



# A Comprehensive Review of Risks Associated with Adaptive Reuse and their Potential Impact on Heritage Buildings in the Egyptian Context

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**Abstract:** Heritage buildings are regarded as vulnerable assets. For decades, in the Egyptian context, they have been subjected to multiple issues and risks that are interrelated in nature. These risks have consequently led to the vacancy, degradation, and sometimes demolition, of a large amount of heritage building stock. Hence, opportunities are wasted to utilize these buildings efficiently as part of the urban environment and to preserve them for future generations. A common approach for heritage conservation is adaptive reuse, which has proven to be a sustainable, yet a risky approach utilized in Egypt and several countries to conserve heritage buildings. Despite adaptive reuse being a widely used approach, risk taxonomies are scarcely found for it in the heritage conservation literature. ‘Taxonomy’ is defined as “a breakdown of possible risk sources” and is regarded as a primary tool for risk identification. Additionally, a lot of focus in the literature has been driven towards physical aspects, related to the impacts of natural disasters on heritage assets, neglecting the associated aspects of society, culture, and economy. Accordingly, there is an actual need for identifying these risk taxonomies for the purpose of proper risk identification and management in adaptive reuse projects of heritage buildings, to maximize the chances of project success and the protection of heritage values and integrity. Accordingly, the aim of this study is to identify and categorize the various risks associated with adaptive reuse that could have a potential impact on heritage buildings in Egypt.

**Keywords:** Adaptive Reuse, Adaptive Reuse Risks, Heritage Buildings, Heritage Conservation, Heritage Management, Risk Management, Heritage Risk Management, Egypt, Egyptian Context.

## I. INTRODUCTION

Risks and disasters are one of the main issues that affect heritage buildings and sites on a global level, causing severe damage to them as well as an ongoing increase in losses (Tahoon & Hegazy, 2019). Risks can be divided into man-made and natural risks/disasters. Egyptian built heritage has been subjected to various and repeated risks along the years, mostly man-made. These risks are diverse and exist on several levels such as: financial, legal, social, economic, and technical. The negligence of these risks leads to heritage degradation and decay, and eventually lead to two main scenarios if the building is not conserved; either the building is left vacant and unutilized, or demolished.

In the Egyptian context, demolitions occur despite the existence of law 144 of the year 2006 This law states that “it is prohibited to demolish or add to any building of significant architectural style related to national history or a historical figure, a building that represents a historical era, or a building that is considered a touristic attraction” (Gharib 2009, Khodeir et al. 2016, Said & Borg 2017). This law also entails the definition of what a “heritage building” is in Egypt. However, this “demolition” phenomenon has been persistent since decades. It is also still ongoing and has risen dramatically since the 25<sup>th</sup> of January revolution in 2011 (Ghanem & Saad 2015; Khodeir, et al., 2016; Said & Borg, 2017).

Heritage buildings should be conserved for future generations as they link communities with their history and identity. Towards revitalizing and generating sustainable values from these buildings, many heritage buildings of cultural and historic values are being adapted and reused rather than being demolished (Bullen & Love, 2011a). Adaptive reuse, in addition to restoration, is a commonly used approach in Egypt for heritage conservation, with many successful and unsuccessful examples. Even though adaptive reuse of built heritage has numerous benefits, it is regarded as a strategy which poses a serious challenge for a variety of stakeholders including owners, governmental authorities, architects, and developers, given the complexity of adaptation work and the risks and challenges posed by the context, including environmental, economic, social, legal, and political pressures. These issues coupled with a lack of formalized risk management approach to handle risks that heritage buildings and sites are subjected to does not help the situation.

When various risks affecting heritage buildings are not well understood, this could lead to intervention decisions based on an incomplete picture, and therefore such decisions become less effective. Accordingly, risk management should be a fundamental part of conservation practices as well as conservation and management plans. When risks and their causes are “identified, analyzed, and prioritized” using a management planning process, their effects can be minimized or mitigated, which can

significantly increase the project success. Defining, institutionalizing, in addition to implementing such a methodology can help in the protection of the values and integrity of heritage areas (Paolini, et al., 2012).

Despite adaptive reuse being a commonly used approach, risk taxonomies are scarcely found for it in the heritage conservation literature. ‘Taxonomy’ is defined as “a breakdown of possible risk sources” and is regarded as a primary tool for risk identification. Additionally, a lot of focus in the literature has been driven towards physical aspects, related to the impacts of natural disasters on heritage assets, neglecting the associated aspects of society, culture, and economy (Thaheem, 2014). The first step of any risk management plan is risk identification. Accordingly, there is an actual need for identifying these risk taxonomies for the purpose of proper risk identification and management in adaptive reuse projects of heritage buildings. Accordingly, this study aims to identify and classify the risks that heritage buildings are exposed to in the Egyptian context, with a special focus on risks associated with the adaptive reuse approach.

## II. RESEARCH METHODOLOGY

A qualitative research approach is employed to acquire and analyze data in this study. Desk analysis (systematic collection, categorization, and analysis of data from secondary sources) was conducted to gather a comprehensive literature review. The data collected for this literature is acquired from different sources of data such as: academic journals, textbooks, website articles, PhD dissertations and MSc theses, conference proceedings, organizations and government publications, and online newspapers articles. The sources used for data collection cover a period of almost 20 years (2000 till 2022), using the following keywords: adaptive reuse, adaptive reuse of heritage buildings, heritage conservation, challenges and risks of heritage building adaptation/adaptive reuse (globally and in the Egyptian context), risk management, and heritage risk management. The conceptual framework of the data collected for the literature review is outlined in Figure 1. All the relevant data collected from the aforementioned sources were scanned and information from selected materials was recorded, analyzed and classified into a comprehensive list of risks associated with adaptive reuse of heritage buildings, with a specific focus on the heritage context in Egypt. The list is not exhaustive; however, it can provide a preliminary checklist of risks that were cited in the heritage conservation and adaptive reuse literature, which could be used by the relevant practitioners and professionals in the field in order to better identify and manage such risks affecting heritage buildings, specifically in the Egyptian context and generally in developing countries where heritage risk management is still not mature. All materials used in this study are cited in-text and in the references list.

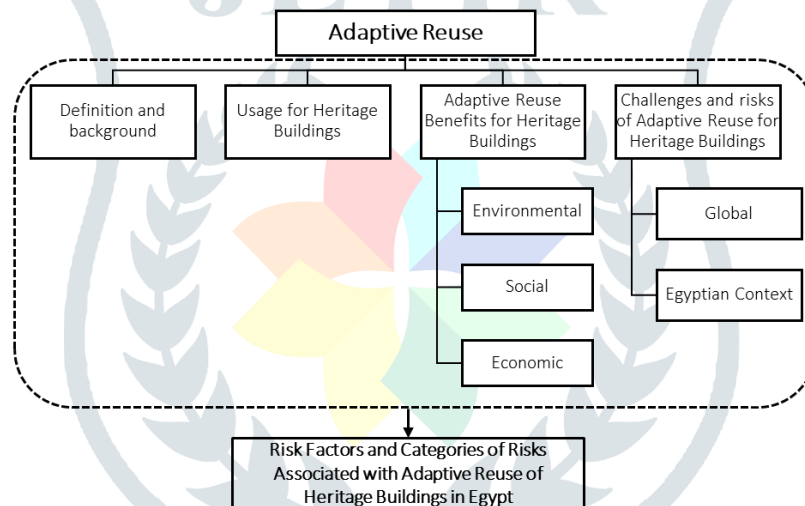


Figure 1 Conceptual framework of literature review (Developed by Authors)

## III. LITERATURE REVIEW

### 3.1 Adaptive Reuse: Definition and Scope of Use

“Adaptive reuse” as a term has several definitions (Smallwood, 2012). Plevoets & Cleempoel (2011) describe adaptive reuse as a strategy towards repairing and restoring existing buildings for continued use. The terminology ‘adaptive reuse’ is also referred to as ‘remodeling’, ‘retrofitting’, ‘conversion’, ‘adaptation’, ‘reworking’, ‘rehabilitation’ or ‘refurbishment’ (see Figure 2). Each term has a different meaning and adaptive reuse can encompass some or all the above interventions. For instance, refurbishment means redecoration and conversion means to change a building use to a completely new and different one, such as changing an office building to a residential building (Wilkinson, et al., 2014). Wilkinson et al. (2014) explain that adaptation can occur “within use” or “across use”, where within use does not include a change in the original function while “across use” involves a “conversion” of the building existing function. Similarly, Haidar & Talib’s (2015) description of adaptive reuse is “rehabilitation, renovation or restoration works that do not necessarily involve changes of use”.

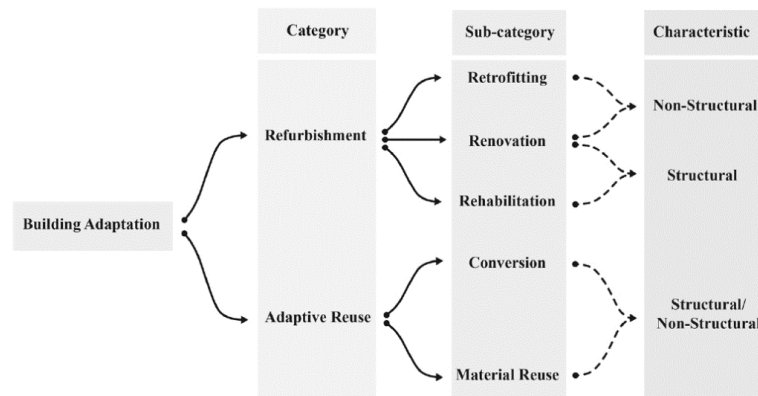


Figure 2 Possible Adaptive Reuse Definitions (Shahi, et al., 2020)

Similarly, Smallwood (2012) explains that adaptive reuse is “to use a building for a new purpose”. Building up on this concept, it can be interpreted that in order to reuse a building, an initial use must be in place, and that use no longer serves the building and people. In order to qualify as adaptive, the new introduced use must be different from the old one, leading to a definition that can simply be explained as “the installation of a different program into an existing building”. An existing building program may fail for a multiple of reasons and as a result, the building may become vacant, and in that case, there are two options: either to reuse or demolish it. Wilkinson et al. (2014) elaborate that adaptation occurs at the end of the useful life cycle of the building or when it is not economically viable to continue the current use. In the case of heritage buildings, when such buildings lose purpose or relevance - despite their heritage status supposedly granting them protection - they become more prone to lack of care, decay, vacancy, and possibly demolition (Ma & Yu, 2017).

### 3.2 Adaptive Reuse of Heritage Buildings

In the context of heritage buildings, adaptive reuse takes a different light. The Heritage Council of New South Wales (cited in DEH (Department of the Environment and Heritage), 2004) describes adaptive reuse of heritage buildings as the introduction of new services, or a new use, or changes to safeguard the heritage asset and its heritage values. Sometimes a building cannot operate anymore with its original use, and the only method to conserve its heritage values and significance is through adaptive reuse (DEH, 2004; Shehata, 2014). DEH (2004) perceives successful adaptive reuse of built heritage as a modification process that respects and protects the built heritage originality and significance to the most possible extent, while upgrading the performance and adding a contemporary layer that fits the modern standards and users’ requirements, which in turn provides value for the future. Thus, it can be understood that the main purpose of adaptive reuse for heritage buildings is the protection of the heritage asset and its values, through the extension of the building life cycle.

Accordingly, adaptive reuse of heritage buildings is primarily regarded as a form of heritage conservation (Bullen & Love, 2011a). Bullen & Love (2011a) further explain that heritage building conservation through adaptive reuse could be viewed as part of a sustainable strategy since the outcomes of adaptive reuse include, and are not limited to, material and resource efficiency improvements (environmental sustainability), cost reductions and financial rewards (economic sustainability) and retention (social sustainability). When considering the adaptive reuse of heritage buildings, the cultural, architectural, and historical values play a major role and are weighed against the potential use and financial/economic value when compared to, for example, newer office buildings, where the use and economic values are the main criteria for reuse (Wilkinson, et al., 2014).

However, it should be noted that adaptive reuse is not a novel phenomenon; humans practically adapted buildings since they started constructing (Plevoets & Cleempoel, 2011; Remøy & Voordt, 2014; Wilkinson, et al., 2014). Buildings that had an appropriate structure in the past were altered to serve a new use without regard for heritage values. During the French Revolution, for example, when religious structures were confiscated and sold, the function of the building was altered from religious purposes into military or industrial use. Similarly, the purpose of Amsterdam’s canal houses, which date back to the 17th century, has shifted several times, from warehouses to housing to offices, and then back to housing and shops (Plevoets & Cleempoel, 2011). Another example in Egypt is historic Islamic architecture buildings (such as Wekalas) being converted into warehouses, factories, and workshops. These types of changes were mostly motivated by functional and financial requirements. In many cases, changing the purpose of a heritage building to accommodate incompatible activities and uses that are not harmonious with the structure’s original function can have negative consequences and cause serious damage.

### 3.3 Adaptive Reuse Benefits

Adaptive reuse gives a second life to heritage buildings, reconnects them with society and preserves the past for the future (Bullen & Love 2011a; RICHES, 2016; Wilkinson, et al., 2014). It carries many significant benefits to the community, governments, and building developers/architects since it can be particularly helpful in the quest to reduce environmental, social, and economic costs of continued urban development and expansion (DEH, 2004). It also helps in increasing the life of buildings and thus aids in meeting the growing demand for facilities. Additionally, lengthening the life of a building through reuse can help in lowering transport, material, and energy consumption as well as pollution associated with these processes when compared with new construction, or demolition (Bullen & Love, 2011b; Wilkinson, et al., 2014). In developed countries such as the UK, adaptive reuse is taken up as a more favourable strategy to new build, where significant expenditure is directed towards adaptive reuse. The proportion and the amount of annual expenditure on adaptive reuse in national economies of several developed countries (such as Australia and the UK), shows the importance of such a strategy (Wilkinson, et al., 2014).

Furthermore, adaptation can help in transforming heritage buildings into usable, accessible spaces in a sustainable manner hence enhancing human interaction and social cohesion (Bullen & Love, 2011b). It can also save energy typically used for demolition and re-build and increase financial value through creating commercially viable investment assets (Othman & Elsaay, 2018). Converting historic areas into attractive city centres generates significant real estate income as well as considerable tourism revenues. In that light, adaptive reuse appears to be one of the most sustainable forms of heritage conservation strategies since it



aims to allow the building to self-finance, and in turn provide enough revenues for regular maintenance of the building. Thus, this regular maintenance enables for the sustainable functional utilisation of the heritage building and in turn can help lengthen the life of the asset while maintaining its characteristics and delaying its decay (Shehata, 2014).

### 3.4 Risks Associated with Adaptive Reuse of Heritage Buildings

Even though adaptive reuse of built heritage has numerous benefits, it is regarded as a strategy which poses a serious challenge for a variety of stakeholders including owners, governmental authorities, architects, and developers. Architects and developers should try to understand and assess the value of the heritage building/s to be reused and why it has a heritage status. Accordingly, they should understand the long-term impact of their decisions (Mallawaarachchi, et al., 2018) and pursue adaptive reuse that has the least impact on the built heritage significance, values, and setting (DEH, 2004). In addition to the understanding of potential heritage values and their importance to the various stakeholders, the risks associated with adaptive reuse should be understood as well (Mallawaarachchi, et al., 2018). This whole process should occur while maintaining a sustainable economic perspective through an appropriate new use and adhering to statutory requirements (Mansfield, 2009), especially if the building is listed as heritage (Mısırlısoy & Günce, 2016).

This appears to be a very complex and challenging process, which requires an interdisciplinary approach including issues of architecture, conservation, engineering, and planning, as well as the bringing together of all the relevant professionals and stakeholders in those fields throughout the various design and construction phases (Bullen & Love, 2011b; Hegazy, 2015; Macdonald, 2011; Mallawaarachchi, et al., 2018; Plevoets & Cleempoel, 2011; Roy & Kalidindi, 2017). For numerous reasons, a recurrent problem that building owners, developers, and architects (relevant decision-makers) will face is whether to adapt or demolish existing buildings (Bullen & Love, 2010; Reyers & Mansfield, 2001).

In Egypt, one of the main reasons for the violation acts on heritage and its demolition by private owners and contractors is that the heritage values of the registered building do not add to its owner any financial and economic privileges (Lwoga & Mwitondi, 2018), which makes some feel that the registration of their properties on the heritage list is more of a burden and liability than a source of pride. Furthermore, there is limited flexibility in the building use, in addition to the high cost of restoration, where most owners have limited financial resources (Badawi, 2017; Roy & Kalidindi, 2017). Additionally, the old Rent Act does not help the situation since it disregards the economic needs of the owners of heritage. Consequently, owners of “listed” heritage buildings look for ways to maximize their profits in the short term, thus the apparent solution would be to file a lawsuit to delist the heritage asset from its status and demolish it, replacing it with a new structure, such as a residential tower to sell the apartments. In the case that the owners do not have the resources to do so, they would sell off the building to a contractor (Badawi, 2017).

This decision is probably based on the perception that adaptive reuse of heritage buildings is a risky, challenging, lengthy, and a complex process, in the sense that it could decrease the expected profit margin owing to risks and uncertainties that could drive up the cost of the project. Hence, there is an unwillingness by contractors and owners to adopt such a strategy and demolition and redevelopment seems to be the more favorable option (Mansfield, 2009; Mallawaarachchi, et al., 2018; Roy & Kalidindi, 2017; Shipley, et al., 2006). According to Wilkinson et al. (2014), the decision to adapt is closely tied to economic factors and is strongly linked with risks posed by adaptation, as well as lack of government incentives and support. Mansfield (2009) explains that for many developers, individual risks, or collections of them may impact the project in unexpected ways which may be sufficient to put off many developers from choosing to conserve the building, since it is perceived that the returns do not equate with the associated levels of risk.

For contractors and developers, the opportunity to maximize plot ratios given by demolition has traditionally been a more appealing investment proposition than adaptive reuse. Thus, it is obvious that most owners, developers, and investors base their decision on whether to adapt or demolish the heritage asset on perceptions instead of an objective assessment of risk. These perceptions are typically based on financial and economic premises (Bullen & Love, 2011b). However, according to Reyers and Mansfield (2001), the objective assessment of risks helps in alleviating their impact, where risk assessment is a phase of risk management consisting of risk identification, analysis, and risk evaluation. Thaheem (2014) states that it is crucial that stakeholders have a plan to “identify, analyze, control and manage” risks before initiating any heritage conservation activities.

Furthermore, Paolini et al. (2012) emphasize the importance of the adoption and application of risk management (RM) by organizations and institutions involved in heritage management, since it offers a well-organized approach that is necessary in conservation and management planning decisions (Paolini, et al., 2012). Heritage conservation decisions are exceedingly complex: the effect of an inaccurate decision may cause damage to the heritage asset, and thus could negatively impact the society and economy, especially that of the communities surrounding the heritage in question. For also this reason, there is a great need for RM and proper risk assessment, where risks are properly identified, analyzed, and prioritized. The risk assessment output acts as critical input to conservation decision-making (Atakul, et al., 2014). Additionally, according to Mansfield (2009), anecdotal evidence and direct experience confirmed that the identification, assessment, and management of various forms of risk are fundamental components of a heritage conservation plan.

It is impossible to handle a risk and understand to what extent it could affect the overall project outcome unless the risk event is clearly identified, and its impact on project objectives is outlined in detail (Becker, 2004). As a result of not fully identifying and understanding risks, poor decisions and actions could be taken regarding risk treatment, which could have an adverse effect on project objectives (Pedersoli Jr., et al., 2016). Accordingly, one of the main aims of RM is to identify and prioritize risks in advance of their occurrence and provide action-oriented information to project managers and decision-makers.

However, according to Atakul et al. (2014) and Thaheem (2014), risk taxonomies are scarcely found in the heritage restoration and conservation literature despite it being normally available in other engineering fields, where ‘taxonomy’ is defined as “a breakdown of possible risk sources” and is regarded as a primary tool for risk identification. Additionally, Thaheem (2014) explains that a lot of attention in the heritage conservation field has been driven towards physical aspects, such as natural disasters and disaster risk management, neglecting the associated aspects of society, culture, and economy.

Therefore, for all the above-mentioned reasons, it was necessary that an in-depth and comprehensive compilation of all possible sources of risks to be conducted, to identify the risks that could be associated with the process of adaptive reuse of heritage buildings, as a step towards proper risk identification, and adequate risk management.

IV. FINDINGS AND DISCUSSION

Upon the scanning of relevant materials and literature, forty main risk factors associated with adaptive reuse of heritage buildings were cited. These risk factors were synthesized and categorized. Since the nature of risks in the heritage literature is more focused on natural disasters and disaster risk management, this study is more focused on human-induced risks associated with adaptive reuse of heritage buildings. Thus, environmental, or natural risk factors to be more specific (such as earthquakes, floods, hurricanes) are not the focus of this study. Furthermore, given the focus of various stakeholders (including owners, developers, architects, etc.) on economic and financial factors as mentioned earlier, neglecting the various other risks related to social and cultural factors, the cited risk categories and factors do not just include financial and economic factors. This is due to the unique nature of heritage buildings possessing heritage values and significance, which distinguishes them from their more modern counterparts, emphasizing the need to identify and understand all possible risks that could affect the heritage values, integrity, and significance. The cited risk factors were classified in a risk breakdown structure (RBS) into nine main categories, namely: functional, economic, social/cultural, technical, political, administrative, financial, legal and environmental (see Figure 3).

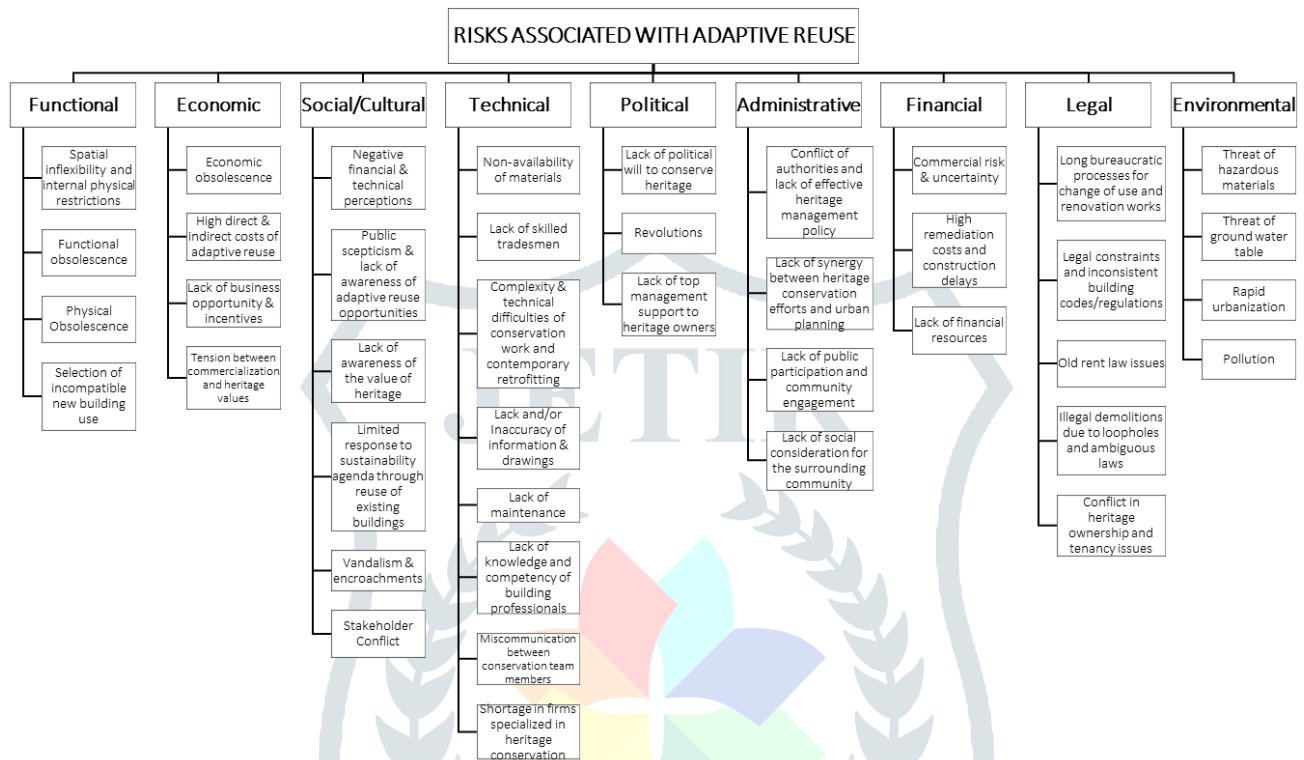


Figure 3 Risk Breakdown Structure of Risks Associated with Adaptive Reuse of Heritage Buildings in Egypt (Developed by Authors. Adapted from Othman and Mahmoud, 2020)

The purpose of RBS is to give insight into the sources of risk, thus providing an image of common causes or sources of risk. This enables stakeholders and project teams to be more aware of certain factors that seriously endanger project activities as well as the heritage asset itself (Thaheem, 2014). It is worthy to note that the risks listed in this study include factors that could affect built heritage either before, during or after adaptation. There are also risks that are related to physical characteristics of the building itself, or risk that are within the legal, political, and institutional context of the heritage asset. It also includes risks that could affect the building whether it is vacant and unused, or it is currently utilized, but its function is incompatible with the structure and context and would need to be converted. Additionally, many of the risks outlined could also be relevant to other approaches of conservation such as restoration, and maintenance. The risk categories and risk factors outlined in the RBS are described in further detail in Table 1, in addition to the potential impact of each risk on the heritage building and its setting.

Table 1 Description of Risks Associated with Adaptive Reuse of Heritage Buildings in Egypt (Developed by Authors. Adapted from Othman and Mahmoud, 2020).

Risk Cat.	Risk No.	Risk Name	Brief Description	Potential Impact on Heritage Building/s
Functional/Design Restraints	1	Design restrictions (Interior spatial inflexibility and physical restrictions)	Physical restrictions related to the technical and spatial aspects of the buildings, such as: existing floor plans/layout and their sizes, as well as the number of columns/walls and structural system configurations, restrictive floor-ceiling heights may limit a building’s ability to adapt to changing spatial requirements, making it less flexible in spatial reconfiguration (Bullen & Love, 2011b; Douglas, 2006; Wilkinson, et al., 2014; Silva & Perera, 2017). A “static internal environment” which cannot be easily adapted is considered inefficient in terms of sustainability and does not guarantee the fulfilment of occupants’ needs (Bullen & Love, 2011b; Douglas, 2006; Shipley, et al., 2006).	<ul style="list-style-type: none"> <li>• Poor spatial quality, thus a reduced functional/use value.</li> <li>• Extra costs for innovative retrofits/renovations that fit with conservation guidelines and restrictions.</li> <li>• Construction delays due to design and retrofitting complexity.</li> </ul>

	2	<b>Functional obsolescence (Outdated technical facilities and poor building performance)</b>	Functional obsolescence occurs when buildings are no longer adequate for the functions that they were essentially designed for (Rozzo & Mignosa, 2013; Wilkinson, et al., 2014). Such issues could happen with a building containing outdated amenities and technology, leading to deficiencies in building performance. This makes it harder to adapt the building to contemporary needs and provide accommodation that meets current-day criteria (Afify, 2011; Azizi, et al., 2016). Thus, the demand for these kinds of buildings is reduced, ultimately leading to redundancy.	<ul style="list-style-type: none"> <li>• Functional inadequacy and decreased utility, leading to depreciation in building value.</li> <li>• Reduced functional/use value.</li> <li>• Long-term vacancy.</li> <li>• Negative impact on value and marketability of other assets in area.</li> </ul>
	3	<b>Physical obsolescence (Deteriorating structural and physical condition)</b>	Physical obsolescence refers to the deterioration of the structure, installations, or the façade of buildings so that they are no longer capable of supporting their functions (Rozzo & Mignosa, 2013; Wilkinson, et al., 2014). Neglected buildings become out of date and suffer from technical, functional, locational, and physical obsolescence to varying degrees (Douglas, 2006). The physical attributes and condition (Wijesuriya, et al., 2013) of a building determines to a large extent its overall performance and the viability of adaptation. A building with a structural frame of poor physical condition would require extensive works to adapt, affecting economic viability, unlike a frame in sound condition (Wilkinson, et al., 2014).	<ul style="list-style-type: none"> <li>• Structural failure, dilapidation, and collapse</li> <li>• Health and safety issues to surrounding inhabitants.</li> <li>• Vacancy and urban decay.</li> <li>• Threat to building authenticity, integrity, and significance.</li> <li>• Extra costs for maintenance and repair.</li> </ul>
	4	<b>Selection of incompatible new building use</b>	One of the major issues in adaptive reuse projects is the random selection of a new function for the heritage building without conducting an in-depth analysis. In order to determine the most appropriate strategy for the adaptive reuse project, the decision on the new use should be founded on an analytic and scientific method. Otherwise, in time, due to economic and social issues, the heritage building may become abandoned, or the new use may compromise the heritage building's originality. Changing the purpose of a heritage building to accommodate incompatible activities and uses that are not harmonious with the structure's original function can have negative consequences and cause serious damage (Misirlısoy & Günce, 2016).	<ul style="list-style-type: none"> <li>• Improper handling and usage of heritage.</li> <li>• Irreversible damage to the heritage asset.</li> <li>• Loss of originality and authentic fabric.</li> <li>• Abandonment by users (society, surrounding community, etc.) due to new function not suiting their needs and requirements.</li> </ul>
Economic	5	<b>Economic obsolescence (Unprofitability of operating the building for original purpose)</b>	Economic obsolescence happens when it is no longer profitable/ cost-effective to keep operating a building for its original purposes, signalling that the property's economic life and rationale is over. This could happen for a variety of factors such as rising maintenance costs, a change in end-user demands (oversupply or drop in demand), changing economic and industrial practises, demographic changes, the land on which the building exists is no longer suitable for this function, or the location is simply poor (remote or inaccessible) (Douglas, 2006; Mansfield, 2009; Misirlısoy & Günce, 2016; Rozzo & Mignosa, 2013; Wilkinson, et al., 2014). It could also be due to physical and functional obsolescence and/or that the location of the building land is high in value, leading to economic pressures to favour newer developments that could optimise the land's potential better (Azizi, et al., 2016; Douglas, 2006; Mansfield, 2009). A typical example is demolishing heritage villas to use the land for residential towers or office buildings (Azizi, et al., 2016).	<ul style="list-style-type: none"> <li>• Lack of utility.</li> <li>• Depreciation of capital or rental value of the building.</li> <li>• Reduced profits acquired from the building to sustain its operations.</li> <li>• Negligence and abandonment, eventually vacancy and deterioration.</li> </ul>
	6	<b>High direct (fixed) and indirect (contingency) costs of adaptive reuse</b>	Adaptive reuse projects may encounter unexpected costs (Mallawaarachchi, et al., 2018). Therefore, several assumptions are made in an adaptive reuse project which increase provisional and contingency costs due to the incomplete design information, which is the case in most conservation projects (Azizi, et al., 2016; Reyers & Mansfield, 2001). This adds up to the direct and fixed costs of conservation, which is initially high in many conservation works (Dubini, et al., 2012) since they potentially contain more economic and technical uncertainties than new-build projects, owing to the scope of work within an existing building as well as the potentially increasing operational demands that will be placed upon the adapted building (Mansfield, 2009).	<ul style="list-style-type: none"> <li>• Unwillingness of contractors, developers, and investors (private sector) to engage in adaptive reuse projects,</li> <li>• Less adaptive reuse projects of heritage buildings,</li> <li>• More vacant and unutilised built heritage.</li> </ul>



	7	<b>Lack of business opportunity and incentives to adapt heritage buildings</b>	The financial stakes in conservation projects are generally high. From a business point of view, adaptive reuse may seem like an unattractive investment that is not particularly profitable. This can be due to the lack of right support provided for such projects with high financial risk (Azizi, et al., 2016). For example, lack of compensation and incentive schemes offered by governments can be a contributing factor. In many developed countries, heritage caretakers are offered indirect support in the form of obtaining a tax relief/deduction when buying historical property as compensation for saving heritage (Getty Conservation Institute, 1999), thus attracting investors to invest money in those properties (Nader, 2016).	
	8	<b>Tension between commercialization and maintaining heritage values</b>	Quite often in adaptive reuse projects, there will be an issue of balancing business economics with cultural heritage protection (that is maintaining the fragile relationship between cultural and economic values) (Demás, 2002). Potential conflict could arise due to the imbalance between the “preservation” logic and the “enhancement” logic, especially when the heritage in question is a touristic site (Dubini, et al., 2012). Conservationists main concern with adaptive reuse approach is the possible overexploitation of the economic and commercial value of the heritage asset, which could lead to deterioration to the structure and its heritage values as well as the overall ambience (Verma, 2007). Quite commonly, many private sector companies and institutions in the Egyptian context want quick profits. The private sector is generally profit-oriented, whereby there is a conflict between financial returns and the method of preservation, along with the absence of regulations, the company will most probably choose profit, which as stated previously, poses a risk to the heritage values of the building (Badawi, 2017).	<ul style="list-style-type: none"> <li>• Overexploitation and misuse of the heritage asset.</li> <li>• Deterioration of the physical and architectural attributes of the structure.</li> <li>• Loss of originality, authentic fabric, and significance.</li> </ul>
Social/Cultural	9	<b>Developers’ and owners’ negative (financial and technical) perceptions on adaptive reuse</b>	In many cases, owners and developers perceive heritage buildings as outdated and inefficient assets, and that adaptation is a pointless and costly process that will not produce a building which meets contemporary needs and performance as modern/newer buildings. As a result of these negative notions and misconceptions, demolition and reconstruction are often seen as a more appealing investment that yield reasonable profits, provides better services/functions as well as building extended life as opposed to adaptive reuse of older heritage buildings (Bullen & Love, 2011b; Douglas, 2006; Silva & Perera, 2017).	<ul style="list-style-type: none"> <li>• Unwillingness of owners, contractors and investors to engage in adaptive reuse projects.</li> <li>• More vacant and unutilised heritage buildings.</li> <li>• Threat of demolition and redevelopment.</li> </ul>
	10	<b>Public scepticism and lack of awareness of adaptive reuse (and its opportunities)</b>	Quite often, owners of listed buildings and the general public may be unaware of adaptive reuse, and how it could yield social, economic, and environmental benefits (Silva & Perera, 2017). In other cases, people may be aware of adaptive reuse, however scepticism is prevalent towards it due to the shortage of successful adaptive reuse initiatives (Said & Borg, 2017) and weak trust in the government (ICLEI (Local Governments for Sustainability), 2020), particularly in developing nations. There might be another underlying factor with other cases related to owners of listed heritage buildings. In the Egyptian economy, there is a substantial gap between a listed building’s selling price and its conservation value, as opposed to its prospective price as unoccupied/vacant land or its potential price following redevelopment. This disparity reveals that many property owners may not comprehend heritage conservation generally as a concept and, consequently, do not value listed buildings; there are also no economic incentives for them to do so (Elsorady, 2011).	<ul style="list-style-type: none"> <li>• Opposition towards adaptive reuse initiatives.</li> <li>• Neglect, misuse, and/or the utilization of heritage buildings using incompatible functions.</li> <li>• Demolition and redevelopment.</li> </ul>
	11	<b>Lack of awareness and appreciation of the value of</b>	In the Egyptian context, there is a general air of under appreciation and misuse of heritage buildings which can be attributed to the misconception that heritage buildings are of	<ul style="list-style-type: none"> <li>• Misuse, negligence, and abandonment.</li> <li>• Vandalism.</li> </ul>

	<b>heritage</b>	no value, have a short lifespan, and obstruct the modernization process. Such way of thinking is prevalent among both the public and the governing authorities. This is usually the result of ignorance, a lack of proper education and awareness, and in some cases, poverty of residents. This frequently leads to abandonment, misuse, vandalism, and other times, intentional destruction by owners of the heritage building in order to demolish it and replace it with a residential tower and sell the apartments (Bullen & Love 2011b; Gharib, 2009; Gharib, 2010; Khodeir, et al. 2016; Lwoga and Mwitondi, 2018; Said and Borg 2017).	<ul style="list-style-type: none"> <li>• Deterioration.</li> <li>• Demolition in order to replace heritage structures with more modern ones.</li> </ul>
12	<b>Limited response to sustainability agenda through reuse of existing buildings</b>	Although demolition is regarded as an environmentally unfriendly process and adapting buildings for a new use is considered to extend the life of buildings, generate less waste, use less materials and energy than demolition and rebuilding (Bullen & Love, 2011b), yet building owners and commercial property markets display limited support to make buildings energy efficient and sustainable through reuse (Silva & Perera, 2017). Achieving sustainability on a national level will not be possible until the existing building stock is adequately managed. Therefore, it is vital to examine the current building stock in order to ensure sustainable development. As a developing country, Egypt has a huge stock of existing heritage buildings, the majority of which are in poor condition, poorly conserved, and regarded as invaluable. To address this issue, adaptive reuse of existing buildings is considered as a crucial strategy for both conserving these buildings and achieving sustainability (Mohamed & Alauddin, 2021).	<ul style="list-style-type: none"> <li>• Demolition of heritage buildings and redevelopment of new buildings.</li> <li>• Disfigurement of authentic urban fabric.</li> <li>• Less cultural heritage for future generations.</li> </ul>
13	<b>Vandalism and encroachments</b>	Vandalism acts, arson, encroachments, and squatting could occur in any building however, buildings that are vacant are more vulnerable. Such buildings consequently are subjected to the effects of vacancy and neglect which include social blight, economic decline, and negative impact on the value and marketability of other assets in the surrounding area (Douglas, 2006; Mohamed & Alauddin, 2021; Roy & Kalidindi, 2017; Wilkinson, et al., 2014; Tahoon & Hegazy, 2019). Vandalism and neglect often occur by the very owners and occupants of heritage (Elsorady, 2011; Lwoga & Mwitondi, 2018). Owners that strive to demolish their heritage-listed buildings often distort and erase the distinct features of architectural styles apparent on the facades of buildings to guarantee that their appeal to get their building de-listed gets accepted (Elsorady, 2011).	<ul style="list-style-type: none"> <li>• Disappearance of heritage distinctive features, destruction and/or disfiguration, sometimes to the extent of irreversible damage</li> <li>• Loss of originality and authenticity.</li> <li>• Additional costs to remediate damaged heritage.</li> <li>• Social blight and economic decline in the urban area.</li> </ul>
14	<b>Stakeholder Conflict</b>	Making adaptive reuse decisions is difficult. There are numerous stakeholders engaged, each with their own perspective. Owners, investors, producers, developers, regulators/governmental authorities, occupants/users, surrounding community, and marketers are all decision-makers. The fact that these stakeholders make decisions at different stages of the process and have varying degrees of impact adds to the complexity of the process. In most cases, decisions taken early in the process have an ongoing impact throughout the project. For example, changing the usage has an impact on all subsequent decisions (Wilkinson, et al., 2014). Stakeholder conflict could also occur in the case that a heritage structure/site is owned by various owners, either from public or private sectors. This issue can manifest due to the presence of many decision makers, and the weak integration and linkages among those stakeholders (Lwoga & Mwitondi, 2018) can cause the decision-making process to become too lengthy and complex, affecting the project schedule, and causing delays (Roy & Kalidindi, 2017). Moreover, Reyers and Mansfield (2001) highlight that early in design and feasibility stages, legal relationships between parties could present a source of conflict and risk. Additionally, local community members who gain economically or desire to use the site for commercial or social purposes, or who may be negatively impacted by the	<ul style="list-style-type: none"> <li>• Lengthy and complex adaptive reuse project due to delays in the decision-making of the project itself or its initiation, leading to vacancy, or neglect.</li> </ul>



			site due to land conflicts or an influx of tourists and traffic could present another layer of decision-making (Demás, 2002).	
Technical	15	<b>Non-availability of materials</b>	There is a necessity to use authentic materials or components in conservation projects which may be limited in availability and/or expensive (Atakul, et al., 2014; Reyers & Mansfield, 2001; Mansfield, 2009; Roy & Kalidindi, 2017). This may result in the use of new materials which may be incompatible with existing materials, affecting the authenticity of the structure (Azizi, et al., 2016; Ma & Yu, 2017; Silva & Perera, 2017; Roy & Kalidindi, 2017).	<ul style="list-style-type: none"> <li>• Use of incompatible materials.</li> <li>• Loss of authenticity and integrity of the structure.</li> </ul>
	16	<b>Lack of skilled craftsmen</b>	There is a general shortage of local workers skilled in conservation work as well as unfamiliarity of tradesmen with older materials (Atakul, et al., 2014; Azizi, et al., 2016; Lwoga & Mwitondi, 2018; Mansfield, 2009; Silva & Perera, 2017). This can be traced to the large body of knowledge of traditional techniques being lost along the years, thus making it particularly uncommon to find good skilled workers (Roy & Kalidindi, 2017). The lack of properly trained craftsmen and preservation specialists with adequate conservation skills and preservation know-how available for the repair and maintenance of historic architecture can result in the use of inappropriate techniques and methods during conservation works, consequently leading to problems emerging afterwards on aesthetic and technical levels, and possibly endangering the heritage asset (Azizi, et al., 2016; López, 2016).	<ul style="list-style-type: none"> <li>• Inappropriate conservation work.</li> <li>• Loss of authenticity and integrity of the structure.</li> </ul>
	17	<b>Lack and/or inaccuracy of information and drawings</b>	Insufficient information could be manifested in the form of lack of documentation and as-built drawings of the original structure, which could cause uncertainty in scope definition (Atakul, et al., 2014; Roy & Kalidindi, 2017). The adaptive reuse process normally involves a detailed assessment (sometimes opening up works) of the building's physical attributes such as structure and fabric (Bullen & Love 2011b; Reyers & Mansfield 2001). Lack of accurate information on, for example, the structure, could lead to the discovery of latent problems such as defects in structure or dimensional and material inconsistencies, which can affect the judgement about the necessary repairs and consequently, the safety of the structure. This could affect the likelihood of the success of adaptive reuse and increase additional costs considerably (Azizi, et al., 2016; Bullen & Love, 2011b; Roy & Kalidindi, 2017). In most cases of heritage buildings, the ages-old construction techniques and specifications employed for these buildings are not necessarily well-documented and preserved (Atakul, et al., 2014). Additionally, the technical documents and proper drawings for structural analysis are limited in availability, and thus any estimates made in the tendering stage are based on assumptions, so the estimates about costs of some work may not be comprehensive (Roy & Kalidindi, 2017).	<ul style="list-style-type: none"> <li>• Inappropriate conduction of conservation work.</li> <li>• Loss of authenticity and integrity of the structure</li> <li>• Rising provisional and contingency costs to account for inadequate design information and assumptions.</li> <li>• Changes in scope of work and increase in conservation costs.</li> </ul>
	18	<b>Complexity and technical difficulties of conservation work (due to contemporary retrofitting and lack of maintenance)</b>	Complexity could occur because older buildings are typically not designed to fit contemporary services. For example, such buildings are not equipped with access ways and adequate room enough to add contemporary services such as air-conditioning (Bullen & Love, 2011b). In other instances, due to minimal or no maintenance, vacant buildings tend to deteriorate at a considerably faster rate than occupied buildings (Douglas, 2006). Occupied buildings deteriorate as well when maintenance takes no place. The fabric and structure of the building could deteriorate to a point where high and complex levels of restoration and repair works are needed to adapt the building successfully. Additionally, despite the improvements done by adaptive reuse, the residual service life expectancy of an older building may be less than that of a new replacement, because the life expectancy of existing materials may fall short of that of new replacements. This can affect the	<ul style="list-style-type: none"> <li>• Rising conservation, repair, and ongoing maintenance costs.</li> <li>• Construction delays.</li> </ul>

			building usage and efficiency, as well as dealing with incurring continuous high costs for regular maintenance and repair more than that for a new building (Bullen & Love, 2011b).	
	19	<b>Lack of knowledge and competency of building professionals</b>	Issues in heritage building conservation can arise due to poor knowledge and lack of conservation expertise of conservation professionals as well as organizations and planning authorities responsible for the conservation and maintenance of cultural heritage. Consequently, this leads to premature loss of valuable historic fabric due to the application of inappropriate conservation techniques (Azizi, et al., 2016; Lwoga & Mwitondi, 2018; López, 2016; MPMAR, 2016). This lack of knowledge among building professionals could be traced to failure to differentiate their approach regarding modern and old buildings, which usually leads to decisions on conservation strategy and repairs without having an appropriate level of information (Azizi, et al., 2016). As a result, some of the larger firms frequently fail in conservation efforts. The issue in these circumstances is that while the eligible contractors may have adequate experience in new construction and sound management systems, they may lack the specialised knowledge required for heritage work. Additionally, another issue could be traced to government contracts being allocated to the lowest bidder without first assessing their heritage conservation skills. As a result, consultants, and contractors with no prior experience in conservation are chosen, and smaller companies with specialist skills are partnered with them. In other cases, conservation contracts are carried out by small labour contractors, who lack technical skills and management expertise, which results in unsatisfactory performance, particularly in large and complex projects (Roy & Kalidindi, 2017).	<ul style="list-style-type: none"> <li>• Incorrect conservation works.</li> <li>• Loss of significance, authenticity, and integrity of the structure.</li> <li>• Extra costs incurred to repair and salvage what remains of the heritage asset due to incorrect conservation work.</li> </ul>
	20	<b>Miscommunication between conservation team members</b>	The heritage conservation body of knowledge is considered to be fragmented, especially in the management context (Roy & Kalidindi, 2017), meaning that the lack of interdisciplinary collaboration/integration between the sciences, arts, and technologies of conservation often gravely constricts the conservation process (Bullen & Love, 2011b; Hegazy, 2015; Macdonald, 2011; Mallawaarachchi, et al., 2018; Plevoets & Cleempoel, 2011; Roy & Kalidindi, 2017). This hindrance appears in the form of poor communication due to conflicting conservation philosophies and techniques (segregation between architecture and engineering), and is exacerbated due to the lack of standard methods of conservation, confusing guidelines, in addition to poor knowledge of professionals (Azizi, et al., 2016; Mansfield, 2009; Roy & Kalidindi, 2017). Miscommunication could also occur due to differences in areas of expertise between professionals in addition to the lines of communication between professionals, craftsmen, and general labourers (Reyers & Mansfield, 2001).	<ul style="list-style-type: none"> <li>• Project delays.</li> <li>• Incorrect conservation works.</li> <li>• Loss of significance, authenticity, and integrity of the structure.</li> </ul>
	21	<b>Shortage in firms specialized in heritage conservation</b>	The shortage of specialized firms, architects, and consultants in the heritage conservation sector (Elsorady, 2011; Roy & Kalidindi, 2017) is a major hindrance particularly in countries where there is a substantial amount of built heritage requiring conservation. This could be traced to the dominance of modern methods and materials in architecture and civil engineering courses, with little attention paid to older and traditional materials and methods (Roy & Kalidindi, 2017).	<ul style="list-style-type: none"> <li>• Less adaptive reuse projects not corresponding to the amount of heritage requiring conservation.</li> <li>• More neglected and abandoned heritage buildings.</li> <li>• Incorrect conservation works conducted by inexperienced companies.</li> </ul>
<b>Political</b>	22	<b>Lack of political will to conserve heritage</b>	In the Egyptian context, this lack of political will to conserve heritage manifested itself even more after political and economic instability, such as that following the 2011 revolution, which redirected the government's focus towards more critical issues than heritage conservation. In such an unstable climate, heritage protection was seen as a luxury	<ul style="list-style-type: none"> <li>• Negligence of heritage, leading to vacancy and deterioration.</li> <li>• Threat of vandalism and encroachments due to limited enforced</li> </ul>

		rather than a necessity, particularly for heritage that is not recognised as a touristic attraction (Said & Borg, 2017). Elsorady (2011) highlights that the success of urban conservation relies mostly upon political factors more than conservation policies, quoting Stovel (2002) “in the end, one realizes that it is not charters or the conservation tools for their own sake, that ensure conservation, it is political will” (Stovel 2002, as cited in Elsorady, 2011). Lwoga and Mwitondi (2018) also highlight factors that are determinant of an unsupportive political environment such as unenforced antiquities legislation and limited legislative coverage of heritage conservation areas.	protection laws and legislative coverage of heritage areas.
	23	<b>Revolutions</b>	<p>Revolutions can lead to acts of vandalism and destruction of heritage. In Egypt, for example, the instability of the country following the 2011 revolution led to the reduction of the budget designated for heritage conservation and tourism as well as postponing renovation works and adaptive reuse projects of heritage buildings (El-Aref 2015; Said and Borg 2017).</p> <ul style="list-style-type: none"> <li>• Vandalism and destruction of heritage.</li> <li>• Less resources for heritage conservation due to instability of economic and political climate.</li> <li>• Less conservation work, and more neglected and abandoned heritage buildings.</li> </ul>
	24	<b>Lack of top management support, commitment, and compensation to heritage owners</b>	<p>One of the main contributing issues which show the lack of top management support is the lack of effective communication between the owners and inhabitants (as stakeholders who are affected by decisions made) and top management in charge of heritage (governmental authorities, including local administrators (Lwoga &amp; Mwitondi, 2018)), with a disregard for the local communities’ possible involvement in heritage-related initiatives and actions (Gharib, 2009; Said &amp; Borg, 2017). This top-down management approach (Lwoga &amp; Mwitondi, 2018) adopted by the Egyptian political system causes a negative impact on heritage by instigating conflict between private owners of heritage and legislation, resulting in tension between heritage owners and the conservation system (Elsorady, 2011). Furthermore, according to Nader (2016), there is limited compensation and support for owners and investors with regard to the adaptation of heritage buildings, further exacerbating the issue (Nader, 2016).</p> <ul style="list-style-type: none"> <li>• Scepticism, tension, and resentment of owners towards the heritage legislative system.</li> <li>• Weak trust in the government.</li> <li>• Failed sense of attachment and ownership of the owners to heritage.</li> <li>• Lack of motivation by owners to adapt heritage.</li> <li>• More neglected buildings and vandalism and destruction acts by owners of heritage, and possibly local communities surrounding the heritage building.</li> </ul>
Administrative/Managerial	25	<b>Conflict of authorities and lack of effective heritage management policy</b>	<p>There are a number of issues contributing to the conflict of authorities in the Egyptian context such as: multiplicity of overlapping authorities in charge of historic areas and buildings (Gharib, 2009), the lack of efficient planning, coordination, and cooperation between those various institutions (Lwoga &amp; Mwitondi, 2018; MPMAR, 2016; Mubaideena &amp; Kurdi, 2017), and bureaucracy and ambiguity of who is responsible for what (Said &amp; Borg, 2017). Fouda (2021) explains that this multitude of authorities responsible for heritage protection in Egypt could be one of the major reasons that many heritage buildings are lost, where every entity shifts responsibility to the other whenever a building is demolished, and localities – that issued the removal and demolition permit - announcing that the building was not even registered (Fouda, 2021). Similarly, Lwoga and Mwitondi (2018) explain that inadequate policy and an integrated legislative framework for heritage buildings, lack of strategic planning, and management crises contribute to heritage issues and challenges. Additionally, the poor quality of cultural and heritage institutions, and disagreement over specialties add to the issue (MPMAR, 2016).</p> <ul style="list-style-type: none"> <li>• Inefficient conservation planning and management of the heritage building inventory.</li> <li>• Delays for many projects for buildings that are in dire need of conservation.</li> <li>• Negligence and deterioration of a larger number of heritage buildings.</li> <li>• Loss of heritage due to demolition lawsuits accepted and issued by authorities responsible for heritage.</li> </ul>
	26	<b>Lack of synergy between heritage conservation efforts and sustainable urban planning and development</b>	<p>One of the most critical challenges for urban heritage management is continuity and also compatibility since the historic setting needs to keep changing in form and function to fit the changing societal needs. Heritage assets worldwide are being threatened by aggressive development and management deficiencies. However, the integration between cultural heritage management and sustainable urban</p> <ul style="list-style-type: none"> <li>• Irreversible deterioration of heritage buildings and sites, consequently damage and disfigurement of the urban fabric.</li> <li>• Threat of built heritage demolition due to</li> </ul>



		<p>development is a not so common practice and has been raising the attention of interdisciplinary academics internationally (Guzmán, et al., 2014). Roy and Kalidindi (2017) explain that there is a prevalent lack of synergy between national and regional conservation programmes, urban planning, and community development as well as the lack of integration of heritage conservation with zonal planning (Roy &amp; Kalidindi, 2017). Additionally, the uncontrolled rapid urban sprawl due to different political, social and economic reasons and the absence of a well-articulated national conservation plan that ensures the effective integration of heritage buildings and historic districts in the planning process has led to the irreversible deterioration of the physical fabric's harmony, leaving a deep negative impact on heritage sites and their surroundings (Mubaideena &amp; Kurdi, 2017). From an urban perspective, adaptive reuse is an invaluable strategy for the revitalization of cities and also mitigating urban sprawl (Cutieru, 2021).</p>	<p>aggressive development waves.</p>
27	<p><b>Lack of public participation and community engagement in the adaptive reuse process (top-down managerial approach)</b></p>	<p>Policies and laws that are created to safeguard heritage in isolation from their context fail to foster a sense of shared ownership and reinforce the concept of conservation among the community (Roy &amp; Kalidindi, 2017). Lwoga and Mwitondi (2018) explain that the authoritative discourse has been chastised for failing to build context-relevant and effective conservation strategies. It frequently employs conservation tactics that force the expert-selected history or heritage, as well as related practices, on local communities who may have reservations about them (Lwoga &amp; Mwitondi, 2018). As a result, local communities frequently oppose heritage conservation programmes. Vandalism and looting in historical sites/buildings are also not uncommon (Roy &amp; Kalidindi, 2017). In heritage management, the opinions of those who live in and around heritage resources, often known as local or resident discourse or lay discourse, which may differ from or complement the authoritative discourse, are equally important (Lwoga &amp; Mwitondi, 2018).</p> <p>Said and Borg (2017) explain that public interests, perspectives and benefits should not be overlooked in the heritage management process since the public is the main user of these heritage buildings, therefore they should be a primary contributor to developing a sustainable and effective heritage management plan (Lwoga &amp; Mwitondi, 2018; Said &amp; Borg, 2017). Previous research states that contemporary perception of heritage adds meaning and value to the heritage asset in question (Said &amp; Borg, 2017). Thus, community involvement in heritage conservation projects, both during and after the adaptive reuse process, is a vital success factor. The significance of conservation projects extends beyond direct stakeholders since people's aspirations and needs determine the success of the place. It is impossible to safeguard and maintain so many heritage structures without the active participation and support of the community since they directly interact with and use the heritage building/s in ways that visitors and organisations, including the cultural heritage management authorities, do not (Lwoga &amp; Mwitondi, 2018; Said &amp; Borg, 2017).</p> <p>Many heritage structures deteriorate after being restored because they were not used by the community since they did not satisfy their needs and did not foster their local knowledge (Roy &amp; Kalidindi, 2017). It is worthy to note that Roy and Kalidindi (2017) highlight that even if such public participation is guaranteed, its benefits could be limited by lack of effective mechanisms, power imbalance, lack of information, and competing stakeholder interests. Additionally, the lack of "democratic maturity" (basic democratic functions, which include public participation), can prove to be challenging in some social/political contexts</p>	<ul style="list-style-type: none"> <li>• Scepticism and opposition towards adaptive reuse initiatives.</li> <li>• Failed sense of ownership and attachment of the community to heritage</li> <li>• Negligence, misuse, and vandalism.</li> <li>• Selection of a new use that does not match the local community's needs,</li> <li>• Hence an economically and socially unsuccessful project that may eventually fall into abandonment and disrepair.</li> </ul>

			or highly centralised countries merely because citizens are not used to interacting with their government – or one another – in this manner (ICLEI, 2020).	
	28	<b>Lack of social consideration for the day-to-day lives of surrounding community while conducting conservation works</b>	In any adaptive reuse project, there is a need to consider the intangible and non-economic perspectives of maintaining the day-to-day lives of individuals and the community attached to the place (Silva & Perera, 2017). In some instances, people who live by heritage often experience a recurring source of psychological stress, affecting their well-being. In Cairo, several adaptive reuse initiatives disregarded the local community living by heritage, ignoring their basic needs (Shehata, 2014). Thus, it is essential when adapting a heritage building to choose a new use that is respectful to the needs and culture of the local communities, as well as respecting their safety and health while conducting conservation works. In some instances, adaptive reuse takes place around the occupants of the building and would need to be carried out with minimum interference to the usage of the building, and in other cases, occupants would need to be decanted (Bullen & Love, 2011b; Roy & Kalidindi, 2017). In either case, considerations for the surrounding community would need to be taken.	<ul style="list-style-type: none"> <li>• Public scepticism and distrust towards adaptive reuse initiatives.</li> <li>• Failed sense of ownership and attachment of the community to heritage.</li> <li>• Negligence and apathy of surrounding community to heritage significance which may lead to vandalism acts, graffiti, deterioration, and destruction, etc...</li> </ul>
Financial	29	<b>Commercial risk and uncertainty of adaptive reuse</b>	Contractors may be unwilling to adapt heritage buildings because of the perception that it is risky due to the possibility of a lengthy and difficult reuse process, which might lead to reduced profits. This is further aggravated by the difficulty of raising finance for adaptive reuse projects. This often occurs due to the possibility of several risks arising during the process such as: unknown work, materials compatibility, design constraints, and decanting of occupants (Bullen & Love, 2011b). In such complex projects with high degrees of uncertainty, a sophisticated management plan is needed, as well as a flexible contract arrangement, to account for contingencies and ensure that contractors are not the only party to incur losses (Roy & Kalidindi, 2017).	<ul style="list-style-type: none"> <li>• Unwillingness of contractors and investors to engage in adaptive reuse projects, thus, more deteriorated, vacant or unutilised heritage buildings.</li> </ul>
	30	<b>High remediation costs and construction delays</b>	Running over the original time schedule intended for a project can be a major reason for a more costly project and hence, a lower return on investment (Shipley, et al., 2006). These delays can happen for a variety of technical and non-technical reasons, for example, the discovery of hazardous materials during the adaptive reuse process can result in contamination in buildings, which would require additional costs to remediate and pose time delays (Silva & Perera, 2017). Additionally, severe deterioration of the structure and fabric is also a factor that contributes to the requirement of extensive sums of money and time to rehabilitate the building. Such issues cause the building to be less attractive as an investment to owners/developers (Bullen & Love, 2010). Quite often, these unforeseen conditions are not visible until the work is started on the structure, which is a defining factor between work done on existing buildings and new build projects. In built heritage, it is difficult to be certain about the scope of work and hence the time needed and cost, unless opening-up of the structure is performed. Construction delays could also occur due to less technical reasons, such as lack of planning, poor contract management, and inexperience of the government department/s involved (Roy & Kalidindi, 2017).	<ul style="list-style-type: none"> <li>• Increased costs due to delays and unexpected remediation work.</li> <li>• Unwillingness of contractors and investors to engage in adaptive reuse projects.</li> <li>• More vacant and unutilised heritage buildings.</li> </ul>
	31	<b>Lack of financial resources</b>	Conservation projects can be quite capital intensive and risky (Macdonald, 2011). Due to the unpredictable nature of conservation work, the final cost of conservation projects is often difficult to ascertain. Thus, the financial aspect is a major determinant to property owners, developers, and even governmental authorities, especially if the building condition is deteriorated (Azizi, et al., 2016; El-Aref, 2015). In Egypt, due to inadequate funds and financial allocations being disproportionate to the size of heritage sites requiring conservation, the number of projects that can be conducted	<ul style="list-style-type: none"> <li>• Limited number of adaptive reuse projects that can be conducted at a given time leading to</li> <li>• Vacant and unutilised heritage buildings.</li> <li>• Vacancy and neglect could lead to severe deterioration, and hence, more financial resources</li> </ul>

			at a given time is limited (MPMAR, 2016).	needed for conservation work.
Legal	32	<b>Long bureaucratic and political processes for change of building use (zoning change) and renovation works</b>	Change of use of buildings through adaptive reuse may result in zoning changes which requires complying with new building codes (Bullen & Love, 2011b). This presents a challenge for developers and architects to deal with new innovative solutions to upgrade buildings (Bullen & Love, 2011b), as well as the challenge to deal with the authorities to provide the necessary permits and development approvals for the proposed new building use (Ma & Yu, 2017). According to ICLEI (2020), long bureaucratic and political processes for acquiring government approvals required for local projects (regarding change of use, and renovation works) are further exacerbated due to political conflicts and differing priorities at various administrative levels.	<ul style="list-style-type: none"> <li>• Longer time to deal with authorities due to complex legal procedures,</li> <li>• Additional costs and construction delays.</li> <li>• Reluctance of developers to deal with heritage conservation projects.</li> </ul>
	33	<b>Legal constraints and inconsistent building codes and regulations</b>	Adaptive reuse of heritage buildings requires the compliance with conservation guidelines, current building codes and regulations, licensing, and planning requirements, which is a complex and challenging process in itself (Silva & Perera, 2017). Such legal restraints may pose restrictions on the extent and form of changes that can done in a listed building (Douglas, 2006). Issues become more prevalent when laws are weak and/or confusing, as well as the presence of inconsistencies in regulations and standards from advisory bodies and professional institutions. This could hinder the decision-making process and cause unnecessary delays (Reyers & Mansfield, 2001) and could also lead to the inappropriate renovation/alteration of heritage buildings (Azizi, et al., 2016). Such issues pose restraints on private entities, such as developers and owners, to adapt heritage buildings smoothly. Additionally, where multiple governmental agencies are involved, the situation would necessitate taking permission from the various agencies with their different rules and specifications, and this could create problems in coordination (Roy & Kalidindi, 2017). In the case of privately owned heritage in Egypt, owners of listed buildings often have maintenance problems, where any type of maintenance has to receive a restoration licence from the district authorities, and this is considered a difficult process (Elsorady, 2011).	<ul style="list-style-type: none"> <li>• Restrictions in available design solutions and innovative techniques for adaptation leading to inappropriate alteration of heritage building.</li> <li>• Delays in obtaining permits, thus delays in the project.</li> <li>• Difficult adaptive reuse process, thus reluctance from various stakeholders to pursue heritage conservation as a viable option.</li> </ul>
	34	<b>Old rent law issues</b>	According to Douglas (2006), unfavourable rate of return and rental income levels can contribute to economic obsolescence. Since the 1950's, the Rent Acts has been enforced in Egypt, which has proven ineffective, resulting in minor annual rent increases to this day. These minimal rental incomes have become economically unfeasible, preventing landlords and owners from having the adequate means in order to properly maintain their properties (Davidson, 2008; Elsorady, 2011). Consequently, for the owners of such structures, demolition and redevelopment have begun to emerge as a viable economic option/solution (Elsorady, 2011). To further elaborate the issue, the majority of these structures are over 75 years old, their commercial and residential units are governed by the old rental statute, and their ownership are passed down to descendants. Because the old rental act does not allow owners to generate considerable revenues, they frequently choose to demolish them in order to capitalise on the buildings' prime location in the city centre, either by selling them as vacant land or by replacing them with multi-story buildings. The Urban Harmony Act permits property owners to file an appeal against the listing of their property, after which the Central Grievance Committee in Cairo conducts a physical inspection of the building, regardless of its location nationwide, and prepares a report on the building and its value, and also decides whether to approve the Cataloguing Committee decision or remove the building from the list (Fouda, 2021).	<ul style="list-style-type: none"> <li>• Economically unsatisfied owners, leading to demolition and redevelopment of heritage to gain profits.</li> <li>• Deterioration of heritage due to inability to conduct restoration work due to the difficulty of decanting tenants, difficult restoration processes, difficulty obtaining permits, etc...</li> <li>• Loss of heritage buildings due to demolitions.</li> </ul>



35	<p><b>Illegal demolitions by heritage owners due to loopholes and ambiguous laws</b></p>	<p>Illegal demolition of heritage buildings threatens many buildings in Egypt (Elsorady, 2011; Osman, 2018; Tahoon &amp; Hegazy, 2019). Due to ambiguous legal jargon, laws aimed specifically at protecting Egypt's built heritage (Laws No. 117/1983, No. 178/1961, and No. 144/2006) have resulted in the endangerment and sometimes demolition of heritage structures. Law No. 144 of 2006 governs demolition permits and is concerned with the preservation of buildings of recognised architectural value. Buildings are classified as "historic" under Law No. 117 if they can be linked to one of Egypt's major cultural influences (Greek, Christian, Islamic, or Ancient Egyptian). In contrast, Law No. 144 leaves the "heritage" classification much vaguer, leaving room for fluctuating interpretation, and no ministry or state institution is explicitly responsible for the official classification or safeguarding of heritage buildings (Elsorady, 2011; Osman, 2018). Despite the National Organization for Urban Harmony (NOUH) correspondences to successive governorates over years, some governorates did not form cataloguing committees in the first place, exposing – and continuing to expose – heritage buildings in these governorates to demolition for failure to list them, thus they remain unprotected by law (Fouda, 2021). For the case of already listed buildings, due to these loopholes and ambiguous statements in Law No. 144, property owners who want to demolish a heritage building only need to seek permission from a heritage committee comprised of specialists and representatives from the governorate and the Ministry of Housing, Utilities, and Urban Communities, making it possible for lawyers to exclude buildings of their clients from the list. These rulings effectively remove all legal barriers that keep these buildings from being demolished (Elsorady, 2011; Osman, 2018). Similarly, the lack of a unified consensus among the listing and re-evaluation committees on the details of the listing criteria is a flaw in the process that could lead to delisting (Elsorady, 2011). According to Elsorady (2011), of the 1135 heritage buildings listed in Alexandria, 1000 are at risk of being delisted as a result of the loophole in Law No. 144/2006 and would accordingly lose their statutory protection from demolition. Elsorady (2011) highlights that it is crucial to strike a balance between private property rights and public needs. It can be argued that this balance is being overlooked in Egypt's heritage conservation process because owners were excluded from consultation during the issuance of Law 144 (Elsorady, 2011).</p>	<ul style="list-style-type: none"> <li>• Threat of demolition to numerous listed heritage buildings</li> <li>• Less heritage assets for future generations.</li> </ul>
36	<p><b>Conflict in heritage ownership and tenancy issues</b></p>	<p>In adaptive reuse projects where tenants are involved, litigations between owners and tenants complicate the process. In some instances, restoration could not be started until the structure is procured from tenants, and they are decanted (Roy &amp; Kalidindi, 2017). In other cases, ownership litigations could hinder and delay the ability to start restoration and maintenance work for a heritage building, such as the case in Aisha Fahmy Palace in Egypt. The palace operation was halted for a couple of times due to ongoing complications between the heirs and the Egyptian court over its ownership. Leaving the palace unutilized and neglected for several years, which in turn increased the restoration and maintenance costs in the end due to vacancy, negligence, and deterioration (Othman &amp; Mahmoud, 2020). Such conflicts in ownership in addition to the top-down approach of authorities in dealing with inhabitants and heritage owners eventually leads to their poor interest in the conservation of heritage buildings in their area or under their ownership (Lwoga &amp; Mwitondi, 2018).</p>	<ul style="list-style-type: none"> <li>• Delays in restoration and conservation work.</li> <li>• Vacancy of heritage until the issues are resolved.</li> <li>• Further deterioration of heritage due to delays,</li> </ul>

<b>Environmental/Urban</b>	<b>37</b>	<b>Threat of hazardous materials</b>	Many older buildings carry a higher risk of hazardous materials contamination when carrying out inspection before adapting the building, such as asbestos and lead. Such materials affect the health and safety of workers and take longer time to deal with if discovered, causing delays. Not only does the discovery of such deleterious materials affect the timing of the adaption scheme, but it could also threaten its feasibility (Douglas, 2006). Moreover, Shipley, et al. (2006) explain that one of the biggest costs that can loom over any adaptive reuse projects is site contamination.	<ul style="list-style-type: none"> <li>• Longer time to deal with remediation of heritage buildings if hazardous materials are discovered, causing construction delays and extra costs.</li> <li>• Health and safety issues for workers.</li> </ul>
	<b>38</b>	<b>Threat of ground water table</b>	High levels of underground water can seep into the foundations of the structure, thus affecting its stability and safety (Gharib, 2009; Tagoon & Hegazy, 2019). Eventually, the building may collapse if not repaired. Additionally, there may be a threat of poor sewage water system which leaks into the groundwater table, not only causing it to rise, but also adding a range of pollutants which may exacerbate the state of the structure (Ghanem & Saad, 2015).	<ul style="list-style-type: none"> <li>• Structural and material deterioration.</li> <li>• Complexity of conservation work and longer time to deal with remediation of the structure, which can cause construction delays and extra costs.</li> </ul>
	<b>39</b>	<b>Rapid urbanization</b>	Many heritage structures in Egypt (particularly in Cairo and Alexandria) deteriorated due to population growth occurring in the second half of the twentieth century (Elsorady, 2011). Progressive urban modernization has ravaged the Cairo's older built environment, continuing to threaten its survival (Davidson, 2008). The urban fabric design in certain areas (such as in Historic Cairo) was not fit to withstand recent updates and changes. These areas have been subjected to various modifications, variables and upgrades that were not thought-out while the urban fabric was being designed. Infrastructure and the quantity of cars are two such variables (Gharib, 2010; Osman, 2018). Furthermore, in a number of situations (such as in Alexandria), the lack of well-planned urban development and extension plans had a negative impact on heritage structures. This is because, due to a lack of adequate transportation networks and infrastructure, these plans have failed to entice Alexandrian society away from the city centre. This has resulted in a large increase in the value of real estate, making real estate investment very profitable for any investor, and putting tremendous pressure on building owners and residents to demolish or add encroachments to their heritage listed buildings (Said & Borg, 2017).	<ul style="list-style-type: none"> <li>• Pressures to demolish heritage buildings.</li> <li>• Vibrations from nearby construction and cars could affect structural stability of older buildings.</li> <li>• Deterioration of existing urban fabric, including fragile heritage buildings.</li> </ul>
	<b>40</b>	<b>Pollution</b>	Typically, heritage buildings surrounded by modern towns are more prone to damage as a result of pollution caused by neighbouring urbanization. Structures near crowded urban districts subject them to a variety of pollutants such as: exhausts emitted from industries/workshops, traffic congestions and vehicles, and restaurants, also a rising in the range of temperature and humidity in the air, which leads to damage to various materials in the heritage asset (Afify, 2011; Ghanem & Saad, 2015; Pedersoli Jr., et al., 2016; Tagoon & Hegazy, 2019). The extent of damage due to pollution also depends on the nature of the area, and the proximity of heritage to areas of central works. For instance, in some areas in Cairo, there is an increase in several harmful activities, such as marble workshops, which result in solid or liquid waste eventually thrown and left in the alleys near the heritage structures (Gharib, 2010; Osman, 2018).	<ul style="list-style-type: none"> <li>• Deterioration of heritage building materials, threatening its architectural and aesthetic value, as well as the building's integrity and authenticity.</li> </ul>

The various identified risk factors in this study may have different defining categories such as technical, social, financial, etc.... However, the impact of each risk from a given category may have repercussions related to a different category. For example, in the social/cultural risk category, vandalism and encroachments are identified. While this is fundamentally a social issue, the repercussions are not just social or relating to the society, but negative consequences also exist on financial, technical, and economic levels. The impact of vandalism as stated in Table 1, manifests itself as a financial issue in terms of additional funds required for the remediation of heritage and its protection, as a technical issue in terms of complexity of restoring previous features of the heritage building affected, and as an economic issue in the sense that vandalism negatively affects the surrounding urban area and decreases the marketability of it as well as other assets in the area. This chain of cause and effect would need to be further explored for all risks, using for example, a cause-and-effect analysis as a tool, or a root cause analysis. This would help the

relevant professionals in the field in developing correct risk scenarios, thus identifying various and effective ways of dealing with and treating these risks.

#### IV. CONCLUSIONS AND RECOMMENDATIONS

Heritage buildings in the Egyptian context represent a significant untapped resource. One of the main approaches to utilize such buildings sustainably while conserving their heritage values and significance is adaptive reuse. Despite the many perceived benefits of adaptive reuse in various nations and in Egypt, it is still considered a relatively risky approach given the fragility of heritage assets and the many inherent and external factors affecting their condition and conservation, as well as the unique nature of adaptive reuse projects characterized by change of building use. All these factors pose a variety of different risks to heritage buildings and their conservation and protection. These risks are scarcely outlined in the heritage conservation and adaptive reuse literature, where also the culture of RM in the heritage industry is limited mostly to disaster risk management, with little information on the effect of human-induced risks imposed by the surrounding context of the heritage and the various approaches of conservation.

Thus, it was necessary to conduct a study to identify the various risk factors associated with adaptive reuse of heritage buildings, given the importance of this approach and its extensive use in various countries and in Egypt. This could aid all relevant professionals and stakeholders in understanding and conducting adaptive reuse projects in a systematic way while reducing the impact of threats that could jeopardize the success of adaption, given that risk identification and categorization is the first step of risk management. Such risks could cause negative impacts on built heritage significance and integrity, eventually causing damage to the urban fabric as well, and leaving less heritage resources for future generations.

Accordingly, a set of adaptive reuse risks in the Egyptian context was gathered and categorized (in an RBS) in this study into nine main categories, namely: functional, economic, social/cultural, technical, political, administrative/managerial, financial, legal, and environmental, comprising of 40 risk factors in total. In Egypt, buildings that are not utilized or adapted are more prone to the threat of deterioration and demolition. It was found that the complexity and interrelated nature of these risks cited in the study could be one of the main underlying factors that hinder the decision to adopt adaptive reuse for heritage buildings more often in the Egyptian context, hence wasting opportunities to conserve and use a large amount of heritage building stock efficiently and sustainably, while also preventing their demolition and maintaining the continuity of the urban fabric.

It is recommended for further research that a cause-and-effect analysis between the various risks is conducted to further understand the linkages between the various risks and their relevant impacts on heritage buildings and their surroundings. It is also recommended that further processes of RM are explored, towards the development of a RM framework catering to the unique nature of heritage conservation projects, as part of a complete heritage conservation and management plan. This framework could focus more on the impacts of human-induced risks on heritage, including the impacts of various heritage conservation approaches.

#### References

- [1] Abada, G., 2008. *Cultural Heritage and Development in the Arab World*, Alexandria: The Bibliotheca Alexandrina.
- [2] Afify, A., 2011. *The Rehabilitation and Conservation policies for Historical Areas; Issues for Egypt and Mediterranean cities*. [Online] Available at: [http://www.cpas-egypt.com/pdf/Ayman\\_Afify/5th%20Paper.pdf](http://www.cpas-egypt.com/pdf/Ayman_Afify/5th%20Paper.pdf) [Accessed 24 January 2021].
- [3] Atakul, N., Thaheem, M. J. & Marco, A. D., 2014. Risk management for sustainable restoration of immovable cultural heritage, part 1: PRM framework. *Journal of Cultural Heritage Management and Sustainable Development*, 4(2), pp. 149 - 165.
- [4] Azizi, N. Z. M., Abdul Razak, A., Mohd Din, M. A. & Nasir, N. M., 2016. Recurring Issues in Historic Building Conservation. *Procedia - Social and Behavioral Sciences* 222 , pp. 587-595.
- [5] Badawi, A. S., 2017. *52 Fouad Street: How did "Sigma" transport this property from past to present?*. [Online] Available at: [http://www.tadamun.co/?post\\_type=initiative&p=9157#.WcS8AIyCzcc](http://www.tadamun.co/?post_type=initiative&p=9157#.WcS8AIyCzcc) [Accessed 20 January 2018].
- [6] Becker, G. M., 2004. *A practical risk management approach*. Anaheim, PMI® Global Congress.
- [7] Bullen, P. A. & Love, P. E., 2010. The rhetoric of adaptive reuse or reality of demolition: Views from the field. *Cities* 27, pp. 215-224.
- [8] Bullen, P. A. & Love, P. E., 2011. Adaptive reuse of heritage buildings. *Structural Survey*, November, 29(5), pp. 411-421.



- [9] Bullen, P. & Love, P., 2011. Factors influencing the adaptive re-use of buildings. *Journal of Engineering, Design and Technology*, 9(1), pp. 32-46.
- [10] Cutieru, A., 2021. *Adaptive Reuse as a Strategy for Sustainable Urban Development and Regeneration*. [Online] Available at: <https://www.archdaily.com/970632/adaptive-reuse-as-a-strategy-for-sustainable-urban-development-and-regeneration> [Accessed 25 January 2022].
- [11] Davidson, T., 2008. *Cairo's Belle Epoque Heritage: Identity, Management and Sustainability*, London: MSc Thesis, University College London.
- [12] DEH, 2004. *Adaptive Reuse – Preserving our past, building our future*, Canberra: Commonwealth of Australia 2004.
- [13] Demás, M., 2002. Planning for Conservation and Management of Archaeological Sites: A Values-Based Approach. In: J. M. Teutónico & G. Palumbo, eds. *Management Planning for Archaeological Sites*. Corinth: Getty Conservation Institute, pp. 27-54.
- [14] Douglas, J., 2006. *Building Adaptation*. 2nd ed. Oxford: Elsevier Ltd..
- [15] Dubini, P., Leone, L. & Forti, L., 2012. Role Distribution in Public-Private Partnerships: The Case of Heritage Management in Italy. *International Studies of Management & Organization*, 42(2), pp. 57-75.
- [16] El-Aref, N., 2015. *New ideas on Egypt's heritage*. [Online] Available at: <http://weekly.ahram.org.eg/News/12701.aspx> [Accessed 17 November 2017].
- [17] Elsorady, D. A., 2011. Heritage conservation in Alexandria, Egypt: managing tensions between ownership and legislation. *International Journal of Heritage Studies*, 17(5), p. 497–513.
- [18] Fouda, M., 2021. *Challenges of Protecting Egypt's Heritage*. [Online] Available at: <https://en.ecss.com.eg/2641/> [Accessed 10 March 2022].
- [19] Getty Conservation Institute, 1999. *Economics and Heritage Conservation: A Meeting Organized by the Getty Conservation Institute*, Los Angeles: Getty Conservation Institute.
- [20] Ghanem, M. M. & Saad, S., 2015. Enhancing sustainable heritage tourism in Egypt: Challenges and framework of action. *Journal of Heritage Tourism*, 10(4), pp. 357-377.
- [21] Gharib, R. Y., 2010. *Revitalising historic Cairo: examining the public policy formulation and implementation*. PhD thesis, Nottingham: University of Nottingham.
- [22] Gharib, S., 2009. *Strengthening the institutional and legal framework*. Morocco, The National Organization for Urban Harmony , pp. 1-6.
- [23] Guzmán, P., Roders, A. P. & Colenbrander, B., 2014. *Bridging the gap between urban development and cultural heritage protection*. Chile, 34th Annual Conference of the International Association for Impact Assessment 8 - 11 April.
- [24] Haidar, L. & Talib, A., 2015. Adaptive Reuse Practice in Tower Houses. *Procedia - Social and Behavioral Sciences* 202, pp. 351-360.
- [25] Hegazy, S. M., 2015. Conservation of historical buildings – The Omani–French museum as a case study. *Housing and Building National Research Center*, 11(2), pp. 264-274.
- [26] ICLEI, 2020. *Adaptive Reuse of Cultural Heritage: An Examination of Circular Governance Models from 16 International Case Studies*, Europe: ICLEI (Local Governments for Sustainability).
- [27] Khodeir, L. M., Aly, D. & Tarek, S., 2016. Integrating HBIM (Heritage Building Information Modeling) Tools in the Application of Sustainable Retrofitting of Heritage Buildings in Egypt. *Procedia Environmental Sciences* 34 , pp. 258-270.
- [28] López, P. J. M., 2016. *Integrated Risk Assessment for Cultural Heritage Sites: a holistic support tool for decision-making*, Lucca, Italy: PhD thesis, IMT School for Advanced Studies.

- [29] Lwoga, N. B. & Mwitondi, M. S., 2018. Challenges Facing the Conservation of Historic Buildings Through Local Eyes: The Swahili Town of Kilwa Kivinje, Tanzania. *HERITAGE & SOCIETY*, 11(3), p. 249–275.
- [30] Macdonald, S., 2011. *Leveraging Heritage: Public-Private, and Third-Sector Partnerships for the Conservation of the Historic Urban Environment*. Paris, ICOMOS, pp. 893-904.
- [31] Mallawaarachchi, H., Hansamali, P., Perera, K. & Karunasena, G., 2018. *RISK RESPONSIVE STRATEGIES FOR ADAPTIVE REUSE OF HISTORIC BUILDINGS: A CASE OF SRI LANKA*. Sydney, ICEC- PAQS Conference .
- [32] Mansfield, J. R., 2009. The use of formalised risk management approaches by UK design consultants in conservation refurbishment projects. *Engineering, Construction and Architectural Management*, 16(3), pp. 273-287.
- [33] Ma, T. & Yu, M., 2017. *An Analysis of the Adaptive Re-use of Heritage Buildings in South Australia: Proceedings of the 20th International Symposium on Advancement of Construction Management and Real Estate*. Singapore, Springer Science+Business Media .
- [34] Maxwell, J. A., 1996. *Qualitative Research Design: An Interactive Approach*. London: SAGE Publications Ltd..
- [35] Mısırlısoy, D. & Günce, K., 2016. Adaptive reuse strategies for heritage buildings: A holistic approach. *Sustainable Cities and Society*, Volume 26, p. 91–98.
- [36] Mohamed, N. & Alauddin, K., 2021. Decision making criteria for adaptive reuse strategy in UNESCO world heritage city. *Journal of Facilities Management*, ahead-of-print(ahead-of-print).
- [37] Mostafa, S. L., 1987. Historic Cairo: Causes of Deterioration and Suggestions for Preservation. *ICOMOS*, pp. 762-767.
- [38] MPMAR, 2016. *Sustainable Development Strategy: Egypt's 2030 Vision*, Cairo: Ministry of Planning, Monitoring and Administrative Reform.
- [39] Mubaideena, S. & Kurdi, N. A., 2017. Heritage conservation and urban development : A supporting management model for the effective incorporation of archaeological sites in the planning process. *Journal of Cultural Heritage*, Volume 28, p. 117–128.
- [40] Nader, A., 2016. *The Decimation of Alexandria's Architectural Heritage*. [Online] Available at: <https://egyptianstreets.com/2016/07/20/the-decimation-of-alexandrias-architectural-heritage/> [Accessed 29 September 2017].
- [41] Osman, K. A.-A., 2018. Heritage conservation management in Egypt: A review of the current and proposed situation to amend it. *Ain Shams Engineering Journal*, Volume 9, pp. 2907-2916.
- [42] Othman, A. A. E. & Elsaay, H., 2018. Adaptive reuse: an innovative approach for generating sustainable values for historic buildings in developing countries. *Organization, Technology and Management in Construction*, May, 10(1), pp. 1704-1718.
- [43] Othman, A. A. E. & Mahmoud, N. A., 2020. Public-private partnerships as an approach for alleviating risks associated with adaptive reuse of heritage buildings in Egypt. *International Journal of Construction Management*.
- [44] Paolini, A. et al., 2012. *RISK MANAGEMENT AT HERITAGE SITES: A CASE STUDY OF THE PETRA WORLD HERITAGE SITE*, Amman: UNESCO.
- [45] Pedersoli Jr., J. L., Antomarchi, C. & Michalski, S., 2016. *A Guide to Risk Management of Cultural Heritage*, Sharjah: ICCROM and CCI.
- [46] Plevoets, B. & Cleempoel, K. V., 2011. Adaptive reuse as a strategy towards conservation of cultural heritage: a literature review. *WIT Transactions on The Built Environment*, Volume 118, pp. 155-164.
- [47] Remøy, H. & Voordt, T. v. d., 2014. Adaptive reuse of office buildings: opportunities and risks of conversion into housing. *Building Research & Information*, pp. 381-390.
- [48] Reyers, J. & Mansfield, J., 2001. The assessment of risk in conservation refurbishment projects. *Structural Survey*, 19(5), pp. 238-244.

- [49] RICHES, 2016. *Public-Private Partnerships for Cultural Heritage: Opportunities, Challenges, Future Steps*, Coventry: RICHES Project.
- [50] Roy, D. & Kalidindi, S. N., 2017. Critical challenges in management of heritage conservation projects in India. *Journal of Cultural Heritage Management and Sustainable Development*, 7(3), pp. 2044-1266.
- [51] Rozzo, I. & Mignosa, A., 2013. *Handbook on the Economics of Cultural Heritage*. UK: Edward Elgar.
- [52] Said, L. & Borg, Y., 2017. Public Perception and Conservation: The Case of Alexandria's Built Heritage. *Heritage in Action*, pp. 151-165.
- [53] Said, L. & Borg, Y., 2017. Public Perception and Conservation: The Case of Alexandria's Built Heritage. In: H. Silverman, E. Waterton & S. Watson, eds. *Heritage in Action: Making the Past in the Present*. Cham: Springer International Publishing, pp. 151-165.
- [54] Shahi, S., Esfahani, M. E., Bachmann, C. & Haas, C., 2020. A definition framework for building adaptation projects. *Sustainable Cities and Society*, Volume 63, pp. 1-15.
- [55] Shehata, W. T. A., 2014. *A FRAMEWORK FOR THE COMPREHENSIVE ASSESSMENT OF THE ADAPTIVE REUSE OF HERITAGE BUILDINGS IN HISTORIC CAIRO*, Cairo: MSc Thesis, Arab Academy for Science, Technology & Maritime Transport.
- [56] Shipley, R., Utz, S. & Parsons, M., 2006. Does Adaptive Reuse Pay? A Study of the Business of Building Renovation in Ontario, Canada. *International Journal of Heritage Studies*, November, 12(6), pp. 505-520.
- [57] Silva, D. D. & Perera, K. K. S., 2017. *Barriers and Challenges of Adaptive Reuse of Buildings*. Colombo, Institute of Quantity Surveyors Sri Lanka annual technical sessions 2016, pp. 1-9.
- [58] Smallwood, C., 2012. *The role of adaptive (re)use*. Paper presented at PMI® Global Congress 2012. Newtown Square, PA: Project Management Institute.
- [59] Tphoon, D. & Hegazy, Y., 2019. Risk management strategies of cultural heritage case study: Tel Basta archaeological site. *International Design Journal*, 9(3), pp. 281-292.
- [60] Thaheem, M. J., 2014. *Project Risk Management for Sustainable Restoration of Immovable Cultural Heritage: Lessons from Construction Industry and Formulation of a Customized PRM Model (Doctoral Dissertation)*, s.l.: POLITECNICO DI TORINO.
- [61] UNESCO, 2010. *Managing Disaster Risks for World Heritage*, s.l.: UNESCO.
- [62] Verma, S., 2007. *Sharing of Risks and Rewards in Public-Private Partnerships for Conservation and Management of Heritage Monuments in India: Exploring the Possible Contours of a Model Concession Agreement*. Jaipur, Rajasthan, H.C.M. Rajasthan State Institute of Public Administration.
- [63] Wijesuriya, G., Thompson, J. & Young, C., 2013. *Managing Cultural World Heritage*, Paris: UNESCO.
- [64] Wilkinson, S. J., Remøy, H. & Langston, C., 2014. *Sustainable Building Adaptation: Innovations in Decision-Making*. 1st ed. England: John Wiley & Sons, Ltd..