

# AN INVESTIGATION INTO TENANT ORGANIZATIONS' WILLINGNESS-TO-PAY FOR THE INTANGIBLE VALUE-ADDED BENEFITS OF SUSTAINABLE BUILDINGS: CASE STUDY IN SINGAPORE

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## ABSTRACT

This research aims to understand the demand for sustainable buildings by investigating the tenant organizations' willingness-to-pay (WTP) behavior towards the value-added benefits (VABs). Tenant organizations refer to tenants operating in office buildings on tenancy agreement. Six groups of factors of tenant organizations' WTP for the VABs are identified: (1) Organization Characteristics, (2) Current Premises, (3) Building Characteristics, (4) Satisfaction of the VABs Experienced, (5) Perception, and (6) Knowledge of Sustainability Issues, Building Sustainability Rating Systems and Building Impacts. A survey was conducted on the tenant organizations operating in office buildings located in the city area of Singapore. The hypothesized relationship between the tenant organizations' WTP for the VABs and its factors were tested using a series of statistical techniques on the data collected from the survey. It is found that older tenant organizations tend to have lower WTP for the VABs of improved health and comfort of their employees. Generally, tenant organizations also have demand for sustainable buildings mainly due to the positive organizational image that sustainable buildings help to project. In addition, it is found that the current building sustainability rating systems are inadequate for communicating the sustainability benefits to building occupants and for achieving building sustainability. Lastly, the investigation reveals that the use of sustainable technologies is not as important as how the building is being managed during its operational stage for ensuring building sustainability performance. The findings from this study are useful for channeling the sustainability efforts of the building industry to more effective areas.

## KEYWORDS

Sustainable Buildings; Intangible Value-added Benefits; Willingness-to-pay; Tenant Organizations; Office Buildings; Indoor Environment Quality

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## 1. INTRODUCTION

Sustainable buildings bring about two main economic gains to building stakeholders as they aim to reduce the negative impacts on the environment and occupants (ASTM 2005, Green Building Council of Australia 2008, Organization for Economic Co-operation and Development 1989). The first type of economic gain is the reduction in costs as sustainable buildings aim to minimize the consumption of resources such as water, energy, and material in order to reduce the negative impacts on the environment (ASTM 2005, The Guidelines for Sustainable Buildings 2002, Raman 2005). Past studies have demonstrated such economic gains from sustainable buildings, particular in energy cost savings. For example, in (Kats 2003), a review of 60 LEED (Leadership in Energy and Environmental Design) certified buildings showed that they save an average of 20-30% energy compared with a non-LEED building. A similar magnitude of energy savings was also observed in a later study by (Turner and Frankel 2008), which involved 121 LEED certified buildings. It found that the energy use intensity of these LEED buildings is 24% less than the national average of all the commercial stock reported in the Commercial Building Energy Consumption Survey. According to (Kats 2003), a 30% reduced energy consumption would translate into an economic savings of US\$0.30/ft<sup>2</sup>/year at an electricity price of US\$0.08/kWh. Over a period of 20 years, this means a present value savings of US\$5.80/ft<sup>2</sup> at a 5% real discount rate.

The other type of possible economic gain is the added value to the businesses of building stakeholders brought about by sustainable buildings in attempting to maximize the health, safety and quality of life of the building occupants (ASTM 2005, The Guidelines for Sustainable Buildings 2002, Raman 2005). It is anticipated that the indoor environment quality of sustainable buildings would be enhanced by the use of environment-friendly materials, efficient HVAC system, natural ventilation, and admittance of daylight. The air, acoustic, light and thermal quality is expected to be improved, enhancing the comfort and health of building occupants and increasing their productivity (Green Building Council of Australia 2008, Carter 2008). A better quality indoor environment also helps tenant organizations in their business operations by attracting and retaining employees because people are more aware of the importance of a good working environment and increasingly demand a more comfortable and healthy environment (Carter 2008, Melbourne Business School 2006, Zimmerman 2008). In addition, pursuing and operating in sustainable buildings gives a positive impression of a socially responsible organization. In a survey carried out by McGraw-Hill Construction & Siemens Building Technologies Inc. (McGraw-Hill Construction and Siemens Building Technologies Inc 2007), the surveyed American corporations indicated that they saw their organizational image being enhanced by operating in sustainable buildings.

### 1.1 Problem Identification

Between the two types of benefits of sustainable buildings, most studies have focused on the cost reduction benefits as it is more tangible and easily quantifiable. However, it is widely believed that the economic impacts of value-added benefits are more substantial than that of cost reduction benefits (Kats 2003, Bartlett and Howard 2000, Lucuik et al. 2005, Madew 2006). Yet, value-added benefits are often overlooked due to its intangibility which makes it difficult to be quantified. The intangible nature of value-added benefits of sustainable buildings may best be demonstrated by comparing it with cost reduction benefits (See Table 1)

The intangibility of value-added benefits can be seen from its economic impacts which are less apparent and immediate than cost reduction benefits. Cost reduction benefits such as

**Table 1:** Comparison between Cost Reduction Benefits and Value-Added Benefits.

	<b>Cost Reduction Benefits</b>	<b>Value-Added Benefits</b>
<b>Examples</b>	<ul style="list-style-type: none"> <li>• Energy savings</li> <li>• Water savings</li> </ul>	<ul style="list-style-type: none"> <li>• Improved productivity of building occupants</li> <li>• Improved health of building occupants</li> </ul>
		<ul style="list-style-type: none"> <li>• Enhanced comfort of building occupants</li> </ul>
<b>Economic Impact</b>	<ul style="list-style-type: none"> <li>• Reduction in costs incurred</li> </ul>	<ul style="list-style-type: none"> <li>• Adding value to business operations and management</li> </ul>
<b>Type of Data Required</b>	<ul style="list-style-type: none"> <li>• Hard, i.e. measurable and documentable</li> </ul>	<ul style="list-style-type: none"> <li>• Soft, i.e. not easily measurable and documentable</li> </ul>
<b>Data Availability</b>	<ul style="list-style-type: none"> <li>• Available from periodic billing, measurement and documentation</li> </ul>	<ul style="list-style-type: none"> <li>• Required data not easily defined and available</li> </ul>
<b>Predictability</b>	<ul style="list-style-type: none"> <li>• Fairly predictable</li> </ul>	<ul style="list-style-type: none"> <li>• Relatively uncertain</li> <li>• Harder to predict with accuracy</li> <li>• Assumptions must be made to their qualification</li> </ul>

energy and water savings reduce the operating costs directly. For value-added savings such as improved productivity of building occupants, it may not be immediately and directly obvious in the revenue streams. This has also made the documentation of value-added benefits difficult as the required data is not easily definable and available. The data required to measure cost reduction benefits is often easily documentable from periodic billing and measurements (Heerwagen 2000, Kibert 2005, Yates 2001). Cost reduction benefits are usually fairly predictable with the availability of hard data, whereas value-added benefits are more uncertain and difficult to predict with accuracy since it involves mainly soft data with many assumptions (Kats 2003, Kibert 2005). The methods of measuring value-added benefits is thus more complex and less readily accepted as compared with the methods used to measure cost reduction benefits (Heerwagen 2005).

Because of its intangibility, the market acceptance of value-added benefits is limited (Green Building Council of Australia 2008). However, to promote sustainable buildings, it is important to demonstrate its full benefits in terms of economic gains for the building stakeholders.

## 1.2 Objective

Instead of attempting to quantify the intangible value-added benefits, this research aims to understand the demand for sustainable buildings by investigating how the demand stakeholders attach to the economic values that these value-added benefits provide, even though they are intangible.

An investigation into the willingness to pay (WTP) of the demand stakeholders for the value-added benefits is thus proposed. Understanding the WTP behavior is an important element of establishing a business case for sustainable buildings (Melbourne Business School 2006). WTP is the amount of resources that an individual is willing to give up in exchange for a good or service. The WTP of the demand stakeholders for the value-added benefits reflect their economic valuation of the benefits. How they value the benefits would in turn reflect their preference and the sustainability performance of the buildings. When they prefer more

of the benefits, it is likely to show up in a higher WTP for them in terms of willingness to pay more. In addition, their WTP for the value-added benefits is likely to be high when the sustainability performance of the building is good. Therefore, by understanding the demand stakeholders' WTP behavior toward the intangible value-added benefits, the demand for sustainable buildings may be stimulated in two ways. Firstly, appropriate strategies and tools can be developed to promote sustainable buildings more effectively based on the preferences of the demand stakeholders. Secondly, new insights into how the sustainability performance of the buildings may be enhanced can be gained.

Therefore, this research aims to investigate the demand stakeholders' WTP for the intangible value-added benefits. More specifically, it shall focus on the tenant organizations of office buildings. Tenant organizations refer to the organizations operating in office buildings on tenancy agreement. The reason for focusing on tenant organizations is that office buildings have usually been the first type of buildings that is covered by the development of the various building sustainability rating systems such as the US' LEED and Australia's Green Star. Secondly, tenant organizations make a greater impact on the demand for sustainable buildings than the individual building occupants who work in the building since they are the ones paying for the rental fees. They are also the one who pay the most for the use of a building over its whole life (Bartlett and Howard 2000).

It is envisaged that sustainable buildings bring about five main value-added benefits (VABs) to tenant organizations. They are as follows:

- Improved Productivity
- The overall productivity of the tenant organizations may be improved due to a better indoor environment (Green Building Council of Australia 2008, Carter 2008). Improvements in productivity of staff may be shown in the form of a decrease in absenteeism rates; improved interactive behavior; and communication of the staff, which results in better information flow and collaborative work; improved product quality and timeliness of output; and increased innovation (Heerwagen 2006, Heerwagen and Zagreus 2005).
- Enhanced Organizational Image
- Positive environmental impacts such as conservation of natural resources and reduced greenhouse gas emissions help to improve the organizational image of the building stakeholders who are committed towards building sustainability. They may be seen as more socially responsible (McGraw-Hill Construction and Siemens Building Technologies Inc. 2007). The improved organizational image may in turn bring about new or more business opportunities for the organizations.
- Improved Ability to Attract and Retain Staff
- Tenant organizations that pursue building sustainability may be seen as a caring employer that is concerned with the welfare of the staff and hence improving the ability to attract and retain staff. Turnover rates of staff may be reduced and the ease of attracting staff may be enhanced (Carter 2008, Melbourne Business School 2006, Zimmerman 2008).
- Improved Physical and Psychological Health of Staff
- Enhanced indoor environment quality brings about improvements in both the physical and psychological health of staff. 'Sick building' related illness may be reduced and staff may respond more positively to a better workplace (Heerwagen and Zagreus 2005).
- Improved Comfort of Staff

- Improved indoor environment also brings about improvements in the comfort of the staff. A staff's comfort level is primarily affected by the thermal comfort, air quality, daylighting and acoustic conditions of their working environment (Abbaszadeh et al. 2006, Fisk 2000, Paul and Taylor 2008).

### **1.3 Research Methodology**

A conceptual model for capturing and analyzing the tenants' WTP for the VABs is firstly developed. Possible factors affecting the tenant organizations' WTP for the value-added benefits are identified from literature and their relationships with the tenant organizations' WTP hypothesized.

A survey questionnaire is next developed to obtain estimates for the tenant organizations' WTP and its factors. The survey is carried out on the tenant organizations operating in the office buildings located in the Central Business District of Singapore.

From the survey results, the relationships between the tenant organizations' WTP for the value-added benefits and its factors are analyzed using statistical techniques. Firstly, the hypothesized relationships are tested individually using Pearson *r* correlation, ANOVA and *t*-test. Next, the collective impacts of the factors on the tenant organizations' WTP for the value-added benefits are analyzed through regression analysis.

Lastly, the results are analyzed and the findings are discussed.

## **2. DEVELOPMENT OF CONCEPTUAL MODEL**

According to (Fellows and Liu 2008), a model "shows how the variables of a theory are hypothesized to interact in a particular situation". It posits relationships between variables and allows for generalizations (Burns 2008). Developing a conceptual model for capturing the tenant organizations' WTP for the value-added benefits would thus entail identifying the pertinent variables of their WTP and making hypotheses about their relationships.

### **2.1 Past Related Works**

There are not many works on the application of the WTP concept in the study of sustainable buildings. This may be due to the relatively new concept of sustainable buildings. Nonetheless, there are some works which have attempted to understand the economic aspects of sustainable buildings through eliciting building stakeholders' WTP.

For example, (Leung et al. 2005) examines the designers' and developers' WTP for improved environmental performance of the building envelope of office buildings in Hong Kong. It is found that the designers and developers are WTP for improvements in the thermal performance of building envelopes provided that there is already access to external views through the building envelopes. In contrast, the amount of WTP for improved acoustic and daylighting performance is negligible. Also, in (Banfi et al. 2008), the WTP of home owners and tenants for energy-saving measures in residential buildings are elicited. The results reveal that in addition to the benefit of energy savings, other benefits such as thermal comfort, air quality and noise protection are significantly valued by home owners and tenants. The value of green energy is another common application of the WTP concept relating to sustainable buildings. The elicitation of WTP estimates in these green energy studies can be broadly grouped into two kinds. Most of them aim to obtain an estimate of consumers' WTP for green energy (Hite et al. 2008, Nomura and Akai 2004, Roe et al. 2001, Yoo and Kwak

**Table 2:** Various Exogenous and Endogenous Factors of WTP Identified in Past Related Studies.

Sources	Goods to valued	Technique used	Exogenous Factors	Endogenous Factors	Method of Analysis
(Banfi 2008)	Energy saving measures in residential buildings	Choice experiment	<ul style="list-style-type: none"> <li>• Attributes of window, façade &amp; ventilation system</li> <li>• Monthly rent or purchase price</li> </ul>		Regression analysis
(Leung et al. 2005)	Environmental performance of building envelope	Averting expenditure (RP)	<ul style="list-style-type: none"> <li>• Thermal, daylighting, acoustic performance</li> <li>• Sensation of outdoor connection</li> </ul>		Regression analysis
(Begum et al. 2007)	Improved construction waste management	Open-ended CV	<ul style="list-style-type: none"> <li>• Company Type</li> <li>• Experience</li> <li>• Contractor Category</li> <li>• Paid-up capital</li> <li>• Frequency rate of waste collection</li> <li>• Purchase of repairable, refillable and durable materials</li> </ul>	<ul style="list-style-type: none"> <li>• WTP or not</li> <li>• Satisfaction level of existing waste collection and disposal service</li> </ul>	Regression analysis
(Nomura and Akai 2004)	Green electricity	Bidding game	<ul style="list-style-type: none"> <li>• Socio-demographic variables*</li> <li>• Monthly electricity bills</li> </ul>	<ul style="list-style-type: none"> <li>• Possession of equipment related to energy use</li> <li>• Opinions about the Kyoto Protocol</li> </ul>	Median values & probability
(Borchers et al. 2007)	Green electricity	Choice experiment	<ul style="list-style-type: none"> <li>• Socio-demographic variables*</li> <li>• Monthly electricity bill</li> <li>• Green energy sources</li> </ul>	<ul style="list-style-type: none"> <li>• Concern about the environment impacts of electricity generation</li> </ul>	Nested Logic Model
(Hite et al. 2008)	Biopower	Open-ended CV	<ul style="list-style-type: none"> <li>• Socio-demographic variables*</li> <li>• Current electricity provider</li> </ul>	<ul style="list-style-type: none"> <li>• Attitudes on energy-related issues</li> </ul>	Regression analysis
(Zarnkau 2003)	Renewable energy	Open-ended	<ul style="list-style-type: none"> <li>• Socio-demographic variables*</li> <li>• Home owner or renter</li> <li>• Primary handler of electric bills</li> </ul>		Regression analysis
(Roe et al. 2001)	Green electricity	Discrete choice	<ul style="list-style-type: none"> <li>• Socio-demographic variables*</li> <li>• Electricity service: monthly price, contract terms, fuel source mix, air emissions profile</li> <li>• Primary handler of household bills</li> </ul>	<ul style="list-style-type: none"> <li>• Membership/donation to environmental organizations,</li> </ul>	Median values and probability
(Yoo and Kwak 2009)	Green electricity	Dichotomous Choice	<ul style="list-style-type: none"> <li>• Socio-demographic variables *</li> <li>• Household information: monthly recreational and environmental expenditure</li> </ul>	<ul style="list-style-type: none"> <li>• Membership of environmental organizations</li> <li>• Whether respondents know about renewable energy</li> <li>• Whether respondents know about government's scheme of green electricity</li> </ul>	Probability
(Yau 2012)	Green housing attributes	Open-ended CV	<ul style="list-style-type: none"> <li>• Socio-demographic variables*</li> <li>• Utility bills</li> <li>• Economic incentives</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental attitude</li> </ul>	Reg analysis

\*Socio-demographic variables: income, age, number of people in household, race, education level, gender, occupation

2009, Zarnikau 2003). Others went a step further to find out how the source of green energy (Borchers et al. 2007) or how the way green energy is being provided to the customers affects their WTP (Wiser 2007).

Table 2 summarizes the studies that elicit the WTP for goods and services relating to sustainable buildings. The majority of the studies adopt the Contingent Valuation (CV) technique to elicit the WTP amounts. A number of explanatory variables are included in the studies to help explain the responses. These variables can be broadly grouped into exogenous and endogenous factors.

Exogenous factors are external factors that respondents do not have a choice to make (Bateman 2002). It explains the WTP of the respondents but is not being explained by it. Some examples as shown in Table 2 include socio-demographic factors such as the age, income and education level of the respondents. Endogenous factors are internal factors where values are revealed through choices made by the respondents (Bateman 2002). They help to explain the WTP amounts and the WTP amounts also reveal something about them. Examples include the respondents' attitude towards green issues, satisfaction level regarding the existing conditions and knowledge about sustainability issues.

## 2.2 Exogenous and Endogenous Factors of Tenant Organizations' WTP

By examining the exogenous factors in previous studies summarized in Table 2, it can be seen that the factors may be further categorized into three groups. The first is about the characteristics of the respondents. These are usually the socio-demographic variables such as the age, income, educational level and gender. The second group of exogenous factors concerns the existing conditions of the good. For example, in eliciting the WTP for green electricity, information regarding the existing costs, contract terms and provider of electricity are also considered as explanatory factors in studies such as (Hite et al. 2008, Nomura and Akai 2004, Roe et al. 2001, Zarnikau 2003, Borchers et al. 2007). The last group relates to the characteristics of the good being valued. For example, the source of the green electricity was taken into consideration when eliciting the WTP for green electricity (Borchers et al. 2007). Following from these observations, the exogenous factors of the tenant organizations' WTP for the VABs are identified as:

- Characteristics of tenant organization  
An organization may be characterized by its *business type* (i.e. type of commercial activities that the organization is involved in, e.g. construction, education, finance); *company type* (i.e. whether the ownership of the organization is private or public); *whether it is a Multi-National Corporation*; *Age*; *Staff size*; *Amount of time the staff spend in office*
- Conditions of existing premises occupied  
The conditions of the current premises include the *leasing arrangements* (i.e. rental fee, rental rates, lease type, length of current lease & length of lease remaining); *storey occupied*; *floor area occupied*; *length of time operated in the current premises*
- Characteristics of building  
The building may be characterized by its *size* (i.e. gross floor area); *age*; *location*; *building sustainability rating level*; *how it is being managed during the operational stage*; *its sustainability features* (i.e. sunshading devices at the façade, design for natural ventilation, use of water efficient fittings, roof gardens, provision of building user guide and adjustable air-conditioning systems)



As for the endogenous factors, three groups of factors are identified as seen in Table 2. The first group, which affects the respondents' WTP, is the satisfaction of the existing good or service. The satisfaction level in turn reflects the respondents' preferences. The other endogenous factors are related to the perception and knowledge of environmental issues and policies. The aim of these factors is to draw out the attitudes of the respondents regarding environmental issues. As explained by (Luzar and Cosse 1998), attitudinal variables are significant explanatory factors that improve the estimation of WTP in CV studies. It is believed that the attitude of an individual is likely to lead to how he/she will act and his/her attitude is related to his/her values and beliefs. Therefore, three groups of endogenous factors of the tenant organizations' WTP are identified. They are the tenant organizations':

- Satisfaction of the value-added benefits experienced

As mentioned, the preference of an individual for a good or service will show up as his/her WTP for it. His/her preference for the good or service is affected by the satisfaction he derived from consuming it. Therefore, the tenant organizations' WTP for the VABs is closely linked to their satisfaction of the VABs

- Perception of sustainable buildings, building sustainability rating systems and building impacts

How the tenant organizations perceive the sustainable buildings may be known from how much they believe that sustainable buildings bring about a range of benefits; if they believe, for instance, it is likely to lead to a positive perception of sustainable buildings and a higher WTP. The tenant organizations' WTP for the VABs may also be affected by their perception of the building sustainability rating systems. If they perceive the rating systems as effective towards enhancing the building sustainability performance, it is likely to raise their WTP for the VABs. Lastly, the tenant organizations' WTP is also affected by how they perceive the impact that buildings have on their business operations. If they perceive buildings to be just shelters for their businesses and do not contribute actively towards their organizations, it is likely to decrease their WTP for the VABs.

- Knowledge of sustainability issues, building sustainability rating systems and building impacts

It is expected that the more knowledgeable the tenant organizations are about the sustainability issues, building sustainability rating systems and the impacts of building, they are more likely to appreciate the VABs and raise their WTP for the VABs.

### **2.3 Hypothesized Relationships**

The relationship between the above six groups of exogenous and endogenous factors and the tenant organizations' WTP for the VABs may be hypothesized in two ways. They may be positively or negatively correlated. For example, the tenant organizations' WTP for the VABs is higher when their satisfaction about them is higher. Their relationship is hypothesized to have a positive correlation. Another way of describing the hypothesized relationship between the tenant organizations' WTP for the VABs and its factors is that there is a difference in the mean WTP of the tenant organizations which are grouped according to the values of the factor. For example, the tenant organizations' mean WTP of different business type is hypothesized to be different. Table 3 lists the factors of the tenant organizations' WTP for the VABs and their hypothesized relationships.



**Table 3:** Factors of Tenant Organizations' WTP for the VABs and the Expected Relationship between Them.

Identified Variables		Expected Relationship with WTP
Exogenous Factors	<b>Organization Characteristics</b>	
	Business Type (OC_Business)	Group Difference
	Company Type (OC_Company)	Group Difference
	MNC or Non-MNC (OC_MNC)	Group Difference
	Organization Age (OC_Age)	+ / -
	Staff Size (OC_StaffSize)	+
	Amount of Time Staff Spend in Office (OC_StaffTime)	+ / -
	<b>Current Premises</b>	
	Number of Years operated at the current premises (CP_YrsOp)	+ / -
	Floor Area Occupied (CP_FloorArea)	+ / -
	Storey Occupied (CP_Storey)	+
	Length of Current Lease (CP_CurrentLease)	+
	Monthly Rental Fee (CP_RentFee)	-
	Rental Rates (CP_RentRate)	-
	Lease Type (CP_LeaseType)	Group Difference
	<b>Building Characteristics</b>	
	Gross Floor Area (BC_GFA)	+
	Building Age (BC_Age)	-
	Location (BC_Loc)	Group Difference
	Building Sustainability Rating Obtained (BC_RatingSys)	+
	Managed by Building Owner (BC_OwnMge)	Group Difference
	Sunshading Devices at Façade (BC_Sunshade)	Group Difference
	Designed for Natural Ventilation (BC_NatVent)	Group Difference
	Use of Water Efficient Products (BC_WaterPdt)	Group Difference
	Roof Gardens (BC_RoofGar)	Group Difference
	Provision of User Guide (BC_UserGuide)	Group Difference
	Provision of Air Con Adjustments (BC_AirConAdj)	Group Difference
Endogenous Factors	<b>Satisfaction</b>	
	Satisfaction of overall productivity (S_Productivity)	+
	Satisfaction of organizational image (S_Image)	+
	Satisfaction of ability to attract and retain staff (S_Staff)	+
	Satisfaction of health of staff (S_Health)	+
	Satisfaction of comfort of staff (S_Comfort)	+
	<b>Perception</b>	
	Perception of benefits produced by sustainable buildings (P_SusBldg)	+
	Perception of effectiveness of building sustainability rating systems (P_SusRating)	+
	Perception of building impacts (P_BldgImpact)	+
	<b>Knowledge</b>	
	Knowledge of sustainable issues (K_Sus)	+
	Knowledge of building sustainability rating systems (K_SusRating)	+
	Knowledge of building impacts (K_BldgImpact)	+

### 3. DATA COLLECTION

#### 3.1 Design of Questionnaires

Information related to the exogenous factors of the tenant organizations' WTP for the VABs are generally obtained with a mixture of open and close-ended questions. For example, open-ended questions are asked on the floor area occupied and the current rental fee. Close-ended questions with options given are asked on the business type and lease type. As for endogenous factors, the satisfaction, perception and knowledge of the tenant organizations are obtained by asking them to rate on a five-point rating scale of satisfaction, importance or agreement, with 1 indicating the least magnitude and 5 the largest. The question central to the questionnaire is the WTP elicitation question. A hypothetical scenario that the current rental fee of the tenant organizations has not taken into consideration of the VABs experienced by them is presented to the tenant organizations, and they are asked "How much more are you willing to pay on top of your current monthly rental fee in order to continue enjoying the same benefits at the same level of satisfaction?"

#### 3.2 Implementation of Survey

A survey was conducted on 32 office buildings located in the city area of Singapore. They are not owner-occupied and are in the operational stage. Questionnaires were sent via mail to 10 tenant organizations operating in each building. This was achieved either by seeking the help of the building managers or by selecting any 10 organizations from the tenant directory at the building. Since the respondent unit of the survey is a group of people, the most suitable person to represent the group should be knowledgeable about the issues in the questionnaire and can provide accurate information (Czaja and Blair 2005). For this study, it is the property manager or office manager who understands the operations and space requirements of the company.

Mail survey was used for the following reasons. Firstly, mail surveys can overcome the time-consuming problem that is often present in face-to-face and telephone surveys. It can be sent out to the 320 tenant organizations at the same time. Secondly, a formal questionnaire in a hardcopy form is also less likely to be overlooked or ignored compared to an email. This ensures a higher possibility that the questionnaire would reach the appropriate personnel in all the 320 tenant organizations. In addition, mail survey has the advantage of a lower cost than a telephone or face-to-face survey. According to (Czaja and Blair 2005), mail survey also gives greater response accuracy as "respondents may consult household or personal records". This is very apt for the survey questionnaire of this study. In this study, the questions vary from about the organizations in terms of staff size to about the current premises in terms of floor area occupied. Hence, the property or office manager may require assistance from other departments. However, mail survey may receive low response rate (Czaja and Blair 2005). In this study, this problem was being minimized by follow-up calls after the questionnaires were sent and by reminders after the first due-date. Furthermore, the survey was carried out as a collaboration project with the Building and Construction Authority of Singapore, which is a government agency, to boost the response rate.

#### 3.3 Survey Responses

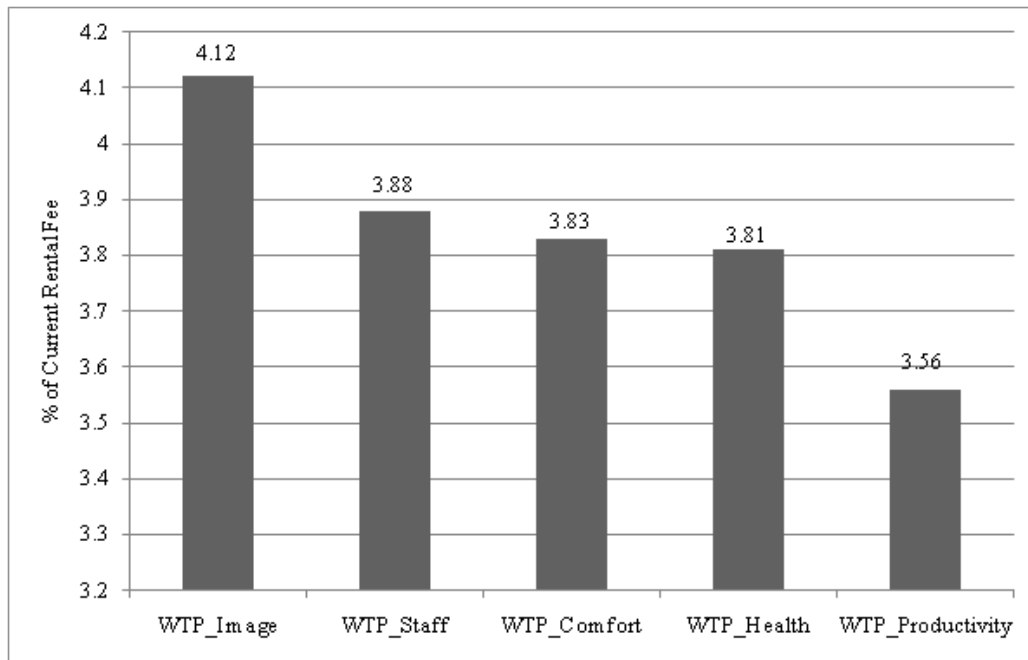
In total, 34 completed questionnaires were received. Hence, the response rate of this questionnaire survey is about 10.6%. The reason for the rather low response rate is that a considerable amount of effort is needed to understand and answer the questions. In addition, some

quantitative data such as the floor area occupied may require the respondents to refer to their documents and records and hence, adding some inconvenience to the respondents. Nevertheless, a sample size of 30 is usually sufficient to carry out statistical analysis. Furthermore, the office buildings in CBD are representative of the building trends in the country. The CBD is the heart of the country and most of the offices buildings are located here. The tenant organizations of office buildings in CBD are also likely to be similar in terms of activities and wealth. Therefore, their WTPs for the VABs experienced are less likely to be influenced by the differences in activities and the income factor. The 34 responses received are deemed to be adequate for understanding the tenant organizations' WTP for the VABs.

The majority of these 34 tenant organizations are private multi-national companies in the finance industry. A typical respondent is one that has been established between one to five years with a staff size of more than 50 employees. In addition, almost two-thirds of the respondents operate in Green Mark awarded buildings.

The average WTP of the respondents for the VABs is 19.21% of their current monthly rent. Figure 1 illustrates the average WTP of the 34 respondents for each of the five intangible benefits. The survey results show that among the five benefits examined, the respondents are most WTP for the benefit of an enhanced image, which is 4.12% of their current rental fee and their lowest WTP is for the benefit of improved productivity which is 3.56% of their current rental fee on average.

**Figure 1:** Average Tenant Organizations' WTP for the VABs.

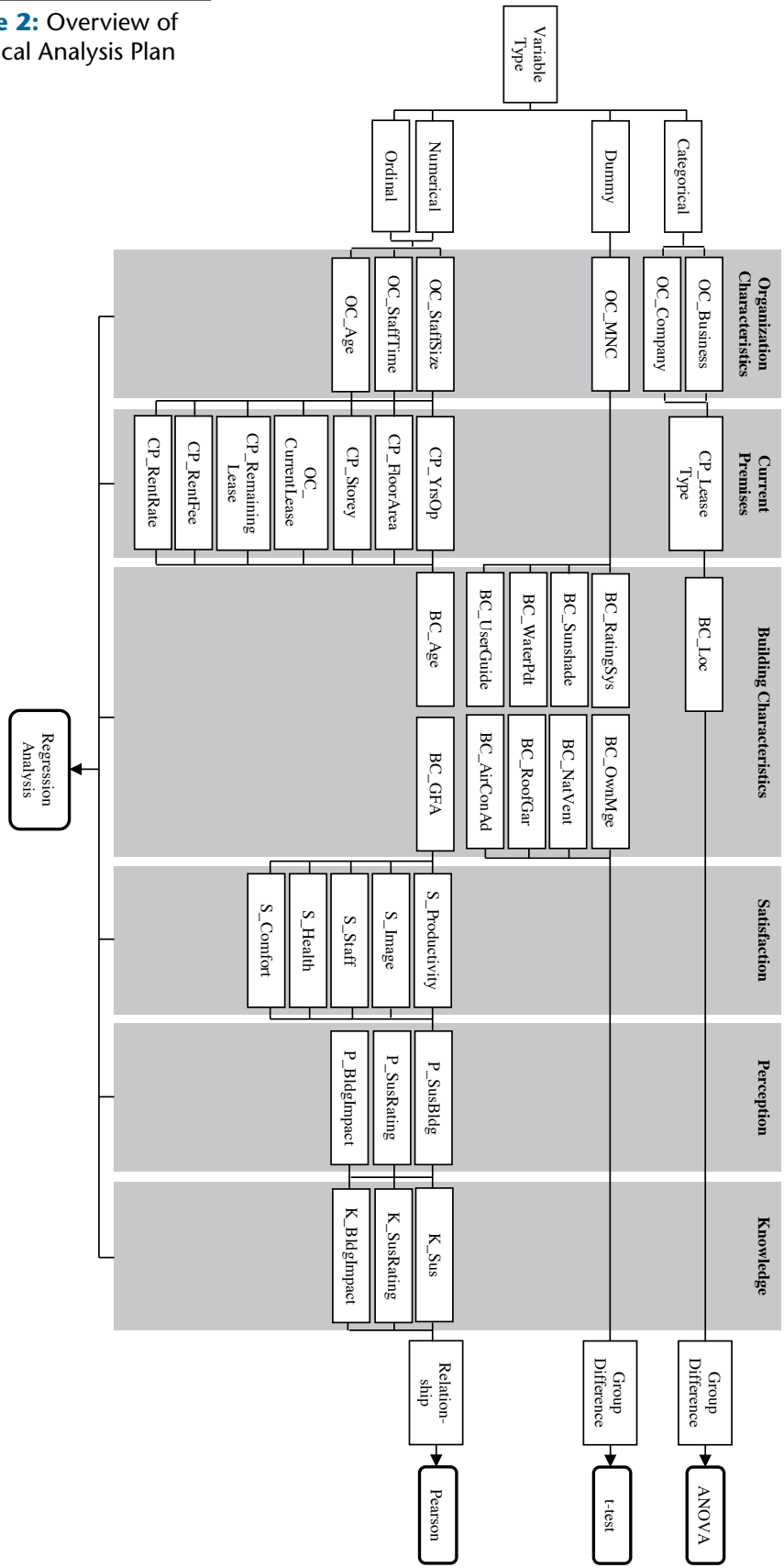


#### 4. STATISTICAL ANALYSIS

Three statistical techniques are employed to test the hypothesized relationships between the tenant organizations' WTP for the VABs and its factors. They are the independent samples t-test, one-way analysis of variance test (ANOVA) and Pearson r correlation test.

Figure 2 shows the overview of the statistical techniques employed to test the hypothesized relationships between the factors and the tenant organizations' WTP for the VABs. The results are reported as follows.

**Figure 2:** Overview of Statistical Analysis Plan



#### 4.1 Significant Exogenous Factors of Tenant Organizations' WTP for VABs

In the group of organization characteristics factors, only OC\_Age is found to be negatively correlated to WTP\_Total at a significant level of 0.05 ( $r = -0.346$ ,  $p = 0.045$ ). Further examining the tenant organizations' WTP for each VAB with OC\_Age found that a negative correlation actually exists between OC\_Age and the tenant organizations' WTP for two of the VABs, i.e. WTP\_Health ( $r = -0.347$ ,  $p = 0.045$ ) and WTP\_Comfort ( $r = -0.408$ ,  $p = 0.017$ ). Therefore, only the organization age is found to be a significant factor of the tenant organizations' WTP for the VABs, in particular for improved health and comfort. The negative relationship between them reveals that the WTP of older tenant organizations for improved health and comfort of staff is lower. The survey results show that for tenant organizations that have been established for more than 10 years, their WTP for improved health and comfort of staff is substantially lower. Hence, it seems that older tenant organizations tend to place less emphasis on the health and comfort of their staff compared with their younger counterparts.

It is also found that WTP\_Total is negatively correlated at the 0.05 significance level with CP\_YrsOp ( $r = -0.393$ ,  $p = 0.022$ ), i.e. the longer the tenant organizations have been operating at their current premises, the lower is their WTP for the VABs. Further Pearson  $r$  correlation tests are carried out between CP\_YrsOp and the tenant organizations' satisfaction about the VABs and also between CP\_YrsOp and OC\_Age. The results show that there is no significant correlation between CP\_YrsOp and the tenant organizations' satisfaction ( $r = -0.107$ ,  $p = 0.054$ ). Hence, the reason for the negative correlation between the tenant organizations' WTP and CP\_YrsOp is not due to the decreasing satisfaction with the current premises as the years passed. Instead, a significant positive relationship is found between CP\_YrsOp and OC\_Age at 0.01 significant level ( $r = 0.465$ ,  $p = 0.006$ ). Therefore, it is likely that the tenant organizations have been operating at the same current premises since their establishment and the correlation between CP\_YrsOp and the tenant organizations' WTP may be attributed to the organizations' age. Hence, CP\_YrsOp cannot be considered as a significant factor of the tenant organizations' WTP for the VABs.

**Table 4:** Results of Pearson  $r$  correlation test between Organization Age and WTP variables.

	WTP Total	WTP Productivity	WTP Image	WTP Staff	WTP Health	WTP Comfort
OC_Age	$r = -.346^*$ $p = 0.045$	$r = -.281$ $p = 0.107$	$r = -.319$ $p = 0.066$	$r = -.292$ $p = 0.093$	$r = -.347^*$ $p = 0.045$	$r = -.408^*$ $p = 0.017$

\*. Correlation is significant at the 0.05 level (2-tailed).

In the group of building characteristics factors, one significant result is that the tenant organizations operating in buildings that are managed by the building owners have a higher mean WTP than those operating in buildings that are not. The average total WTP of tenant organizations which are operating in buildings that are managed by building owners is 29.6% of their current rent, whereas the WTP of tenant organizations operating in buildings that are not managed by building owners is only 14.3% of their current rent. The  $t$ -test shows that this difference is significant at a 0.01 level. Furthermore, it is found that tenant organizations operating in buildings that are managed by building owners have consistently higher

**Table 5:** Results of Pearson r correlation test between Years Operated at Current Premises and WTP variables.

	WTP Total	WTP Productivity	WTP Image	WTP Staff	WTP Health	WTP Comfort
<b>CP_YrsOp</b>	$r = -.393^*$ $p = 0.022$	$r = -.335$ $p = 0.052$	$r = -.335$ $p = 0.052$	$r = -.364^*$ $p = 0.034$	$r = -.410^*$ $p = 0.016$	$r = -.422^*$ $p = 0.013$

\*. Correlation is significant at the 0.05 level (2-tailed).

WTP for each VAB. The WTP of the tenant organizations operating in buildings managed by building owners for each VAB ranges from 5.5% to 6.4% and that of tenant organizations operating in buildings not managed by building owners ranges from 2.6% to 3.1%. Again, the t-test results reveal that the difference in the mean WTP for each of the VAB is significant at the 5% level.

The statistical analysis results also show that the tenant organizations' WTP for enhanced organizational image is related to the BC\_GFA, BC\_RoofGarden and BC\_AirConAdj. At 0.05 significant level, WTP\_Image is positively correlated with BC\_GFA, i.e. the larger the building, the higher is the tenant organizations' WTP for enhanced organizational image ( $r = 0.391$ ,  $p = 0.036$ ). This correlation may be explained by a more prestigious image projected by a larger building compared with a smaller one. In addition, tenant organizations operating in buildings with roof gardens have an average WTP for an enhanced image of 5.62% of their current rental fee whereas those operating in buildings without roof gardens have an average WTP for an enhanced image of 2.79%. Tenant organizations' WTP for enhanced organizational image is also higher in buildings with air con adjustment (4.59% of current rental fee) than those without such feature (1.40% of current rental fee). T-test results reveal that these difference are significant at a level of 0.05 and 0.01 respectively. Therefore, except for the BC\_RoofGarden and BC\_AirConAdj, the building sustainability features, such as façade sunshading device, natural ventilation design, use of water efficient products and provision of user guide are found to have no relation with the tenant organizations' WTP for the VABs. The t-test shows that the mean WTP of tenant organizations in the two groups of buildings with and without such features are not significantly different at a significance level of 0.05.

#### 4.2 Significant Endogenous Factors of Tenant Organizations' WTP for VABs

Pearson r correlation test is mainly used to test the hypothesized relationships between the tenant organizations' WTP for the VABs and their satisfaction level, perception and knowledge.

Among the group of satisfaction factors, S\_Comfort has been found to be a consistent significant endogenous factor of the tenant organizations' WTP for all the VABs and their overall WTP. Although the Pearson r correlation test does not establish a causal relationship, a higher satisfaction is likely to show up in a form of WTP based on the economic theory. Therefore, it is assumed that the causal direction is from the tenant organizations' satisfaction to their WTP. Four aspects regarding the indoor comfort, i.e. thermal comfort, lighting quality, acoustic quality and air quality, are further tested for their relationship with the tenant



organizations' WTP for each VAB. Satisfaction about the thermal comfort and air quality are the only two factors found to have positive impacts on all the WTP variables. On the other hand, the satisfaction about lighting quality impacts on the least number of WTP variables. S\_Staff is another significant factor that is found to have a significant positive correlation with the tenant organizations' WTP for all the VABs, i.e. the more satisfied the tenant organizations are about their ability to attract and retain staff, the higher is their overall WTP for the VABs and for each VAB.

In the group of perception factors, the Pearson  $r$  correlation test results show that there is no relationship between the perception of the tenant organizations regarding the building impacts, building sustainability rating system and benefits of sustainable buildings and their WTP for the VABs. Further statistical tests are carried out to investigate how the perception of the tenant organizations may affect their WTP for the VABs in some other ways. Pearson  $r$  correlation tests are thus conducted to test for any significant relationships between P\_SusBldg, P\_GM and PM\_BldgImpact and the tenant organizations' satisfaction about the benefits experienced. Only the tenant organizations' perception of the benefits produced by the building is found to have a positive significant relationship with their S\_Image, S\_Health and S\_Comfort. The interactions between them are further investigated by using Pearson  $r$  correlation to test for any relationship between them and the tenant organizations' WTP for the VABs. Together with S\_Image, S\_Health and S\_Comfort, the tenant organizations' perception of the benefits produced by the buildings they are located in has a positive relationship with WTP\_Productivity at a significance level of 0.05. In addition, their perception regarding the benefits produced by the buildings and S\_Comfort have a positive relationship with WTP\_Total and WTP\_Image at a 0.05 significant level. Therefore, the perception of the tenant organizations' regarding the benefits produced by the buildings they are located in have some indirect impacts on their WTP for the VABs, in particular for productivity and image.

As for the group of factors concerning the knowledge of tenant organizations, the Pearson  $r$  correlation test results reveal that they are not significantly correlated with the tenant organizations' WTP for any of the VABs. This result is similar to that reported in (Brown and Cole 2009) where the influence of occupant knowledge on their comfort was explored. The occupant knowledge refers to "the occupants' awareness and understanding of building environmental features and control systems, gained through their immediate experience in the building while tempered by a broad range of influences such as tacit knowledge, and contextual and cultural influences". It was found that there is no significant correlation between the occupant knowledge and comfort. Similarly, in this study, the knowledge of the tenant organizations regarding sustainability issues, the building sustainability rating system and building impacts was found to have no correlation with their WTP for the VABs experienced.

## 5. DISCUSSIONS OF FINDINGS

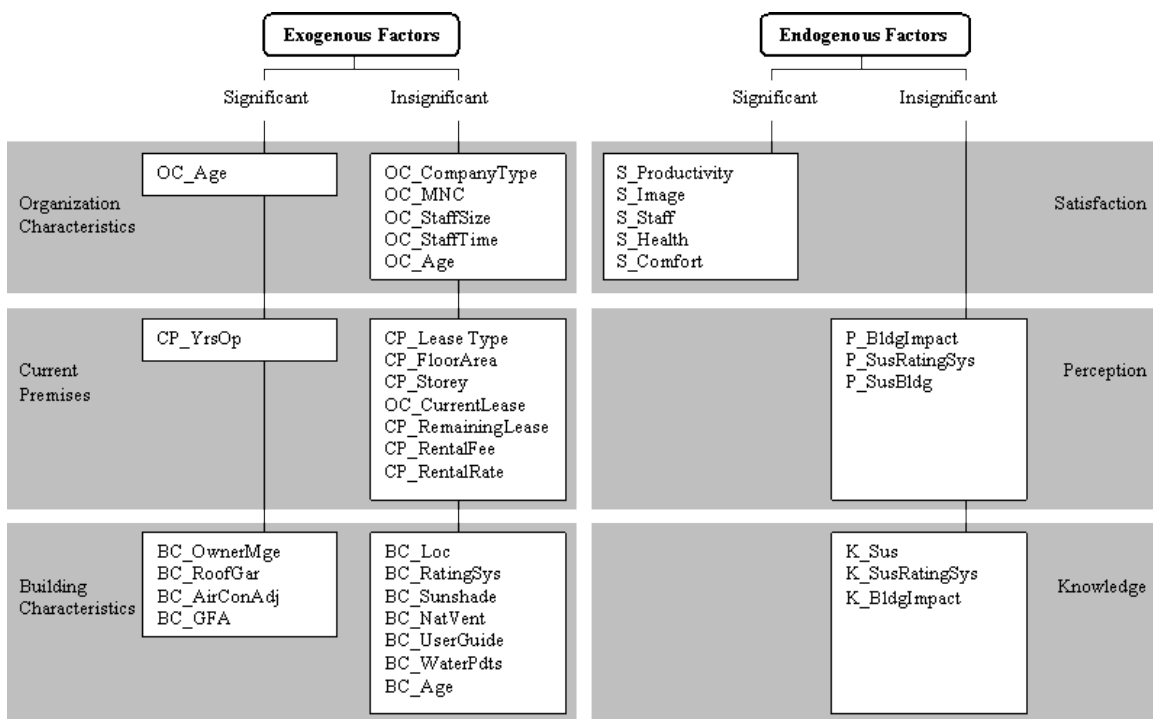
Table 6 and Figure 3 show the identified significant factors of the tenant organizations' WTP for the VABs from two perspectives - i.e. by the WTP view and by the Exogenous and Endogenous Factors view respectively. Findings on the tenant organizations' WTP behavior towards the VABS are discussed as follows.



**Table 6:** Significant Factors of Tenant Organizations' WTP for the VABs (by WTP view).

Tenant Organizations' WTP for VABs						
	WTP_Total	WTP_Productivity	WTP_Image	WTP_Staff	WTP_Health	WTP_Comfort
Exogenous Factors	OC_Age	BC_OwnMgc	BC_OwnMgc BC_RoofGar BC_AirConAdj BC_GFA	BC_OwnMgc	OC_Age BC_OwnMgc	OC_Age BC_OwnMgc
Endogenous Factors	S_Staff  S_Health S_Comfort	S_Productivity S_Staff S_Image S_Health S_Comfort	S_Productivity S_Staff  S_Comfort	S_Staff  S_Comfort	S_Staff  S_Comfort	S_Staff  S_Comfort

**Figure 3:** Significant Factors of Tenant Organizations' WTP for the VABs (by the Exogenous and Endogenous view).



### 5.1 Older Tenant Organizations have Lower WTP

The investigation of the tenant organizations' WTP for the VABs reveals a negative relationship between the age of a tenant organization and its overall WTP for the VABs, i.e. the older tenant organizations tend to have a lower WTP for the VABs. In particular, their WTP for improved staff health and comfort are lower (See Table 6). This may be due to their lower level of awareness about the building sustainability benefits. As reported by (Melbourne Business School 2006, Lützkendorf and Lorenz 2011), building occupants do not recognize the benefits of a high quality indoor environment, particularly on their health and comfort. Although

there are reports of increasing awareness of the sustainability benefits, the awareness of the majority demand stakeholders remains relatively low. This low awareness has been cited as the main reason for the low demand for sustainable buildings (Melbourne Business School 2006, McGraw-Hill Construction. and Siemens Building Technologies Inc. 2007, Building & Construction Interchange Asia 2008, Du et al. 2014).

### ***5.2 Enhanced Organizational Image remains the Main Motivation of Tenant Organizations' Demand for Sustainable Buildings***

The investigation also reveals that among the five VABs, the tenant organizations are more conscious of only the VAB, i.e. an enhanced organizational image.

Among the five intangible VABs examined, the tenant organizations indicated the highest WTP for an enhanced organizational image (See Figure 1). One of the reasons could be due to the changing demand of the consumers, in particular those from the European markets. According to (McGraw-Hill Construction and Siemens Building Technologies Inc. 2007), 70% of the European consumers do take into consideration a company's level of social responsibility when making a purchase. And operating in a certified sustainable building is one of the obvious ways to demonstrate an organization's commitment to sustainability causes. Another reason could be explained by the tangible factors affecting it. As seen from Table 6, the tenant organizations' WTP for an enhanced organizational image is related to many building characteristic factors, such as the existence of roof gardens, which are physical. The emphasis on the building characteristics is probably due to the changing determinant of a property's worth to building characteristics (Lützkendorf and Lorenz 2011). On the other hand, the tenant organizations' WTP for other benefits is mainly related to satisfaction factors which are less tangible. Therefore, it is easier for the tenant organizations to attach a monetary value for enhancing their organizational image.

Hence, an enhanced organizational image remains the main VAB that the tenant organizations aim to attain from operating in sustainable buildings whereas they tend to overlook or place less emphasis on the other VABs.

### ***5.3 Inadequacy of Building Sustainability Rating Systems***

Another finding is that the current building sustainability rating systems is inadequate for communicating the sustainability benefits to building occupants and for achieving building sustainability.

#### ***5.3.1 Inadequate for Communicating Sustainability Benefits to Building Occupants***

Currently, building sustainability rating systems are likely to be the only indication to the demand stakeholders about the sustainability performance of a building from the labeling. Such labeling has the advantage of being simple to use and understand. However, their simplistic may also hinder the effective communication of actual benefits to the building occupants. The proliferation of different building sustainability rating systems and tools in the market may also add to the confusion of the building occupants (Green Building Council of Australia 2008). Yau (2012) and Yau and Chiu (2013) also suggested that the lack of knowledge and credibility of the building rating or eco-label system would result in the failure of the system to attract building users' willingness-to-pay for more sustainable buildings.

The findings from the investigation of the tenant organizations' WTP behavior towards the VABs confirm the problem about the inadequacy of the building sustainability rating system as a tool for communicating sustainability benefits to the demand stakeholders. Although the building sustainability rating systems have been developed with the objective of stimulating the demand for sustainable buildings (Cole 2005, Lee 2013, World Green Building Council 2007), the investigation of the tenant organizations' WTP for the VABs suggests that this objective has not been achieved. As shown in Figure 3, the building sustainability rating system is found to be an insignificant factor of the tenant organizations' WTP for the VABs. Whether the building has been awarded a label of sustainable building or what level of sustainability certification has been obtained - these do not affect how the tenant organization attach economic values to the intangible VABs. In other words, the building sustainability rating system is not a tool that the tenant organizations would rely on for the information regarding the sustainability performance of the buildings.

One of the reasons for the inadequacy of the building sustainability rating system is the diverse information needs of the tenant organizations. As seen in Table , the tenant organizations' WTP for each VAB are not exactly affected by the same set of factors, i.e. how the tenant organizations attach economic value to each VAB is slightly different. For example, their WTP for improved ability to attract and retain staff is affected by how the building is being managed and the indoor environment. On the other hand, in addition to the two factors, physical building characteristics such as the existence of roof gardens play a role in the tenant organizations' WTP for enhanced organizational image. Therefore, to summarize the diversity of the information needs of the tenant organizations in just one label may not be too helpful to the tenant organizations in understanding the sustainability performance of a building.

Another reason is the absence of clear information about the indoor air quality and thermal comfort of the indoor environment in the current building sustainability rating system. Indoor air quality and thermal comfort are found to be significant factors of the tenant organizations' WTP for the VABs, in particular for improved staff health and comfort. The importance of thermal comfort is also confirmed in the study conducted by (Paul and Taylor 2008) where it is concluded that thermal comfort influences the overall satisfaction with the workplace environment. Therefore, indoor environment quality, especially the indoor air quality and thermal comfort, are pertinent to the realization of the intangible VABs and are important information to the tenant organizations

Hence, the building sustainability rating systems which indicate the sustainability performance of buildings by labeling are not quite effective in communicating the benefits of the building to the demand stakeholders so far. It has failed to convince the demand stakeholders of the sustainability benefits of a building. To summarize the sustainability benefits in just one label may be too crude to stimulate the demand for sustainable buildings.

### ***5.3.2 Inadequate for Achieving Building Sustainability***

In recent years, many countries have developed their own building sustainability systems. Regardless whether they are voluntary such as the LEED or are initiated by the government such as the Singapore's Green Mark, they generally aim to promote sustainable buildings by labeling them with a "greenness" level (Kibert 2005, Macalusa 2006) and hence creating awareness of sustainability issues among the building industry players. Although such sustainability rating systems are not created with the main purpose of providing design guidelines towards achieving sustainable buildings, they are often used as such nowadays (Raman 2005, Kaatz et al. 2006, McCreadie 2004).

The criteria stated in the rating systems are often used by the supply stakeholders, i.e. architects, engineers, building contractors, developers as the targets or standards of sustainable buildings. Hence, during the design stage, the supply stakeholders often look to these criteria as the design guidelines for achieving sustainable buildings. However, the issue that follows is whether the expected building sustainability benefits are actually realized. As highlighted by (Raman 2005, Environmental Building News 2008), sustainability benefits may be achieved theoretically but in practice, it may not be so.

In this study, the investigation of the tenant organizations' WTP for the VABs finds that the building sustainability award from the rating system is not a significant factor of their WTP for the VABs (See Figure 3). The tenant organizations operating in certified sustainable buildings have not experienced greater VABs than those operating in non-certified sustainable buildings. Therefore, the building sustainability rating systems should be used with caution when they are used as a tool towards achieving sustainable buildings.

#### ***5.4 Use of Sustainable Technologies is Not as Important as How the Building is Being Managed during the Maintenance Stage***

Among the list of building characteristics examined, only how the building is being managed during the operational stage is found to be a significant factor to the tenant organizations' WTP for each VAB. Roof gardens and air conditioning systems that allow adjustments are found to have some impacts on the tenant organizations' WTP pertaining to the VAB of an enhanced organizational image. The remaining building sustainability measures are found to have no impact on the tenant organizations' WTP behavior at all.

The investigation reveals that tenant organizations operating in buildings that are managed by the building owners have a higher WTP for each of the five VABs than those managed by outsourced facilities management (FM) companies. This may be due to better management of the building owners than FM companies which results in a better sustainability performance, leading to greater VABs. The better management may be due to building owners having a higher commitment than FM companies for ensuring the performance of the buildings. Another reason could be the later involvement of the FM companies in the life of the building, as compared to the building owners who are likely to be involved in the early stage. Being involved earlier allows for the consideration at the design stage of how the building will be managed during the operational stage and thereby maximizing the building performance.

Therefore, what kind of sustainable building technologies are being implemented is not as important as how they are being managed during the operational stage of the building for ensuring the sustainability performance of buildings. As pointed out by (Morris 2007), sustainable features that require specialized maintenance or sophisticated operation are often overridden by the building maintenance team.

## **6. CONCLUSION**

This study has investigated the WTP behavior of tenant organizations towards the five VABs in order to understand the demand for sustainable buildings.

Although the response rate of the survey is rather low, a sample size of 34 is usually deemed adequate for statistical analysis. Furthermore, by focusing on office buildings in the CBD, the tenant organizations are likely to be similar in terms of activities and wealth. Their WTPs for the VABs experienced are less likely to be influenced by the differences in activities and the income factor.

It is found that older tenant organizations tend to have a lower WTP for the VABs of improved health and comfort for their staff. Furthermore, the demand for sustainable buildings seems to remain at just projecting a good organizational image. Therefore, campaigns and education programs such as those proposed in the past studies (Melbourne Business School 2006, Xenergy 2000) to raise the awareness of demand stakeholders regarding sustainability benefits should target at older tenant organizations and emphasize on the other VABs besides enhanced organizational image.

The investigation also reveals the inadequacy of the building sustainability rating systems for communicating sustainability benefits to building occupants. Instead of labeling the overall sustainability performance of a building, some countries, in recent years, have looked to labeling the building according to a specific aspect of its performance. For example, the UK has made disclosure of building energy consumption mandatory to inform building occupants of the specific energy performance of a building. In Singapore, besides the Green Mark rating system, the National Environment Agency has also implemented the Energy Smart Labeling which informs building occupants about the energy performance of a building. Such specific tools may be more useful to building occupants.

In addition, the building sustainability rating systems are also found to be inadequate for achieving building sustainability. As highlighted by (Kaatz et al. 2006), these rating systems should not be viewed as instruments solely for producing sustainable buildings. Rather, they “offer the means potentially to enhance the quality of decision-making in the building process by incorporating the philosophy of sustainable development”. (Vakili-Ardebili and Boussabaine 2013, Wedding and Crawford-Brown 2007) also agree that the building sustainability rating systems can be used to facilitate and encourage multi-stakeholder involvement at all the stages of the life of a building. Also, to improve its effectiveness, the building sustainability rating system needs to be constantly refined (Turner and Frankel 2008). Hence, it is important to understand the effects of the sustainability criteria on the building sustainability performance (Olgyay and Herdt 2004). Currently, although the building sustainability rating systems are widely used, there is little information about how the buildings, which have met the sustainability criteria in the rating systems, actually perform (Looking Back and Moving Forward 2008).

Lastly, this study also reveals that the maintenance and operation of the building is an important factor to the realization of the VABs. Hence, sustainability efforts should extend beyond just the design stage and implementing high-level building technologies. Currently, most of the tools and guidebooks available focus on sustainable design. More resources should be created for sustainable facilities management. Regular re-certification by the building sustainability rating systems is also a good way of ensuring the sustainability performance of the building during its operational stage and shifting the focus of the industry to the operational stage of building. Furthermore, engaging the building maintenance team during the design process can lead to better designs and a better understanding by the team regarding the functions of the sustainable features (Morris 2007).

In conclusion, the findings from this study provide insights into the tenant organizations' WTP behavior toward the VABs and help towards channeling the sustainability efforts to more effective areas.

## LIST OF ABBREVIATIONS

WTP_Image:	WTP for enhanced organizational image
WTP_Staff :	WTP for improved ability to attract and retain staff
WTP_Comfort:	WTP for improved comfort of staff
WTP_Health:	WTP for improved staff of staff
WTP_Productivity:	WTP for improved productivity

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