



Property tax assessment incentive for green building: Energy saving based-model



S.A.A. Shazmin, I. Sipan^{*}, M. Sapri, H.M. Ali, F. Raji

Centre for Real Estate Studies, Faculty of Geoinformation & Real Estate, Universiti Teknologi Malaysia, 81310, UTM, Skudai, Johor, Malaysia

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ABSTRACT

The practice of providing property tax assessment incentives within the green building sector has been empirically documented to encourage the growth of green buildings. However, no definite and uniform basis has been adopted in the development of these incentive models. Additionally, these incentives require local authorities to bear the implementation costs. Therefore, the aim of this paper is to develop property tax assessment incentive models through the evaluation of their effects on the tax revenue of local authorities and the amount of tax imposed on properties for the taxpayers. There are two incentive models developed in this paper, namely the property tax assessment exemption model and the reduction model. Cost-Benefits analysis between the amount of tax assessment increment and the annual energy savings conveyed by the green envelope components were conducted to determine the appropriate percentage of reduction. Through the exemption model, local authorities do not experience any increment on their existing tax revenue, and taxpayers do not have an increased amount of tax imposed on their properties. However, through the reduction model, local authorities do experience a tax increment of \$4 to \$9 on their existing tax revenue. As for the taxpayers, annual energy savings conveyed by the green envelope components compensate the amount of their tax increment.

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1. Introduction

The participation of governments has been regarded as an effective way of stimulating the development of green buildings [1,2]. Local authorities are non-profit agencies whose function is to provide services to the society, this includes control and regulation of town planning and the approval of planning, development and renovation of premises. Urban Land Institute [65] defines a green building as a practice of increasing the efficiency with which the building uses resources while at the same time reducing impact on human health and environment during its lifecycle. This is achieved through better siting, design, construction, operation, maintenance and removal respectively.

Green building developments are able to convey various benefits to the local authorities, these include a positive outlook, increased property tax revenue, reduced worker absenteeism, reduced pollution and natural disasters, creating new job

opportunities and cost savings in management, maintenance, operational, utility, and infrastructure costs [4–8].

There are two categories of incentives that are provided by the local authorities as initiatives to encourage green building developments, namely financial and structural incentive [5,9]. Financial incentives are related to monetary supports such as property tax assessments, grants and development fees. On the other hand, structural incentives provide technical supports such as marketing, technical assistance, expedited permit processing, and density bonuses. Property tax assessment financial incentives on green buildings such as exemption, reduction, and rebate are widely adopted by several countries around the globe including Spain, Romania, Italy, Bulgaria, United States, Canada, Malaysia, and India [10]. Moreover, the practice of providing property tax assessment incentives on green buildings has been empirically proven by several researchers to encourage the growth of green buildings at a local level [2,11,12,64].

However, it was comprehensively reported by Refs. [3,10] that there is no definite and uniform basis in the development of these incentive models and some require the local authorities to bear the implementation costs of the incentive programs [14]. Therefore, this exhibits that the incentive models were not prudently and

^{*} Corresponding author.

E-mail addresses: mimin_rena@yahoo.com.my (S.A.A. Shazmin), ibrahimsipan@utm.my (I. Sipan), maimunahsapri@utm.my (M. Sapri), hishamuddin@utm.my (H.M. Ali), fauziahraji.kl@utm.my (F. Raji).

scholastically developed, and only favours local authorities with strong financial capabilities. Hence, allocating for the incentive programs become a constraint for local authorities with tight financial capabilities. This paper aims to overcome the constraint by methodically developing property tax assessment incentive models based on their effects on the tax revenue of local authorities and the amount of tax imposed on properties. Thus, the paper scrutinizes green envelope components that increase the property value of green buildings. The establishment of the influence of individual green envelope components on the increase of property values is undeniably noteworthy as this finding highly contributes to the emerging knowledge of green building valuation. Likewise, the development of these incentive models highlights the significance of energy savings. This is performed through cost-benefit analysis on the green envelope components.

Above all, this paper is substantial in promoting all local authorities to participate in green building development through providing property tax assessment incentives despite their present financial capabilities.

2. Reviews of property tax assessment incentive models on green buildings

There are several Commonwealth countries around the globe which provide property tax assessment incentives for green buildings [10,15,16]. In Europe there are four countries, all members of the European Union (EU), who have been identified to have adopted several types of property tax incentives for green buildings. These countries include Spain, Romania, Italy and Bulgaria [11,12,14,17–20]. Meanwhile in North America, the two countries identified as those providing relevant property tax incentives included the United States [13,21,22] and Canada [23,24]. There are also two countries in Asia, particularly in South Asia, that have adopted property tax incentives in order to promote the development of green buildings. They are Malaysia and India [25–27].

Previous works in the field show that there are three types of property tax assessment incentive models that are being provided on green buildings. These property tax assessment incentive models are reduction, exemption, and rebate. There are four bases adopted to develop property tax assessment incentive models on green buildings, namely 1) increased amount of property tax assessment of green buildings, 2) cost of green components, 3) rate imposed on property tax assessment, and 4) level of green certification [10]. It was found that there are five countries that provide the reduction property tax assessment incentive model; these are Romania, Spain, Italy, Canada and United States. Meanwhile, there are 2 countries that provide the exemption property tax assessment incentive models, namely Bulgaria and United States. Further, India, Malaysia and United States provide the rebate property tax assessment incentive model for green buildings. It is clear that United States is the only country that provides all three types of property tax assessment incentive models on green buildings.

It was established that there are three bases adopted for the development of the exemption and rebate models; these are: exemption or rebate on the increased amount of property tax assessment of the green buildings, exemption or rebate on the cost of green components, and exemption or rebate based on the level of green certification achieved. On the other hand, there are four bases adopted for the reduction models; these are: reduction on the increased amount of property tax assessment of the green buildings, reduction on the cost of green components, reduction on the rate imposed on property tax assessment, and reduction based on the level of green certification. Table 1 below summarizes the incentive models and bases adopted according to countries.

3. Methodology

This paper has outlined two objectives. The first objective is to analyse green envelope components that increase property values. A questionnaire was purposefully designed to establish the effect of green envelope components on property values. The questionnaire encompasses basic questions on the respondent's experiences in valuing green buildings and the effects of green envelope components on property values. The aim of the questionnaire is to ensure the respondent has knowledge and exposure in valuing green buildings. This is significant as the green building market in Malaysia is at infancy and green building valuation is uncommon compared to other well developed countries. The differences between green buildings and conventional buildings are still vague amongst property valuation practitioners in Malaysia. Hence, the questionnaire is decisive to ascertain the credibility of the respondents and achieve valid findings.

The questionnaire required the respondents to provide their professional opinions based on their experiences and knowledge on the effect of the listed green envelope components on property values. The range of answers on the effect of green envelope components on property values were provided in three categories, these are increase property values, decrease property values and no effect on property values. The developed questionnaire was distributed amongst government and private property valuation practitioners in Peninsular Malaysia Sabah and Sarawak.

3.1. Data collection and sampling

This study focuses on property valuation practitioners in Malaysia with green building valuation experiences. This group was purposely selected due to their experiences, knowledge and exposure to the valuation of green buildings. This is significant to ensure the credibility of the respondents who answered the questionnaire in order to achieve valid findings. However, at present, these types of data are unavailable in Malaysia. Therefore, questionnaire surveys were distributed amongst government and private property valuation practitioners in Malaysia. Around 550 sets of questionnaires were distributed amongst government and private property valuation practitioners all over Malaysia. However, the number of questionnaires returned was only 474. The returned questionnaires were screened and filtered. It was subsequently found that only 441 of questionnaires had been duly completed. Out of the 441, only 103 questionnaires were returned by respondents having green building valuation experience. Hence, data from the 103 questionnaires were included in this analysis. Based on Taro Yamane formula [28], the sample size (more than the required minimum of 96) is adequate. The sample size is supported and consistent with published tables by Dillman [29]; and Salant and Dillman [30]. Furthermore, several published studies that utilized a similar questionnaire survey to acquire a perception of green buildings from experts or experienced green building players were found to have adopted a smaller sample size ranging between 40 and 95 respondents. Mohsen and Jin [31] analysed 40 respondents who were contractors with experience in green building development projects. Meanwhile, Davies and Osmani [32] analysed 45 architects with green building experience in their studies. In the United States, Han and Srebric [33] examined 96 respondents consisting of practising green building designers in their survey. These studies second the view that the sample size analysed in this study was both adequate and relevant.

3.2. Incentive models development

The second objective is to develop property tax assessment

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