

The Green Adaptive Reuse of Historic Buildings

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Abstract

The green concept of adaptive reuse could become the ideal strategy as it combines embodied and operational benefits, reduces greenhouse gas emissions and carbon footprints. However, lack of knowledge, expertise and multi-skills design and project team in understanding the green concept in adaptive reuse projects are the main problems in the application of green concept. The green concept requires technical expertise in environmental modeling, comfort and energy performance, while adaptive reuse requires the engagement and understanding of historical connections and cultural sensitivities. It is crucial to well integrate green and adaptive reuse concept because these could produce extraordinary outcomes. The purpose of this study is to propose the conceptual framework of green concept in adaptive reuse projects. Therefore, this paper discusses the literature related to the green concept in adaptive reuse. The conceptual result in this regard would help adaptive reuse practitioners to seek out and pursue the green concept in adaptive reuse.

Keywords: Green Concept, Adaptive Reuse, Historical Buildings

1.0 Introduction

Historical buildings offer opportunities for adaptive reuse in terms of new purposes and redevelopment for a community. For example, an old woolstore may be converted into a residential building, office or hotel. The rich of historical culture in the Malaysia offers unique opportunities for the reuse of its' historic buildings. To date, "Sekeping Projects" which consists of historic buildings such as Sekeping Kong Heng (Perak), Sekeping Victoria and Sekeping Pinang (Penang), Sekeping Sin Chew Kee and Sekeping Backland (Kuala Lumpur) is an endeavor to acquire and fully reuse Malaysian historic buildings. The adaptive reuse of historical buildings could save energy and resources. The green concept concerning sustainable techniques and technologies can be incorporated to modernize the buildings' performance as well as creating a healthy space for one to dwell in.

The green concept of adaptive reuse can become the ideal strategy as it combines embodied; reduce greenhouse gas emissions and carbon footprints (Langston 2011 and Balaras et al 2004). However, the main problem in understanding the significance of green concept in adaptive reuse projects is in integrating sustainable with adaptive reuse practice. The green concept requires technical expertise in environmental modeling, comfort and energy performance, meanwhile adaptive re-use requires engagement and understanding of historical connections and cultural sensitivities. By combining these two concepts, one could provide multi-skills design teams who can integrate preservation and sustainability with creativity and flair (Langston 2011). It is crucial to well integrate green and adaptive reuse concept because it could produce an extraordinary outcome.

The objective of this study is to examine the significant points of green concept of adaptive reuse practice in Malaysia. Such an adaptive reuse practice will not only benefit the usage of energy and resources, but also the sustainable techniques and technologies in modernizing the buildings' performance. Thus, this study investigates the following question: can the green concept and adaptive reuse integrate integrate preservation and sustainability with creativity?

2.0 Literature Review

2.1 Adaptive Reuse

Adaptive reuse is defined as a process of transforming the functions, the structures and the fabric or building envelopes of historic buildings to become more contemporary. The process is complex and needs to be managed with the appropriate management skill of multi project team members who collaborate with the historic and modern value of the design and construction components (Kartina, 2014).

Previous research in adaptive reuse project focused on the skills and knowledge of project teams such as the ability of individuals to carry out the normal process related adaptive reuse. With regard to the green adaptive reuse, Langston (2011) defined green adaptive reuse as an optimal strategy which combined embodied and operational benefits in a coordinating design. Langston (2011) validated some of adaptive reuse projects in Australia with Adaptive Reuse Potential (ARP) Model by using iconCUR software. Many researchers focused and agreed that the skills and knowledge in adaptive reuse project are critically important for project success, but not related to the green (Watson 2009a, 2009b; Zawawi and Abdullah 2008). Not much research has been done on green adaptive reuse. Presently, the application of green concept in new building construction is quite popular in Malaysia. In the United Kingdom, most of the buildings have been assessed with green building index. According to the Governor's Green Government Council, the idealized understanding of green concept for the building is by assuring the healthiest possible environment with the optimum design solution that effectively emulates all the natural systems and condition of the existing building. Most of the developed countries have very well developed evaluation tools for green buildings for historical buildings.

2.2 Green Building Principles

The green concept that is associated with building refers to the incorporation of environmentally friendly and resource efficient processes. Both are crucial at any stage from design to construction, including maintenance, renovation and demolition. The attempt of green concept is to seek minimum impact on the environment. According to Preeti (2012), green concept in a building can be categorized into two points; first is to increase the efficiency of building usage related to energy, water and materials. Second is reducing building impacts of human health and the environment throughout the complete building life cycle. This can be done by choosing a better site selection, designing, constructing, maintaining and removing and perhaps the recycle of the buildings. Governor's Green Government Council (GGGC) of Pennsylvania developed five fundamental principles for green building that can possibly be used in conjunction with the adaptive reuse approach. There are sustainable site design, water quality and conservation, energy and the environment, indoor environment quality, material and resources. The GGGC focuses on principles and strategies rather than specific solutions or technologies. Table 1 shows the summary of the five fundamental principles of green building.

Table 1 : Green Building Fundamental Principles

Green Building Principles	Key Principles
Sustainable Site Design	Minimize urban sprawl and needless destruction of valuable land, habitat and green space, which results from inefficient low-density development. Encourage higher density urban development, urban re-development and urban renewal, and brownfield development as a means to preserve valuable green space.
Water Quality and Conservation	Preserve the existing natural water cycle and design site and building improvements such that they closely emulate the site's natural "pre-development" hydrological systems.
Energy and Environment	Minimize adverse impacts on the environment (air, water, land, natural resources) through optimized buildingsiting, optimized building design, material selection, and aggressive use of energy conservation measures.
Indoor Environment Quality	Provide a healthy, comfortable and productive indoor environment for building occupants and visitors. Provide a building design, which affords the best possible conditions in

	terms of indoor air quality, ventilation, thermal comfort, access to natural ventilation and day lighting, and effective control of the acoustical environment
Material and Resources	<p>Minimize the use of non-renewable construction materials and other resources such as energy and water through efficient engineering, design, planning and construction and effective recycling of construction debris.</p> <p>Maximize the use of recycled content materials, modern resource efficient engineered materials, and resource efficient composite type structural systems wherever possible. Maximize the use of re-usable, renewable, sustainably managed, bio-based materials. Remember that human creativity and our abundant labor force is perhaps our most valuable renewable resource. The best solution is not necessarily the one that requires the least amount of physical work.</p>

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The application of green building concept for heritage buildings depends on the adaptive reuse process. According to Latham (2000), the adaptive reuse processes started from acquisition until the building is occupied. However, adaptive reuse processes can be categorized according to the green building concept which includes the site selection, design, construction and maintenance. This study had synthesized the adaptive reuse processes in three stages. Figure 1 shows the three stages of adaptive reuse processes.

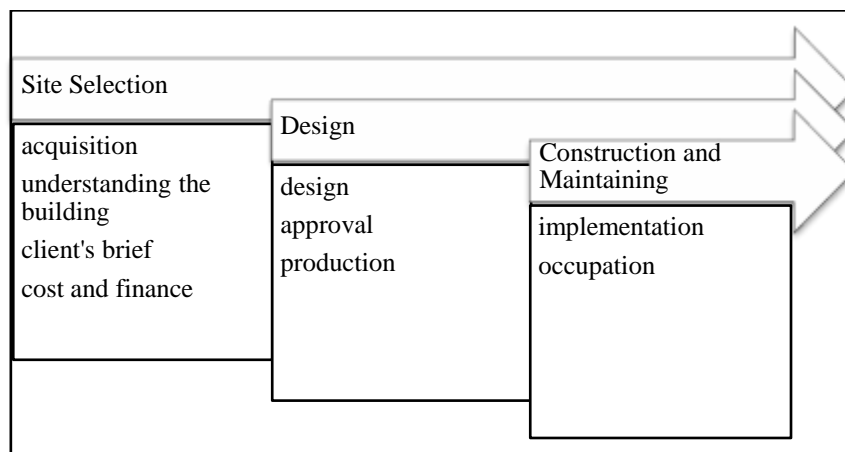


Figure 1: Three Stages of Adaptive Reuse Processes.

- Acquisition – the process of purchasing the buildings if the owner of the building is not the client.
- Understanding the building – the architect, the planner, the heritage consultants’ synthesizing process from many documents to understand the building.
- The client's brief – it is critical to establish the requirements of the client. A well-considered brief will avoid later problems if it is client, and not building, oriented.
- Cost and finance – an accurate cost plan by a quantity surveyor is essential. The main issue is if the team members fail to understand the true cost of adaptive re-use. This stage, the feasibility study, is critical to raising funds.
- Design – this stage provides critical direction towards the production of accurate information, presenting a clear transparent and acceptable design solution.
- Approval – the approval process can lead to delays in the process and costly appeals in regards to preparing a very high standard proposal.
- Production – detailed design established with client approval. The critical components of the production stage are the time taken to prepare adequate information, the choice of procurement route, good co-ordination between consultants, the selection of the contractor, and preparing and maintaining a realistic program. Additional fee costs and program delays are likely if client requirements are changed that cause design variations.
- Implementation – the construction process starts at this stage. This stage demands respectful,

co-operative and productive communication between the design team and contractor. The early investigation, planning, discussion, design, detailing and production must be pulled into focus to inform the work necessary on-site. The end result still depends upon any unforeseen implementation being in accordance with all that has gone before.

- Occupation – the project is considered complete if the building is occupied. The building needs to be maintained.

Based on the review of literature, this study proposed the conceptual framework that conjunction between green concept and adaptive reuse processes to answer the study question: can the green concept integrate preservation and sustainability with the creativity?

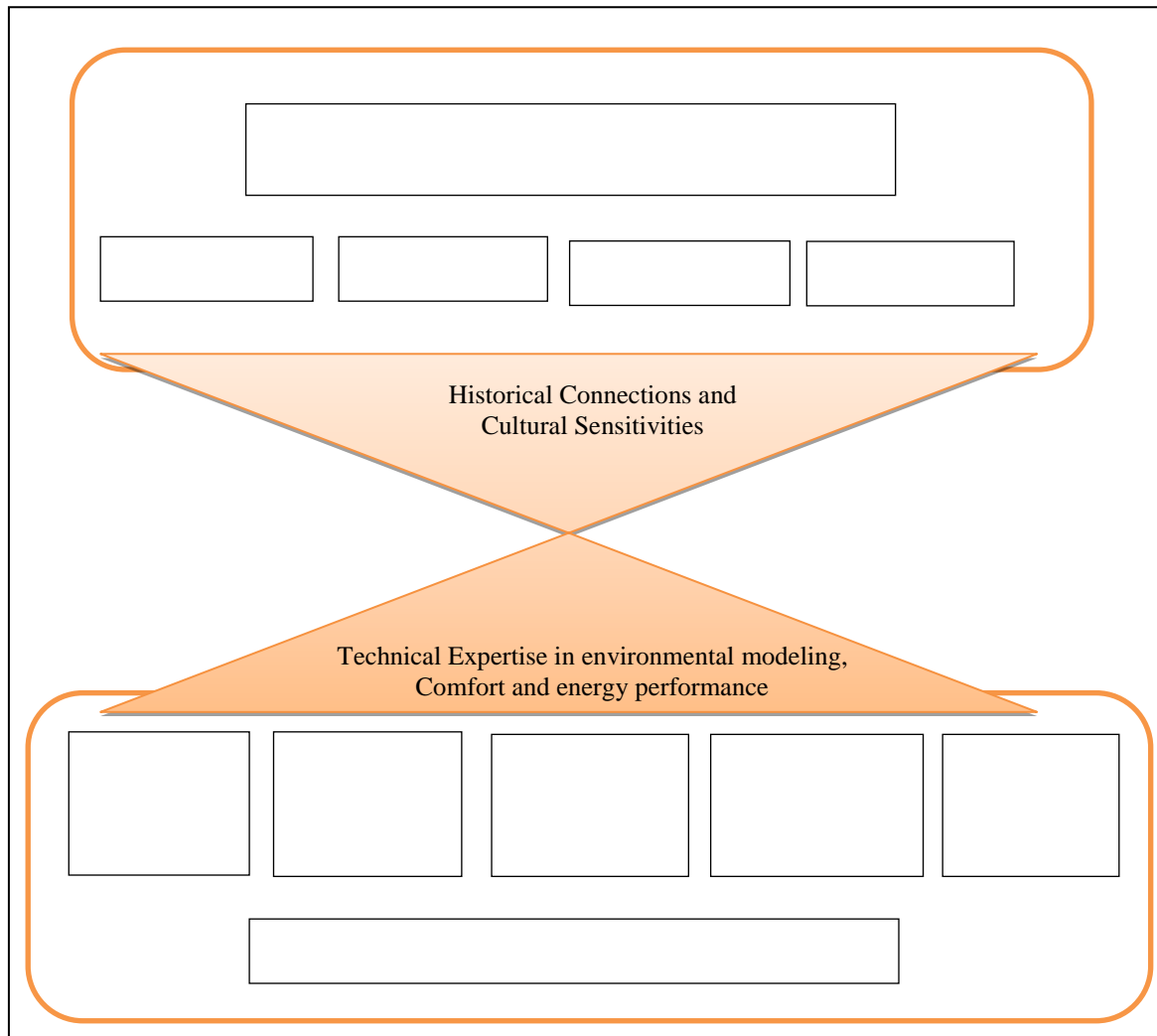


Figure 2: The Framework of Green Adaptive Reuse.

The proposed Framework of Green Adaptive Reuse has been synthesized from a literature review of adaptive reuse and green building area. Langston (2011) stated that it is crucial to well integrate green and adaptive reuse concept because it could produce an extraordinary outcome. By combining historical connection and cultural sensitivities with technical expertise in environmental modelling would help adaptive reuse practitioners in any decision making stages. It is also crucial to ensure green elements to be added as one of significant element in the future of adaptive reuse related to decision making. Hence, all the adaptive reuse practitioners should understand the green concept such as the quality of water, energy and the environment, indoor environment, material and resources. Last but not lease the sustainable site design.

This framework embraces the green concept in adaptive reuse processes to enhance the adaptive reuse practitioners' knowledge. This enhances really require higher understanding and knowledge in relation to the green adaptive reuse of historical buildings.

3.0 Methodology

The case Study approach will be implemented by identifying the historical buildings that were transformed or adapted to other functions particularly in heritage states such as Perak, Penang, Malacca and Kuala Lumpur. Identifying the adaptive reuse projects by searching from *Badan Warisan Malaysia*, *Muzium Negara* and other private interest group related to conversion of historical buildings. Answering this study question requires the collection of observation data from the unique case studies. The proposed cases are the Sekeping Projects which consist of historical buildings including Sekeping Kong Heng (Perak), Sekeping Victoria and Sekeping Pinang (Penang), Sekeping Sin Chew Kee and Sekeping Backland (Kuala Lumpur). The observation checklist will be used as a tool for data collection in identifying the crucial key environmental aspects in green concept for adaptive reuse projects. The preparation of checklist for observation is in progress and will be generated for the future research plan.

4.0 Conclusion

It is believed that this study would provide new ways of an understanding the importance of green concept in adaptive reuse approaches. Moreover, the final result of this study should enhance the available knowledge of adaptive reuse. Perhaps, the combined green concept and adaptive reuse would produce an extraordinary outcome for Malaysia with regard to sustainability.

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