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The application of ARP modelling to adaptive reuse projects in Hong Kong

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A B S T R A C T

Protecting the heritage of our increasingly ageing building stock is becoming more important but difficult, particularly as citizens look for ways to minimize their impact on scarce resources and fragile environments in the context of impending climate change. Adaptive reuse is an efficient way to reuse existing buildings that have become obsolete by 'recycling' them in-situ through giving them a new functional purpose. In this paper, using Hong Kong as a case study of dense urban development with immense redevelopment pressure, adaptive reuse potential (ARP) modelling is deployed to test the processes underway in Hong Kong for the adaptive reuse of 14 existing publicly owned historic buildings with various degrees of heritage protection, and rank these buildings to determine the most effective time to undertake adaptive reuse intervention. The best and worst projects are then investigated in further detail to provide insight into the validity of the modelling process. This research illustrates that the ARP model works well for the two in-depth studies, and recommends further use of this technique by government authorities to help manage the daunting task of where best to prioritize its resources for heritage protection.

Introduction

Historic building stock is increasingly found in major cities worldwide. Old buildings become inappropriate for their original use due to their deteriorating physical conditions, and changing and obsolete economic, social and environmental attributes. Adaptive reuse is an effective strategy to encourage conservation through renovating old buildings for new uses, by providing economically viable alternatives to vacant or under-utilized structures or premature demolition. In the context of heritage conservation, adaptive reuse means modifying a building, site or precinct to suit a proposed new use (ICOMOS, 1999). However, heritage designation, renovation costs and loss of new development potential can largely discourage property owners and other stakeholders from undertaking adaptive reuse (Shipley, Utz, & Parsons, 2006). Buildings that have been persistently vacant for many years and without proper maintenance will become severely dilapidated (Ball, 1999) and their physical life expectancy may be significantly reduced. This increases the financial cost of revitalization later and minimizes options for the new use. Thus, timeliness is one of the most important underlying characteristics in identifying adaptive reuse potential (Langston, Wong, Hui, & Shen, 2008).

Previous works have explored factors that make a building suitable for adaptive reuse (e.g. Bullen & Love, 2010; Watson, 2009; Wilkinson, James, & Reed, 2009). Evaluation of the architectural character and physical conditions of building elements and the economic viability has also been conducted (Murtagh, 2006; Rabun & Kelso, 2009). Shipley et al. (2006) investigated successful adaptive reuse in terms of building type, architectural and marketing approach, financing and regulatory aspects. International organizations and charters stress the significance and integrity of historic buildings (e.g. DEH, 2004; Heritage Council of NSW, 2008; ICOMOS, 1999). It has been further suggested that successful adaptive reuse and conservation should take into account the capital costs of building works, future running costs of the proposed use, and maintenance costs (UNESCO, 2007).

However, much less emphasis has been placed on estimating the most suitable timing for adaptive reuse. The concept of adaptive reuse potential (ARP)provides a robust assessment of the useful life of a historic building, taking consideration of factors affecting obsolescence (Langston, 2008). The model is able to assist policy makers and planners in prioritizing historic building stock in terms

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of the most effective time to undertake adaptive reuse, and to plan accordingly. It needs to be applied in conjunction with other assessment techniques capable of evaluating triple bottom line reward once specific reuse plans for a property are cast. In other words, the ARP model helps to 'sift' through a portfolio of existing building stock to identify and prioritize properties for possible conversion before valuable time is invested on more detailed analysis.

Adaptive reuse is an international issue that has risen to prominence due to a need to preserve heritage buildings that have become obsolete, to save resources through in-situ reuse of materials rather than demolition and new build, and to improve built environment sustainability by making better use of existing infrastructure. As Jacobs (1961) first stated, the greenest buildings are the ones we already have.

Yudelson (2010) claimed that about 75% of all buildings expected to be operating in the year 2040 have already built or renovated, and the pace of building energy retrofits and green upgrades will accelerate dramatically in the next five years. Further, Tobias and Vavaroutsos (2009) indicated that since new construction accounts for merely 1–1.5% of existing building stock each year in most developed countries, adaptive reuse or retrofitting will play a critical role in reducing emissions from the built environment. UNEP (2009) emphasized that adapting and retrofitting existing buildings to the optimal energy efficiency standard must be given more focus by the building sector. Tobias and Vavaroutsos (2009) reported that green building practices have under-emphasized the importance of sustainable retrofits of existing building stock globally and that environmentally sensitive and energy efficient new construction by itself cannot significantly change the environmental impact of the built environment unless sustainable design and construction technologies are applied to existing building stock. Indeed, Gorse and Highfield (2009) asserted that there is no better example of the environmental benefits of effective sustainability in practice than the recycling of existing buildings through adaptive reuse.

Hong Kong provides an interesting example as the tension between demolition and conservation of heritage buildings are immense under the redevelopment pressure. Here conservation of built heritage has been advocated strongly over the last decade. There are more than 1000 graded buildings that are waiting for an appropriate conservation approach. So far, the conservation and reuse of historic buildings has rested primarily upon government intervention and financial support. Recently, the HK Government initiated the *Revitalizing Historic Buildings through Partnership Scheme* to involve non-government organizations. The government has requested HK$100 million to fund the first seven buildings (China Daily, 2008). However, renovation cost is still a major obstacle for potential applicants (Yung & Chan, 2012).

The purpose of this paper is to investigate the application of ARP modelling to existing buildings, using Hong Kong as the context, via an analysis of 14 projects listed by the Hong Kong Heritage Office for adaptive reuse, or recently completed. The aim is to find out the optimum timing to implement adaptive reuse. Given an optimal time for adaptive reuse intervention can be determined, capital cost savings and ease of conservation work is likely to be enhanced. The detailed discussion of cases representing highest and lowest potential explores the validity of the model by providing evidence that the specific reuse solutions adopted in practice reflect their initial prioritization rank.

The paper is structured to provide a brief summary of the ARP model's conceptual framework, followed by a review of the current state of play in Hong Kong related to the revitalization of historic buildings, and in particular adaptive reuse, the method employed to collect data, findings from applying the model to 14 listed projects and the in-depth analysis of two identified case studies at each end of the ARP range. The paper culminates in some recommendations for future practice.

Given the increasing interest in heritage protection worldwide, not just in Hong Kong, it is important to be able to make quick yet reliable judgements about existing built assets in order to identify and prioritize them for potential restoration activities. The application of the ARP model in this regard, and its ability to guide early selection of properties suitable for adaptive reuse, has implications for any city facing, on the one hand, tensions between progress and the need to improve amenity and living standards, and the responsibilities of heritage conservation and protection of environmental values on the other.

Assessment of adaptive reuse potential

A distinction is made in this paper between the assessment of adaptive reuse potential and the analysis of project viability. In the former, the purpose is to identify and prioritize existing buildings for possible adaptive reuse. In the latter, a business case needs to be made to justify that adaptive reuse intervention is indeed worthwhile. Both involve decision-making and risk management, yet the former is a scanning technique (i.e. applied to a portfolio of existing stock) without regard to specific solutions, while the latter is a feasibility or cost–benefit study based on one or more detailed design responses.

A number of models have been developed over the last decade aimed at scanning for adaptive reuse potential in existing buildings. Based on research results, different tools and instruments have been developed to analyze a building's conversion potential and may be applied at different stages of the conversion process. Most of the tools were developed as checklists, and are based on thorough studies of building conversions. Each is briefly discussed below.

In order to be able to judge office buildings on their potential for transformation into housing, the 'transformation meter' was developed by Geraedts and Van der Voordt (2003, 2007) as a quick-scan. This tool consists of criteria to assess the value of a building and its location for housing, based on the physical aspects of building and location and with some criteria considering organizational aspects and market aspects. Some of the criteria are 'veto criteria', meaning that if they have a negative influence on transformation potential, adaptive reuse is unfeasible. While only a few building aspects may fall into this category, locational characteristics often do. Depending on the target group, while the transformation of the building can be financially feasible, its locational characteristics cannot be easily changed. The transformation meter was developed to assist decision-making at the beginning of a possible transformation trajectory.

Hek, Kamstra, and Geraedts (2004) developed an instrument called 'programmatic quick scan', which consisted of four phases. The first phase considers defining possible functions based on location characteristics, financial, societal, technical and procedural aspects. The study is hierarchical, starting with the location characteristics, and then a consideration of possible functions. In the second phase, combination opportunities for different functions are studied, starting with possible interaction and synergy effects between functions, and then developing a concept for fitting the functions within the building. The third and fourth phases then explore design solutions via sketches and prepare a financial feasibility of the plan. In every phase, a checklist is filled in, assigning scores to decide the viability of conversion of the building and the potential for reusing it for a specific function. Thereafter, the scores are weighted and the feasibility of converting the building into the chosen function(s) is determined.