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RETROFITTING OF OLD BUILDINGS INTO MUSEUM IN PENANG: CHALLENGES AND POSSIBLE SOLUTIONS.

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Abstract:
Heritage Buildings are a legacy from the past that needs to be conserved Buildings are to prevent it from being lost forever it is imperative that preservations must be made for the benefit of future generations. However, some of these buildings are at risk from defects and are not being well cared for due to lack of technical knowledge and high cost of repair and maintenance. Hence, retrofitting of a building requires an understanding of the existing building performance before considering the improvement to be made on it. The purpose of this research is to understand the challenges related to retrofitting old Buildings into museums. This study uses a quantitative method which is by distributing questionnaires to the respondents comprising of, the manager, the maintenance staff, the admin and the clerk. One of the highest challenges that respondents gave included strongly on safety aspects of the building structure and for the suitable solution. Respondents commented strongly agree in understanding the terms of retrofitting, implement guidelines and regulations on retrofitting buildings as well as giving more education, training and activities to create awareness.

Keywords: Challenges, Museum, Retrofitting

1.0 INTRODUCTION

Being stated as the UNESCO World Heritage Site, George Town must preserve their heritage buildings according to the conservation regulations in order to retain the Outstanding Universal Value (OUV). One of retrofitting strategy is when buildings reach the end of their design life. In order to continue functioning they must adapt to new standards and a retrofit is an obvious option. With the important role of the building to be retrofit, it ~~is~~ plays in the reduction of environmental loads, just a handful of research have been carried out with respect to existing buildings retrofitting (Rodrigues and Freire, 2013). One of the main problems in the case of retrofitting is related to the accepted degree of the interventions and the necessity to reach the safety of the new buildings (Traykova, 2015). Other challenges are that are all costs are approximate and will vary depending on many factors including location, condition of property, cost of labor and whether the measures are being undertaken in isolation or as part of a larger programme of works.Hence, the aim of this research is to determine the challenges related to retrofitting old building into museum. The research is to achieve the following objectives, i) to identify challenges in retrofitting old buildings into museums, and ii) to propose solutions in retrofitting old buildings into museums.

2.0 LITERATURE REVIEW

Penang started with a single museum in 1965. By 2013 the state had has more than 18 museums, mini museums and galleries that cover ethnography, history, the Second World War, the arts, owl, cats, Islam, toys, flora and fauna, Sun Yat Sen and a consummate entertainer from the state. Most of these museums and galleries are located within the city of George Town. A number of private museums are located within the city's heritage enclave, straddling the heritage trail which is popular with local and foreign tourists. (Ahmad, 2015). In Malaysia, the thrust of heritage conservation of a number of the state's landmark buildings were undertaken by means of the public area. The public is now starting to be aware of the cost of background buildings as a restrained resource that paperwork a part of the urban surroundings in addition to a tourism landmark and attraction (Nik-Azhari and Mohamed, 2012). The

cultural heritage matters to individuals, ethnic groups, nations, and the international community. The values of cultural heritage are various: symbolic, historic, informational, aesthetic and economic. Retrofitting takes on an important significance in the context of commercial property. In the academic literature there has been much debate over the meaning of "retrofit" and its distinction, if any, from "refurbishment" or "renovation". In a literal sense retrofit can be defined as to provide (something) with a component or feature not fitted during manufacture; to add (a component or feature) to something that did not have it when first constructed. In other words, the term, which originated in the USA in the late 1940s and early 1950s, is essentially a blend of the words, "retroactive" (applying or referring to the past) and "fit" (to equip) (Dixon et al., 2014). Within the context of the built environment, the term 'retrofit' has been used to imply substantive physical changes to a building or buildings (e.g. mitigation activities to improve energy efficiency), and often linked to the concept of 'adaptation' (i.e. intervention to adjust, reuse or upgrade a building to suit new conditions or requirements.

2.1 Challenges In Retrofitting Old Building

Factors that cause the challenges in conducting old Building in to a Museum includes the cost of maintenances for the whole building operation, material that are hard to find for renovation purpose and the size of the building that give limited spaces. According to Traykova (2015) there are some challenges on retrofitting of historical buildings: -

2.1.1 Cultural value of the building

If a structure is of great cultural value it might even be considered not to be used at all but to be left as a monument of the historical time it represents. If there is need of any structural interventions, they are to be chosen with great care so that any impact is minimized.

2.1.2 Condition of the building

If the building is well preserved that indicates that it has withstood the test of time and therefore its structure is adequate and could be trusted to be safe, even if it does not meet current code provisions. Of course, past conditions should be compared and to be expected future conditions.

2.1.3 Current use of the building

Sometimes the significance of the function of the building (that might be its original function) prevails over its cultural value. Safety should be considered primary to historical preservation, because in the case of an extreme action (e.g. earthquake) the social cost could be much higher than the cost of affecting the cultural value of the building.

2.1.4 Continuity of history.

The main question here is why the building is valuable. It is always better to make some changes to a building that has curtain cultural value, even if they are significant, and keep it living this way, then to leave it into ruins or even demolish it. The nature of the problem stated needs a decision based on which actors involved in the implementation of a retrofit measure can interact. Seeking for ways of solving contradictions between the objectives of single actors in the retrofit implementation strategy, not only through choice, but also through the customization of an adequate decision system implies multidisciplinary aspects.

2.1.5 Unique characteristics.

Historic projects are always different; there is not one project that is identical to another. The unique characteristics of each historic project, including archaic construction materials, hidden details, and "uncommon" original construction techniques require thinking outside of the box and coming up with approaches that are not obvious at first glance (Structural Focus, 2016). While there may be some ideas that can be used from project to project, each project's analysis and detailing differ greatly.

2.1.6 Limited Documentation.

Due the historic nature of the buildings, there was limited access to original documentation; surprises in the original structure were bound to arise (Structural Focus, 2016). It was essential to understand the characteristics of the existing structure and ascertain the behavior of the building during a seismic event; therefore, Structural Focus performed complex modeling of the structure to obtain a level of confidence in the building's behavior and how our retrofit measures would affect that behavior.

2.1.7 Historical Significance vs. Safety.

One of the biggest challenges of a historic project is to maintain the historic significance of the structure while improving its performance and safety (Structural Focus, 2016). The beauty of a truly successful structural rehabilitation is the ability to meet a performance goal without impeding its original and unique character.

2.1.8 Unforeseen Conditions.

The constant interaction between the design team members is necessary in order to deliver a successful project of this complexity (Structural Focus, 2016). We understand that surprises will arise during construction and we must have the flexibility to reassess the original design based on those surprises in order to move forward.

3.0 METHODOLOGY

There are a variety of data gathering techniques ~~are~~ used to describe the research and structured questionnaires in providing reliable data to accomplish the objectives of the study, which were reigned to the construction industry by survey. The data required are opinions of respondents which would be accumulated from the observation via questionnaire surveys. Sources from the literature would be used in designing the questionnaire. Ideally, in order to determine and establish the objectives of the study, the data and information were collected through in-depth literature review and questionnaire survey. In this study, self-administered questionnaire was engaged as the primary data collection method. The questionnaire was designed based on three research objectives where the aim of the study is to investigate the method that the contractors use in order to manage the communications barrier. Quantitative data gathering is also used as a data accumulation method where the opinions of representative would be obtained via questionnaires surveys which involves their ratings of the attributes. The respondents of this study includes managers, maintenance staffs, administration and clerks of the museum.

4.0 DATA ANALYSIS AND FINDINGS

During this stage, the methods applied are by examining and formulating accumulated data from the questionnaire. All accumulated data from the questionnaire would be analysed entirely in order to achieve the objectives of this research. The analysis of the data is limited towards questionnaire. The analysing procedure was to accumulate each individual's response in pertaining to each question. One of the selected method is through Likert scale in this procedure. By this, it can trigger of multiple item measures. Likert scaling is a bolar scaling method, measuring either positive or negative response to a statement. The respondents specify their level of agreement to a questions statement.

4.1 Software Application

The data accumulated from the study is analysed and measured using a computerised program by the frequency occurrence and appeared into percentage and easily diagram representing the vastly opinion for better understanding. The highest rating value will become the result either the respondents are aware or otherwise regarding to the study. Next, the accumulated data will be keyed in into statistical software named as Statistical Package for Social Science (SPSS) and also by using Microsoft Excel. It is used to

analyse the data that obtain from respondents. The strongly agree index of each category is a result of highest of all its related problems. The results are shown in tables for the categories for detailed problems.

4.2 Data For Challenges In Retrofitting Old Building Into Museum.

Table 1: Challenges faced by the management staff.

ITEM REF.	DESCRIPTIONS	STRONGLY AGREE INDEX (%)
1	Financial problems	86.67
2	To maintain the value of culture heritage	80.00
3	Spare parts problems	63.33
4	Safety of the building structure	90.00
5	Management and Administration problems	53.33
6	Lack of documentation	83.33

The above table shows the challenges in retrofitting old buildings into museums. As it shows that the highest challenges that the respondents strongly agree is on safety of the building structure. Where the percentage is 90% about 27 out of 30 respondents choose strongly agree for this type of challenges that the faced. This clearly shows some proof from previous literature that the safety aspects of buildings were the most challenging thing during retrofitting old buildings into museums and its proven again in this data collection and findings, that the respondents strongly agree on the statement that had been given during answering the questionnaire.

4.3 Data For Suitable Retrofit Solution For Old Building Into Museum

Table 2: Suggested solution for retrofit old buildings into museum

ITEM REF.	DESCRIPTIONS	STRONGLY AGREE INDEX (%)
1	To understand the term of retrofitting	96.67
2	Give higher tax credit	83.33
3	Assessment by the design professional is important	93.33
4	Practice more retrofit building around the city	70.00
5	Implement guideline and regulation on retrofitting building	96.67
6	Giving more education, training and activities	96.67

The purpose for this objective is to find a suitable solution for retrofitting old buildings into museums. In order to find out the suitable solutions, question was asked to the respondents about some suggested solutions that based on previous study literature review and findings. The table above show the suitable retrofit solutions for old buildings into museums. It shows the most suitable solution in which respondents mostly agreed was to understand the terms of retrofitting, implement guidelines and regulations on retrofit buildings as well as giving more education on training and activities to create awareness. All these three solutions had the same percentage of 96.67% about 29 out of 30 respondents choose strongly agree for these solutions.

5.0 CONCLUSION

When designing existing buildings for retrofitting, the primary existing conditions for buildings are differentiated and considered for design mainly for energy modeling, variations benefits, and legislation considerations. In Malaysia today, history buildings are considered as precious due to their excessive ancient values and top-notch tourism potentials. It has become essential to preserve these building so that you can protect them from being destroyed. The reality that no building is maintenance free irrespective of the building being a background or new emphasizes that historical past buildings need utmost care and safety to restriction their deterioration and extend their existence span and features. In order to minimize the challenges such as safety of the building, the party who involve in retrofit industry should firstly understand the term of retrofitting. Other than that, implementing guidelines and regulations on retrofit buildings might also be useful. Last but not least, by giving more education, training and activities to create awareness also can be quite effective to ensure that people in construction industry or in other case the management staff of the building can be aware and alert on this matter.

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