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Will green building development take off? An exploratory study of barriers to green building in Vietnam

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ABSTRACT

Green building (GB) is one of the most effective solutions to increase the efficiency of buildings through resource utilisation and recycling, mitigating the negative impact of the construction industry on the environment. As a construction innovation, GB has faced numerous challenges to its penetration into a market crowded with conventional buildings. Studies of GB barriers have been conducted around the world, including the United States, Europe, Australia and Asia, but they are scarce in Vietnam and limited to individual perspectives.

This paper identifies 41 barriers to GB in Vietnam from the literature and validates them by a survey of 215 construction professionals and government officers. Principal Component Analysis in Exploratory Factor Analysis is used to reveal that, while legislative and institutional barriers are widely perceived as the most challenging obstacles, social and cognitive barriers as a whole represent the main hindrances involved. Final remarks include policy recommendations for GB adoption in Vietnam and suggestions for further research.

1. Introduction

Vietnam's rapid economic growth has adversely affected its infrastructure and the environment. The increasing demand for buildings, growing population and over-urbanisation, predicted insecurity of energy supply, and environmentally detrimental and negative impacts of climate change are creating the need for a more sustainable built environment (Nguyen and Gray, 2016). Buildings, in general, consume more than 30% of total global final energy use (Berardi, 2017) and a large amount of raw materials, such as 70% of timber globally (Sev, 2009; Thilakaratne and Lew, 2011). Conventional buildings also add to environment pollution by generating a significant amount of waste during their lifecycle (Chau et al., 2010; Li et al., 2016).

Green building (GB) emerged from the green movement around 1970s-1980s as a solution to meet building demand while reducing the construction industry's energy consumption (Retzlaff, 2010). Studies have shown that the greening technologies and design applied in GB can increase the efficiency of buildings by up to ten times in terms of resource utilisation (Green building: project planning & cost estimating, 2011). Compared to average conventional buildings, certified GBs in Australia and New Zealand emit only 1/3 greenhouse gases, consume 1/3 electricity and ½ potable water, and recycle almost 96% of demolition waste (BCI Economics, 2014). In this study, GBs are defined as "those embracing the principles of lower environmental impact through greater energy efficiency, lower energy demand, reduced water usage, improved indoor quality and minimising construction waste" (O'Leary, 2008 as cited in Yang and Yang, 2009).

It is argued by a number of construction professionals and GB experts in Vietnam that the adoption of GB in the building market is slow and still in its infancy (Le, 2008; Pham, 2015; Solidiance & VGBC, August 2013). GB adoption faces numerous barriers against its progress to find a niche or be in the mainstream market (as referred in the following section). After the first certified building dating back to 2010, GBs can now be seen in large urban areas throughout Vietnam, mainly in two metropolitan cities – Hanoi and Ho Chi Minh City – as several demonstration projects of large corporations (Solidiance & VGBC, August 2013). In 2013, there were 41 certified and registered GB projects with 7 different rating systems (see Appendix A), among which, the Leadership in Energy and Environmental Design (LEED) Green Building Rating System and LOTUS – a set of market-based green building rating tools developed by the Vietnam Green Building Council (VGBC) – are the two primary GB certification tools (Solidiance & VGBC, August 2013). Updated data obtained from the U.S. Green Building Council (USGBC), VGBC and the International

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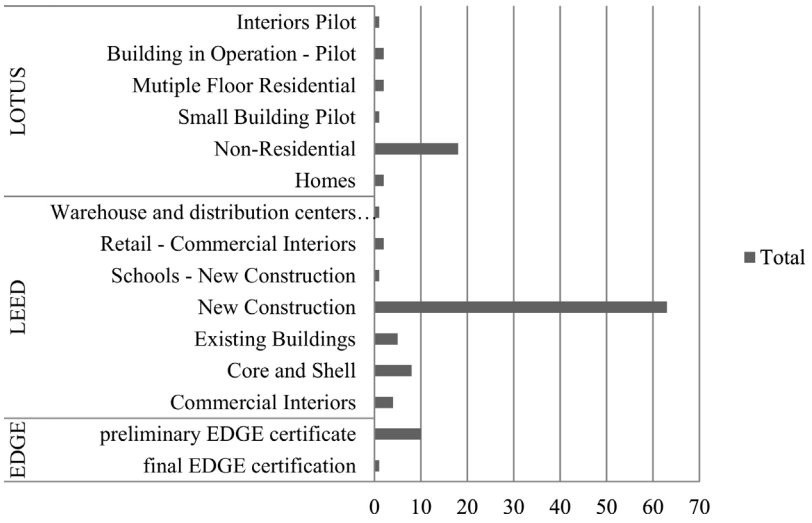

Fig. 1. Total number of GB projects categorised by rating tools.

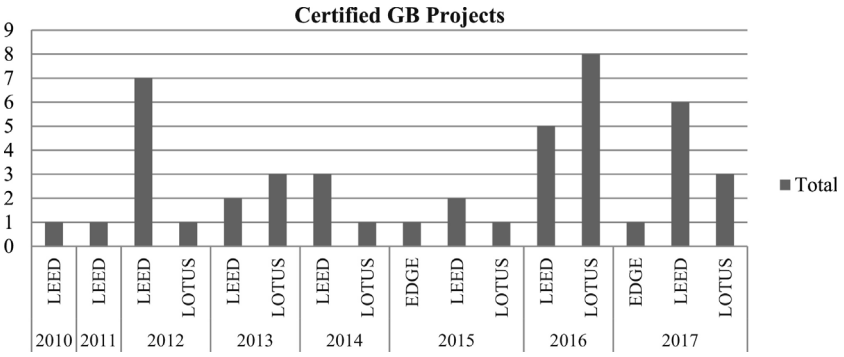

Fig. 2. Certified GB projects from 2010 to 2016 categorised by rating tools.

Finance Corporation (IFC)-World bank group shows the existence of 121 GB projects in Vietnam up to 2017, including 84 LEED, 27 LOTUS and 11 IFC EDGE green building certification system projects. Fig. 1 presents the total number of GB projects, mainly "design as-built". From 2010–2016, there have been only 46 certified projects with rating tools applied (Fig. 2). The statistic demonstrates a stronger trend towards international certification (LEED and EDGE); however, the localised tool (LOTUS) is currently attracting more attention. In comparing LEED and LOTUS, Solidiance & VGBC (August 2013) point out that the former is more recognised while the latter is more applied and costs less.

2. Literature review

The literature review comprises a review of the barriers to GB in different contexts and government interventions as part of measures to promote GB projects.

2.1. Barriers to GB projects in developed, developing markets and in Vietnam

The small number of GB projects each year and in total are reflected by point A in Appendix B, indicating the slow progress of GB adoption. This graph is also used by Hoffman and Henn (2008) to demonstrate GB adoption in the U.S. in 2008, when there were approximately 1000 LEED certified buildings, comparing to approximately 106,000 current listed LEED projects on the USGBC website. "Diffusion of innovation" theory (Meade and Islam, 2006) and "barrier to entry" theory can explain the slow progress in GB adoption. As GB the concept is still considered an innovation (Potbhare et al., 2009), it will take considerable time and effort to increase the number of initial and early adopters (Appendix C), while barriers to entry are factors that make it "impossible or unprofitable for a company to try to start selling its products in a particular market" (Evans, 2006).

The many barriers and challenges hindering GB adoption have been well documented by numerous studies in the green construction field. A review of related publications – including general GB, sustainable housing (SH), green office and energy efficient building (EEB) – identifies 41 key GB barriers in different markets, as summarised in Appendix D. The existing literature is also clustered into developed, developing markets and Vietnam to identify the similarities and differences between the challenges to adopting GB in different levels of market maturity and economic development.[1]

In terms of developed markets, Yang and Yang (2015) classify the barriers to sustainable housing in Australia into technical and design factors, economic factors, socio-cultural factors and institutional factors in reference to Spangenberg's (2002) sustainability prism. The study identifies economic factors as the most significant, followed by institutional factors. This confirms that the housing industry in Australia prioritises economic benefits over other softer values and that there is considerable concern over the inefficient policy-making mechanism involved. Similar barriers are recognised in the U.S. by Mulligan et al. (2014), who state that GB costs are the most frequently reported barrier and that the low awareness of incentive policies is resulting in industry players being less likely to adopt GB. GB projects in Singapore are highly likely to be associated with more risks, including those common to constructions projects and those closely related to green construction, such as the "Use of new construction methods and technology" and "Unclear requirements of clients" (Zhao et al., 2016). Yau (2012a,b), through studies in Hong Kong, stresses the information

[1] Developed markets include Australia, New Zealand, United States, Singapore and Hong Kong, while developing markets include India, South East Asia, Malaysia and China.