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# Assessing the performance of urban heritage conservation projects – influencing factors, aspects and priority weights

Sunena Abdul Huq<sup>1\*</sup>  and Bimal Puthuvayi<sup>1</sup>

## Abstract

Heritage conservation in urban areas involves complex systems often faced with the dilemmas of maintaining the built form's historical character, improving infrastructure, and managing development through stakeholder cooperation. At present, the performance of any conservation project is solely vested in conserving the built fabric. Evaluation tools for urban heritage conservation projects do not have provisions for measuring the subjective value of stakeholders who are part of the heritage setting. This study tries to identify and prioritise the factors that need to be considered when developing a conservation project performance assessment model for an urban heritage conservation project from the perspective of experts that can be further evaluated from the perspective of stakeholders. As these complex systems can be better viewed in the context of developing countries, the case of India is adopted. From a literature review, factors that contribute to the outcome of an urban heritage conservation project were identified and categorised into six aspects: the physical, social, economic, cultural, political, and continuity aspects. Through an expert survey, the factors that constituted each aspect were filtered using the feature selection method of correlation to avoid factors that may seem related. The factors under each aspect were ranked using a weighted average ranking method to identify the most prioritised factors determining the outcome of an urban heritage conservation project. The priority weights of the aspects were calculated using Saaty's analytic hierarchy process. The results show that the cultural aspect was the most important aspect, followed by the continuity aspect. The social and physical aspects were prioritised similarly, followed by the economic and political aspects. This study is distinctive because it identifies the influential factors that can help develop a conservation project performance assessment model for an urban heritage conservation project.

**Keywords** heritage conservation, urban conservation performance, influential factors, AHP, filter-based feature selection

\*Correspondence:

Sunena Abdul Huq  
sunenaabdulhuq92@gmail.com

<sup>1</sup> Department of Architecture & Planning, National Institute of Technology  
Calicut, NIT Campus, P. O. 673601, Kozhikode, Kerala, India



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## 1 Introduction

This paper attempts to identify the factors that affect the performance of an urban heritage conservation project. Urban heritage is a complex system<sup>1</sup> characterised by conflicting social issues that address preservation and development (Battaglini 2020). Urban conservation is a practice for understanding and managing heritage areas of historic value for the future (Whitehand and Gu 2007). Urban heritage conservation focuses on two primary aspects: the community's quality of life, which considers the social, economic, and functional dimensions of its people and can include various processes and resources; and the conservation and preservation of tangible and intangible cultural heritage. The performance evaluation of a project is used to gauge its success, which is a multifaceted concept that implies that various stakeholders have differing perspectives on the level of satisfaction or success of a project (Zwikael and Meredith 2019). This paper also attempts to identify various aspects of conservation projects and assess their importance through priority weights. Identifying factors and aspects as well as their priority weights is an essential step in any attempt to evaluate the conservation performance of urban heritage conservation projects worldwide. A comprehensive set of factors, aspects, and their priority weights can also help develop a standard model framework for assessing conservation projects with well-defined scores and benchmarks. Such a standard measurement system will lead to better learning from past examples and ultimately improve stakeholders' acceptance of conservation projects.

Conservation at the building level is an intricate procedure. Heritage structures devoid of their context ultimately face demolition and become mere monuments within a rapidly changing urban fabric (Abdurahiman and Kasturba 2022). This intricacy is particularly true in urban settings where it is necessary to balance the built heritage and the population's demands for infrastructure. Urban heritage areas encompass many stakeholders, affect the livelihood of the public, impact the maintenance and use of private property, and affect the continuity of the tangible and intangible historic fabric with which people identify (NIUA 2015). Change must be managed to promote continuity in heritage-sensitive urban areas (Adishakti 2010).

Evaluation refers to the assessment of a completed or ongoing project, programme, policy, design, implementation or outcome (OECD 2010). Conservation performance

evaluation is essential for prolonging the life of heritage assets, as noted by Fielden and Jokilehto (1998). There are no pre-defined phases for an urban heritage conservation project, and it is not easy to create a universal framework due to the varying nature of such projects. However, the Australia International Council on Monuments and Sites (ICOMOS) mentions various steps for managing a place of cultural significance, including understanding the place, assessing the cultural significance of the site (based on a values-led approach), identifying the factors and issues arising from its significance, developing a policy, preparing the management plan, implementing the management plan, monitoring the results and reviewing the plan. Here, community and stakeholder engagement occurs throughout the process (Australia ICOMOS 1999). Although these stages involve the components needed to achieve the outcome of protection of the historical value of urban heritage for present and future needs, they do not endorse the need for subsequent performance assessment, which is a vital step before the implementation of an urban heritage conservation project.

Urban heritage conservation does not mandate the need for performance assessment; however, it is essential because it deals with public assets. Urban heritage is a national asset, and its conservation must address various stakeholders, its influence on multiple domains and its conflicting need for public money (NIUA 2015). A performance assessment is based on numerous factors, as it is not based on a single entity or quantity. There are several stakeholders, with each having its own view on a project's performance. Hence, there is a need for a framework for performance assessment. As various stakeholders, organisations, and establishments are involved, identifying the influential factors from different stakeholders cannot be directly carried out; hence, expert opinions are obtained. Doing so necessitates the assessment of factors and aspects through an expert consultation, which also helps make the framework more general and applicable to a variety of projects rather than a specific project. However, there should be ample provisions for the competing viewpoints of individual stakeholders in prospective projects. The experts were involved in shortlisting the factors that could be used as instruments for detailed stakeholder analysis.

This study focuses on heritage-sensitive urban areas comprising one or more heritage buildings or related places with some shared physical, social, or cultural significance that merits preservation and conservation (Shankar and Shobha 2015), where considerable heritage structures exist but have been enveloped by new constructions. This study does not incorporate natural feature areas. The time scope of projects is mostly urban heritage conservation projects that have implemented several built heritage conservation works and comprise living communities that strive for development

<sup>1</sup> The complex system is bounded by various components from its living history (being the symbol of a country's living architectural, economic, social and cultural heritage), including natural ecology (settlements governed by natural factors: water, topography, the landform, the availability of materials), land use patterns (mixed land uses), circulation systems (street systems influence the morphology of historic cities), open space systems (which characterise the social life of people), infrastructure (services provided for people), architectural form (impact of culture, climate, traditional knowledge systems contextualising the built form) and the symbolism of the area (the historic significance imprinted in it).

**Table 1** Heritage conservation evaluation tools and their drawbacks

Heritage Conservation Evaluation Tool	Drawbacks
1. Cultural Heritage Impact Assessment: International Council on Monuments and Sites (ICOMOS)	Heritage impact assessment (HIA) originated in the environmental impact assessment (EIA) framework as a tool to assess the impacts caused by new interventions on cultural heritage assets (Egusquiza et al. 2018)
2. Reactive Monitoring (RM) and Periodic Reporting (PR) by the United Nations Educational, Scientific and Cultural Organisation (UNESCO)	RM is an evaluation tool for monitoring the state of conservation of sites that fall on the World Heritage in Danger list. PR does not provide any information on the nature of the threat but provides a quantitative value that allows for comparison between sites over time.
3. Facility Performance Evaluation (FPE)	This evaluation method is at the building level. FPE assesses the performance of a facility/heritage building in terms of its intended use for revitalisation or rehabilitation projects.
4. Post-Occupancy Evaluation (POE)	This is one of the most widely used evaluation measures for assessing the performance of a building. The POE process is a stage that needs to be oriented towards the end user's satisfaction and expectations.
5. Conservation Performance Indicator (CPI)- National Trust, UK	The CPI seeks to evaluate the performance of only selected prominent features and does not consider the built fabric's setting.

under a constant state of flux. Assessing the outcome of urban heritage conservation projects depends on a case-by-case basis where there is no single point of preference.

### 1.1 Existing evaluation tools in heritage conservation

Various cases in developing and developed contexts have been studied, finding that the monitoring stage of a project, which involves continuous monitoring and evaluation, rarely becomes a mandate in the long run. Table 1 lists the tools used to evaluate a conservation project's performance at the building level. However, we could not identify any tool that addresses the evaluation of urban heritage conservation projects. Firzan et al. noted that stakeholders' points of view need to be considered in such cases (Firzan et al. 2017).

There is a need for an evaluation framework for assessing the performance of urban heritage conservation projects from the stakeholder perspective. Such a framework may significantly help in future conservation policy decision-making. While assessing conservation performance, the expert value of professionals should be considered, as should the subjective value of stakeholders. Performance should be evaluated in a manner that better includes the value attributed to a wider array of stakeholders (Wells 2011). Identifying the influential factors that determine a conservation project's outcome will help formulate a framework while planning for development in heritage-sensitive urban areas, taking stakeholder satisfaction into consideration. Research has been conducted to solve specific problems in urban heritage conservation projects during the implementation phase, such as stakeholder conflicts, insufficient financial aid, a lack of public awareness and the reuse of historic buildings (Chen, Yoo, and Hwang 2017).

Developing and developed countries adopt different methods of conserving and managing their heritage. Amsterdam, Chester, and York are well-maintained historic towns due to

their well-defined character specificity. In developing countries, the homogeneity is diversified due to the complex need to manage development among varying historical layers. One of the limitations in existing international doctrines related to historic urban areas is that they are focused on architecture alone (Jokilehto 2007). As the outcome of any project can be considered situation specific, this paper can be seen as a framework for developing a conservation performance assessment model for various regions.

The literature on factor identification and investigating a project's post-implementation and monitoring phase is scarce. This study tries to identify the influential factors that determine the outcome of an urban heritage conservation project in a developing country such as India from the perspective of Indian heritage conservation experts. The influential factors listed in this paper can be considered a starting point for similar studies in performance assessment. The list of factors has been evolved by engaging in a systematic process of identifying various factors through a literature review of various sources and studies within developed and developing countries and through expert interviews.

Factor prioritisation and aspect weighting are performed to identify the importance of diverse aspects while planning for development. The technique chosen for the prioritisation of aspects is the analytic hierarchy process (AHP), and for the prioritisation of factors, the average weighted ranking (AWR) is used. Multi-criteria decision-making (MCDM) encompasses various tools and methods that can evaluate multiple conflicting criteria in decision-making. There are few MCDM techniques used in urban heritage projects (Morkúnaitė, Kalibatas, and Kalibatienė 2019). Most studies involve selecting appropriate reuse or refurbishment alternatives in urban heritage conservation projects (Yau 2009; Munarim and Ghisi 2016). Table 2 shows the studies that have tried to integrate various MCDM methods in urban heritage conservation projects and the focus of each of those papers.

**Table 2** Studies using MCDM techniques in urban heritage conservation projects

Article	Topic theme/category	MCDM methods employed	Focus of the paper
Berta, Bottero, and Ferretti (2016)	Mixed-method approach for the integration of urban design and economic evaluation	Analytic network process (ANP), multi-attribute value theory (MAVT)	Selection of the best masterplan option
Chen, Yoo, and Hwang (2017)	Fuzzy multi-criteria decision-making (FMCDM) assessment of urban conservation in historic districts	Fuzzy AHP, fuzzy simple additive weighting (SAW)	Using an FMCDM model to assess a property-led urban conservation project's success, various stakeholders' worries and problematic factors may be quantified without the investigator's subjective influence. Interdependence among the criteria is not assessed.
Yau 2009	MCDM for urban-built heritage conservation	AHP	Based on the selection of the best project outcome for a project selection process
Munarim and Ghisi (2016)	Heritage building rehabilitation	Computer simulation and life cycle assessment tools	The method is used to assess buildings' environmental performance and for decision-making in rehabilitation projects.

The various MCDM methods used in heritage studies were identified, reviewed and compared through different review papers (Morkūnaitė, Kalibatas, and Kalibatiėnė 2019; Nadkarni and Puthuvayi 2020). The studies showed that the AHP was the most common MCDM technique employed in built heritage studies and was primarily used for identifying the most suitable alternative for adaptive reuse projects. No papers have tried to explore the priority of the aspects that define the outcome of an urban heritage conservation project. Since the AHP is the most sought-after method for assigning priority weights due to its ability to reduce subjective bias, it is adopted in this study for assigning aspect weights. The same method is not adopted in the case of factor prioritisation, as it is more tedious and time-consuming. Therefore, the AWR is preferred since the factors need to be reduced using the feature selection method of correlation to arrive at the final list of influential factors.

The sustainable development goals also indicate that there is a need to promote heritage in achieving sustainable development since the future of societies is decided by urban areas where culture plays an important role (UNESCO 2015), which further enhances the need for such a study to identify these influencing factors. The current study attempts to answer the following research questions: 1) What are the influential factors that contribute to determining the outcome of an urban heritage conservation project when developing a conservation performance assessment model? 2) What are the priority weights assigned to various aspects when considering an urban heritage conservation project in the context of India? This study is relevant because the first phase of identifying these influential factors can help develop a framework for planning in heritage-sensitive urban areas.

## 1.2 The dilemma of conservation in developing countries: India

As a cultural tourism destination with the richest and most diverse stock of intact heritage structures, India has been plagued by the developing urban fabric meant for people (Menon 2014; Udeaja et al. 2020). India has a wide range of protected monuments, such as World Heritage Sites (42) and centrally protected monuments (3693), under the custodianship of the Archaeological Survey of India (ASI). Some are under the archaeological department of various states; various others fall under the jurisdiction of religious establishments; and many others do not fall under the jurisdiction of any such system of protection (Menon 2014). Indian cities are expanding rapidly to accommodate the growing needs of the urban population (NIUA 2015). Urban areas are under considerable stress due to the urbanisation caused by the need for new industries, housing, businesses, and public infrastructure. The characteristics of historic urban places and their environments are also changing due to changes in land use, the population's wants and aspirations, and its associated uncontrolled development (NIUA 2015). Having bounded resources has always been a problem in developing countries when finance is needed for nation-building. Heritage can be considered a vital component of tourism and possesses social value that serves as a factor in stimulating sustainable development (Basu and De 2021).

The priority placed on building infrastructures with historical and artistic elements makes the organisational structure observed in nations such as the United Kingdom unusually well planned (Hobson 2003). Good design principles that harmoniously permit sensitive development should also meet infrastructural and amenity needs.





**Fig. 1** Taj Palace Hotel and Gateway of India, Mumbai (Source: Arian Zwegers)



**Fig. 2** Sarkhej Roza Complex, Ahmedabad (Source: AFP Photo)

Westernised conservation planning cannot be implemented within the context of multiple cultures since external factors cannot be the mere determinant of character. Figure 1 shows the Taj Palace Hotel and Gateway of India in Mumbai, which are distinctive monumental buildings of character that are well conserved. Figures 2 and 3 provide a glimpse of the rapid urbanisation occurring within and near the sites of historic value where the character of the buildings is insensitively lost among modern constructions.

A study conducted in 2020 in Surat revealed that the inadequacy of heritage-focused urban conservation management policies and processes; the lack of decision makers' skills, resources, and training; and the ongoing conflict and competition between developers' interests and heritage conservation needs were some of the challenges that were faced in the conservation process (Udejaja et al. 2020). Infrastructure development and management deficits hinder heritage needs in developing urban areas (Veldpauw et al. 2014). Since there are

many issues based on the management of these heritage sites, there is a need to integrate a sustainable urban heritage conservation strategy involving different people and incorporating their needs. Hence, this study needs to identify the factors that determine the outcome of urban heritage conservation projects.

### 1.3 Listing the factors that determine the outcome of an urban heritage conservation project

The common framework for heritage management systems with nine characteristics can be grouped into three main elements (the legislative framework, the institutional framework, and resources), three processes (planning, implementation, and monitoring) and three results (outcomes, outputs, and improvements) (UNESCO et al. 2013). The conservation framework is synonymously subdivided into three major areas for assessment purposes in this study: the legislative framework (acts and laws), the institutional framework (institutions and governmental bodies), and the



**Fig. 3** Demolition work for the Kashi Viswanath Temple Corridor, Varanasi (Source: Tarique Anwar)

executive framework (techniques formulated while executing the project). The conservation frameworks of various developed and developing countries were compared through a literature review to identify factors that influence the outcome of a conservation project. Chen formulated six aspects for assessing urban heritage conservation performance, consolidated from a series of works performed by Kocaban, Steinberg, Cohen, Su, and Orbasli (Chen, Yoo, and Hwang 2017). The six aspects are the physical, social, economic, cultural, political, and continuity aspects.

The term ‘aspect’ refers to a particular set of features that can be generalised in any context, whereas the factors are specific components that contribute to an aspect. The factors used in the criteria formation process by Chen were used in this study, and several factors identified from the literature and expert opinions were also grouped under these specific aspects to reduce complexity (Chen, Yoo, and Hwang 2017). The aspects and their factors are shown in Table 3, and their references are detailed in Appendix 1. A description of the factors is provided in Appendix 2.

The various aspects are defined as follows:

1. The physical aspect is linked to the conservation of the built form and the urban fabric of tangible nature that surrounds it.
2. The social aspect is associated with the needs and concerns of users, the local community and the urban population.
3. The economic aspect refers to the economic benefit for users and the financial feasibility of conservation.
4. The political aspect focuses on the politics and processes associated with various levels of an urban heritage conservation project.

5. The cultural aspect is associated with preserving the social and cultural values associated with the heritage site.
6. The continuity aspect can be associated with dimensions leading to sustainable conservation.

The outcome of any conservation project can be based on tangible and intangible elements. In his study, Khaled El Daghar mentioned that the factors influencing the success of a project rely on a good legal and administrative system, good community participation, and financial aspects (El-Daghar 2020). In developed countries, the top-down approach to planning is widely accepted, as incentives and funding mechanisms are available and play a major role in project implementation (Tabellini 2010). Heritage conservation is strained due to increased infrastructure needs in developing countries such as India, which has a growing population and economy. The success criteria for any project in an urban context vary depending on the project goals and the site context. In an urban heritage area, a project’s overall implementation and long-term sustainability need to be ensured through community involvement and persistence to maintain heritage (NIUA 2015).

#### 1.4 Conservation framework in the Indian context

India is a diversified nation composed of many different social groups and communities. The 1780s marked a turning point in British rule when monuments were found and made known to the public through publications (Thakur 1986). The need for follies in English landscapes resulted in the discovery of various valuable and distinctive buildings. Recording and preserving the breadth and calibre of India’s architectural legacy became necessary. In 1961, the ASI, a central organisation, was

**Table 3** List chosen for identifying the influential factors of an urban heritage conservation project (source: adapted from Chen, Yoo, and Hwang. Factors added to the existing list by the author)**Physical aspect (10)**

Preservation of the historic built environment, preservation of the urban pattern and issues of the historic city, preservation of the overall style and features of the conservation area, heritage authenticity and interpretation, environmental enhancement, spatial transformation of the historic built form, the compatibility of older land uses with new land uses, adaptation of the historic quality of the mixed-use environment to modern conditions, infrastructure improvement, and buffer zone treatment

**Social aspect (9)**

Residents' living standards, the community of low-income residents should be retained, supporting strategy for low-income residents when relocation is unavoidable, low-income residents are protected from the impact of gentrification, public participation, public and private initiatives, the maintenance of public openness during the decision-making process, social cohesion, and tourism and the host community

**Economic aspect (8)**

Economic needs, the economic viability of conservation, the funding system, financial support, taking advantage of private and public resources, land value and taxes, special tourist interest, consolidation of the urban economy

**Political aspect (10)**

The power structure, developing a community and culture-led agenda, the planning process, the relocation of residents, incremental renovation, policy agendas, management of the heritage site, the generation and maintenance of political support, the orientation of development, and cooperation among the central government, the local government, non-governmental organisations (NGOs), and inhabitants

**Cultural aspect (6)**

Enhance the sense of place and local culture, retain significant meaning and associations with the community, cultural needs, conserving culture, the strengthening of indigenous cultural traditions and forms, and enhance identity and collective memory

**Continuity aspect (5)**

Environmental continuity, ecological sustainability, economic sustainability, socio-cultural sustainability, and political sustainability

established. Lord Curzon enacted the Ancient Monuments Preservation Act in 1904 to legally contribute to the preservation of India's cultural heritage. Governmental changes in 1919 and 1935 strengthened the status and preservation of monuments. The Ancient Monuments and Archaeological Sites and Remains Act of 2010 is the most recent of multiple revisions to the preceding act.

The 73rd amendment to the constitution provided local governments additional authority, and the Indian National Trust for Art and Cultural Heritage (INTACH) was recognised to encourage the preservation of historical sites and increase communities' understanding of environmental issues. Even though there were operational issues with the central government, uniform standards and quality could be managed. Although it was more practical, local protection lacked uniformity. For the direction of state parties and ULBs (urban local bodies), the Town and Country Planning Organisation (TCPO) and the Ministry of Urban Development produced model building bylaws in 2016. Even though numerous organisations try to preserve historic buildings and sites, the necessity for development outweighs the need for conservation. Although a solid institutional framework for heritage protection exists, it lacks a focus on urban heritage (Udeaja et al. 2020). Because India is a large country, managing centrality in conservation is challenging. Therefore, the priorities among various states determine what should be conserved and

what should not. The top-down approach to planning with fragmentation within the governance system at different levels does not seem to be a favourable basis for development in heritage-sensitive urban areas due to varying interests (Udeaja et al. 2020). Figure 4 provides a glimpse into the urban heritage conservation framework in the Indian context.

The primary issue faced by heritage structures in India is demolition, as people aspire to develop rather than protect their heritage. A balance between protecting heritage structures while simultaneously catering to the interests of people needs to be struck. The factors identified as part of this study could be probable determinants that define the outcome of a heritage conservation project on the ground, considering the various aspects in developed and developing contexts such as India. Since the top-down planning approach is interlaced with priorities with regard to what to protect and governmental delays, the factors and their prioritisation from the perspective of conservation experts can help focus on the primary factors of importance that can ensure the continuity of an urban heritage conservation project in the long run. There is no pre-defined process for managing change in a heritage-sensitive urban area. The demolition of historic neighbourhoods paves the way for further development, which is where the relevance of this study comes in.

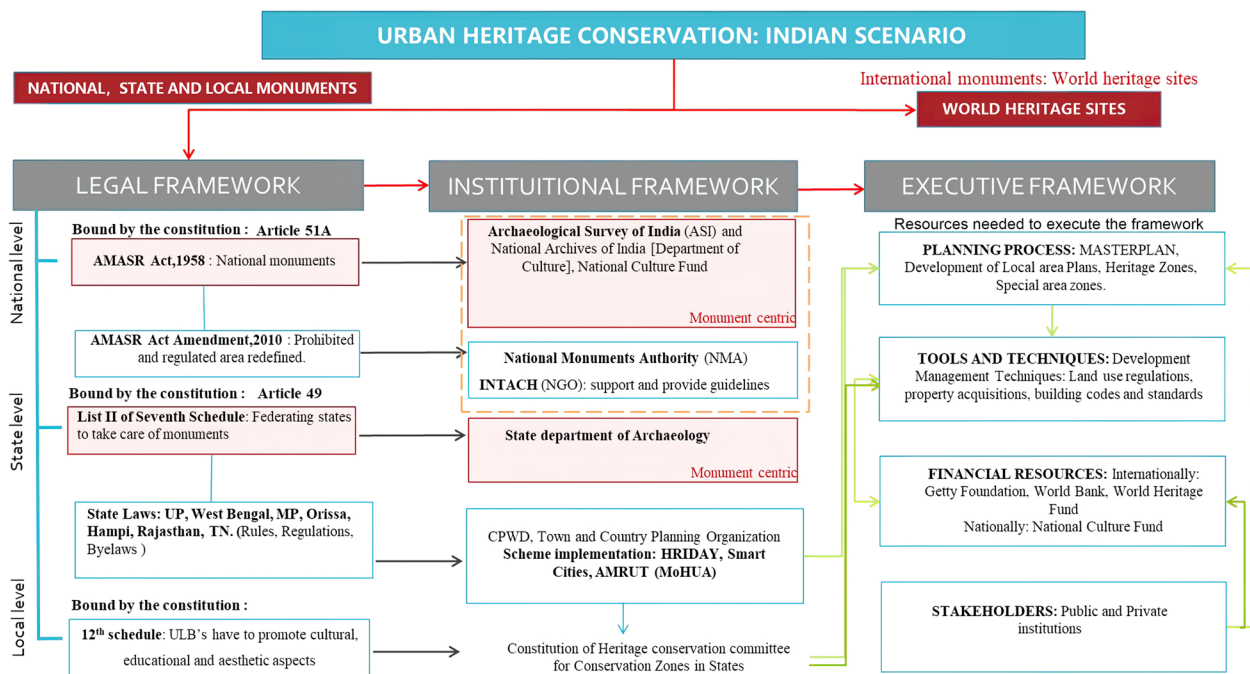


Fig. 4 Urban heritage conservation in the Indian context (Source: the author)

## 2 Research methods

People and cultural built heritage are two of the primary components that give a sense of identity to a place. A detailed stakeholder evaluation is required to assess the conservation performance of an urban heritage conservation project. Stakeholders need to provide input on a set of aspects and factors. However, these aspects and factors have not been identified. Therefore, this paper attempts to derive this set of factors. A previous study conducted by Chen identified a list of factors that were reduced and categorised through an expert evaluation (Chen, Yoo, and Hwang 2017). However, not all the factors were considered for the analysis. This paper tries to ensure that all factors are taken into account, and further additions to the list are made. The list is then reduced through the feature selection method of correlation to arrive at the final list of factors. The identified factors can be subsequently used to develop a conservation performance assessment model to assess stakeholder satisfaction within an urban heritage conservation area, which fall beyond the scope of this paper.

The factors required for stakeholder evaluation were identified through a weighted rank method coupled with correlation using experts. To obtain a generalised perspective, a group of experts was identified to discern the influential factors determining the outcome of urban heritage conservation projects. A literature review identified and listed factors under the six aspects mentioned

by Chen (Chen, Yoo, and Hwang 2017). Experts ranked the factors determining the outcome of urban heritage conservation projects from highly important to least important. Through an expert survey, the factors constituting each aspect were filtered using the feature selection method of correlation to avoid subsets of factors. The factors determining each aspect were ranked using the AWR to identify the most prioritised factors regarding the outcome of an urban heritage conservation project from the perspective of experts. The survey was conducted with 60 conservation experts from India who were involved in building conservation work within developing urban settings in heritage-sensitive urban areas. The AHP method considers the relative importance of various aspects through pairwise comparisons. A pairwise comparison of the aspects was performed with 30 experts, whose results showed a consistency ratio of 0.1 to arrive at the priority weights of the aspects that influence the outcome of a conservation project.

### 2.1 Stage I: reducing the list of factors

Every project has an outcome that may become a success or a failure in the long run. There are few studies on the post-implementation phase of urban heritage conservation projects; thus, several cases were identified both internationally and nationally. The listed factors were manually refined, and repetitive factors were eliminated. From the study conducted by Chen, 45 factors were



selected, four factors were identified from the literature, and 21 factors were identified by experts. A total of 70 factors were identified and classified into six aspects, namely, the physical (15 factors), social (14 factors), economic (9 factors), political (17 factors), cultural (10 factors), and continuity (5 factors) aspects. Redundant factors were refined by identifying factors that were variants of another factor through expert opinions. The final list of 48 factors was refined for this study.

The physical aspect encompasses factors related to conserving built heritage and its surroundings, such as preserving the overall character of a historic urban area, maintaining heritage authenticity, enhancing facilities, upgrading infrastructure, and treating the building and its surroundings. 'Buffer zone treatment' was added to the list after a literature review. The social aspect comprises factors related to people, their living conditions, social connectedness, and the capacity to participate. The 'social cohesion' and 'tourism and the host community' factors were added to the list. The economic aspect is influenced by factors that help in the implementation of a conservation project, such as financial aid and addressing the economic needs of people, the provision of tax incentives, and external funding mechanisms that aid in conserving the built fabric. The political aspect is associated with various stages of the conservation framework, such as the formulation of policy agendas, planning development orientation, and the maintenance of cooperation among various governmental organisations. The 'orientation of development' factor was added to the list from the literature. The cultural aspect encompasses factors that help retain a place's identity and meaning by strengthening an urban area's culture and tradition. The continuity aspect is associated with factors that need to assess a project's sustainability into the future.

## 2.2 Stage II: methods

The factors identified are to be filtered since some factors could be subsets of another factor and essentially represent the same factor. The weighted average rank technique prioritised factors and aspects by assessing professionals' subjective rank responses. The process involves tasks such as identifying a suitable feature selection and prioritisation technique, preparing a questionnaire survey to record expert opinions and selecting the panel of experts. Two different methods were employed in aspect prioritisation: the AWR and AHP methods. The first method used subjective ranking to arrive at the priority list of the aspects, whereas the AHP converted subjective opinions into measurable values.

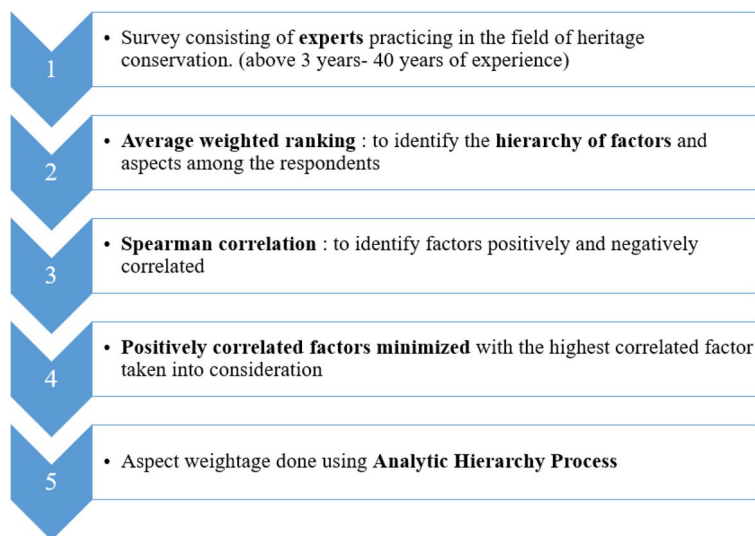
The AHP was found to be the most suitable technique for determining the priority weights of aspects (Okutan et al. 2018). Saaty introduced the AHP as a method

for allocating the relative importance of various items based on a criterion of different weightings. The AHP incorporates objective and subjective considerations in decision-making, which helps individuals exercise sound judgement. It breaks down decision-making problems into a hierarchy by identifying goals, criteria, sub-criteria and various decision alternatives. Several studies have been conducted to decide the best alternative for a project by turning subjective opinions into objective measures. Pairwise comparisons were used to determine the relative importance of various aspects in this study to ascertain the area of importance while dealing with the uncertainty between conservation and development. Figure 5 depicts the methodology used in the study.

The aspects are prioritised based on the perceptions of experts in the architectural conservation field via a questionnaire survey. The questionnaire was divided into three main sections: a brief introduction, ranking criteria to identify influential factors contributing to the outcome of an urban conservation project, and questions recording the experts' perceptions of the importance of each aspect. A list of practising conservation architects who have worked in urban-level heritage conservation projects was identified. This list was filtered for experts with more than 3 years of experience. A sample of 60 experts was chosen from this modified list to ensure an equitable representation for the study. The sixty experts were selected for the first phase of the survey, i.e., ranking the various factors defining each aspect. Eighteen of the experts who were chosen fell within the 3- to 5-year experience category but had experience with conservation projects in a developing context. The next phase surveyed the prioritisation of aspects using thirty experts in the field. A few experts pre-tested the questionnaire to test its general layout and to determine the amount of time required to complete the questionnaire. The questionnaire was further refined after critical reviews were obtained, and it was then administered.

## 2.3 Stage III: data analysis

The data collected through the questionnaire were analysed to determine the influential factors constituting each aspect and to determine the criteria weights for each aspect. The processes involved in the data analysis included computing the descriptive statistical data such as the mode and median of the ranked factors, computing the average weighted ranking of the factors, using the Spearman correlation to identify correlations among factors, and prioritising aspects using the AHP. The AWR is computed because there are factors that have similar ranks when computing the mode and median of the dataset. The AWR was calculated using the following formula:



**Fig. 5** Methodology of the study (Source: the author)

$$\text{Average weighted rank} = \sum W_i X_i / \text{total count}$$

where  $W_i$  is the weight of the ranked position and  $X_i$  is the response count for an answer choice.

The resulting factors were further filtered using Spearman’s rank-order correlation to identify whether there were any relationships between the factors within an aspect. Only positive and negative correlations that subsumed a statistically significant and moderately correlated significance at the 0.01 value were considered for analysis. The pairwise comparison of aspects was further analysed using the AHP.

### 3 Theory and calculations

#### 3.1 Reliability and consistency of the data collected

In the expert survey, the first section of the questionnaire included ranking the factors constituting each aspect. Descriptive statistics were used to summarise the data sample. The mode and median of the factors were computed to conclude that multiple factors are assigned a single rank. The standard deviation of the ranked data collected did not exceed 4, showing that the data can be considered reliable. Most of the factors in the physical, social, economic and political aspects had factors falling beyond +2 SD, signifying variations among the responses of the ranked data among the respondents. All the factors, excluding the ‘power structure’, ‘residents’ living standards’ and ‘cooperation among various stakeholders’, fell within +3 SD.

The second section consisted of evaluating the priority weights of the aspects. The AHP pairwise comparison matrix of the aspects was calculated for each respondent. Thirty respondents who were included in the study

had prior experience working with conservation projects within an urban setting. The respondents whose responses in the pairwise comparison matrix did not have a consistency index of 0.1 were asked to revisit their responses. Upon reaching a consistency ratio of less than or equal to 0.1 for each respondent, the geometric mean of the consistency ratio of the aspects was calculated. Table 4 shows the geometric weights and consistency ratio of the respondents.

#### 3.2 Arriving at the influential factors: the average weighted rank method and Spearman correlation analysis

The AWR of the factors under each aspect was calculated. Subsequently, a feature selection method involving Spearman correlations was used to arrive at the finalised list of influential factors. The AWR is calculated not to arrive at a particular hierarchy of factors but, rather, to prioritise assessment areas from an expert’s perspective. The experts’ AWR of the factors and aspects is shown in Appendix 3.

Based on the AWR method, the priorities of the aspects were as follows:

Social > Cultural > Physical > Economic > Continuity > Political

The experts’ AWR of the aspects stressed the need to attach the most importance to the social aspect, followed by the cultural aspect. The physical aspect was also prioritised over the economic and political aspects. The continuity aspect is rarely considered when planning for development, hence leading to the dilapidation of

**Table 4** Geometric mean of the consistency ratio and weights of aspects from 30 experts

Aspects		Aspects					
		x <sub>1</sub>	x <sub>2</sub>	x <sub>3</sub>	x <sub>4</sub>	x <sub>5</sub>	x <sub>6</sub>
Physical	x <sub>1</sub>	1.00	0.96	1.11	3.49	0.65	0.70
Social	x <sub>2</sub>	1.05	1.00	1.14	2.80	0.73	0.90
Economic	x <sub>3</sub>	0.90	0.88	1.00	2.54	0.62	0.86
Political	x <sub>4</sub>	0.29	0.36	0.39	1.00	0.30	0.38
Cultural	x <sub>5</sub>	1.53	1.37	1.62	3.33	1.00	1.19
Continuity	x <sub>6</sub>	1.43	1.12	1.17	2.60	0.84	1.00
Weights		0.1702	0.1757	0.1560	0.0638	0.2382	0.1960
Consistency Ratio		0.0048					

heritage buildings and unsustainable solutions in a developing context.

The prioritised factors were further combined using Spearman correlations. The positively correlated factors were combined into a single factor to arrive at the finalised list of influential factors that determine the outcome of an urban heritage conservation project.

## 4 Results and discussion

### 4.1 Average weighted rank analysis

The average weighted rankings obtained showed that the physical aspect prioritised 'preservation of the historic built environment' and 'heritage authenticity and interpretation', followed by 'environmental enhancement' and 'spatial transformation of the historic built form'. 'Infrastructure improvement' and 'buffer zone treatment' were ranked towards the bottom. The initial list of factors consisting of ten criteria was reduced by removing positively correlated factors: 'preservation of the historic built environment', 'preservation of the urban pattern and issues of the historic city', and 'preservation of the overall style and features of the conservation area'. 'Adaptation of the historic mixed-use environment to modern conditions' and 'infrastructure improvement' were also positively correlated. The correlation matrix for the physical aspect revealed a negative correlation between 'preservation of the historic built environment' and 'adaptation of the mixed-use environment to modern conditions'. Similarly, 'buffer zone treatment' was negatively correlated with 'heritage authenticity and interpretation'.

In the social aspect, due importance was given to 'public participation' and improving 'residents' living standards', followed by the 'community of low-income residents should be retained'. One of the reasons that low-income residents need to be retained is their sense of belonging to urban heritage areas. Public and private initiatives supporting the community and 'tourism and the host community' fell within the last tiers of the

ranking. The list of nine factors was reduced to six. The positively correlated factors were the 'community of low-income residents should be retained', 'supporting strategy for low-income residents when relocation is unavoidable', and 'low-income residents are protected from the impact of gentrification'. 'Social cohesion' and 'tourism and the host community' had a positive correlation of 0.4, denoting that the connectedness between the host community and the tourist community needs to be balanced. The correlation matrix shows a strong negative correlation between 'social cohesion' and the 'community of low-income residents should be retained', suggesting that connections between various groups of people may be hindered by trying to retain low-income residents.

The economic aspect prioritised the need for the 'economic viability of conservation' over 'financial support' and the 'funding system' for conservation. 'Land value and taxes' and 'special tourist interest' fell within the bottom ranks, which could indicate that the economic requisites for conservation had to be put first, followed by a viable conservation strategy of incentives. The correlation matrix did not yield any significant negative correlations except for the positive correlations between 'taking advantage of public and private resources' and 'special tourist interest'. This result implies that private and public resources are mostly used for tourism enhancement and amenities. The list of eight factors was reduced to five.

The political aspect highlighted the 'planning process' as the main factor, followed by 'policy agendas'. 'Cooperation among the central government, the local government, NGOs and inhabitants' and the 'power structure' were given lower ranks, as they are based on political will. The correlation matrix revealed that the correlation was significantly inversely proportional to several factors. The factor 'developing a community and culture-led agenda' was negatively correlated with 'policy agendas' and the 'generation and maintenance of political support'. The 'relocation of residents' and the 'management of

**Table 5** Significant negative correlations of the correlation matrix and their analysis

Aspect	Negative correlation	Remarks
Physical	<ul style="list-style-type: none"> <li>• Preservation of the historic built environment with adaptation of the mixed-use environment to modern conditions (-0.441)</li> <li>• Buffer zone treatment with heritage authenticity and interpretation (-0.393)</li> </ul>	<ul style="list-style-type: none"> <li>• Preservation of the built environment is inversely proportional to development since new additions are fitted.</li> <li>• When treated, the buffer zone/area surrounding the built heritage leads to an artificial outlook and a lack of heritage authenticity.</li> </ul>
Social	<ul style="list-style-type: none"> <li>• Social cohesion and the community of low-income residents should be retained (-0.530)</li> <li>• Residents' living standards and tourism and the host community (-0.544)</li> <li>• The community of low-income residents should be retained and public and private initiatives (-0.520)</li> </ul>	<ul style="list-style-type: none"> <li>• The connections between various groups of people may be hindered by trying to retain low-income residents.</li> <li>• Residents' living standards decline as tourism is given more importance and development is catered to the needs of tourists.</li> <li>• Public and private initiatives for implementing the urban conservation of an area do not tend to consider the low-income residents who are a part of that area.</li> </ul>
Economic	The correlation matrix did not yield any negative correlations of significance.	<ul style="list-style-type: none"> <li>• There are positive correlations among 'taking advantage of public and private resources' and 'special tourist interest'. This could imply that private and public resources are mostly used for tourism enhancement and amenities.</li> </ul>
Political	<ul style="list-style-type: none"> <li>• The factor 'developing a community and culture led agenda' was negatively correlated with 'policy agendas' (-0.485) and the 'generation and maintenance of political support' (-0.440).</li> <li>• The 'relocation of residents' and the 'management of heritage sites' (-0.438).</li> </ul>	<ul style="list-style-type: none"> <li>• Policy agendas tend to cater to the developmental trends and political will of those in power. The development of an agenda for the community associated with a heritage site or with the cultural traditions associated with it are not considered.</li> <li>• The management of a heritage site without the original residents will not be successful.</li> </ul>
Cultural	No significant correlations could be found among the factors.	No significant correlations could be found among the factors.
Continuity	There is a slight negative correlation between 'environmental continuity' and 'economic sustainability' (-0.382)	The data cannot be interpreted; further works need to be performed to assess the implications of the correlation.

heritage sites' were negatively correlated, as managing a heritage site without its original residents may hinder the management of a site in the long run due to the changing values associated with the migrant population. The list of ten factors was reduced to six.

The cultural aspect attached importance to 'retaining significant meaning and associations with the community', followed by 'enhancing the sense of place and local culture'. The 'strengthening of indigenous cultural traditions and forms' came third, with 'cultural needs' being placed towards the bottom. No significant correlations could be found among the factors. The list of six factors was reduced to three.

The continuity aspect prioritised 'socio-cultural sustainability', followed by economic, ecological, environmental, and political sustainability. Although a slight negative correlation existed between 'environmental continuity' and 'economic sustainability', the data cannot be interpreted. The significant negative correlations were analysed, as shown in Table 5.

#### 4.2 Analytical hierarchy process

The aspects were compared using a pairwise comparison matrix to identify the weights given to various aspects that contributed to the outcome of an urban conservation project. The analysis revealed that the highest weight was given to the cultural aspect (24%). The weights of the aspects were as follows: the cultural aspect (24%),

continuity aspect (20%), social aspect (18%), physical aspect (17%), and political aspect (6%).

The following implications can be derived from the aspect weights:

The cultural aspect is given a weight of 24%. This result intimates that a place acquires an associated meaning when it is linked with the culture, tradition and history of the place. Buildings are not standalone monuments; rather, the people and the culture associated with them bring meaning to the place. Therefore, the cultural aspect is given the highest weight.

The continuity aspect is given a weight of 20%, suggesting that any conservation project has to be sustainably designed in all ways to ensure integrity. Continuity is an essential aspect, as it ensures the need for a long-term sustainable solution, which is always lacking. Once buildings are restored, they become dilapidated, as people do not care for them over time, as they are reserved as protected monuments. For example, to ensure environmental continuity, conservation architects may suggest certain materials for facades, paving, etc. However, the continued upkeep of these added infrastructures or additions requires further expenditure. If a project is not associated with a revenue generation mechanism to cover such expenses, the sustainability of the whole project will be compromised. Therefore, while proposing planning in heritage-sensitive urban areas, there is a need to provide recommendations on the abovementioned factors



**Table 6** Aspect weights and finalised list of factors determining each aspect

Aspect	Weightage	Priority Factors
Cultural	24%	<ul style="list-style-type: none"> <li>• retain significant meaning and associations with the community</li> <li>• enhancing the sense of place and local culture</li> <li>• the strengthening of indigenous cultural traditions and form</li> </ul>
Continuity	20%	<ul style="list-style-type: none"> <li>• socio-cultural sustainability</li> <li>• economic sustainability</li> <li>• ecological sustainability</li> <li>• environmental continuity</li> <li>• political sustainability</li> </ul>
Social	18%	<ul style="list-style-type: none"> <li>• public participation</li> <li>• the maintenance of public openness in decision-making</li> <li>• residents' living standards</li> <li>• social cohesion</li> <li>• retaining and protecting low-income residents</li> <li>• public and private initiatives</li> </ul>
Physical	17%	<ul style="list-style-type: none"> <li>• preservation of form</li> <li>• heritage authenticity</li> <li>• environmental enhancement</li> <li>• infrastructure improvement</li> <li>• spatial transformation of the built form and land use</li> <li>• buffer zone treatment</li> </ul>
Economic	16%	<ul style="list-style-type: none"> <li>• economic viability of conservation</li> <li>• economic needs</li> <li>• consolidation of the urban economy</li> <li>• private and public resources</li> <li>• land value, taxes and incentives</li> </ul>
Political	6%	<ul style="list-style-type: none"> <li>• planning process</li> <li>• developing a community and culture-led agenda</li> <li>• management of heritage sites</li> <li>• policy agendas</li> <li>• cooperation among all levels</li> <li>• power structure</li> <li>• maintenance of political support</li> <li>• relocation of residents</li> <li>• orientation of development</li> </ul>

based on all the specified aspects. Doing so will also help develop conservation policies that ensure better performance of urban heritage conservation projects.

The social aspect (18%) was given a slightly higher priority than the physical aspect (17%), as people are the bearers of change and continuity. When people are satisfied with their living conditions and are given a voice to be part of a project, considerable changes can be expected from the attitude of the stakeholders who are part of it. Therefore, if people are not part of a project, built heritage is only an asset without meaning. The physical aspect encompasses those factors that need to be considered to maintain the authenticity and integrity of the built environment and its character. The next important aspect is the economic aspect (16%) since no project can be implemented without appropriate funding or a planning mechanism. The political aspect (6%) is ranked last, as it is only a binding aspect, tying all the levels involved in implementing the project, which involves the management of the heritage site, the policies involved, the orientation of development and the power structure.

Table 6 provides a glimpse of the hierarchy of the aspects and their respective factors.

## 5 Conclusion

The present study attempted to identify the factors and aspects that determine the outcome of urban heritage conservation projects. The factors constituting each aspect were listed, followed by obtaining a priority weight for each aspect. This study attempted to further detail the aspects described by Chen in the context of developing nations by identifying the weights associated with the aspects from experts who have been involved in such contexts. The study further detailed each aspect and their relevant factors.

This study adopted a method of identifying factors through a ranking mechanism coupled with correlation. Overall, 48 factors were identified and reduced to 34 by the feature selection method via correlation. The identified factors were also ranked using the AWR to prioritise the factors that fall under each aspect. The priority ranking using the weighted average rank of the aspects

by experts gave importance to (in descending order) the social, cultural, physical, economic, continuity and political aspects. The priority weights of the aspects calculated using the AHP gave importance to (in descending order) the cultural, continuity, social, physical, economic and political aspects. The priorities of the experts were similar for both methods, except for the noteworthy difference in the continuity aspect. The continuity aspect, which was given a weight of 20%, was given a lower priority in the AWR method, implying that any urban conservation project is implemented in a specific place and a specific time. The long run of the project is not considered, leading to issues that arise within a span of a few years, such as negligence and dilapidation of urban heritage areas.

This list of influential factors can also be used to develop survey instruments for stakeholder consultation to evaluate the performance of an urban heritage conservation project. If an urban heritage conservation project incorporates stakeholders' perspectives on

these factors and aspects, this approach may ensure that the outcome is accepted by stakeholders in the long run. However, to ensure the satisfaction of different stakeholder groups, the weights of factors may have to be reassessed from the stakeholder perspective. This study examined the performance of an urban heritage conservation project from the expert perspective. However, to ensure the wide acceptability of projects, the satisfaction of different stakeholder groups also needs to be examined.

A model framework for evaluating conservation projects with clearly defined scores and benchmarks can also be developed with the help of these factors and the priority of aspects. As no solid boundary exists between aspects, the aspects that need to be prioritised in a case are confusing. This study may help set that boundary by understanding the different factors that need to be given due importance and the priority of the aspects that need to be considered when examining an urban heritage conservation project.

## Appendix 1

**Table 7** List of factors and their references

Papers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<b>Physical Aspect</b>															
1	Preservation of the historic built environment								*						*
2	Preservation of the urban pattern and issues of the historic city														*
3	Preservation of the overall style and features of the conservation area								*						*
4	Heritage authenticity and interpretation														*
5	Environmental enhancement														*
6	Spatial transformation of the historic built form								*						*
7	The compatibility of older land uses with new land uses														*
8	Adaptation of the historic quality of the mixed-use environment to modern conditions								*						*
9	Infrastructure improvement														*
10	Buffer zone treatment									*					

Papers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<b>Social Aspect</b>															
1	Residents' living standards	*												*	*
2	The community of low-income residents should be retained			*					*				*		*
3	Supporting strategy for low-income residents when relocation is unavoidable			*					*						*
4	Low-income residents are protected from the impact of gentrification			*					*				*		*
5	Public participation	*			*	*	*		*	*				*	*
6	Public and private initiatives								*						*
7	The maintenance of public openness during the decision-making process						*							*	*
8	Social cohesion														
9	Tourism and the host community	*												*	
<b>Economic Aspect</b>															
1	Economic needs	*												*	*
2	The economic viability of conservation											*		*	*
3	The funding system														*
4	Financial support			*										*	*
5	Taking advantage of private and public resources														*
6	Land value and taxes											*		*	*
7	Special tourist interest														*
8	Consolidation of the urban economy			*										*	*
<b>Cultural Aspect</b>															
1	Enhance the sense of place and local culture	*	*												*
2	Retain significant meaning and associations with the community	*													*
3	Cultural needs														*
4	Conserving culture	*								*				*	*
5	The strengthening of indigenous cultural traditions and forms	*	*							*				*	*
6	Enhance identity and collective memory	*							*	*				*	*
<b>Political Aspect</b>															
1	The power structure											*			*
2	Developing a community and culture-led agenda										*				*
3	The planning process	*						*			*				*

Papers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
4															*
5															*
6								*			*	*			*
7								*							*
8					*										*
9					*						*				
10					*	*		*							*
<b>Continuity Aspect</b>															
1			*											*	*
2														*	*
3			*								*				*
4			*								*				*
5															*

1: Byrd (2007); 2: Easterling (2004); 3: Stubbs (2004); 4: Shin (2010); 5: Kwan (2010); 6: Ota (2010); 7: Techera (2011); 8: UNESCO et al. (2013); 9: Boussaa (2014); 10: Endere (2014); 11: Guzman et al. (2018); 12: Amin and Adu-Ampong (2016); 13: Seifoddini and Harris (2017); 14: Rasoolimanesh and Jaafar (2016); 15: Chen, Yoo, and Hwang (2017)

## Appendix 2

**Table 8** List of factors and their descriptions

Aspect	Factor	Description
Physical aspect: conservation of the built form and the urban fabric of tangible nature that surrounds it	1. Preservation of the historic built environment	Preserving and conserving the historic built environment
	2. Preservation of the urban pattern and issues of the historic city	Preserving the urban fabric of the historic city, i.e., the street network, urban spaces, etc.
	3. Preservation of the overall style and features of the conservation area	Preserving and conserving the character of the conservation area: the unique style and features of the area
	4. Heritage authenticity and interpretation	The integrity of the historic built environment and its interpretation
	5. Environmental enhancement	Enhancing the immediate surroundings around heritage buildings
	6. Spatial transformation of the historic built form	The adaptive capability of heritage buildings
	7. Compatibility of older land uses with new land uses	The compatibility of historic land uses with modern land uses
	8. Adaptation of the historic quality of the mixed-use environment to modern conditions	The adaptability of the mixed-use character of historic cities to modern conditions
	9. Infrastructure improvement	the upgrading of infrastructure in heritage buildings
	10. Buffer zone treatment	Treating the areas beyond heritage buildings



Aspect	Factor	Description
Social aspect: associated with the needs and concerns of users, the local community and the urban population	1. Residents' living standards	The quality of life of the residents living within the heritage site
	2. Community of low-income residents should be retained	Low-income residents, who are most often the original inhabitants of the area, are retained
	3. Supporting strategy for low-income residents when relocation is unavoidable	The provision of supporting mechanisms to retain low-income residents
	4. Low-income residents are protected from the impact of gentrification.	the need to protect low-income residents from being impacted by gentrification due to tourism
	5. Public participation	The inclusion of the public in the project
	6. Public and private initiatives	Public and private initiatives aimed to upgrade the quality of life of the community.
	7. Maintenance of public openness during the decision-making process	The depth of participation: to what extent are the participants involved in the decision-making process
	8. Social cohesion	The community's ability to achieve common goals to protect its heritage
	9. Tourism and the host community	The influence of tourism on the host community
Economic aspect: economic benefits for users and the financial feasibility of conservation	1. Economic needs	The economic status of the community living within historic urban areas
	2. Economic viability of conservation	The ability to derive economic value for heritage sites
	3. Funding system	The provision of external funding for maintaining heritage areas
	4. Financial support	The provision of financial incentives for maintaining heritage sites
	5. Taking advantage of private and public resources	The provision of funding through public–private partnerships
	6. Land value and taxes	Changing land value and taxes as part of being a part of the urban historic area
	7. Special tourist interest	The provision of economic services as part of the tourism industry
	8. Consolidation of the urban economy	Constraining further economic development within the boundaries of pre-existing historic urban areas
Political aspect: focuses on the politics and processes associated with various levels of an urban heritage conservation project	1. Power structure	The need to consider the power dynamics in the process of planning for an urban heritage area
	2. Developing a community and culture-led agenda	Proposing a community and culture-led agenda in the planning framework
	3. Planning process	The formulation of plans in urban heritage areas
	4. Relocation of residents	Planning policies aimed at the relocation of the original residents in urban heritage areas
	5. Incremental renovation	Renovation works may be split into different phases in a project
	6. Policy agendas	Policy agendas on development in urban historic areas
	7. Management of the heritage site	The management of the site by multiple stakeholders
	8. Generation and maintenance of political support	Political participation and political support at all levels of government
	9. Orientation of development	Measuring whether future development is oriented towards maintaining the historic character of the area
	10. Cooperation among the central government, the local government, NGOs, and inhabitants	Cooperation among all levels of governance for project implementation and the project outcome.

Aspect	Factor	Description
Cultural aspect: associated with preserving the social and cultural values associated with the heritage site	1. Enhance the sense of place and local culture	Protecting and maintaining the heritage of tangible and intangible nature
	2. Retain significant meaning and associations with the community	Retaining the original significance of the place associated with the community
	3. Cultural needs	The needs that must be met for an individual to thrive based on his or her cultural background
	4. Conserving culture	Intangible aspects of cultural heritage preserved
	5. Strengthening of indigenous cultural traditions and forms	Preserving the cultural identity of indigenous communities
	6. Enhance identity and collective memory	The cultural identity of the historic area collectively remembered by the people.
Continuity aspect: associated with dimensions leading to sustainable conservation	1. Environmental continuity	Maintaining the historic character of the area for future generations
	2. Ecological sustainability	Resource consumption and preservation actions needed with relatively low impact on the environment.
	3. Economic sustainability	Maintaining long-term financial stability
	4. Socio-cultural sustainability	Maintaining cultural heritage, beliefs and practices across all generations
	5. Political sustainability	The capacity of policy, once enacted, to maintain its integrity and functionality in the face of endogenous policy feedback

### Appendix 3

**Table 9** Average weighted rank of the factors and aspects according to experts

Aspect Rank	Aspect	Priority of Factors	AWR
1	Social	Public participation	1
		Maintenance of public openness in the decision-making process	2
		Residents' living standards	3
		Social cohesion	4
		Supporting strategy for low-income residents when relocation is unavoidable	5
		Low-income residents are protected from the impact of gentrification	6
		Community of low-income residents should be retained	7
		Public and private initiatives	8
2	Cultural	Tourism and the host community	9
		Retain significant meaning and association with the community	1
		Enhance the sense of place and local culture	2
		Strengthening of indigenous cultural traditions and form	3
		Enhance identity and collective memory	4
		Conserving culture	5
		Cultural needs	6

Aspect Rank	Aspect	Priority of Factors	AWR
3	Physical	Preservation of the historic built environment	1
		Heritage authenticity and interpretation	2
		Preservation of the urban pattern and issues of the historic city	3
		Preservation of the overall style and features of the conservation area	4
		Environmental enhancement	5
		Adaptation of the historic mixed-use environment to modern conditions	6
		Compatibility of older land uses with new land uses	7
		Spatial transformation of the historic built form	8
		Infrastructure improvement	9
		Buffer zone treatment	10
4	Economic	Economic viability of conservation	1
		The funding system	2
		Economic needs	3
		Financial support	4
		Taking advantage of private and public resources	5
		Consolidation of the urban economy	6
		Land value and taxes	7
5	Continuity	Special tourist interest	8
		Socio-cultural sustainability	1
		Economic sustainability	2
		Ecological sustainability	3
		Environmental continuity	4
6	Political	Political sustainability	5
		Planning process	1
		Developing a community and culture-led agenda	2
		Management of heritage sites	3
		Policy agendas	4
		Cooperation among stakeholders	5
		Incremental renovation	6
		Power structure	7
		Relocation of residents	8
		Generation and maintenance of political support	9
Orientation of development	10		

## Abbreviations

ICOMOS	International Council on Monuments and Sites
RM	Reactive monitoring
PR	Periodic reporting
UNESCO	United Nations Educational, Scientific and Cultural Organisation
HIA	Heritage impact assessment
EIA	Environmental impact assessment
FPE	Facility performance evaluation
POE	Post-occupancy evaluation
CPI	Conservation performance indicator
MCDM	Multi-criteria decision-making
AHP	Analytic hierarchy process
ANP	Analytic network process
ELECTRE	Elimination and choice translating reality
TOPSIS	Technique for order of preference by similarity to ideal solution
REGIME	Ranking alternatives by generating a hierarchical structure with interactive control
DEMATEL	Decision-making trial and evaluation laboratory
MAVT	Multi-attribute value theory
SAW	Simple additive weighting
UGRS	Urban green rating system

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## Authors' contributions

HSA: conceptualisation, methodology, data collection, formal analysis, and writing- original draft ; PB: Supervision, validation, and writing- editing and review. All authors read and approved the final manuscript.

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