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A Sustainability Based Framework for Evaluating the Heritage Buildings

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ABSTRACT

There are large number of heritage buildings across the world. Heritage buildings are historically unique by nature and require specific attention to their architecture. Current trends of protection and use of heritage buildings and cultural heritage components testifies to an increasing attention of the study of heritage and legacy. The literature review indicates that there many existing rating systems developed to evaluate the performance of buildings from a sustainability point of view. They all based on three pillars; environment, physical, and society. Also, LEED, BREEAM, CASBEE, ITACA, and others are examples of these rating systems. However, each of them has its own assessment attributes that originate from its local context. Besides, none of the rating systems proposes a definitive guideline for the decision makers to select the best affordable rehabilitation alternatives, taking into account the sustainability of the buildings. Nevertheless, there is an absence of a comprehensive rating systems that could assess heritage building elements and assist facility managers in their rehabilitation decisions. Therefore, the main objective is to develop a comprehensive rating system for heritage buildings that not only evaluates the different building components but also optimizes the expenditures through effective utilization and the allocation of the limited budget among the building components.

KEYWORDS

Architectural Engineering, Architectural Rehabilitation, Energy, Heritage Buildings, Rating Systems, Sustainability

INTRODUCTION

Heritage buildings inherited from the past are crucial component in our modern society. Heritage include those buildings, structures, artifacts, and areas that are historically, aesthetically and architectural significant. The three factors that determine if a property is worthy to be listed as heritage are historic significance, historic integrity, and historic context. Historic significance is related to the importance of a property to history, archaeology, engineering or culture of community. That includes any heritage building that is associated with past events or important persons or has distinctive physical characteristics of design representing work of a master. Historic integrity is relevant to the authenticity of a building identity with an evidence of the existence of its physical characteristics during the building's historic period (Central Public Works Department 2013). As of August 2018,

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there were 1092 sites on the World Heritage List: 845 cultural sites and 209 natural and 38 mixed properties, located across 167 States Parties. Their geographic distributions are as following: 47.07% of these sites are in Europe, 23.63% are in Asia and the Pacific, 12.91% are in Latin America, 8.7% in Africa and the rest are in the Arab states. Figure 1 and Table 1 provides a summary of the number of World Heritage buildings by region. Since heritage is constantly under threat by worldwide ecological issues, political issues, and improvement, heritage sustainability has turned into a fundamental thought. Heritage sustainability can be defined as designing built environment that follow the standards of social, economic and ecological sustainability (McLennan 2004).

Historic heritage buildings are very vulnerable. They were built of low resistant materials. The connections between main structures tend to be inadequate. Causes of damage includes lack of maintenance, deterioration due to induced water from rain or rising damp, natural disasters such as earthquakes. In addition, from a structural point of view, damage may occur due to high stresses from gravity loading, alterations in lay-out constructions or repetitive environmental actions. (Perovic 2015).

Heritage Buildings Revenues

Heritage has an enormous value. The tourism division is the 'business' that utilizes heritage as help for its spine exercises like hotel settlement, transport and providing food. Heritage is a noteworthy supporter of the pay from tourism, which remains for 5,5% of the EU GDP, creates over 30% of its incomes from exchange outer administrations, and utilizes 6% of the EU workforce (Nypan, 2006). Tourism represents to 6% (2003 data, in US$) of the world fare of products and ventures. The phenomenon has tendency to be stretched out on a worldwide scale, including an ever-increasing

Figure 1. Summary of the number of World Heritage buildings by region (McLennan 2004)

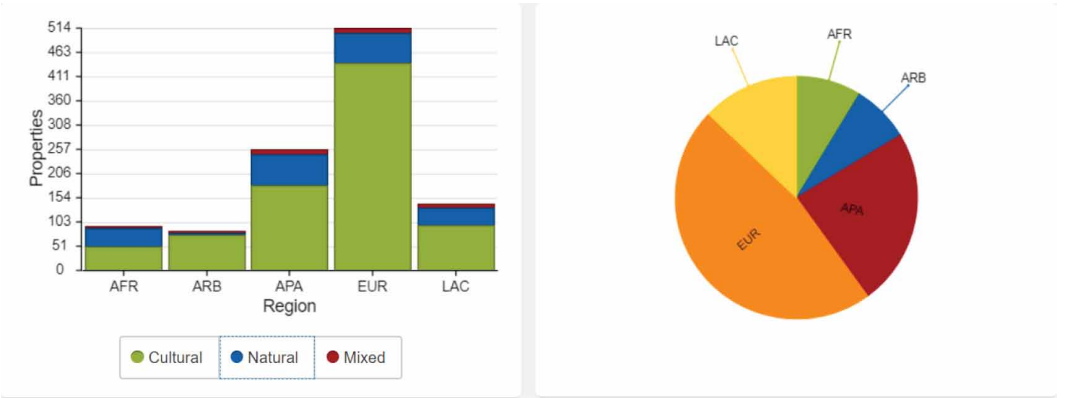

Table 1. Number of World Heritage buildings by region (https://whc.unesco.org/en/list/stat)

Region	Cultural	Natural	Mixed	Total	%
Africa	52	38	5	95	8.70%
Arab States	76	5	3	84	7.69%
Asia and the Pacific	181	65	12	258 *	23.63
Europe and North America	440	63	11	514 *	47.07%
Latin America and the Caribbean	96	38	7	141 *	12.91%
Total	845	209	38	1092	100%