Identifying The Role of Project Management in Sustainable Refurbishment of Heritage Buildings.

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ABSTRACT

Cultural heritage is considered one of the major valuable resources that improve the quality of life. Therefore, protecting as well as enhancing its value through applying sustainable refurbishment process is a major challenge that needs to be properly managed. The problem is although there are a number of studies that are concerned with sustainable refurbishment, cultural heritage refurbishment management and its impact on reducing the probability of demolition remain under researched. In 2018, the UNESCO stated that 58% of the global cultural heritage buildings got demolished over the past 18 years. Moreover, in the same year, a research paper stated that there is a gap between urban development and cultural heritage conservation. Therefore, the purpose of this study is concerned with identifying the role of sustainable refurbishment management in reducing the probability of applying heritage demolishing principles that lead to facing the risk of demolition heritage buildings. In this regard, qualitative and quantities methods were used in this paper to gather secondary data (from of literature review), and preliminary data (from case studies of cultural heritage projects, and survey). Results of this paper identified the mutual relation between sustainable refurbishment principles, their relation to heritage value, and the impact of this relation on demolition principles in the form of extant literature and case studies.

KEYWORDS: Cultural heritage, Heritage demolish, Heritage refurbishment.

تحديد دور إدارة المشروعات في الترميم المستدام للمباني التراثية.

يعد التراث الثقافي واحداً من الموارد الرئيسية ذات القيمة التي تعمل على تحسين جودة الحياة. لذا، فإن الحفاظ على قيمة هذا التراث وكذا تعزيز تلك القيمة من خلال عمليات الترميم المستدامة يعد تحدياً من التحديات الأساسية التي تحتاج إلى إدارة رشيدة. فعلى الرغم من توافر عدد من الدراسات التي تولي اهتماماً بمفهوم الترميم المستدام، فلا تزال العديد من الأبحاث تجرى حول الطرق المثلى في إدارة مشروعات ترميم التراث الثقافي، وكذا حول تأثير الإدارة الجيدة لهذه المشروعات على الحد من احتمالية اللجوء إلى الهدم. ففي عام ٢٠١٨، ذكرت منظمة اليونسكو أنه تم هدم ٥٨٪ من مباني التراث الثقافي على مستوى العالم خلال الـ ١٨ عاماً الماضية. فضلاً عن أنه في العام نفسه، أكدت إحدى الدراسات تزايد الفجوة بين الزحف العمراني والحفاظ على التراث الثقافي بشكل كبير. وبناء على ذلك، تهدف هذه الدراسة إلى تحديد الدور الذي تضطلع به الإدارة الجيدة لمشروعات الترميم المستدام في الحد من احتمالية اللجوء إلى مبادئ هدم التراث، الأمر الذي يترتب عليه مواجهة خطر إضاعة مباني التراث الثقافي. وفي هذا الصدد، تستعين هذه الدراسة بالطرق الكيفية والكمية في جمع البيانات الثانوية (من مراجعة الأدبيات)، والبيانات الأولية (من دراسات الحالة الخاصة بمشروعات التراث الثقافي، ونتائج الاستبيانات. كما حددت النتائج المستخلصة من هذه الدراسة العلاقة المتبادلة بين مبادئ الترميم المستدام، وأهميتها في تعزيز قيمة التراث، وكذا أثر هذه العلاقة على مبادئ الهدم من خلال مراجعة الأدبيات ودراسات الحالة.

INTRODUCTION

Cultural heritage is one of the key challenges of enhancing the overall land value by expressing tangible and intangible values (Senthil & Ramya, 2016). Also, cultural heritage provide a better chance for understanding the urbanization process to achieve sustainable urban development (SUD) (Golinelli & Gaetano, 2015).   Therefore, demolishing cultural buildings constitutes a major danger on the lands' values and life spans. Heritage refurbishment aims to maintain and restore the original form of cultural heritage buildings without modernizing them. According to the Sustainable Local Heritage Conservation (2006), a conference was held with the aim of merging Project Management Body of Knowledge (PMBOK) and the National Historic Preservation Act (NHPA) (Hajialikhani, 2014).
It also recommended more management schemes for cultural heritage projects in terms of operations and resources.

Research Problem

In 2017, the UNESCO released statistics which showed that the number of world heritage sites at risk was 36%, and escalated to 40% in 2018 (Armsrong, 2017). Another study made by the UNESCO (2020), showed that the risk level reached 44%. Furthermore, 52% of Africa's cultural heritage buildings were recorded to be in danger (UNESCO, 2020). The stated percentage by the UNESCO from 2017 till 2020 shows that the data provided by the PMBOK and the UNESCO was not enough to save the cultural heritage, which increases the level of inefficient demolition leading to an excess in the construction wastes and the loss of cultural assets (Hajialikhani, 2014). Furthermore, only 20% of the action plans made for the stakeholder's role in achieving sustainable cultural heritage were for operation and resources with the aim of documentation rather than enhancing the project managers' soft skills (UNESCO, 2016). Therefore, the problem lies in the lack of project management competencies for the sustainable management of cultural heritage, which may lead to deformation in urban development as shown in Figure 1:

Figure 1. Embron Villa demolition in Egypt.
Source: Aggour, 2016.

Research Aim

The main aim of this paper is to analyze the importance of the role of project management for cultural heritage buildings to achieve sustainable refurbishment from the perspective of project managers and team members for the decision making process, through providing guidance for, first, the flow of work between the stakeholders and, second, the arrangement of the tasks.

1.   METHODOLOGY

The methodology used in this study is a combination of a theoretical study, represented in the literature review and an analytical study represented in the analyzed case studies of heritage buildings. Another set of data was obtained from interviews and a questionnaire with Egypt-, India-, and UK-based engineers in the field (see Figure 2).

| Methodology | Secondary data:literature review and case-studies. | Principles and processes. |
| | Preliminary data: questionnaire and interviews. | Methods of refurbishment and priorities. |
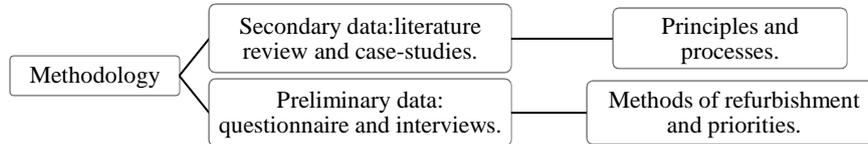
Figure 2. Methodology plan.
Source: Author.

2.   LITERATURE REVIEW

This section shows the relation between management techniques, barriers, challenges, and strategies of sustainable cultural heritage as the key factor in reducing the demolition rate of cultural heritage after analyzing the principles, levels, and factors of cultural heritage. The timeline in Figure 3, which is drawn from previous literature, briefly shows how heritage approaches were developed from 2004 till 2019 (See fig.3).

Figure 3. Timeline.
Source: Author.

2.1   Sustainable Cultural Heritage

2016
- making a list that define whether it's a heritage or not.
(model building Bye-laws, 2016)).

2007
- Risks of CH in Challenges in H conservation sites. (Hajialikhani, (2007)).
- Principles for making demolition for HB. (challis A., et al. (2007)).
- Types and levels of demolishing for HB. (Victorian Government Department, (2007)).

2013
- Sustainable heritage conservation. (Model Building Bye-laws, (2013)).
- Strategy for sustainable restoration of CH. (Elnokaly A. (2013)).
- Factors for deteriorating HB. (Morandotti M. (2013)).

- building laws for Keeping or demolishing some of the heritage investments. (Nassar D,(2016)).
- investigates different definitions of "early phase" and what the project should contain. (Lund O. (2016)).
- investigate why people demolish existing buildings. (ICE, (2016)).

2018
- benefits of CH in relation to the TBL, to protect them. (European parliament (2017)).
- National Scenarios for partial demolition of CH and their impacts. (Groizard J. (2018)).

2004
- integration between heritage conservation with SD. (NSW heritage office, (2004)).

2009
- Challenges and strategies facing SH in 21 century. (Cassar M. (2009)).

2006
- managing CH. (Hajialikhani M.(2006)).
- Role of CH to enhance SD. (Gražulevičiūtė I. (2006)).
- integration between the CH and sustainability in heritage. (Vileniske I. (2006)).

2008
- National codes and standards for defining and protecting HB. (NOUH (2008)).
- principles for HM. (Kammeier H. (2008)).
- Principles for applying sustainable refurbishment. (MICKAITYTĖ A. (2008)).

2015
- Gov. Theories and TT for cultural heritage. (Golinelli G. (2015)).
- Policy Document for SD Perspective the World Heritage Convention from the UNESCO. (UNESCO, (2015)).
- Role of Heritage conservation and SD. (Shetabi L. (2015)).
- Enhance stakeholder's skills to reach effective management. (Haribar M. (2015)).
- Identify (drivers , barriers ,challenges) of refurbishment alongside design. (Winiwarter V. (2015)).

2017
- Barriers affecting cultural heritage. (Sae-Wang R., (2017)).
- technologies and skills needed to cope with CH. (Alivizatou-Barakou M. et al., (2017)).
- Methods for managing sustainable CH. (Guzmán, (2017)).

2019
- Identification of appropriate assessment themes and sub-themes for the refurbishment and improvement of heritage buildings. (Hamzah N. (2019)).

According to Loulanski (2011), proposed the first framework for sustainable integration in cultural heritage in terms of needs and barriers that support the community rights in enhancing the value of the area rather than focusing on individual profit making. She also classified cultural heritage in terms of benefits, equity, and diversity as follows (Loulanski, 2011):

A. *Tangible Assets:* which are assets that have long-term physical existence and property that can be touched such as land, building, and equipment.
B. *Intangible Assets:* which are assets that do not have physical existence. To illustrate, these assets cannot be seen, touched, or felt such as copyrights and trademarks.
C. *Intergenerational Approach:* which refers to what the present generation owes to future generations and the obligation of the present generation to compensate for the wrongs done by the past generations.
D. *Intragenerational Approach:* which refers to the moral obligation of not causing harm to the neighboring state.

In 2015, the UNESCO amended its environmental and artificial policies; this enhanced the value of sustainable cultural heritage that acts as international codes for issues related to the heritage in terms of balancing the dimensions of sustainable development (UNESCO, 2015). In the same year Winiwater (2015), introduced 8 criteria that identify a place or a building as a heritage property. For a place or a building to be considered as such, it should meet one of the following descriptions:

- A masterpiece that reflects human creativity.
- A place or space that enhances human value in various scales such as monumental art and town planning.
- The last element remaining from a certain culture that existed in a particular area.
- An outstanding building, design, or technology which illustrates significant state for human history.
- A feature that reflects traditions, ideas, and historic work.
- Special natural phenomenon that is considered a remarkable beauty with an aesthetic appearance.
- A unique feature either man made or natural (landform, geographic, or geometric form).
- A feature that represents an evolution in ecosystem, either marine or land.

2.2   Categorization of Built Heritage from National and International Perspectives

In 2013, a handbook, *Conservation of Heritage Buildings*, was released with the aim of grading and listing heritage levels and conditions. These levels are interrelated as illustrated in the following graph (see Figure 4) (Model Building Bye-laws, 2013):

level I: national

level II: local.

level III: townscape.
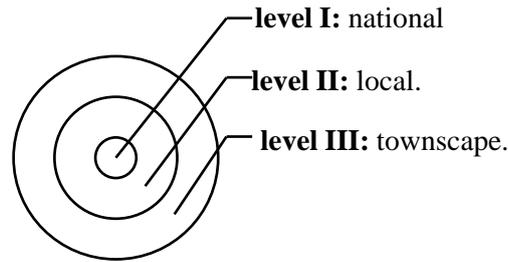
Figure 4. Levels of heritage.
Source: Model building bye-laws, 2013.

There are different levels and limitations for the changes in the scale. All levels of change require governmental approval, but each level allows for a limited change level. These levels can be classified as follows (Elnokaly & Elseragy, 2013):

- *Grade I:* No changes are allowed. Materials similar to the ones used in the building are only allowed for maintenance, yet with restrictions.
- *Grade II:* Internal changes and additions are allowed to enhance adaptive reuse. Additions should be in harmony with the existing condition.
- *Grade III:* Internal changes and additions are allowed to enhance adaptive reuse at a larger scale, adding extensions to the building.

Egypt has a variety of heritage buildings that were constructed in different epochs with differential architectural styles. According to Khodeir et al. (2016), the National Organization of Urban Harmony classified built heritage into three categories, as follows:

- *Level 'A':* Limited internal and external modifications.
- *Level 'B':* Medium flexibility; permissions are given for more internal modifications.
- *Level 'C':* Maximum flexibility; internal architectural design can be destroyed and rebuilt, but the external elevation must be kept.

2.3　　Levels and Approaches for Bridging Cultural Heritage Conservation with Urban Development

In 2014, Guzman et al. defined three levels for Urban Development (UD) monitoring and Cultural Heritage (CH) based on reviewing 19 international reports. The levels are demonstrated as follows (see Figure 5 and Figure 6) (Guzman et al., 2018):

Level1:	Level 2:	Level 3:
• Strategic level: recommendations to integrate heritage conservation in urban planning and policies.	• Operational level: by referencing the integration of heritage conservation and urban planning as best practice.	• Cultural heritage within themes and categories.
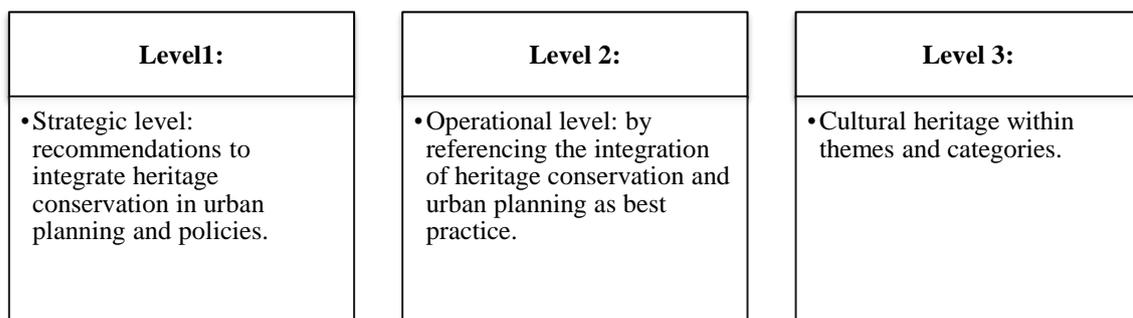
Figure 5. Levels of bridging UD and CH.
Source: Guzman et al, 2018.

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Therefore, the main focus shall be on Level 1 in order to recommend integration based on in-depth analysis for managing sustainable cultural heritage. Moreover, the recommended integration needs to define the stakeholders involved and their exact roles (Golinelli & Gaetano, 2015). According to Guzman et al. (2018), the approaches for reducing the gap between UD and CH based on 27 common indicators released from analyzing 69 world heritage cities, using the UNESCO State of the Conservation Reporting System. The approaches are represented as follows (Guzman et al., 2018):

Trends on the assesment of cultural heritage managment in urban context:	**Use of common sustainable development indicators.**	**Current moitoring tools for world CH in urban context.**
• Focus on understanding the heritage by analyzing value, settings, and context. • Implement social and economical participation.	• Focus on applying Triple Bottom Line (TBL) in dealing with the challenges facing the levels.	• Define the available guidance for making the balance between CH and UD . • Make integrating for all the tools will be used to reach efficient decisions.

Figure 6. Approaches of bridging UD and CH.
Source: Guzman et al, 2017.

Results from these approaches showed that cultural heritage buildings/places are considered assets in urban development in the process of city planning or development. Therefore, demolishing cultural heritage buildings leads to the loss of the urban context of the city (Guzman et al., 2014).

2.4   Managing Sustainable Cultural Heritage

Heritage management is an essential process as it entails conservation and restoration of both historical and architectural features through identification, interpretation, and maintenance, while keeping a balance between modern urbanization and the character of such heritage places to preserve the value of the city (Senthil et al., 2016).

2.4.1 Approaches of Negative Risks (Threats)

There are consequent principles developed to reduce the negative risks (see Figure 7) that may result in the loss of some cultural heritage features (Hajialikhani, 2014).

Avoid	Eliminating the threat posed by an adverse risk, isolating the objectives from the risk's impact, or relaxing the object that is in jeopardy, clarifying requirements, obtaining information, improving communication, or acquiring expertise.
Transfer	Requires shifting the negative impact of a threat and the ownership of the response to a third party and does not eliminate it.
Mitigate	Implies a reduction in the probability and/or the impact of an adverse risk event to an acceptable threshold, Adopting less complex processes, conducting more tests, or choosing a more stable supplier.

Figure 7. Negative risks.
Source: Hajialikhani, 2007.

2.4.2 Approaches for Positive Risks (Opportunities)

Consequent principles were developed to enhance the positive risks (see Figure 8) that form opportunities which lead to the enhancement of the cultural heritage features (Hajialikhani, 2014).

Exploit	Responses that include assigning more talented resources to the project to reduce the time of completion, or to provide better quality than what was originally planned.
Share	Allocating ownership to a third party who is best able to capture the opportunity for the benefit of the project, include forming risk-sharing partnerships, teams, or joint ventures.
Enhance	Modifies the "size" of an opportunity by increasing probability and/or positive impacts, and by identifying and maximizing the key drivers of these positive-impact risks.

Figure 8. Positive risks.
Source: Hajialikhani, 2007.

According to Golinelli & Gaetano (2015), a new term was defined; namely, Triple Target (TT) for cultural heritage viability for cultural heritage governance. Triple target involves three processes as follows: conservation, protection, and enhancement. The focus shifts from the object to the context through these three processes (Golinelli & Gaetano, 2015). In 2017, the UNESCO proposed guidelines that identify the features and that factors that determine whether a heritage place is in a critical level or in danger. These factors are divided into major and supplementary factors (see Figure 9) (UNESCO, 2017).
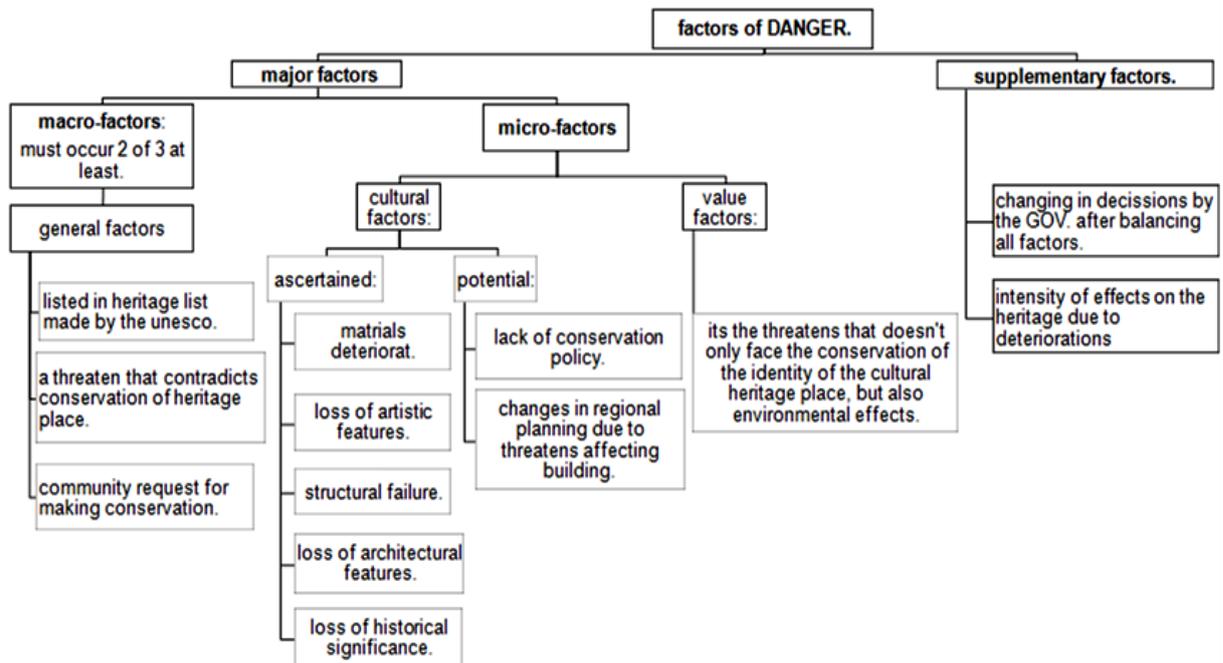
Figure 9. Breaking down the factors of 'in danger' heritage sites.
Source: UNESCO, 2017: Author after.

2.5   Demolition of Cultural Heritage

Even though developing buildings is considered a crucial decision from the perspective of sustainable approaches to achieve the Triple Bottom Line (TBL), save embodied energy, and enhance the importance of the building within a local, a national, or a global context (Challis, 2007).

Some developers still prefer demolition as a process of "sweeping away old features" to construct new buildings with modern approaches to create buildings with highly economic value and to reduce technical difficulties (Challis, 2007). In 2007, New Zealand Historic Place Trust (NZHPT) defined the principles of heritage demolition and their effect on future generations and resources, through documentations, reuse, and maintenance as follows (Challis, 2007):

A. *Short-term convenient solution:* which destroys the significance of the place and the opportunity for future generations to appreciate the place and its value.

B. *Scarcity in sustainable management:* which contributes to waste disposal issues that may already be problematic.

C. *Demolition or removal of historical buildings:* this happens in very rare circumstances where it is imperative for the survival and the reuse of the greater portion of the site.

D. *To demolish:* demolition should be encouraged in case repair, maintenance work, and maintenance plans are impossible.

E. *Engineering reports:* which include economic feasibility and options as well as advanced evidence before demolition proposals.

F. *Record and documentation:* of any building or structure that will be demolished after and during the demolition process**.**

2.6   Sustainable Refurbishment as a Solution for Heritage Demolishing

according to Heinonen et al. (2011), "refurbishment is needed due to the age of the existing building stock, the need to decrease the energy demand of existing buildings, infill development to limit urban sprawl and social issues in the need for rapid sustainable solutions: urban renewal" (p. 14). Figure 10 shows the differences between new and already existing buildings in terms of emission release (Heinonen et al., 2011).
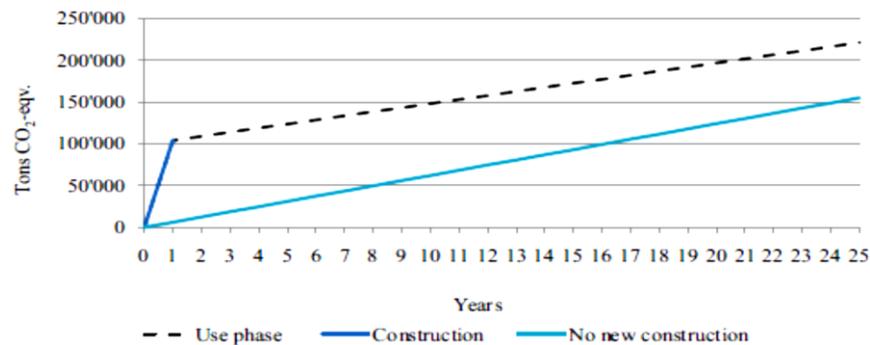

Figure 10. The differences between new and refurbished buildings in emissions release.
Source: Heinonen et al., 2011.

According to Haribar et al. (2015), explained that the barriers for applying refurbishment are the lack of top-level commitment, the lack of skilled individuals, and the lack of cooperation among department members, which lead to the scarcity in achieving sustainability. To address these challenges, 'healthy housing' needs to be adopted. It involves the following aspects (Haribar et al., 2015):

- Physical entity.
- Sense of the place.
- Surrounding environment.
- Feeling of neighbourhood.

According to Lund et al. (2016), suggested that to create a sustainable balance and integration between designs and building refurbishment, principles should be applied starting from the initial idea till the implementation phase to make efficient decisions, especially in public buildings. The principles are as follows (Lund et al., 2016).

- *Collection:* It refers to collecting information about purposes, tasks, and results to detect the problem, whether in physical deprecation, requirements failure, or inadequate application of standards. This phase aims at providing information about general energy saving, technical innovative technologies, and refurbishment costs.
- *Decision:* Analysis and decision making are complicated because of many possible alternatives in projection, construction, and usage stages presented in the form of evaluation criteria and distinguishing alternatives. This process should be implemented while taking into consideration the stakeholders in order to propose the best practice and project strengths and weaknesses.
- *Selection:* This phase focuses on selecting correct alternatives, evaluating of expected results to make the best final decisions, and choosing methods that implement multiple criteria based on expert's decisions.

- *Implementation:* It is the last phase when the decisions are transferred to implementers who examine the best alternative selections.

Furthermore, Lund proposed some guidance to achieve sustainable management refurbishment (see Figure 11). This guidance aimed to have a defined start and end time for each step to (1) support forming the needed comprehensive study before making decisions or taking actions for any refurbishment that is based on early expectations related to building failures, (2) give the performing stakeholders a more secure fundament for the further work, and (3) lower the uncertainty concerning the economic framework (Lund et al., 2016).
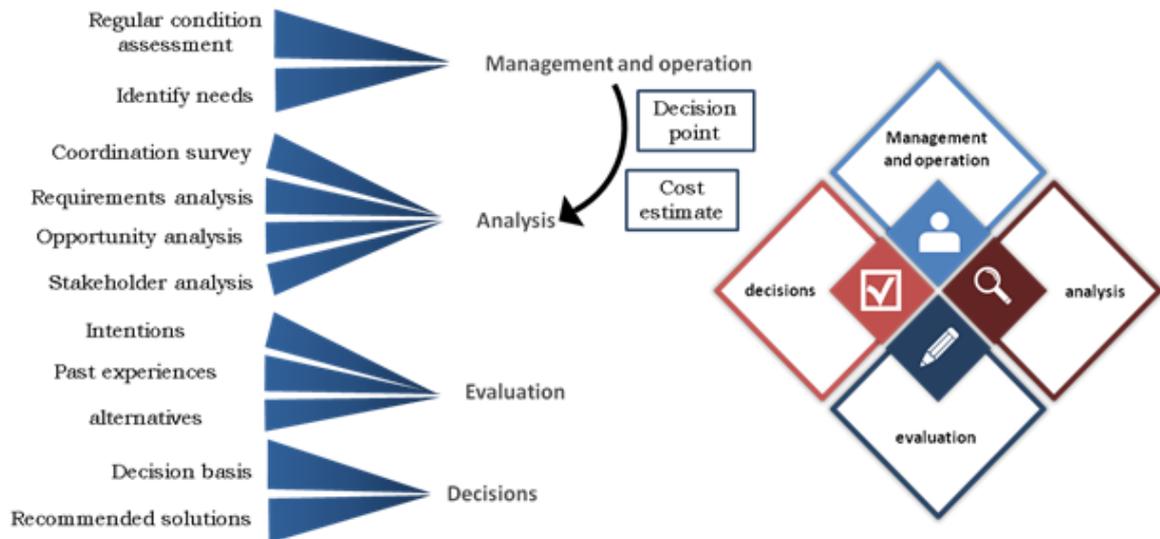
Figure 11. Proposal guidance principles to achieve sustainable management refurbishment.
Source: Lund et al., 2016. Author after.

Also, based on the same study, the stakeholders who are involved in this process are as follows: Building owner(s), Architect, Consultant, Contractor, and Researcher (Lund et al., 2016).
The literature review aimed to explain the cultural heritage by defining heritage value techniques, sustainable refurbishment barriers, heritage management challenges, and principles heritage demolish, to be baseline for making case studies analysis and forming the survey.

3.   ANALYSIS OF CASE STUDIES

By analyzing national, regional, and international case studies in this paper, a practical perspective, together with a theoretical account, is ensured.

3.1 Case Studies and Examples Justifications

- The main scope of case studies is in Africa, as it occupies the second rank among countries under the threat of losing heritage buildings (Armsrong, 2017).
- All cases focus on the value and identities of heritage from the aesthetic perspective not from the simulations or the energy efficiency perspective.

3.2   Example 1: SAHRIS Management System in South Africa

SAHRIS system is a tool that focuses on recording what are currently known or approved as 'heritage' places, whether these are tangible or intangible heritage resources, and records them in the form of reports for online documentation (Smuts & Mlungwana, 2016). This documentation supports the INTERPOL in its combat of heritage crime by providing access to a database that enables them to return stolen items (Smuts & Mlungwana, 2016). The following are the policies based on which the SAHRIS system was formed (see Figure 12):
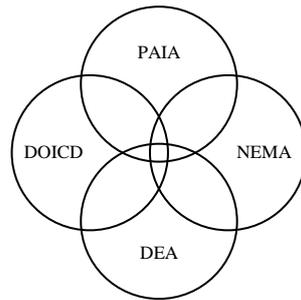
Figure 12. Baseline of SAHRIS.
Source: Smuts & Mlungwana, 2016.

- Promotion of Access to Information Act (PAIA).
- National Environmental Management Act (NEMA).
- Department of Environmental Affairs (DEA).
- Department of Justice and Constitutional Development (DOICD).

This system is created by project managers and web developers. It supports the public involvement in decision making through two approaches: CCYSA licenses and FOSS application. SAHRIS aims to support heritage management system through four major pillars (see Figure13) (Smuts & Mlungwana ,2016).

Integrated heritage managment system:
- Managing heritage decisions and authorities concerning the EIA and EA in form of reports documented and uploaded to the system.
- Providing opportunities for the public participants to be involved in decision making via online regestration using free accounts.

National heritage sites repository:
- Conducting a survey that works on having a map that shows the sensitive places in terms of geological aspect.

National collections managment system:
- Small scale of security for heritage buildings that traces the monuments methods of conservation and their transportation from city to another.

Centralized heritage crime database:
- Making sure that the monuments have been transfered from one place to another have not loss their originality or got stolen.
- Collaborating with the INTERPOL to have a database for the stolen peices and their history.

Figure 13. Pillars of SAHRIS.
Source: Smuts & Mlungwana, 2016.

3.2.1 Results from Applying the 4 Pillars

In December 2015, 8020 heritage cases were reported and uploaded to the application, 26,195 heritage objects were introduced to the system, and 260 heritage monuments were recognized as stolen and illegally transported from one city to another (Smuts & Mlungwana, 2016).

3.3   Example 2: Cities of old Djenne-Mali in Africa

Djenne-Mali is considered one of top 7 historic cities in Sub-Saharan Africa. The problems this place is facing are conservation and management planning, lack of comprehensive strategies, and lack of appropriate mechanism to apply the term of 'continuity' (see Figure 14) in order to achieve ongoing process of 'nesting' values (Juma, 2010.)
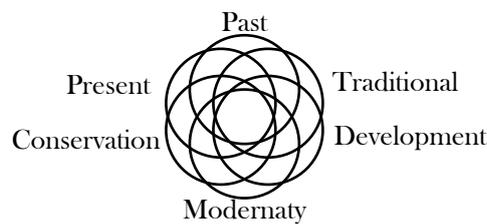
Figure 14. Principle of continuity.
Source: Juma, 2010.

The UNESCO and the Direction Nationale du Patrimoine Culturel (DNPC) have cooperated through data gathering and historical site analysis since 2005 (Juma, 2010). They released statistics to analyze the rate of internal resources and tourism growth and made reports for the dynamic and socioeconomic management plans (Juma, 2010).

The main aim was to provide technical assistance to stakeholders in order to help them implement the developing plans (see Figure 15). The UNESCO and DNPC developed guidelines to manage the refurbishment process (Juma, 2010).

Effects of changes.

By team:

Aim to report and docoment the state of conservation, and to make priliminary data gathering by making observation for PROS and CONS that consider to be a factor for applying planning regulations.

Factors that are observed are:
1- Tourism rate.
2- Construction state.
3- Changes in the urban fabric.
4- Climate effect.
5- Vanalism rate.

Resolution stratigies.

By stakeholders:

Aim to have step for preparation and coping the heritage with the development of conservation of place inform of structure for addoption.

Need a higher level of competence and technical skilled stakeholders, to infor the people with their roles.

Settelment stratigies to frame level.

By public:

Aim to enhance public level of knowledge and awareness in order to make them understand the regulations and its aim in order to accept it.

Figure 15. DNPC guidance.
Source: Juma, 2010.

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The results of the guidelines show the role of each member in the planning process for the heritage management refurbishment. However, they did not focus on how to apply these findings to a specific building or how to break these guidance down into elements to be sustainably refurbished (Juma, 2010).

4.   INTERVIEWS AND QUESTIONNAIRE

4.1   Justification of Methodology

As a method of gathering preliminary data, conducting interviews helped in facilitating discussions with highly qualified experts in heritage culture all over the world. Moreover, designing a questionnaire allowed for a fast-paced information gathering across many countries. Some of the interviewees worked in similar issues either as individual team members or as project managers in the UNESCO.

4.2   Interviewee and Questionnaire Sample Selection:

The final number of the selected sample was 50 interviewees. The interviewees' selection process and the distribution of the questionnaire were based on the following criteria:

- *Targeted continents:* Asia, Europe, and Africa.
- *Targeted type of specialists:* architects, civil engineers, and conservators who have previous experience in heritage refurbishment projects or heritage demolishing projects (full or partial demolish) for cultural heritage buildings.
- *Job title:* team member or project manager.

4.3   Data Analysis

Interview questions covered the two main categories of the paper which are the refurbishment principles and the demolishing conditions principles. They also discussed the methods and techniques of applying the refurbishment and its reasons; the most common damages to each building element based on its type; the critical level of refurbishment process for each building element; the role of heritage refurbishment in enhancing the value of the building and reducing the probability of demolishing. The survey questionnaire included qualitative and quantitative elements.

The main aim of the questionnaire was to assess both stages of the sustainable refurbishment process as whole and as separate elements in order to integrate demolition reasons within sustainable refurbishment, enhance building value, and reduce demolition probability. The findings of the questionnaire showed that the highest rate of people getting involved in heritage refurbishment and demolishing are recent graduates, which means that this field has recently caught attention. It could also mean that the expertise in this field is not enough to deal with all the available heritage buildings. The following figure shows respondent types and experience (see Figure 16).
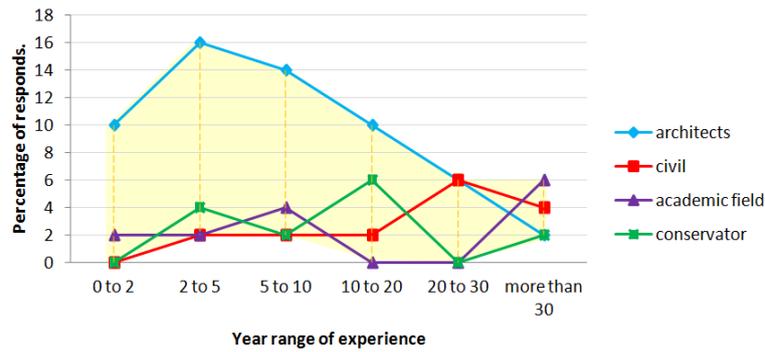
Figure 16. Rate of response; relation between major of work and years of experience.
Source: Author.

Concerning the responses to the levels of knowledge and experience in heritage refurbishment and heritage demolishing project in terms of continent-scale, Figure 17 shows that Africa is the most experienced continent in heritage refurbishment and heritage demolition.
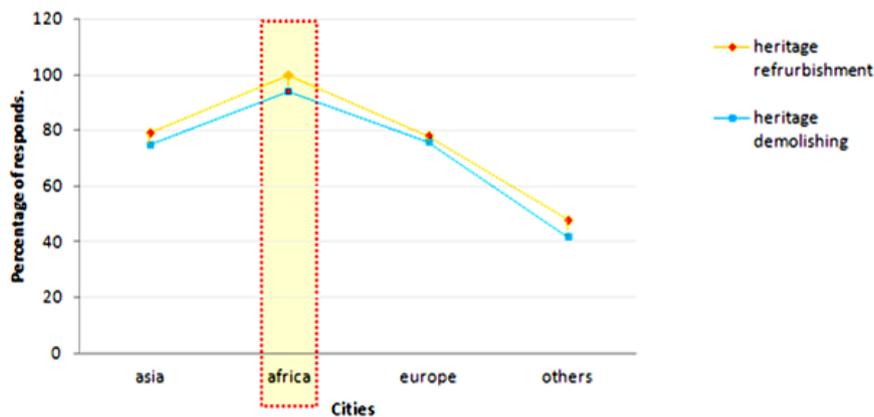

Figure 17. Rate of response; relation between heritage refurbishment and heritage demolishing work experience in macro-scale.
Source: Author.

On a smaller scale in Africa, Egypt is considered the most experienced country when it comes to heritage refurbishment and heritage demolition (see Figure 18).
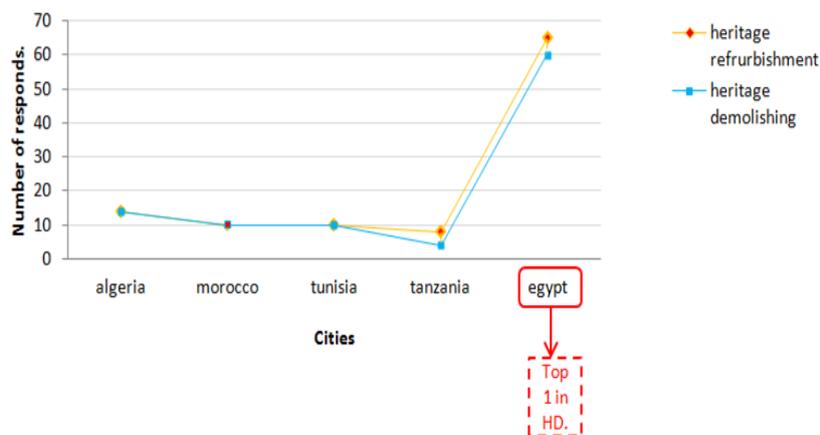
Figure 18. Rate of response; relation between heritage refurbishment and heritage demolition work experience in micro-scale.
Source: Author.

Heritage experts have been categorized based on the discussed analysis as follows: a junior expert would have 0 to 10 years of experience and a senior expert would have 10 to 30 or more years of experience (see Figure 19). Junior experts preferred to have work experience in heritage refurbishment and demolition equally, to get the maximum knowledge about both situations, and, in the future, to learn how to avoid reaching the demolition level for heritage building by enhancing the process of refurbishment.
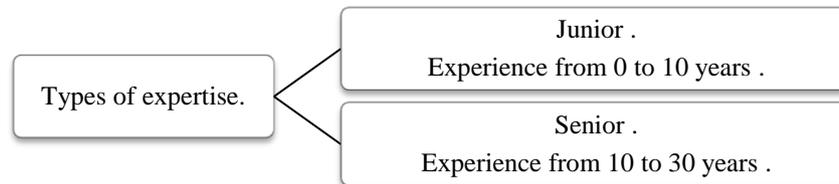
Figure 19. Types of expertise.
Source: Author.

Therefore, when heritage professionals become seniors, they get more involved in less heritage demolition projects as they only monitor the process and provide guidance concerning the demolition type and level. Most junior experts are architects. However, it can be noticed that architects with more experience are mostly conservators and civil engineers. It could be argued that experienced architects are capable of creating various scenarios to understand and appreciate the value of heritage buildings. Therefore, they need more work and focus on the technicalities of the application of refurbishment materials and their compositions to be both sustainable and suitable.

Furthermore, results show that there are two types of experts: junior and senior; junior professionals pay more attention to the structural elements and the stability of the building. The more experience the junior professionals gain, the more their focus on non-structural elements is enhanced. It can be inferred that experience helps professionals appreciate the aesthetic and heritage value of such buildings. Both junior and senior experts agree that phase 1 in the refurbishment process is the most important one because the success of all the upcoming steps depends on this phase.

The most challenging barrier that may hinder the accomplishment of heritage refurbishment mission and may even increase demolition probability is the human factor due to the lack of knowledge and awareness and scarcity in skills. Based on the classification made by the UNESCO for the risks facing heritage buildings, the questionnaire findings show an elaboration for the factors of barriers (see Figure 20). The results were assessed based on a selection from the respondents.

The results showed that the most common barrier is the human factor. Challenges can be classified into quantitative barriers and qualitative barriers, with knowledge and awareness as the most common qualitative barrier. Consequently, the findings indicated that the data obtained from the interviews show the steps of the cyclical process of sustainable heritage refurbishment achieved by managers and team members. The data also showed the techniques of refurbishing for each heritage building element and the causes of damage, which will be summarized in a diagram of quantitative and qualitative barriers.
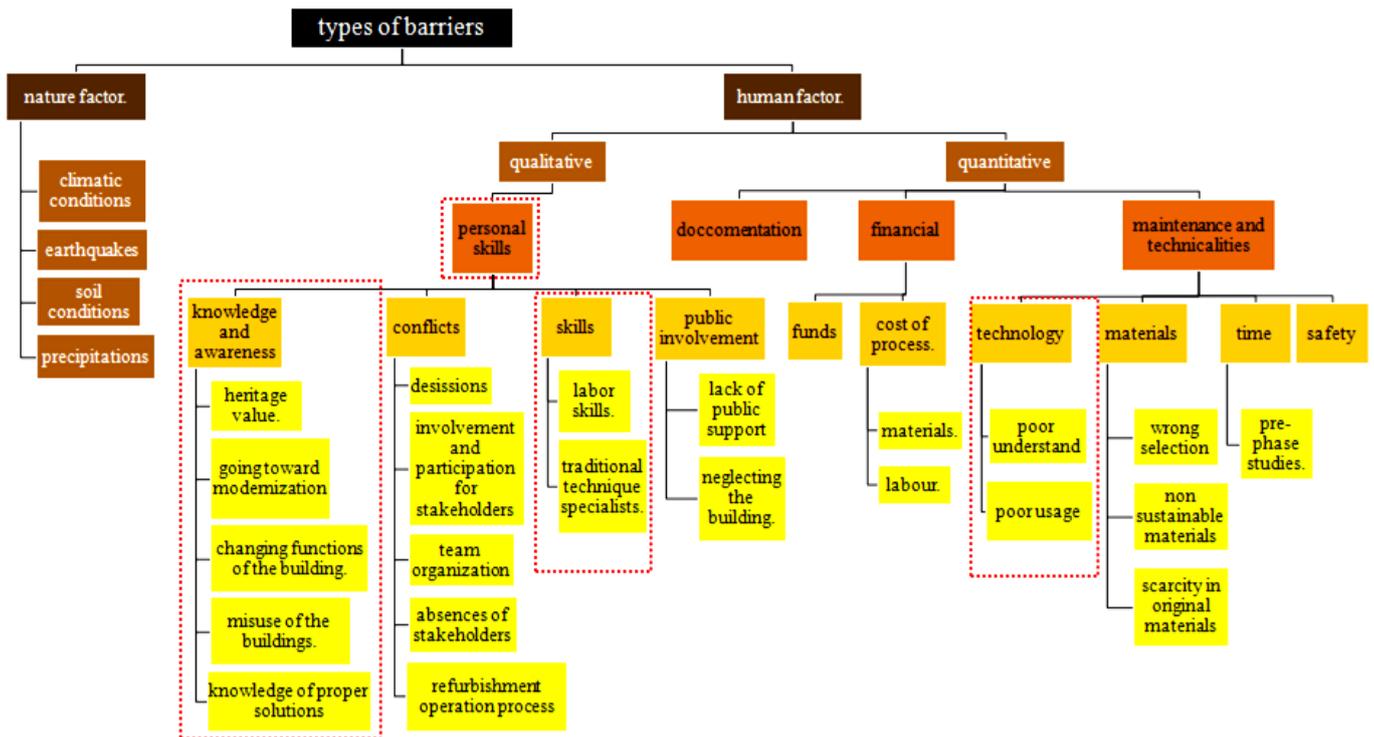
Figure 20. Findings of interviews.
Source: Author.

In the management cyclical process of heritage projects, although reporting the performance of the workers in accomplishing tasks and in their relation with managers is essential in construction management, there is a gap between workers and reporters.

5.   PAPER FINDINGS

Findings of this literature have shown that the highest percentage of papers that tackled the topic of sustainable heritage management was focused in Italy and Australia. This could be attributed to the fact that both Egypt and India have a higher percentage of heritage demolition due to the inadequate awareness and poor skills in refurbishing heritage buildings as well as the lack of clear guidance on defining a building as heritage.
Therefore, it is essential to halt any demolition processes before turning to the next step of sustainable refurbishment.
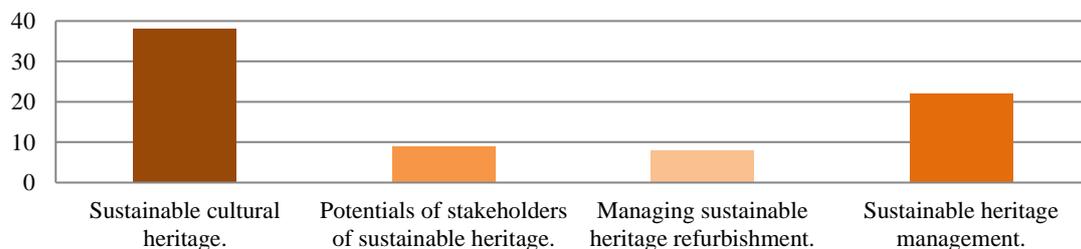
Figure 21. Covered percentage of each topic.
Source: Author.

Figure 21 reflects the percentage of the reviewed research papers and articles through the available analytical studies. It also shows a breakdown of the percentages of covered issues. The figure shows that the least covered topics are cultural heritage demolition, ways to stop heritage demolition, and sustainable refurbishment management.
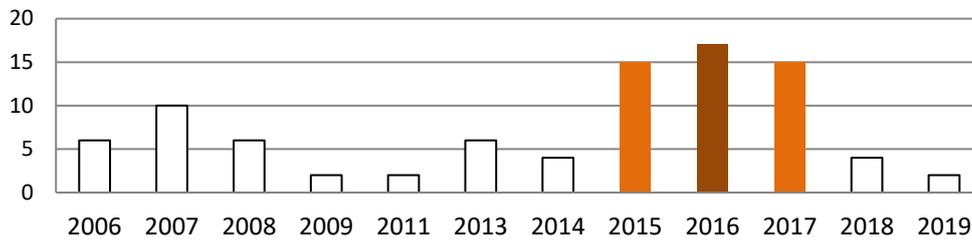

Figure 22. Annual covered percentage.
Source: Author.

As shown in Figure 22, the heritage issue was developed in the period between 2006 and 2019, but the heritage approaches became more prominent between 2015 and 2017, wherein 2015 the Triple Target Principle for Cultural Heritage was released. In 2016, a list which identifies a place as heritage was developed. In 2017, the needed technologies and skills to cope with cultural heritage were researched. As shown in Figure 23, the findings of the examples showed that Example 2 achieved a higher rate of sustainable management and reduction of heritage demolishing.
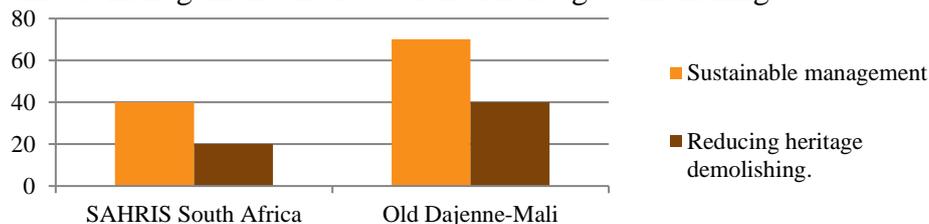
Figure 23. Rate of coverage of approaches.
Source: Author.

In order to link the findings of the literature review with the findings of the case studies, Table 1 shows the approaches that have been used in accomplishing the heritage refurbishment process and the reduction of heritage demolition.

Table 1. Comparison of findings for the examples.

Sustainable Management.		Reduction of Heritage Demolition.	
Example 1	**Example 2**	**Example 1**	**Example 2**
Did not discuss other aspects such as participant competencies and the reliability of shared information through online application.	Created a balance between heritage conservation and enhancement of socio-economic and cultural development.	Focused on security and documentation using reports and GIS maps.	It minimized the decentralization and lack of expertise.
Another missing area is whether participants are qualified to take part in the leading decision making.	This can be introduced to future sustainable heritage refurbishment professionals to make them believe in the importance of sustainability implementation.	Protection of elements and places that have already been recognized as heritage with special focus on small scales such as museums.	Worked on enhancing communication and training.

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	This guidance supports setting a backup plan which defines tasks assigned to laborers based on conservation management plan and heritage development plan.	The risk this application may pose is the lack of acknowledgment of some highly iconic places and elements which reflect the identity of certain architectural styles.	Applied the aforementioned guidance that showed the importance, method, and philosophy of planning regulations for heritage places.

Source: Author.

Based on national and international interviews conducted with various levels of experts in such field, a comparison between the national and international techniques for refurbishing the heritage building elements has been made (see Table 2). Also, since the literature review mentioned the general heritage risk factors, Table 2 shows the similarities and differences between the national and international refurbishment from the perspective of the common risk factors leading to heritage demolition that faces each of them on the scale of heritage building elements (see Table 2). The following heritage building elements in the table are the highest elements from three category elements (i.e., structural, non-structural, and completion) that shall be taken into consideration in this process.

Table 2. Similarities and differences between the national and international heritage refurbishment methods.

Building elements	Similarities	National differences	International differences
Walls	- Similar used material. - Material deterioration due to climatic conditions. - Artistic value of wall is at major risk due to cracks' levels. - Structural failure is a major risk.	- Focus search on the reason of the problem. Prefer to keep trying all the possible refurbishing solutions. - Risk of architectural features due to natural factors. - Preferring to use the original building materials in the refurbishment process. - Structural problems resulting from human factors.	- Focus search on problem solving. - Prefer to make replacement and replica. - Risk of architectural features stems from human factors. - Prefer to use new materials in the refurbishment process. - Structural problems stem from natural factors.
Columns	- Material deterioration due to natural factors. - Use of similar material: stones, marble, and granite.	- Loss of architectural features from natural and human factors. - Structural failure from natural factors.	- Loss of architectural features due to human factors and managerial aspects.
Stairs	- Material deterioration, loss of architectural features, and risk of losing the historical essence due to climatic conditions. - Structural failure mainly due to natural factors.	- Different materials. - Structural failure due to natural factors.	

Floors	- Use one same material: Stones. - Material deterioration and loss of architectural features due to climatic conditions.	- Material used: Marble.	- Materials used: mud and straw mix. - Material deterioration and risk of loss historical significance due to human factors.	
Foundations	- Material deterioration and structural damage due to climatic conditions.		-Different materials.	
Monuments	- Both face the risk of artistic features loss due to climatic conditions.		- Loss of artistic features and historic significance due to human factors.	- Loss of artistic features and historic significance due to natural factors.
Flat roofs	- Material deterioration and structural damage from climatic conditions. - Use of same material: wood. - Structural damage from nature factors.		- Structural damage from insects. - Paying attention to the loss of artistic features due to human factors.	- Structural damage due to floods.

Source: Author.

6.   CONCLUSION AND RECOMMENDATION

Thus, the paper shows that the human factor is the greatest barrier facing the heritage refurbishment process due to the scarcity of the needed efficient personal skills for analyzing the importance of the role of project management to make sustainable refurbishment for cultural heritage buildings. Therefore, it is essential for the field experts to choose the convenient methods of refurbishment that best suit the situation and reduce the gaps between stakeholders in the management process. This will help the project managers and team members in the decision making process through providing guidance for the flow of work between stakeholders and the arrangement of tasks.
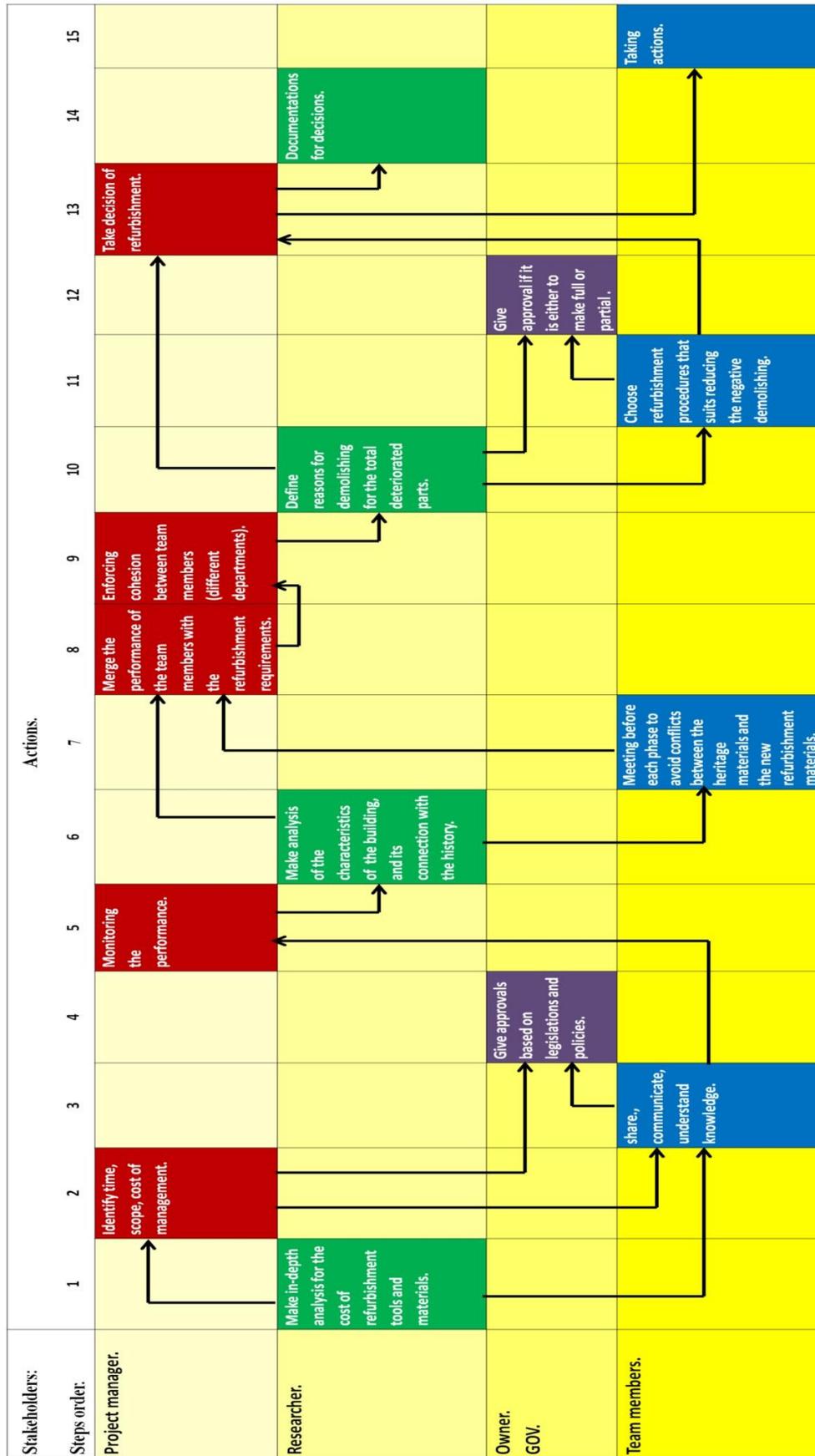
Figure 24. Matrix of work flow between stakeholders for cultural heritage buildings.

Figure 24 shows the flow of work between the stakeholders and the arrangement of tasks, where the arrows reflect the direction of the flow of the needed steps to be prosecuted in order. The figure also shows the flow of work between the stakeholders in achieving each step to apply the following approaches.

- Determine if the building/place is of a heritage value or not (from the heritage principles) before taking the decision of refurbishment.
- Determine to what extent the changes are allowed to make refurbishment without overly modernizing the building.
- Define the level of danger facing the current state of the building before taking any action for refurbishment.
- Analyze the type of risk facing the building whether it is a positive risk or a negative one, before taking the decision of demolition.
- When taking the decision of heritage demolishing, in-depth analysis shall be made to determine the needed level of demolition (partial or full).
- Enhance having a closed cycle of information and reporting between all the stakeholders who are involved in this process through having a web-based system.
- Enhance the achievement of the different refurbishment approaches through public participation.

Stakeholders involved in each process/phase of managing sustainable refurbishment for heritage buildings should achieve long-term benefits such as Triple Target (TT) and Triple Bottom Line (TBL) (see Figure 25).
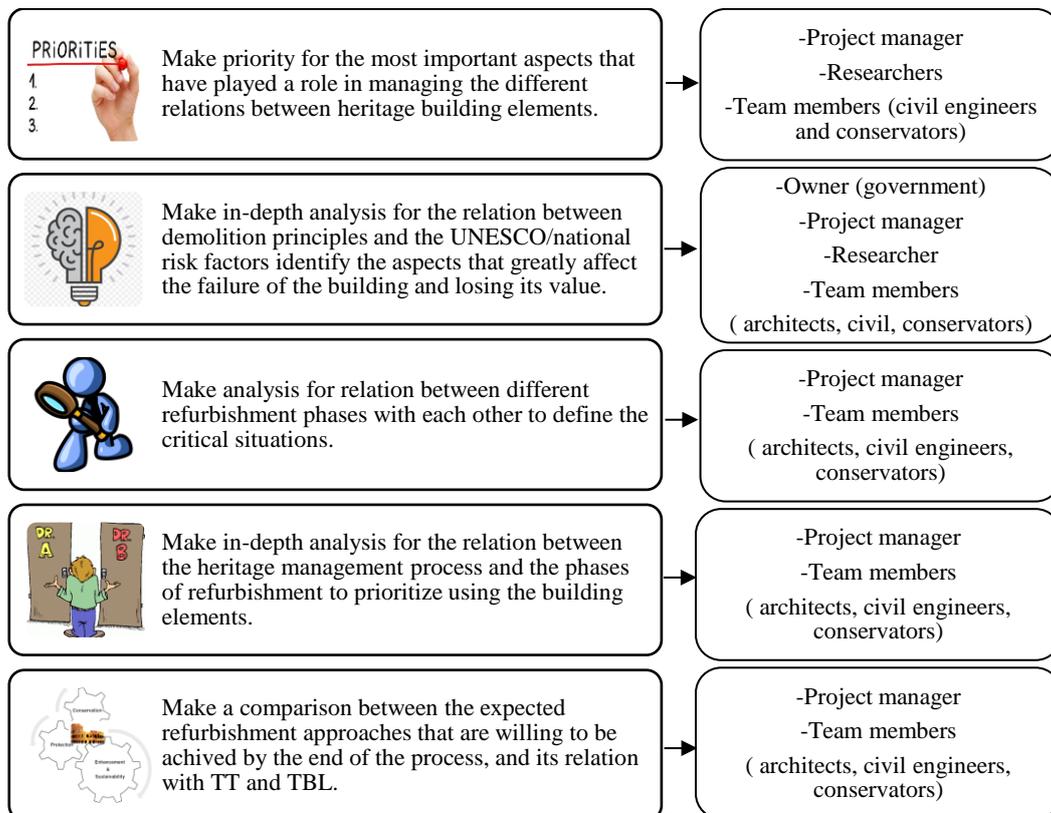

Figure 25. Guidance for the role of project management on heritage refurbishment.

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