

RETROFITTING PROCESS FOR HERITAGE BUILDING

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ABSTRACT

The understanding on the conservation process for heritage buildings is still vague. A lot of the heritage buildings have been neglected due to the problems faced by many owners especially in term of correct preservation strategy and approach. These problems lead to premature abandonment and demolition. The aim of this study is to promote understanding of the implementation process from the introduction phase to the delivery of conservation project. To fulfil the aim, three objectives have been proposed which are to study the criteria in conservation of heritage building in Malaysia, to determine the benefit of upgrading and conservation of heritage building, and to study the technical method of conventional and conservation works of heritage building. This study is divided into three stages. First stage, to identify problem statement, objectives and significant of study. Second stage followed by extensive literature review and case study. After data collection has been performed, record analysis is carried out appropriately as part of a third stage which includes flowchart diagram and framework diagram. Framework diagram describes the general process involved in the upgrading and conservation of heritage building project being carried out in Malaysia. This information covers from pre project to post project to provide a clear picture of the process involving client, consultants, conservator and contractor based on the selected case study. For work flowchart diagram, it is related to physical and technical works performed on site project after approval of documents such as shop drawing and method of statements. The technical method shown is based on the general work done in upgrading and conservation projects depending on the design and materials of heritage buildings. Based on findings and record analysis in this research, hopefully it will help construction professionals practice and other stakeholders as reference for future retrofitting of heritage building project.

ABSTRAK

Pemahaman mengenai proses konservasi bangunan warisan masih samar-samar. Banyak bangunan warisan telah diabaikan kerana masalah yang dihadapi oleh kebanyakan pemilik terutamanya dari segi strategi dan pendekatan konservasi yang betul. Masalah ini membawa kepada pengabaian pramatang dan perobohan. Tujuan kajian ini adalah untuk menggalakkan pemahaman proses pelaksanaan dari fasa pengenalan kepada penyerahan projek konservasi. Bagi memenuhi matlamat ini, tiga objektif telah dicadangkan iaitu untuk mengkaji kriteria dalam konservasi bangunan warisan di Malaysia, untuk menentukan manfaat menaiktaraf dan pemuliharaan bangunan warisan, dan mengkaji kaedah teknikal kerja-kerja konvensional dan konservasi bangunan warisan. Kajian ini dibahagikan kepada tiga peringkat. Peringkat pertama, untuk mengenalpasti pernyataan masalah, objektif dan kepentingan kajian. Peringkat kedua diikuti oleh kajian kesusasteraan yang luas dan kajian kes. Selepas pengumpulan data telah dijalankan, analisis rekod dijalankan dengan sewajarnya sebagai sebahagian daripada peringkat ketiga yang merangkumi pengalihan carta aliran dan gambar rajah rangka kerja. Gambar rajah rangka kerja menerangkan proses umum yang melibatkan kerja menaiktaraf dan konservasi projek bangunan warisan yang dipraktikkan di Malaysia. Maklumat ini merangkumi dari fasa pra projek sehingga penyerahan projek bagi memberi gambaran yang jelas proses yang melibatkan pelanggan, konsultan, konservator dan kontraktor berdasarkan kajian kes yang dipilih. Bagi pengalihan carta aliran kerja, ianya berkaitan kerja teknikal dan fizikal yang dijalankan di tapak projek selepas kelulusan dokumen seperti lukisan perincian dan borang tatacara kerja. Kaedah kerja teknikal yang ditunjukkan adalah berdasarkan kerja umum untuk projek menaiktaraf dan konservasi bergantung kepada rekabentuk dan bahan binaan bangunan warisan. Berdasarkan penemuan dan analisis rekod di dalam kajian ini, diharapkan ia dapat membantu ahli professional pembinaan dan badan kepentingan lain dapat untuk dijadikan rujukan bagi projek pengubahsuaian bangunan warisan pada masa akan datang.

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LIST OF ABBREVIATIONS

- GHBC** – Guidelines of Heritage Building Conservation
- UNESCO** – United Nations Educational Scientific and Cultural Organization
- NHDM** – National Heritage Department Malaysia
- HSBC** – Hong Kong and Shanghai Bank
- FMHG** – Fort of Melaka Heritage Gallery
- HABS** – History, Architectural and Building Survey

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CHAPTER 1

INTRODUCTION

Variety of words have been used to define and portray the conservation of heritage building. In general, conservation is a technical activity towards historical. It involved physical action to preserve the material and fabric of the heritage buildings. It is a process to prevent decay and the action is aiming to prolong the life of the buildings (Harun, 2011). According to the National Heritage Act 2005 Malaysia. “conservation” includes restoration, preservation, rehabilitation, reconstruction, and adaptation or any combination.

However, misunderstanding about conservation has caused it to be defined as renovation using conventional work even though both have different scope of work. There are still lack of technical knowledge and training among the professionals who involved in conservation of heritage buildings. (Beckman & Bowles, 2004). Drury (2011) further added that practicing conservation must be based on an understanding of the heritage values attached to a building or structure, how they are represented in its fabric and the effects on them of different approaches to conserve.

Construction professional especially architects, engineers and quantity surveyors provides little or no guidance on the conservation and preservation of heritage buildings. (Beckman & Bowles, 2004). Research by Hegazy (2014) shows that, an integrated team of highly qualified professionals have to be involved in conservation of heritage buildings. Conservation work scope must involve specialist such as Conservator and Historian. The consultants and contractor selection in running a conservation project is also considered through the background of the company that has done the conservation projects previously. This is important in giving a reference to the responsible agency and the public because all the involved

agencies should acknowledge and understand the process and scope of work to be done.

1.1 Background of study

The background of study of this research includes literature review to understand main criteria and principles of conservation and upgrading heritage building. Meanwhile, the implementation of heritage building conservation works in Malaysia is done according to the Guidelines of Heritage Building Conservation (GHBC) 2017. It also covers the general fundamental criteria in conservation for national standard which is suitable for heritage building, site or monument. Furthermore, a case study of heritage building project was selected in Malacca to review how upgrading and conservation work is carried out in standard practice.

1.2 Problem statement

Subsequent to United Nations Educational, Scientific and Cultural Organization (UNESCO) declaration of Melaka Historical City and Inner City of George Town as World Heritage Site in UNESCO World Heritage List on 7th July 2008, conservation of heritage buildings become a great demand in practice whilst in tourism industry, it become a primary agenda. The issue of conflicts, complexities and uncertainties with conservation projects in implementing right process and methods have affected construction professional members to be involved in the conservation project. There are less than fifty (50) conservators registered under National Heritage Department Malaysia (NHDM) in Malaysia. The lack of registered conservator indirectly limiting the development of conservation industry.

In addition, conservation methods and techniques have an inadequacy of skilled worker and technical experts. Both upgrading and maintenance stages in majority of conservation projects require an analysis and understanding of building defect diagnoses, hence, this inadequacy will be a critical issue. There is likewise the

issue of treating and testing building material, determining the most convenient and effective methods and tools to conserve the building. Conservator face a major challenge concerning this issues, as the accountability to conservation task falls on his shoulder. Thus, one of the objectives of this study is to explain the criteria and methods of upgrading and conservation work of heritage building in order to give a clearer picture regarding this work scope.

1.3 Aim and objectives

The aim of this research is to study the common method for general work of conservation and upgrading heritage building. The objectives of this study are as follows.

- (1) To review the criteria in conservation of heritage building in Malaysia.
- (2) To investigate the conservation and upgrading practices for heritage building in Malaysia.
- (3) To develop the technical method of conventional and conservation works of heritage building.

1.4 Scope of study

One heritage building in Melaka was chosen as case study to get a clear understanding of the process involved. The chosen project is an old Hong Kong and Shanghai Bank (HSBC) building that is built as a commercial building in 1912. The building is built by the British and initially operated as a bank. HSBC bank operation has moved to Jalan Hang Tuah (Figure 1.1) in 1990 and since then the building was left unoperated. The building is bought by NHDM in 2007 to be made as the NHDM South office.



Figure 1.1 Case study location Hong Kong and Shanghai Bank building (NHDM)

1.5 Significance of study

Based on previous studies, the importance of this study according to historical perspective, is it can retain the identity and architectural value on a heritage building in Malaysia. In addition, Melaka which was gazette and listed on (UNESCO World Heritage List as World Heritage Sites) on 7th July 2009 and the case study building which is also located in the centre of Bandar Hilir, has been a turning point for Melaka in making the conservation of heritage buildings a primary agenda especially in tourism as it will be a focal point for tourists that come from various background to view or study the heritage building.

Secondly, with regular conservation of heritage buildings, it will become a tourist attraction, and generate economic growth. Indirectly, this will help to the surrounding businesses to increase their revenue. Studies across the country have shown that historic preservation acts as a powerful economic engine, creating tens of thousands of jobs and generating significant household income (Clarion, 2002). On this basis, this study can be considered important as it helps to grow the tourism industry and practices that involve conservation works through employment and economic opportunities.

Thirdly, the importance of the study appears also from its main objective. This study attempts to determine the process and technical methods involved in conventional and conservation of heritage building in Malaysia. Conservation guidelines should be developed to control changes or make good made to conservation works on heritage buildings and to avoid random conservation works that can lead to damage to heritage buildings.

REFERENCES

- A. Ziad (2017). Course outline: Preventive Conservation. Basic Definition
- A.C. Vollenhoven (2013). A Conservation Management Plan for Cultural Heritage Sites Identified at The Overlooked Colliery, Mpumalanga Province.
- A.G. Ahmad (2004). Understanding Common Building Defects: The Dilapidation Survey Report". Architect Magazine.
- A.G. Ahmad (2006). Restoration of the Fort Cornwallis.
- Beckman & Bowles (2004). Structural Aspects of Building Conservation. (2nd Edition).
- C. Alho & I. Poloz (2015). Authenticity Criteria in Conservation Of Sacred Buildings
- C. Alho (2010). Authenticity Criteria in Conservation of Historic Buildings.
- C. Cameron (2017). Reconstruction: Changing Attitudes - United Nations Educational, Scientific and Cultural Organization. Educational, Scientific and Cultural Organization (2008). New South Wales. Guidelines for The Adaptation of Historic Building and Sites.
- Clarion Associates (2002). The Importance of Heritage Conservation.
- Department of the Interior (2016). United States.
- Drury, P. (2011). Conservation: An Evolving Concept. in J. Taylor (Ed.), The Building Conservation Directory. Cathedral Communications Limited.
- European Standard UNI EN 16096 (2012). Conservation of Cultural Property – Condition Survey and Report of Built Cultural Heritage.
- F. Afifi (2017). How Conservation Works Take Place in Malaysia.
- Guidelines of Heritage Building Conservation (2017). National Heritage Department Malaysia, Ministry of Tourism and Culture Malaysia.
- Hegazy S.M (2014). Conservation of Historical Buildings – The Omani: French Museum as A Case Study.
- Kamal (2007). Kecacatan Dan Kerosakan Umum Pada Rumah Melayu Tradisional: Kajian Kes Rumah Kutai, Proceedings 2nd Asean Post Graduate Seminar in Built Environment.

- M. Yusoff, Dollah & Kechot (2010) Malay Journal – Legacy Development in Malaysia: General Overview of the Policy. A. Halim (2012). Diagnosis of Dampness in Conservation of Historic Building
- National Heritage Act (2005), National Heritage Department Malaysia, Ministry of Tourism and Culture Malaysia.
- O. Karakul (2018). Sculptural Reproduction of Architectural Ornamentation as A Way for Conservation of Traditional Craftsmanship.
- Orbaşli, A. & Whitbourn, P. (2002). Professional Training and Specialization in Conservation: An ICOMOS Viewpoint. Journal of Architectural Conservation.
- Q.Y Lee & Y.M Lim (2010). Preparation of Tender for Building Conservation Work. Current Practice in Malaysia.
- R. Lakhani & R.K Sharma (2018). Strategies for The Restoration Of Heritage Buildings.
- Reyers, J. & Mansfield, J. (2001). A Practitioner Perspective on Risk Management in Conservation Refurbishment Projects.
- S. Johar & A.G. Ahmad (2010). Conservation Activities of Old Traditional Mosque in Malaysia: An Overview.
- S.N. Harun (2011). Heritage Building Conservation in Malaysia: Experience and Challenges.
- The Australia ICOMOS. The Burra Carter (1979) The Conservation of Places of Cultural Significance
- The Nara Document on Authenticity (1994). International Council of Monuments and Sites (ICOMOS).