Maintenance of Saudi heritage buildings: facility management perspectives

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Abstract
Saudi heritage buildings are historically unique by nature and require specific attention to their architectural elements. Current trends of protection and use of heritage buildings and cultural heritage components testify to increasing attention to studying of heritage and legacy in the country. Therefore, the purpose of this paper is to establish the impact of good maintenance work on heritage buildings in Saudi Arabia. This purpose is achieved through identifying factors that lead to the good maintenance of Saudi heritage buildings. The fuzzy analytic network process (FANP) is used here to calculate the weighted importance of the factors and subfactors that protect Saudi heritage buildings. The factors and subfactors were determined based on 41 questionnaires. The main contribution of the present research can be presented in determination of the current facility management perspective for Saudi heritage buildings and highlights the areas that require more attention from the facility management to fill the gaps in maintenance approaches for Saudi heritage buildings, thus preventing unexpected destruction for many of the original historically important elements and keeping the originality of the buildings from any action that may lead to unexpected destruction.

Keywords: Saudi heritage building, maintenance, conservation

Introduction

The movement to conserve heritage buildings all over the word has developed extremely rapidly in many countries since the World Heritage Centre and the World Heritage list within UNECSO were both established in 1972. This movement began with the belief of the governments of the world in the importance of heritage buildings and what they represent in terms of material and moral value to their peoples (Central Public Works Department 2013). Currently, it has been noted that World Heritage buildings are still threatened by several factors that are allowing the heritage buildings to suffer from a lot of defects and deterioration. For example, 95% of the heritage buildings in Africa, 88% of heritage buildings in Asia/Pacific, 77% of such buildings in Latin America, 77% of these buildings in Arab States, and 41% of heritage buildings in Europe are in poor condition and are endangered (Veillon 2014).

In Saudi Arabia, the condition of its heritage structures is similar to much of the rest of the world. It is a country with a rich and authentic heritage, with five UNESCO World Heritage Sites as of 2019. These sites are Al-Ahsa Oasis, Al-Hijr Archaeological Site (Madain Salih), At-Turaif District of ad-Dir'iyah, Historic Jeddah, and Rock Art of the Hail Region (Figure 1). In addition, Saudi Arabia has 11 sites on the UNESCO tentative list that reflect the cultural aspects of the history of the Saudi nation. As Saudi heritage buildings have their own historical, esthetic, social, archeological, cultural, architectural, documentary, and even symbolic values that characterize each of the 13 regions of Saudi Arabia, the Saudi government has paid more attention to their heritage buildings and established the Saudi Commission for Tourism and National Heritage (SCTH) in April 2003 (SCTH 2010). The important objectives of the SCTH are the maintenance and development of various elements of urban heritage, including the heritage towns, quarters, villages, and architecture (Mohd-Isa et al. 2011; SCTH 2019).

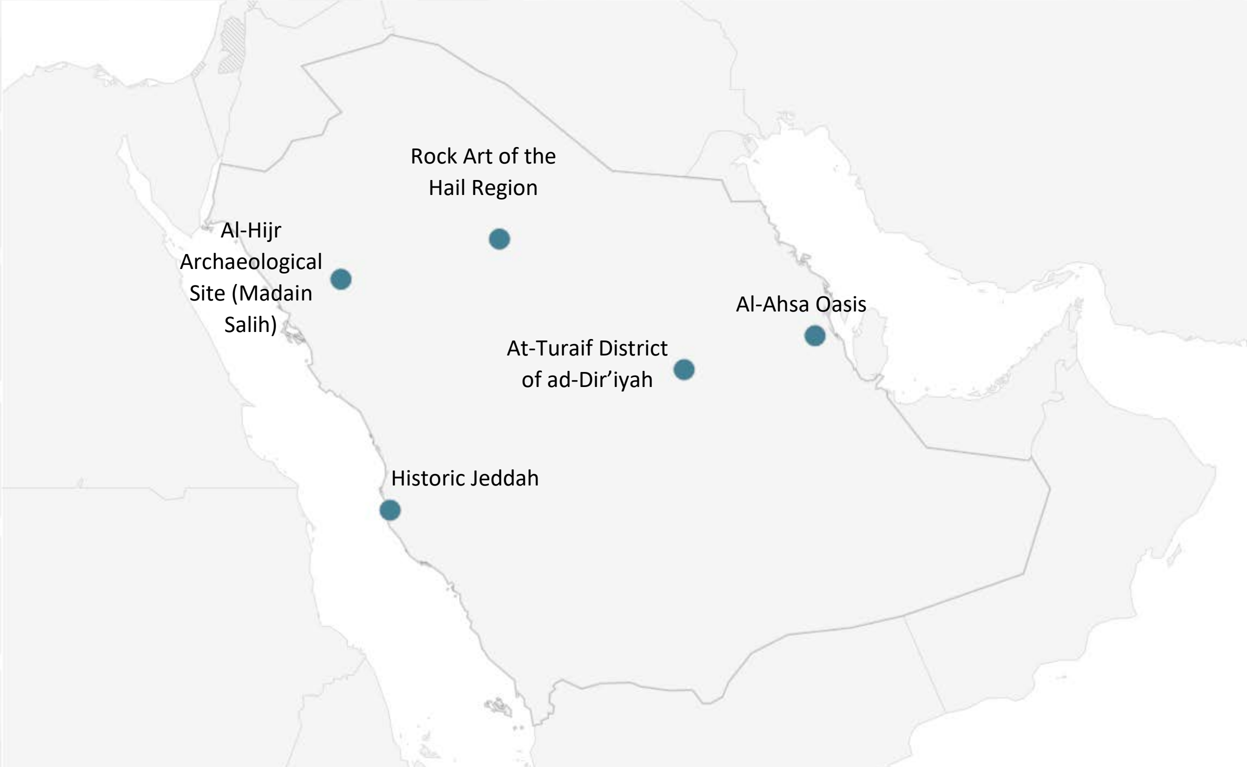

Figure 1: The five UNESCO World Heritage Sites in Saudi Arabia as of 2019.

In 2002, SCTH, together with the parties concerned with the heritage buildings, has cataloged the number of heritage buildings and recorded more than 2,000 sites (SCTH 2010). Therefore, the idea of the conservation of heritage buildings in Saudi Arabia has become a primary concern because these treasures have many benefits such as economic value, cultural and urban value, and social value. Consequently, the Saud government has spent more than 3.2 billion riyals (more than USD 853 Million) for maintenance work on these sites (SCTH 2010).

Despite all these efforts to conserve the Saudi urban heritage, however, there are many heritage buildings within Saudi Arabia that have suffered from serious problems without being properly maintained and operated for a number of years. These problems can be categorized into three categories, which are the physical category (moisture, heat and frost, ultraviolet solar radiation, and particulate emissions), the chemical category (acids, alkalis, bird excrement, and flue gases attacking the building materials), and the biological category (fungi, worms, and insects) (Knöfel, 1978; Maness 1999; Robson, 1991; Bell 1993; Michael 1987; Lee 1996).

Consequently, many of the Saudi heritage buildings have fallen into poor condition due to poor maintenance and management practices over time, which eventually resulted in the historical buildings suffering from physical defects and deterioration (Veillon 2014; Alhussayen 2010; AlHathloul 2017).

Literature Review

Many studies (Bagader 2016; Alzahrani 2016) have reported that the conservation practices in Saudi Arabia have still not reached an appropriate level to adequately address the issues related to organizing heritage building maintenance and management, arranging financing, and enacting legislation related to heritage buildings (Sodangi et al. 2013; Zolkafli et al. 2017). As a result, the misunderstanding of the concept of the conservation of heritage buildings has led to the deterioration of many Saudi heritage buildings. Many experts in the Kingdom considered the concept of conservation and maintenance of heritage buildings to be the same, whereas maintenance is just one of the necessary activities in conservation practice. Unlike the other aspects of conservation, maintenance needs to be conducted frequently and regularly; it is insufficient to just wait for the buildings to deteriorate and visibly show a need for it (Ahmad 2006; Dann and Cantell 2005; Dann et al. 1999; Forsyth 2007).

On the other hand, Rashid and Ahmad (2011) and Rahman et al. (2012) concluded that the absence of a comprehensive understanding of the critical requirement for scheduled and systematic maintenance was one of the reasons that have made the heritage buildings suffer. They indicated that the specialty requirements of maintenance for heritage buildings is regularly ignored and most maintenance work did not respect the special characteristics of this type of building, thereby resulting in rotting structures and allowing the heritage buildings to become sick and in a bad condition for their visitors and tenants (Paiman, 2002).

Meanwhile scholarly attention was being turned to these historic structures. Ebn Saleh (1995) studied the style, structure, and urban development of the village of Al Khalaf in the southern Asir region. In addition, Ebn Saleh (1997) analyzed the traditional urban pattern of the village of Al-Akkas. On the other hand, Alhussayen (1996, 2010) studied the types and elements of urban buildings in Madinah and the traditional urban style in Riyadh. In addition, Kalical (1989) highlighted a number of traditional houses with an analysis of their components in the central region of the Kingdom. All of these studies indicated that a misunderstanding of the need for specialist maintenance of such buildings and the lack of a systematic maintenance approach had led to most of the country’s heritage buildings being treated in an inappropriate manner that had caused unexpected damage to many of the original elements of historical importance and had failed to protect the buildings from any action that may lead to their deterioration and even unexpected destruction.

Therefore, the aim of this paper is to demonstrate the impact of good maintenance work on heritage buildings in Saudi Arabia. This aim is achieved through the following process. First, identify the criteria, factors and indicators that directly affect Saudi heritage buildings. Second, design an integrated weight-based tool for good maintenance work for Saudi heritage buildings.

Methodology and model development

There are different factors that contribute to protecting Saudi heritage buildings from the negative impacts of visitor recreation, interpretative and visitation facilities, localized utilities, and management systems. Therefore, the model being developed is based on the factors chosen from the world heritage site in a state of conservation of world heritage properties report (Veillon 2014). In addition, Saudi expert opinions are also included in the indicators’ identification process through several meetings.

The fuzzy analytic network process (FANP) is used here to calculate the weights of importance of factors and sub factors that protect Saudi heritage buildings. The FANP consists of four steps. The first step is to identify the factors and sub factors that affect Saudi heritage buildings from a facility management perspective. The second step is to categorize the sub factors into the main criteria. A questionnaire-based data collection initiative is the third step. Finally, a fuzzification scale is utilized to accommodate the uncertainties that the data collecting could contain.

After the FANP's four steps, the output will be three matrices, namely, the lower, the most probable, and the upper matrices. Finally, one combined matrix will be generated based on the three matrices as mentioned before. Each element within this matrix represents a fuzzy trapezoidal distribution.

FANP calculations are done by using an Excel-MATLAB interface adapted from El Chanati (2014). In order to calculate the FANP, two developed codes are used. The first code represents the three matrices. The second code is the output of the FAHP relative weights of importance for the sub factors. The FAHP weights are used to generate an unweighted super matrix. Then, the unweighted super matrix will be normalized in order to get the weighted super matrix. Subsequently, the weighted super matrix will be utilized as an input in MATLAB's second code, to raise the weighted FANP to a large number of powers reaching to the limited matrix. FANP relative weights will be presented in the first column of the limited matrix table. The relative weights are defined as the importance of each sub factor relative to the other sub factors (Ismaeel 2016).

Data Collection

Several of the facility management aspects in heritage building surveys were reviewed in an effort to select the most appropriate items for the questionnaire. Adapting widely used surveys enables a comparison of the results across similar studies completed earlier. The questionnaire also underwent many modifications to modify the time required to respond to the items so that it could be taken in 10 to 15 minutes. In addition, the questions were adjusted several times to achieve the optimal clarity, directness, and reliability. The population size of heritage buildings experts was assumed based on Table 1. According to Table 1, when the degree of confidence and margin of error was identified as 3.5% and 29, respectively, the sample size was selected to be 30 (Mahmoud 2017). One hundred thirty-four experts in the heritage building field were contacted by email and requested to complete the questionnaire. From these experts, 41 responded by completing and returning the questionnaire.

Table 1: Sample size determination (Mahmoud 2017).

Required Sample Size†								
	Confidence = 95%				Confidence = 99%			
Population Size	Margin of Error				Margin of Error			
	5.0%	3.5%	2.5%	1.0%	5.0%	3.5%	2.5%	1.0%
10	10	10	10	10	10	10	10	10
20	19	20	20	20	19	20	20	20
30	28	29	29	30	29	29	30	30
50	44	47	48	50	47	48	49	50
75	63	69	72	74	67	71	73	75
100	80	89	94	99	87	93	96	99
150	108	126	137	148	122	135	142	149
200	132	160	177	196	154	174	186	198
250	152	190	215	244	182	211	229	246
300	169	217	251	291	207	246	270	295
400	196	265	318	384	250	309	348	391
500	217	306	377	475	285	365	421	485
600	234	340	432	565	315	416	490	579
700	248	370	481	653	341	462	554	672
800	260	396	526	739	363	503	615	763
1,000	278	440	606	906	399	575	727	943
1,200	291	474	674	1067	427	636	827	1119
1,500	306	515	759	1297	460	712	959	1376
2,000	322	563	869	1655	498	808	1141	1785
2,500	333	597	952	1984	524	879	1288	2173

Tables 2 and 3 summarize the identified indicators that contribute to protecting the Saudi heritage buildings from a facility management perspective. These indicators are categorized into four main categories: management knowledge, management roles, facility knowledge, and operation activity. First, management knowledge includes resource management, change management, risk management, quality management concepts, and financial management. Second, the management roles consist of strategic alignment, strategy analysis, strategy briefing, proposing, deciding, approving, planning and budgeting, space and facilities standards, control and measurement, and environment programming. Third, facility knowledge includes performance measures, space measures and auditee, material register/databases, maintenance systems, condition surveys, and project and services procurement. Fourth, the operation activity has under it acquisition and disposal, rearrange and refurbish, space configuration, operations, maintenance and repair, and cleaning.

Table 2: Definitions of the main four categories that contribute to protection of Saudi heritage buildings from a facility management perspective.

#	Category	Description
1	Management knowledge	facts, information, and skills acquired through experience or education related to the facility management side of the heritage buildings
2	Management roles	the function assumed or part played by facility managers in a particular situation within heritage management issues
3	Facility knowledge	a profession that encompasses multiple disciplines to ensure on the one hand functionality, comfort, safety and efficiency, and on the other hand historical, architectural, culture values by integrating people, place, process and technology.
4	Operation activity	operations refers to the management of all of the processes, people and assets required for a facility to do what it is designed to do.

Table 3: Identified indicators that contribute to protection of Saudi heritage buildings from a facility management perspective.

#	Factors	Sub factors
1	Management knowledge	1 resource management
		2 change management
		3 risk management
		4 quality management concepts
		5 financial management
2	Management roles	1 strategic alignment
		2 strategy analysis
		3 strategy briefing
		4 Guidelines
		5 planning and budgeting
		6 Space
		7 facilities standards
		8 control and measurement
		9 environment programming
3	Facility knowledge	1 performance measures
		2 space measures and auditee
		3 material register/databases
		4 maintenance systems
		5 condition surveys
		6 project and services procurement
4	Operation activity	1 acquisition and disposal
		2 rearrange and refurbish
		3 space configuration
		4 Operations
		5 maintenance and repair
		6 Cleaning

Results

To calculate the relative weights of the defined factors and sub factors, the fuzzy analytical network process (FANP), which comprises a series of calculations, was used. On the questionnaire, the experts were asked about the relative importance of identified factors and sub factors, and a pairwise comparison (i.e., the most probable pairwise comparison or matrix) was built using the output of the questionnaires based on the Saaty scale (Figure 2) to obtain the lower and upper matrices, as Table 4 explains.

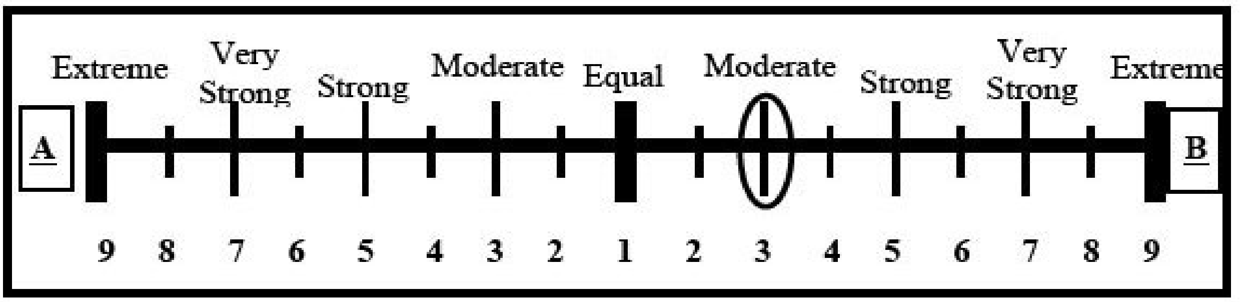

Figure 2: Saaty scale

Table 4: Pairwise comparison for the four mine factors.

#		Management knowledge	Management roles	Facility knowledge	Operation activity
1	Management knowledge	1	1	1	1
2	Management roles	1	1	3	2
3	Facility knowledge	1	0.3	1	9
4	Operation activity	1	0.5	0.1	1
	Totals	**4**	**2.8**	**5.1**	**13**

Table 5: Pairwise comparison for the management knowledge factor.

#		Resource management	Change management	Risk management	Quality management concepts	Financial management
1	Resource management	1.0	6.0	5.0	4.0	6.0
2	Change management	0.2	1.0	1.0	2.0	1.0
3	Risk management	0.2	1.0	1.0	1.0	1.0
4	Quality management concepts	0.3	0.5	1.0	1.0	6.0
5	Financial management	0.2	1.0	1.0	0.2	1.0
	Totals	**1.8**	**9.5**	**9.0**	**8.2**	**15.0**

Table 6: Pairwise comparison for the facility knowledge factor.

#		Performance measures	Space measures and auditee	Material register/databases	Maintenanc e systems	Condition surveys	Project and services procurement
1	Performance measures	1.0	2.0	1.0	3.0	2.0	1.0
2	Space measures and auditee	0.5	1.0	1.0	1.0	2.0	1.0
3	Material register/databases	1.0	1.0	1.0	1.0	2.0	1.0
4	Maintenance systems	0.3	1.0	1.0	1.0	2.0	2.0
5	Condition surveys	0.5	0.5	0.5	0.5	1.0	9.0
6	Project and services procurement	1.0	1.0	1.0	0.5	0.1	1.0
	Totals	**4.3**	**6.5**	**5.5**	**7.0**	**9.1**	**15.0**

Table 7: Pairwise comparison for the operation activity factor.

#		Acquisition and disposal	Rearrange and refurbish	Space configuration	Operations	Maintenance and repair	Cleaning
1	Acquisition and disposal	1.0	1.0	1.0	1.0	1.0	4.0
2	Rearrange and refurbish	1.0	1.0	1.0	1.0	1.0	5.0
3	Space configuration	1.0	1.0	1.0	1.0	1.0	6.0
4	Operations	1.0	1.0	1.0	1.0	1.0	1.0
5	Maintenance and repair	1.0	1.0	1.0	1.0	1.0	9.0
6	Cleaning	0.3	0.2	0.2	1.0	0.1	1.0
	Totals	**5.3**	**5.2**	**5.2**	**6.0**	**5.1**	**26.0**

Table 8: Pairwise comparison for the operation activity factor.

#		Strategic alignment	Strategy analysis	Strategy briefing	Guidelines	Plann-ing and budget-ing	Space	Facilities standard	Control and measure-ment	Environment programming
1	Strategic alignment	1.0	3.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0
2	Strategy analysis	0.3	1.0	2.0	3.0	4.0	5.0	4.0	3.0	3.0
3	Strategy briefing	1.0	0.5	1.0	4.0	5.0	6.0	7.0	8.0	7.0
4	Guidelines	1.0	0.3	0.3	1.0	6.0	5.0	3.0	5.0	4.0
5	Planning and budgeting	1.0	0.3	0.2	0.2	1.0	3.0	5.0	7.0	6.0
6	Space	1.0	0.2	0.2	0.2	0.3	1.0	4.0	5.0	4.0
7	Facilities standards	1.0	0.3	0.1	0.3	0.2	0.3	1.0	3.0	2.0
8	Control and measurement	0.5	0.3	0.1	0.2	0.1	0.2	0.3	1.0	1.0
9	Environment programming	1.0	0.3	0.1	0.3	0.2	0.3	0.5	1.0	1.0
	Totals	7.8	6.2	5.0	10.2	17.8	21.7	25.8	35.0	29.0

All calculations were performed with Excel sheets in order to calculate the unweighted matrix from normalization. Normalization was performed to make values in each column equal 1 by obtaining the sum of each column and dividing each cell within that column by the sum. Normalization is considering an important step in order to transform the input data into a numerical form and comparable input data by using a common scale which is between 0 and 1, as Tables 9–12 show.

Table 9: Normalization for the four mine factors.

#		Management knowledge	Management roles	Facility knowledge	Operation activity	Totals
1	Management knowledge	0.3	0.4	0.2	0.1	0.9
2	Management roles	0.3	0.4	0.6	0.2	1.3
3	Facility knowledge	0.3	0.1	0.2	0.7	1.3
4	Operation activity	0.3	0.2	0.0	0.1	0.5
	Totals	**1**	**1**	**1**	**1**	**4**

Table 10: Normalization for management knowledge.

#		Resource management	Change management	Risk management	Quality management concepts	Financial management	Totals
1	Resource management	0.56	0.63	0.56	0.49	0.40	2.64
2	Change management	0.09	0.11	0.11	0.24	0.07	0.62
3	Risk management	0.11	0.11	0.11	0.12	0.07	0.52
4	Quality management concepts	0.14	0.05	0.11	0.12	0.40	0.83
5	Financial management	0.09	0.11	0.11	0.02	0.07	0.40
	Totals	**1**	**1**	**1**	**1**	**1**	**5**

Table 11: Normalization for management roles.

#		Performance measures	Space measures and auditee	Material register/ databases	Maintenance systems	Condition surveys	Project and services procurement	Totals
1	Performance measures	0.23	0.31	0.18	0.43	0.22	0.07	1.44
2	Space measures and auditee	0.12	0.15	0.18	0.14	0.22	0.07	0.88
3	Material register/databases	0.23	0.15	0.18	0.14	0.22	0.07	1.00
4	Maintenance systems	0.08	0.15	0.18	0.14	0.22	0.13	0.91
5	Condition surveys	0.12	0.08	0.09	0.07	0.11	0.60	1.06
6	Project and services procurement	0.23	0.15	0.18	0.07	0.01	0.07	0.72
	Totals	**1**	**1**	**1**	**1**	**1**	**1**	**6**

Table 12: Normalization for facility knowledge.

#		Acquisition and disposal	Rearrange and refurbish	Space configuration	Operations	Maintenance and repair	Cleaning	Totals
1	Acquisition and disposal	0.19	0.19	0.19	0.17	0.20	0.15	1.09
2	Rearrange and refurbish	0.19	0.19	0.19	0.17	0.20	0.19	1.13
3	Space configuration	0.19	0.19	0.19	0.17	0.20	0.23	1.17
4	Operations	0.19	0.19	0.19	0.17	0.20	0.04	0.98
5	Maintenance and repair	0.19	0.19	0.19	0.17	0.20	0.35	1.28
6	Cleaning	0.05	0.04	0.03	0.17	0.02	0.04	0.35
	Totals	**1**	**1**	**1**	**1**	**1**	**1**	**6**

Table 13: Normalization for operation activity.

#		Strategic alignment	Strategy analysis	Strategy briefing	Guidelines	Planning and budgeting	Space	Facilities standard	Control and measurement	Environment programming	**Totals**
1	Strategic alignment	0.13	0.48	0.20	0.10	0.06	0.05	0.04	0.06	0.03	1.14
2	Strategy analysis	0.04	0.16	0.40	0.30	0.22	0.23	0.15	0.09	0.10	1.70
3	Strategy briefing	0.13	0.08	0.20	0.39	0.28	0.28	0.27	0.23	0.24	2.10
4	Guidelines	0.13	0.05	0.05	0.10	0.34	0.23	0.12	0.14	0.14	1.29
5	Planning and budgeting	0.13	0.04	0.04	0.02	0.06	0.14	0.19	0.20	0.21	1.02
6	Space	0.13	0.03	0.03	0.02	0.02	0.05	0.15	0.14	0.14	0.71
7	Facilities standards	0.13	0.04	0.03	0.03	0.01	0.01	0.04	0.09	0.07	0.45
8	Control and measurement	0.06	0.05	0.02	0.02	0.01	0.01	0.01	0.03	0.03	0.26
9	Environment programming	0.13	0.05	0.03	0.02	0.01	0.01	0.02	0.03	0.03	0.34
	Totals	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**9**

The results of normalization, as seen in Tables 9–12, were used as inputs, whereas the output was an unweighted supermatrix located automatically in the Excel sheet. After the unweighted supermatrix was calculated, the weighted supermatrix was calculated by normalizing the unweighted one. Next, the limited matrix was calculated by raising the weighted supermatrix to a larger power in a continuous process until an output matrix equaled the one before it. That limited matrix calculation process was performed with an Excel sheet by multiplying the weighted supermatrix up to 65,536 times by itself. As a result, the FANP relative global weight for factors and subfactors was obtained from the first column of the limited matrix, as Table 14 shows.

Table 14: Factors and sub factors relative weight.

Factors	Function global weight	Indicators	Local weights
Management knowledge	22%	Resource management	12%
		Change management	3%
		Risk management	2%
		Quality management concepts	4%
		Financial management	2%
Management roles	34%	Performance measures	8%
		Space measures and auditee	5%
		Material register/databases	6%
		Maintenance systems	5%
		Condition surveys	6%
		Project and services procurement	4%
Facility knowledge	31%	Acquisition and disposal	6%
		Rearrange and refurbish	6%
		Space configuration	6%
		Operations	5%
		Maintenance and repair	7%
		Cleaning	2%
Operation activity	13%	Strategic alignment	2%
		Strategy analysis	2%
		Strategy briefing	3%
		Guidelines	2%
		Planning and budgeting	1%
		Space	1%
		Facilities standards	1%
		Control and measurement	0%
		Environment programming	0%

In terms of management knowledge (Figure 3), the highest relative weights were the functions of resource management (12%), followed by quality management concepts (4%) and change management (3%). Concerning management role, Figure 4 indicates that performance measures and condition surveys had the most relative weight with 8% and 6%, respectively. The weights for material registration and maintenance systems were nearly identical to the relative weights, which were (6%) and (5%). Conversely, operation activity contributed least to heritage building facility management with (13%) (Figure 5), compared to management knowledge (22%), management role (34%), and facility knowledge (31%). Such results could be explained by the fact that facility management experts in heritage buildings do not consider operation activity as a result of management knowledge, management role, and facility knowledge. If the management knowledge, management role, and facility knowledge were established in a professional way, the operation activity must perform in a good way. In addition, the operation activity is nearly constant for each type of building, which means operation activity has a lot of activity in common with other types of buildings.

In regard to facility knowledge (Figure 6), maintenance and repair were the highest important sub factors within facility knowledge with 7%. Then, space configuration, rearrange and refurbish, and acquisition and disposal have an identical relative value of 6%. These are fallowed by operation with 5%. Operation activity, Figure 5 indicates that strategy briefing has the most impact on facility management of heritage buildings. Also, strategy analysis, guidelines, and strategic alignment each contributed 2% to operation activity. The lowest sub factors that contributed within operation activity were planning and budgeting, space, and facility standards which each contributed 1%.

Figure 3: Relative weight for the sub factors of management knowledge.

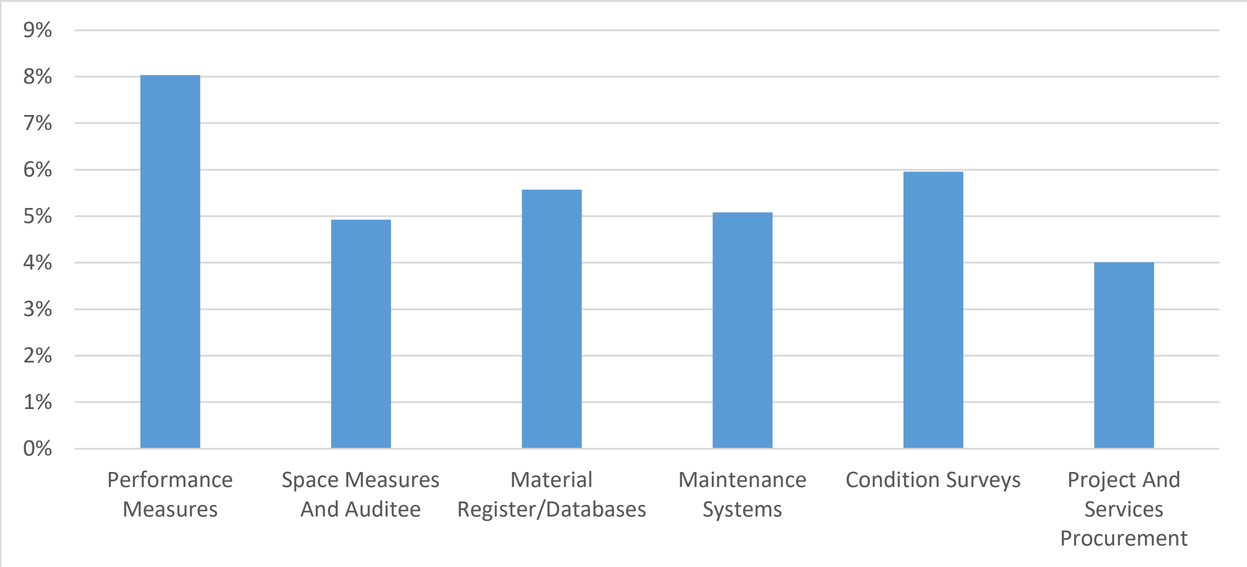

Figure 4: Relative weight for the sub factors of management role.

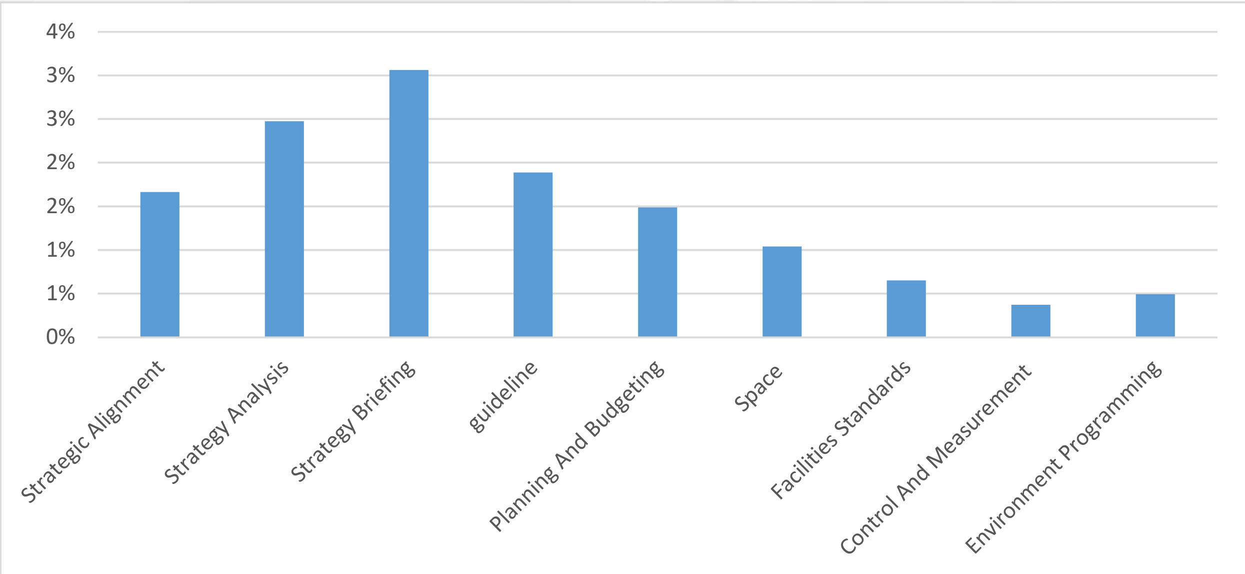

Figure 5: Relative weight for the sub factors of operation activity.

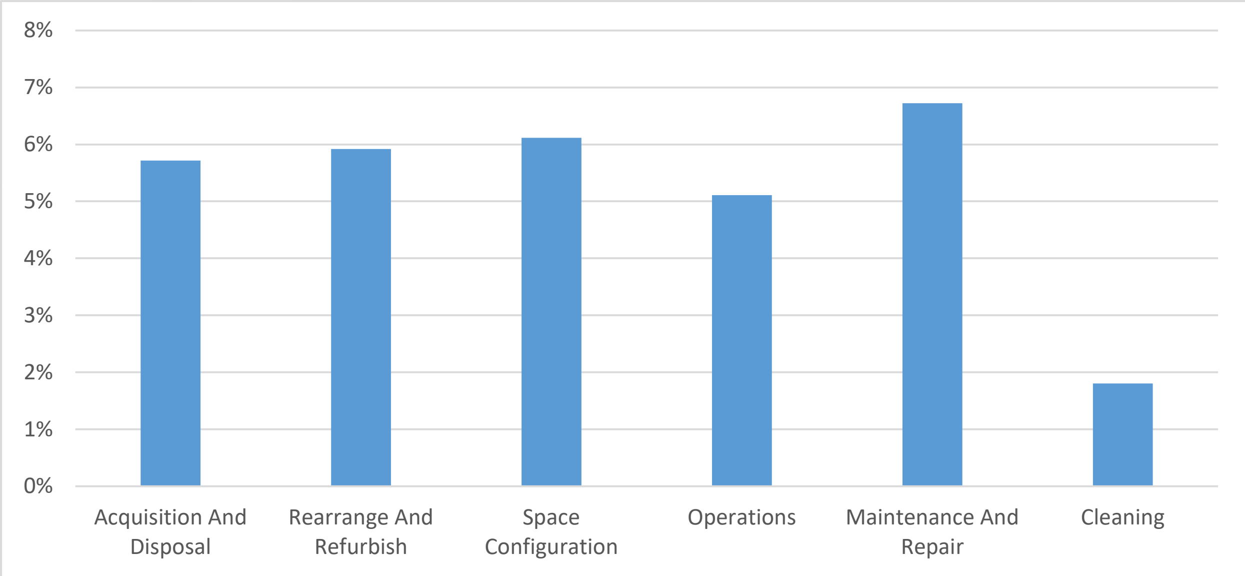

Figure 6: Relative weight for the sub factors of facility knowledge.

Discussion

Protecting Saudi heritage buildings is part of the facility management of the preservation process. By considering the importance of the four factors — management knowledge, management roles, facility knowledge, and operation — the Saudi facility managers will be able to manage their heritage building based on the relative weight of each factor which could sustain their heritage values while engaging in opportunities to enhance, develop and improve their buildings. In addition, according to Oxley (2006), conservation activities can interfere with a building's breathing performance. It can lead to a loss of character, distortion of appearance, and loss of historic fabric. Therefore, it is important to remember first to identify the significance of the building, which requires an understanding of the nature of the structure, who values it and why, how the values relate to the fabric and what the importance of these values is relevant to the reuse advantages based on the relative weight of factors and their subfactors. Understanding these factors to protect the heritage values and the historic significance of heritage buildings is paramount to making appropriate decisions about the conservation of heritage buildings and the improvements to be carried out. This is in line with the BS 7913 (2013, Section 4) which states that "understanding the significance of a historic building enables effective decision making about its future."

In clear terms, the significance of these factors based on their relative weights is connected to the value of the building in the minds and eyes of the people, and established as an outcome of its present continuity and as an asset to them. This value is a combination of its historical, emotional, cultural, and spiritual significance. Thus, without these considerations, all the good intentions of a reuse initiative will eventually compromise the building's significance for future generations. It is, therefore, paramount to understand the history of construction, modification and use, cultural significance, and the protected status. Additionally, it is also important to get to grips with the performance, intended performance, and changes in the intended performance along with the performance in use.

Conclusion

This research study proposes an understanding of the specialty for the maintenance of heritage buildings by demonstrating the impact of good maintenance work on heritage buildings in Saudi Arabia. This research takes into consideration the factors and sub factors that effect Saudi heritage buildings from the facility management perspective, whose four main factors are management knowledge, management roles, facility knowledge, and operation. According to our study, the most important factors in this conservation effort are management role (34%), facility knowledge (31%), management knowledge (22%), and operation (13%).

The main contribution of the present research can be presented as the determination of the current facility management perspective for Saudi heritage buildings. Our study highlights the areas that require more attention from the facility management in order to fill the gap in maintenance approaches of our heritage buildings. It is imperative to prevent the unexpected destruction of as many as possible of the original and historical elements. Our goal should be to keep the originality of the building from any action that may lead to unexpected destruction.

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