of the building (Othman June 2008)

### **5.3. Reusing heritage and reusing it as an axis and entry point for advancement:**

The economic factor cannot be neglected as one of the most important factors affecting the processes of upgrading heritage domains, especially in developing countries whose budgets are unable to provide sufficient funding needed to upgrade their heritage domains. Therefore, it was necessary to find multiple sources to provide the necessary funding for these projects by investing the heritage building and bringing it back to life again, whether by reusing it in the same original function or by reusing it in another use that suits its capabilities With the aim of preserving it in a way that befits its historical and artistic value, through (Al-Esawy 2015)

- 1- Providing an appropriate return that suffices the building maintenance costs.
- 2- Re-integration of the building with its current surroundings to serve the needs of the surrounding community.
- 3- Raising the efficiency of historical areas and providing them with the necessary services without the need to construct new buildings.
- 4- Investing and exploiting heritage buildings as a tourist attraction.
- 5- Creating permanent supervision of these buildings by users and beneficiaries.
- 6- Ensuring the continuity of maintenance and cleaning work  
..... etc..

## **6. Investing in heritage and financing methods**

Heritage buildings and sites are considered economic vessels, and the archaeological building in itself represents an economic value because it is only an archaeological building, and an existing national wealth that is easy for investment and economic exploitation, which increases its historical value.

The actual measure of the success of re-employment projects is the extent to which they cover the costs of maintaining and maintaining the building from various sources of financing, in addition to the expected return on use.

The economic return of the use of the archaeological building depends on the extent to which its capabilities are exploited and its historical and artistic value is provided in a way that provides a financial return for the maintenance and preservation of the building. (El-Din November 2011)

The different types of financing and investment of urban heritage can be presented as follows:

**Public financing:** which is carried out by the government directly through the general budget through the ministries and relevant committees.

**Private financing:** through the various types of private sector investments.

**Mixed financing:** It is the participation between the public sector and the private sector in financing programs to preserve the urban heritage

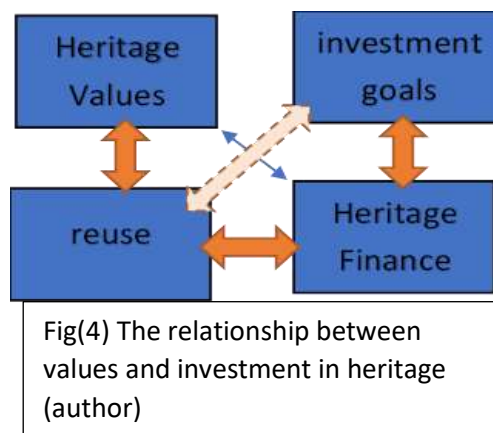
**Popular participation in financing:** The importance of popular participation has been pointed out and emphasized in many charters and constitutions since the Treaty of Venice in the year 1964 AD and the subsequent international treaties and charters.

According to the decision to reuse and based on the available funding sources, a decision is made to invest in heritage, whose objectives differ according to the type of use and the source of funding.

## 7. The most important goals affecting the decision to invest in heritage

It is clear that the government investment is interested in the uses that benefit the community regardless of its economic return, as it aims to preserve the heritage building as a historical and cultural value that helps raise community awareness on the one hand and ensures an increase in the national income of the community surrounding archaeological sites on the other hand, as well as preserving heritage crafts. Therefore, government investment tendencies are largely focused on cultural and service uses.

Whereas, private investment has an economic orientation with the concept of profit and cost, considering the cost of investing in heritage is lower in establishment expenses than construction and is more popular with tourists. Therefore, private investments prefer uses with good returns, such as hotels, restaurants, specialized museums and traditional workshops.



While the community aims to provide activities appropriate to the needs of the people of the region and to improve them through conservation projects.

Each funding source has different orientations and different preferences in terms of optimal use, and here lies the problem in taking the appropriate decision to ensure the sustainability of the investment. Fig(4).

As a result of the multiplicity of criteria presented when making a decision, as well as the multiplicity of financing alternatives, the research adopts a scientific analytical methodology to choose the optimal financing based on determining the appropriate use of property values through the use of hierarchical analysis.

### **8. Hierarchical Analysis (AHP)**

The theory of hierarchical analysis is one of the methods adopted in multi-criteria decision-making that depends on employing quantitative methods in the decision-making process for selecting the optimal alternative from among a group of alternatives according to multiple criteria. The theory has proven its success and high efficiency in solving complex problems and multi-criteria decision-making, and many studies around the world have relied on it in the issue of differentiation and choice between a set of alternatives. This theory was developed by Professor Thomas Saati, who was born in the city of Mosul, Iraq in 1926, a scientist specializing in mathematical sciences and served as a professor at the University of Pittsburgh in the United States of America.

(This theory has become one of the most prevalent methods in the world, for many reasons, including the existence of a program through which the theory can be applied and hierarchical forms built, accurate analysis and drawing conclusions in a simplified and effective way. Also, the same principle of hierarchical analysis in general is an easy and close principle to the way of thinking Logical.) for the average person, and it was defined by Thomas Saati in 1980 as “an integrated framework that combines objective and non-objective criteria and pairwise comparisons based on a relative scale (zhou September 2006)

The process of hierarchical analysis provides an effective practical structure that depends on determining numerical values for each variable compared to the rest of the variables, which gives a quantitative character to the decision even with the presence of qualitative variables, which helps decision makers to maintain a coherent intellectual model that helps them reach a balanced decision that takes into account all the variables and puts in Considering all alternatives, which enhances the credibility of the hierarchical analysis process as a tool for decision-making

### **9. Hierarchical analysis and methodology for making an investment decision in heritage**

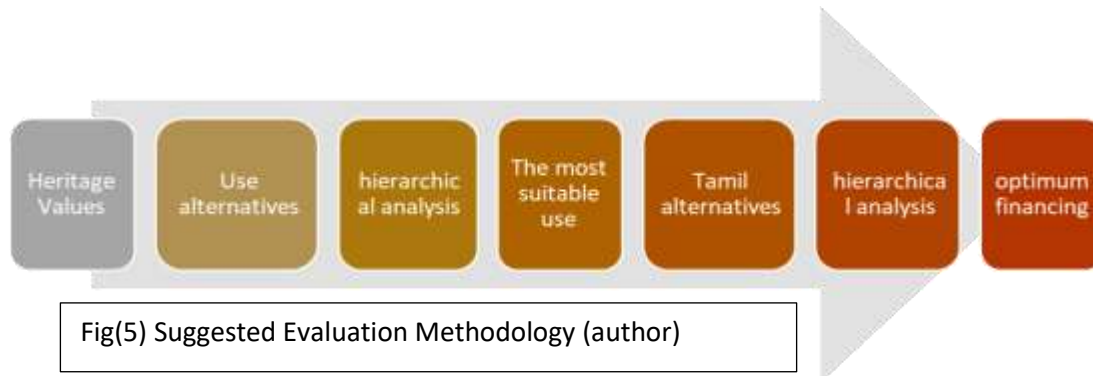
Using an appropriate evaluation methodology (fig 5) to support the efficiency of choosing the appropriate use and appropriate investment for the values of heritage buildings using AHP hierarchical analysis as one of the multi-criteria decision-making tools MCDM, which is in line with the manifold criteria (main criteria and sub-criteria).

To support the efficient selection of the optimal alternative in conservation projects by linking value, reuse and investment sources in heritage.

**The first part** of the analysis aims to assess the relationship between heritage values and alternatives to reuse through hierarchical analysis to reach optimal use.

**The second part** of assessing the relationship between the objectives of optimal use and sources of funding.

Through the results of the first part of the analysis and the second part, it is possible to visualize the indirect relationship between historical values and the most appropriate sources of funding (Hebatu-Allah Abdul Fattah Haroun April 2019).



## 10. Case Study :

The Palace of Prince Said Halim (Champillion Palace) was chosen as an applied case to clarify the methodology used to link heritage values and funding alternatives by determining the appropriate use of the building based on the evaluation and inventory of its heritage values and then determining the most appropriate funding according to the objectives of reuse

Prince Said Halim asked the famous Italian architect of Austrian culture, Kurt Antonio Lascia, to design this palace as a gift to his wife, Amina Tosun, who did not live in it and preferred to stay in Turkey. It was completed within 4 years to produce the architectural masterpiece in 1889, formed in the "Neo Baroque" style

It was later transformed into a school bearing the name (Al-Nasiriya) in 1934 and continued until 2004, then the school was closed two years after it was registered as a monument in accordance with Ministerial Resolution 121 of 2004.



The European Union provided a grant for the Khedival Cairo project from 1999 until 2004, which ended with providing a full vision of the palace and its condition and what can be done to repair it and return it to its old condition architecturally. Then the decision was taken to transfer it to a museum for the city of Cairo as part of the development of Khedivial Cairo, which is originally buildings and buildings, some of which are governmental and some Private, but Saeed Halim Palace represented a very special case, as it is the only remaining palace of about 7 palaces and villas that were located in that area, although its use as a school played a role in changing some of its features, especially after adding small buildings to it, closing windows, or exhausting the building itself internally. Externally, however, the place retained its distinctive architectural style and the decorations it contains

### **10.1. Palace location**

It is located on Champollion Street in the center of the country, surrounded by a spacious garden, bordered by the north of Al Nabarawy Street, to the east by Hussein Al-Mimar Street, to the west by Champollion Street, and to the south by a small street that connects Hussein Pasha Al-Mimar Street and Champollion Street. For the museum triangle, the square and the streets of Khedive Cairo.

### **10.2. Description of the palace**

The main building and has two eastern and western wings. It has four facades overlooking the garden surrounding the palace. These facades embody the splendor of the architectural elements of the era in which it was built. The facade of the palace is characterized by the presence of magnificent statues.

The palace itself consists of a basement and two floors, to a large extent. As for the entrance to the palace, there are two entrances, one main, which is the south, and the other secondary, which is the north, in addition to a small entrance that opens to the basement, and in the middle of the southern facade of the palace is the main entrance block, which is a block prominent from the facade and is characterized by the usual luxury in the Renaissance and Baroque style.



To a huge pavilion with two branches on its sides, one on the eastern side and the other on the southern side. It is also distinguished by the presence of two columns topped by a semi-circular arch adorned with a mask representing the head of a woman. These arches are filled with their exquisite plant decorations, while the wooden doors are filled with pieces of beautiful stained glass in their colors and design. (https://akhbarelyom.com/ Sunday, 01 November 2020)

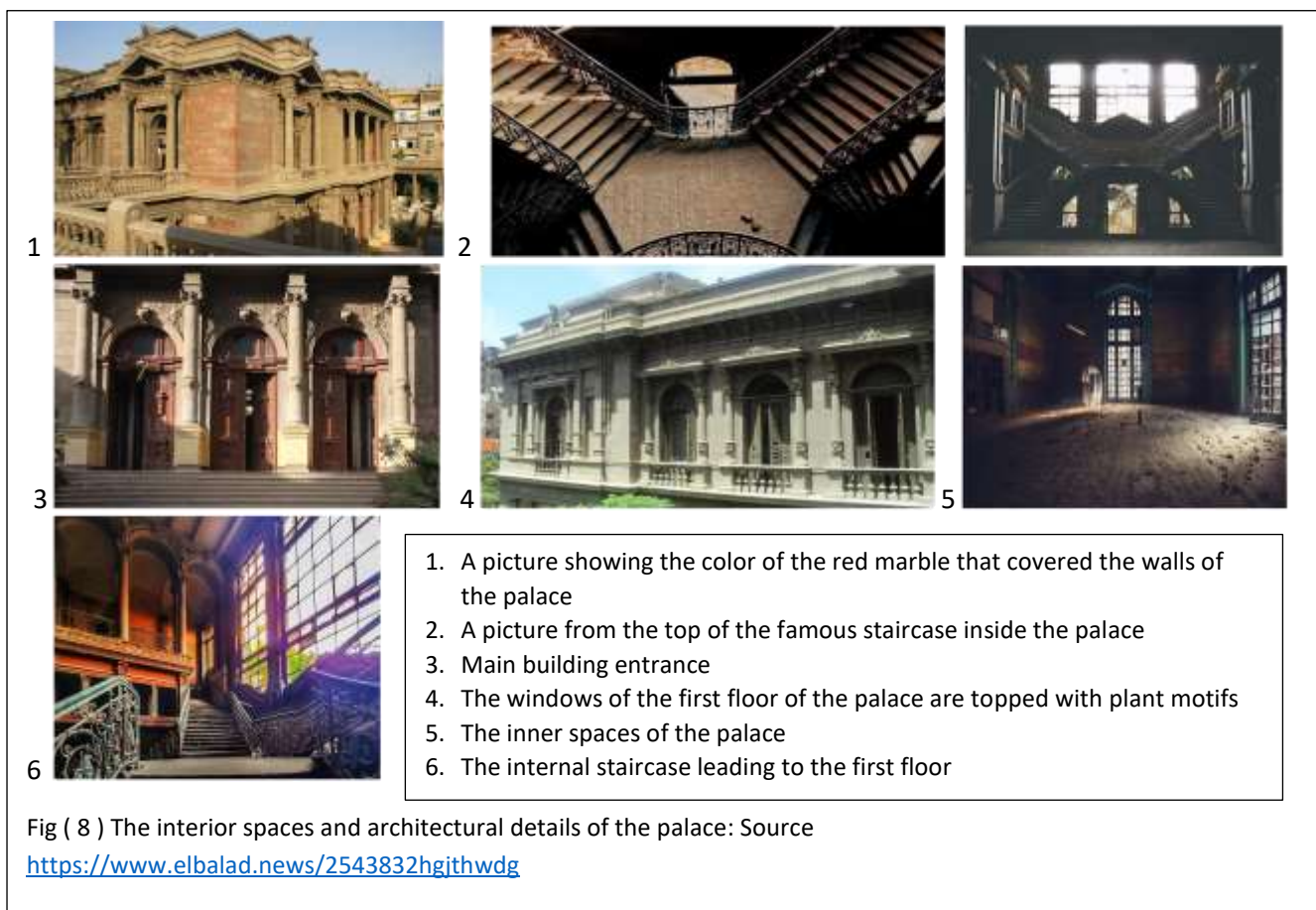
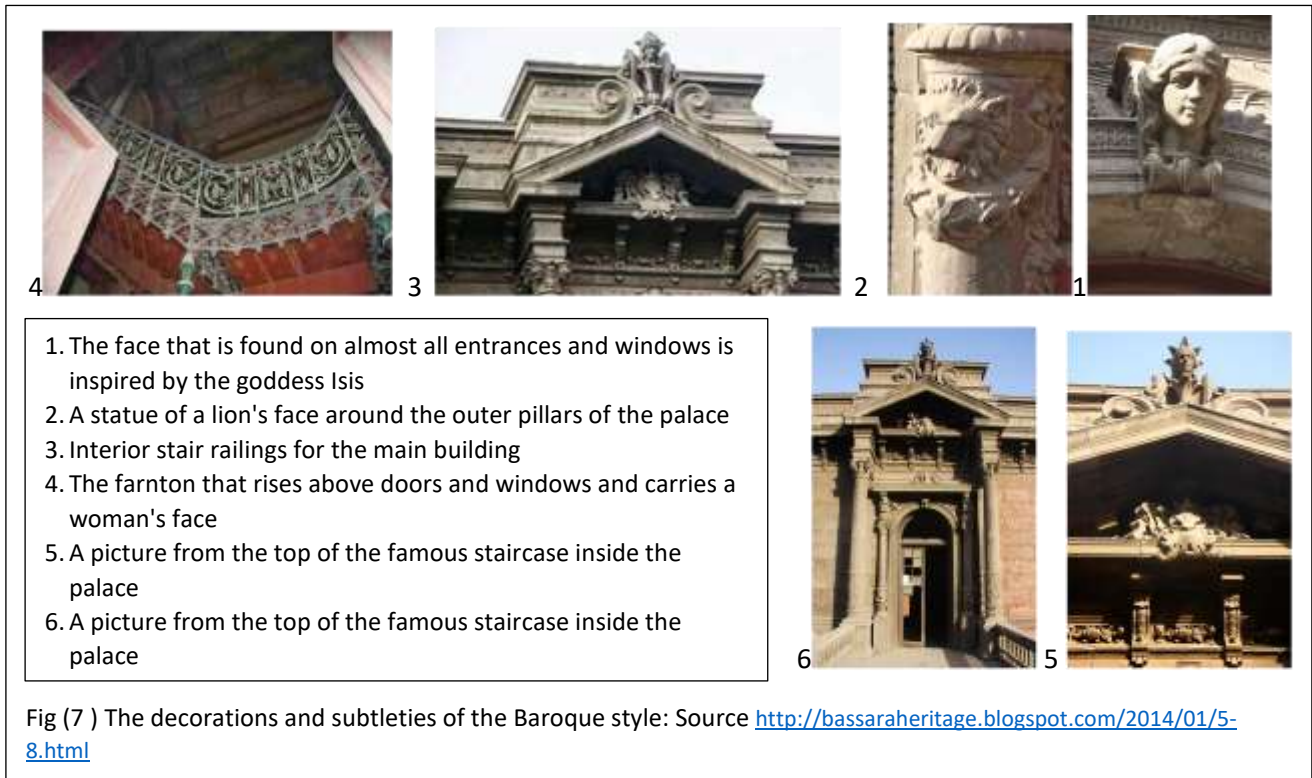
The palace from the inside, it consists of a basement, a ground floor, and a first floor. The basement consists of a huge hall, a vestibule, and some service accessories that include storage rooms, a kitchen, and toilets, while the ground floor is a spacious lobby that extends the length of the palace from north to south and tops the hall on the north side, a double staircase with two branches. They reach the upper floor and the lobby opens to six doors, three on the eastern wall and three on the western wall that open to its spacious rooms. The layout of the first floor is similar to the ground floor, except that part of the main lobby was occupied by two spacious rooms that open onto the main balcony of the palace above the southern entrance. In general, the palace is characterized by its very splendid architectural elements, whether they are windows, columns, lobes, frontons, balconies, or balustrades. The exquisite decorative elements abound in the forms of shields, bows, flower necklaces, and medals. The palace in itself is a very distinguished architectural masterpiece.

The palace has two wings attached to it, an eastern wing and a western one, each connected to the palace by a walkway whose ceiling carries two rows of columns.



Fig ( 6 ) 1920 map showing Halim Palace fronting Antikhana Street

General website, old and new: Source <http://bassaraheritage.blogspot.com/2014/01/5-8.html>



The research used hierarchical analysis as one of the methods used in analyzing multi-criteria decisions

**Part One:** Determining the optimal use according to the values

**Part Two:** Determining the appropriate financing for the proposed use in accordance with the investment objectives

## **11. part One**

### **11.1. EVALUATION PROCESS**

Based on the sequence of steps of the hierarchical analysis and according to the table of adopted values that were monitored in the building, the evaluation process is carried out according to the following steps

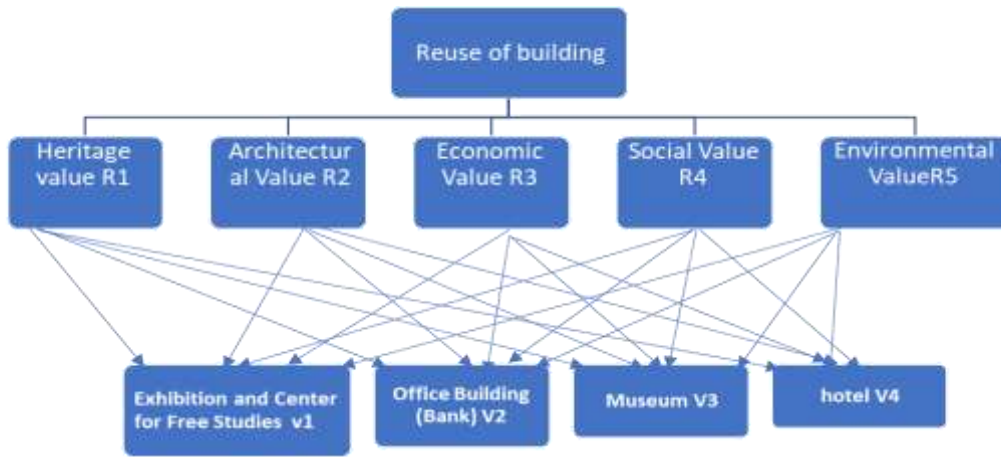
2. Defining the goal (most appropriate adaptive reuse)
3. Evaluation criteria (the heritage values of the building) Table1. Proposed criteria
4. Pairwise comparison scale.
5. Alternatives reusable Table 3. Project alternatives.
6. Hierarchy of the evaluation process
  - a. Making pairwise comparisons between the criteria is to determine the weight of each criterion with respect to the goal. Table (4 )
  - b. Normalization of the results.(Weighted Attributes) Table (5 )
  - c. Calculate overall priorities. Table (6 )
  - d. Summary of analytic hierarchy process Fig ( 10 )

**. Evaluation criteria**

Table1. Proposed criteria	
Evaluation Criteria(R)	Sub Criteria
Heritage value (R1)	Protection and enhancement of heritage significance (R11)
Architectural Value (R2)	Suitability of the new function with the building system and new space requirements (R21) Respect the building & ancient architectural features and ornaments (R22) Building physical stability (23) Respect region laws and building codes (R24)
Economic Value (R3)	Economic impact on the building and district (R31) Adaptation cost (R32)
Social Value (R4)	Meet the region needs and increase the quality of life (R41)
Environmental Value (R5)	Congruity with land uses(R51) Accessibility of the building for disabled users, vehicles and pedestrians (R52)

Table 2. Pairwise comparison scale.		
Intensity of importance	Definition	Explanation
1	Equal importance	Two criteria contribute equally to the goal.
3	Weak importance of one over another	Experience and judgment slightly support one of the criteria over the other one
5	Strong or essential importance	Experience and judgement, strongly support one of the criteria over the other one.
7	Demonstrated importance	A criterion is considered strongly more important and its dominant
9	Extreme importance	The evidence showing one criterion to be more important than another is the heights possible order
2,4,6,8	Intermediate values between the two adjacent judgements	When compromise is needed

Identification of project alternatives
Table 3. project alternatives.
Exhibition and Center for Free Studies Fine Arts
Office Building (Current Use)
Museum



Fig(9): shows the hierarchy of the evaluation process, which includes five Criteria for evaluation, and three alternatives for funding

From the previous points of evaluation criteria and suggested project alternatives, the following three levels may be drawn for the evaluation process hierarchy as shown

**Table 4** shows the main objective of the evaluation process, which is reuse, as well as the hierarchy on which the evaluation process is based, including five Criteria for evaluation and five alternatives for reuse.

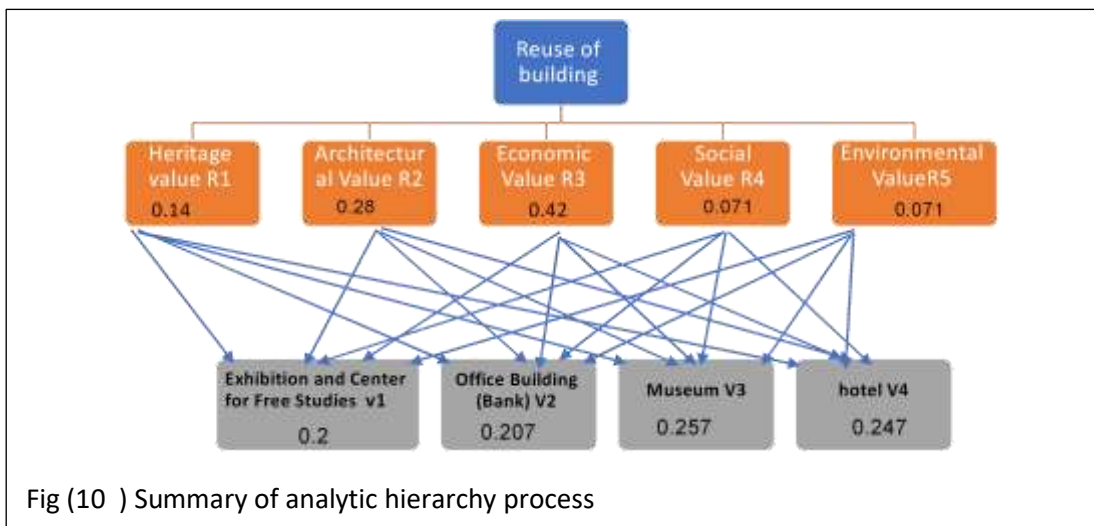
Tabel 4 : Making pairwise comparisons between the criteria is to determine the weight of each criterion with respect to the goal.							
	Hertage vaalue	Architectural value	Economic value	Social value	Environmental value	Weight	Priorities
Hertage vaalue	1	0.5	20.33	2	2	14.29	0.143
Architectural value	2	1	70.66	4	4	28.57	0.286
Economic value	3	1.5	1	6	6	42.86	0.429
Social value	0.5	0.25	70.16	1	1	7.14	0.071
Environmental value	0.5	0.25	70.16	1	1	7.14	0.071

\* Consistency Ratio calculated as=0

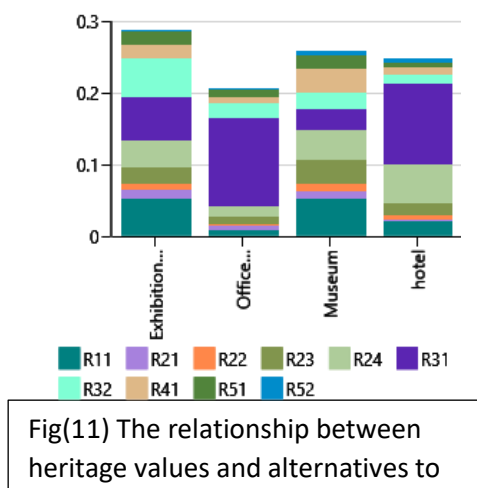


**Table 5** Normalization of the results.(Weighted Attributes)

Option	R11	R21	R22	R23	R24	R31	R32	R41	R51	R52
Exhibition and Center for Free Studies fine arts	0.055	0.012	0.008	0.024	0.038	0.058	0.053	0.02	0.02	0.001
OfficeBuilding (Bank)	0.010	0.005	0.001	0.012	0.012	0.122	0.021	0.006	0.01	0.003
Museum	0.055	0.008	0.011	0.032	0.038	0.031	0.021	0.032	0.019	0.006
hotel	0.021	0.002	0.006	0.017	0.054	0.11	0.011	0.0107	0.006	0.6



According to the priority criteria, the exhibition and the Center for Free Studies of Fine Arts is the most appropriate proposal for the heritage values of the building, followed by the museum, then the hotel, and finally the administrative building.



## **12. First part results**

From the previous analysis, we note that according to the proposed use alternatives, the use of the palace as a center for free studies of plastic arts is the least use of the impact on the building and does not require making substantial modifications to it, followed the use of the palace as a museum and then the hotel use, which requires a degree of spatial change that may affect the value The architecture of the palace and then the originality of the design as well as the administrative use (bank), which calls large numbers of users, which generates a large amount of material depreciation of the palace that may harm it structurally, and therefore the of the results of the hierarchical analysis indicate a preference for cultural use (Exhibition and Free Studies Center for Fine Arts ) As it is the least uses impact on the values of the building.

To complement the objective of the research in linking between heritage values and the most appropriate sources of funding by determining the most appropriate use of the values and then the appropriate funding for the proposed reuse goals, hierarchical analysis is used to determine the most appropriate funding for the goals through the second part of the study.

## **13. Part Two:**

Determining the Most Appropriate Funding for a Proposal (Exhibition and Free Studies Center fine Arts , Based on the sequence of steps of the hierarchical analysis, the evaluation process is conducted according to the following steps

1. Defining the goal (appropriate funding)
2. Proposed criteria Table7.
3. Pairwise comparison scale Table 8.
4. Project alternatives Table 9.
5. Steps in the hierarchy of the evaluation process
  - a. Making pairwise comparisons between the criteria is to determine the weight of each criterion with respect to the goal. Table (10 )
  - b. Normalization of the results.(Weighted Attributes) Table (11)
  - c. Calculate overall priorities. Table (12 )
  - d. Summary of analytic hierarchy process Fig ( 14 )

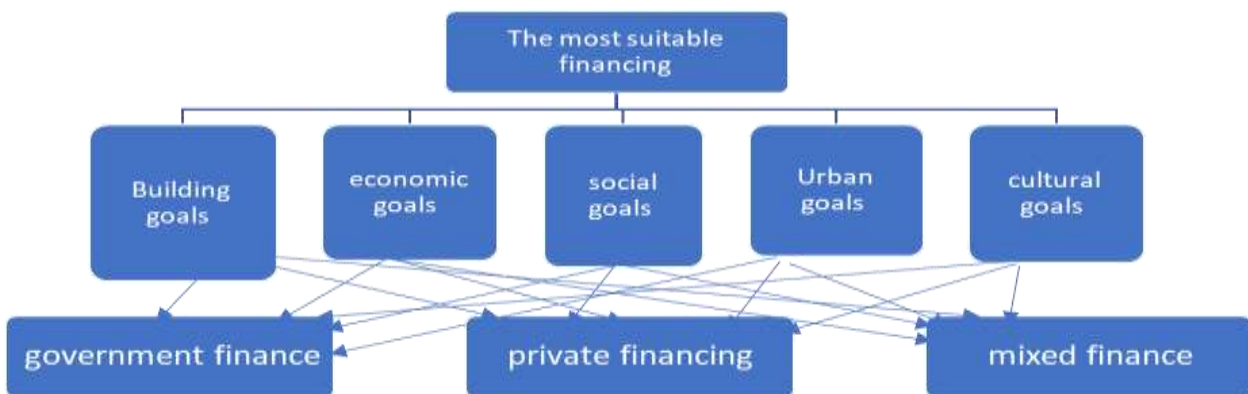
**. Evaluation criteria**

Table7. Proposed criteria	
Evaluation Criteria(R)	Sub Criteria
Building goals (R1)	<ul style="list-style-type: none"> <li>• To preserve the heritage and architectural values R11</li> <li>• Achieving the highest levels of maintenance R12</li> <li>• Provide structural safety for the archaeological building R13</li> </ul>
economic goals (R2)	<ul style="list-style-type: none"> <li>• . Exploitation of the old building, its location and history R21</li> <li>• . Opening a new investment activity and providing an appropriate return R22</li> <li>• . Less capital used compared to new investments R23</li> </ul>
social goals (R3)	<ul style="list-style-type: none"> <li>• . Develop national awareness for the preservation of archaeological buildings R31</li> <li>• . Create new business opportunities R32</li> </ul>
Urban goals (R4)	<ul style="list-style-type: none"> <li>• Forming a merger and cohesion between the old and new urban fabric of the historical areas of the existing cities R41</li> <li>• Development of the community surrounding the ancient building R42</li> </ul>
cultural goals (R5)	<ul style="list-style-type: none"> <li>• Raising the level of the culture of the surrounding community</li> </ul>

**Identification of project alternatives**

Table 9 :project alternatives
1. government finance
2. private financing
3. mixed finance

From the previous points of evaluation criteria and suggested project alternatives, the following three levels may be drawn for the evaluation process hierarchy as shown



Fig(12): shows the hierarchy of the evaluation process, which includes five Criteria for evaluation, and three alternatives for funding



**Tabel 10 :** Making pairwise comparisons between the criteria is to determine the weight of each criterion with respect to the goal

	Building goals	economic goals	social goals	Urban goals	cultural goals	Priorities
Building goals	1	2	2	3	2	0.33
economic goals	0.5	1	3	3	0.5	0.21
social goals	0.5	0.33	1	2	0.5	0.12
Urban goals	0.33	0.33	0.5	1	0.5	0.087
cultural goals	0.5	2	2	2	1	0.23

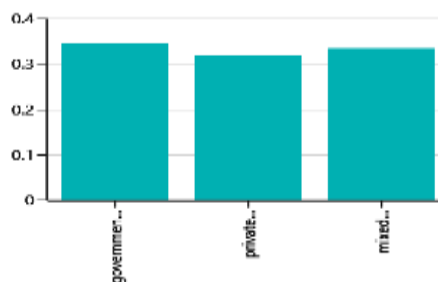
\* Consistency Ratio calculated as =0.057

**Table 11** Normalization of the results.(Weighted Attributes)

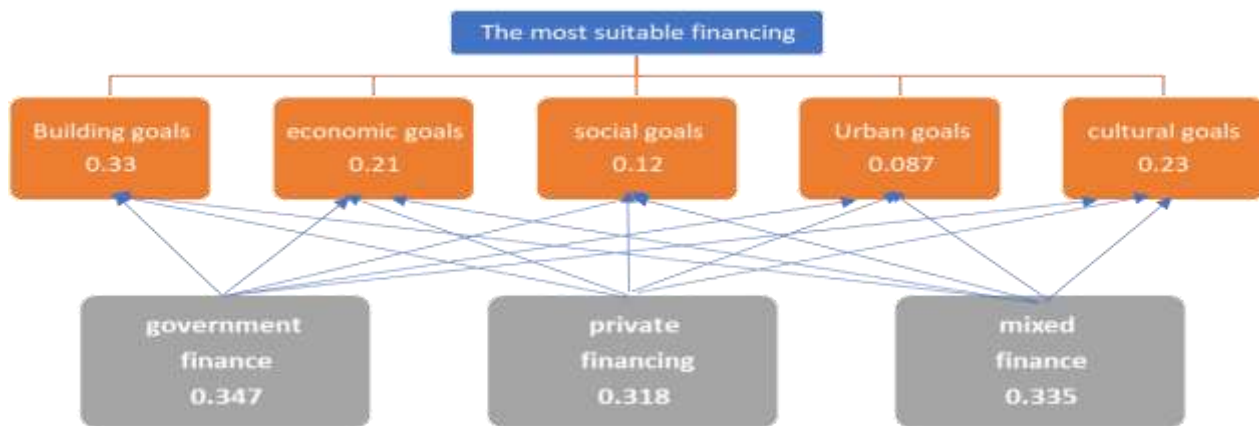
Value											
Option	R11	R12	R13	R21	R22	R23	R31	R32	R41	R42	R5
government finance	0.014	0.041	0.073	0.016	0.011	0.006	0.016	0.051	0.004	0.034	0.078
private financing	0.022	0.016	0.035	0.062	0.037	0.022	0.005	0.015	0.011	0.011	0.078
mixed finance	0.034	0.024	0.072	0.026	0.020	0.012	0.010	0.028	0.006	0.019	0.077

**Table 12** Calculate overall priorities

Option Name	Priorities
government finance	0.347
private financing	0.318
mixed finance	0.335



**Fig(13)** Funding sources priorities



Fig(14) Summary of analytic hierarchy process

#### 14. The results of the second part

The investment objectives are varied according to the type of the proposed use, which varies between economic goals, social, cultural, and urban goals, and specific goals for the building. as the results of the first phase of the analysis, which recommended using the building as an exhibition and center for free studies of plastic arts, three alternatives to funding were proposed (government funding). – Private financing - mixed financing) and as we know the orientations of each financing differed according to its goals and priorities. Therefore, a hierarchical analysis was performed that determines the most appropriate financing for the proposed use according to the desired goals of the financing as well as from the use. The results indicated the nomination of government financing, which corresponds to the cultural and social goals With the objectives of use, which ensure the sustainability of use, financing, and preservation (fig14)

#### 15. results and recommendations

The results showed that the most appropriate alternatives to reuse the palace are the Exhibition and Center for Free Studies fin art, followed in order by Museum - hotel and Office Building (Bank). Figures (10) and (11) illustrate the summary of the evaluation process. As for the appropriate financing alternatives for the proposed use, their results were as follows, in the order: government finance, mixed-finance, then private financing, as shown in Figures (13) and (14).

With the emphasis that the obtained results are suitable only for the palace building and should not be generalized to the rest of the heritage buildings, because each effect has its own data, circumstances, and independent personality that impose different criteria and therefore different alternatives

Expanding the study of criteria and alternatives helps to give more accuracy to the results, and thus the evaluation process will be better

The aim of the research is to improve the decision-making process with regard to the adaptive reuse of heritage buildings and to choose the most appropriate funding for adaptive reuse in a sequential process starting from determining values ??and then developing alternatives, followed by a hierarchical analysis process to reach the most appropriate uses and then identifying the proposed use goals and funding alternatives available for access. For the best financing for the most appropriate use, in order to achieve the objectives of the heritage, while preserving the heritage value of the building

This paper presents an appropriate MCDM tool to address the complex problems of decision-making in the re-selection of heritage buildings and methods of financing them in order to achieve more scientific results.

Understanding the heritage building is an essential and initial step. To determine the heritage value of the building and then identify the weaknesses that threaten the building and its strengths as well as its condition. This helps in a better understanding of the building and therefore. Suggesting alternatives suitable for the construction conditions, which helps in achieving a highly efficient evaluation to choose the best alternatives.

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