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Green features, symbolic values and rental premium: systematic review and meta-analysis

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Abstract

Typical determinants of office building rental prices include location, height, age, and other tangible features of a building – and this is no exception to green buildings. Although evidence shown that green office buildings command rental premium than comparable non-green office buildings, literature could not fully explain causes of the higher rental prices. In addressing this gap, the aim of this research is to identify possible rental price attributes of green office buildings. More specifically, this study attempts to (1) analyse collective influence of various rental price attributes of green buildings, (2) review methods applied to probe the rental price attributes. The study was conducted by systematic review and meta-analysis on related literature. The result shows that literature identified rental attributes of green buildings using regression analysis, and these attributes are mostly indifferent to those of non-green buildings. Limited attention was given to attributes that are specific to green buildings. More specifically, green office building' symbolic aspect was not considered when analysing its rental premium. The result will be utilised in subsequent stage of the research project to probe the significance of its impacts.

1. Introduction

Over the last decade, evidence has shown that there are changes in the societal and regulatory demands for the building and construction industry to contribute positively to the environments and communities by the means of 'green building' [1–4] and that the number of green buildings has increased steadily in most developed countries [5].

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For example, in Australia, there is a constant growth in the number of green buildings where the office building sector has outperformed other sectors such as residential, retail, and non-core (e.g. healthcare) sectors. To this end, the building sustainability assessment schemes (such as BREEAM (UK), LEED (US), Green Mark (Singapore) and Green Star (Australia)) help providing information on the environmental performance of buildings that typically cannot be measured by the real estate market participants [6]. It is thus not surprising that green office buildings have outperformed their non-green counterpart in terms of higher rents and sales prices, and higher occupancy rates. For instance, an early study in the US found that average rental prices for LEED certified Class A office buildings was $39 per ft2 whilst non-certified Class A offices commanded only $29 per ft2 [7]. Later, Fuerst also found that both LEED and Energy Star certified Class A office buildings consistently commanded higher prices than non-green office buildings for five years since 2005 [6].

While the above shows positive signs of green building, attributes for the green building's higher prices and their possibly different magnitudes are yet unclear. Similar to non-green office buildings, the market performance of green office buildings could be influenced by a number of different attributes such as location, building height and size, and lease term and structure. In other words, if rental price attributes for the green and non-green buildings are not much different while they do not fully explain the reasons for the higher prices, green buildings' lucrative price tag might be attributed by factors that are yet identified.

2. Research Aim and Methodology

The aim of this paper is to examine if and to what extent green buildings provide rental price premiums over comparable non-green buildings. Under this aim, specific objectives are to: (1) critically review analytical methods applied to probing those rental price attributes; and (2) analyse the collective influence of various rental price attributes of green buildings. Rental prices of green office buildings were used in this study as an indication of market performance – a procedure that has been commonly adopted by previous studies such as Kok and Jennen [8], Reichardt et al. [9], and Das et al. [10]. Through reviewing of literature, attempts had been made to identify the market performance between green and non-green office buildings in their respective markets. Thereafter, by using SPSS, meta-analysis was conducted to: (i) determine the degree and consistency of the green office buildings' market performance across different geographical locations, and (ii) measure the magnitudes of each identified rental price attribute. To this, qualified models and their attributes were extracted from the literature. Then, as it is suggested by Durlak [11], standardised effect sizes of current and past literature were compared using meta-correlation analysis. Cohen's benchmark was also used as it is powerful especially when the number of identified literature are relatively small [12]. Lastly, meta-regression analysis was performed to analyse the effect of each identified attribute [13]. To this, each attribute was coded as a binary variable for its presence (i.e. 1=yes, 0=no). As a part of meta-regression analysis, heterogeneity test was conducted to determine the degree of diversity between the studies and their models. This includes computation of I^2 based on Cochran's Q and degree of freedom (df). The obtained results were interpreted using several indicators such as beta coefficient (β) and p-value.

3. Critical review

3.1. Analytical method adopted

Table 1 summarises the list of studies that looked at the rental prices of green office buildings and its attributes. Overall, these post-2000s literature has consistently found that green buildings command rental price premium over the non-green counterpart. A considerable amount of research has typically used hedonic regression modelling techniques such as ordinary least squares (OLS) in their analyses. In fact, hedonic pricing models are widely utilised in the literature on real estate market performance (i.e. rental and sales prices) [14] – regardless if the study focus was green or non-green buildings – despite of its limitations such as subjective choice of covariates [15]. Quite often, several equations and models were developed to measure the degree of rental price premium of green buildings.