

Green Office Building Environmental Perception and Job Satisfaction

Sariya Saengsawang*, Supeecha Panichpathom**

Thammasat Business School, Thammasat University

2 Prachan Rd., Pranakorn, BKK. 10200, Thailand

Email:s.sariaire@gmail.com*, supeecha@tbs.tu.ac.th**

Abstract

Employees' satisfaction in jobs is one crucial factor for successful corporation. They have higher level of loyal and are less likely to leave their jobs. This study focused on workplace environmental perception at green office buildings toward environmental factors including perceived indoor air quality, thermal, visual and acoustic.

Completed data were collected from 286 employee working at green office building in Bangkok. Questionnaires were direct distributed at Park Venture, AIA Capital Center and Sathorn Square and via Google Docs during February 7 – 20, 2016. Results derived from exploratory factor analysis and multiple regression analyse showed significant positive relation between perceived indoor air, thermal, acoustic and visual and job satisfaction.

Working in good environmental conditions or in certified green office buildings affect employee job satisfaction. Company owners who are concerned with employees' job satisfaction pay more attention to the perception in indoor air, thermal, acoustic and visual. These environmental factors to contribute to employees' satisfaction. Investors for new office building or major renovations should choose green designs that are suitable for working condition. Better green office buildings should also attract office rates. Better human capital management shall lead to better compete abilities in the marketplace.

Keywords: Job Satisfaction, Perceived Indoor Air Quality, Perceived Thermal, Perceived Acoustic, Perceived Visual, Green Office Building, Environmental Factors

Introduction

Nowadays, giving precedence to environment, energy consumption, and impacts of energy consumption on environment tends to become a major trend more than before. That is because it can enhance competitive efficiency and communicate good images to public. Many companies, therefore, focus on the significance of CSR (Corporate Social Responsibility); and thus it affects changes in real estate business as well, that is, offices for rent, or green buildings in particular. These buildings are different from other general ones in the sense that they are basically designed for effective energy consumption, adjusting balance to suit users, and eco-friendly look.

Thus, most tenants realize the importance of green buildings and want to stay in them, with their interest in gaining benefits from the use of being “green.” Indoor environment is mainly focused as the vital factor to be considered for finding new rental spaces/offices. Green buildings with quality improvement are required, i.e., air quality, illuminance, temperatures, humidity, and noises. Tenants are even also willing to pay extra costs for office rental inside green buildings(บุญเกียรติ วิสิทธิ์กานทร์, B.E. 2552).

If viewing in the aspect of investors, green buildings do not only create higher rental incomes than other regular office buildings and possess the lower tendency of unoccupied space rates than those without green quality certification(Fuerst, McAllister, Wetering, & Wyatt, 2011), but also generate long-lasting and higher returns throughout the project. In other words, to invest more from values of general projects in order to initiate certified green office buildings make higher returns all through the project than those without the mentioned certification. It is the direct result that can be seen obviously from resource and water saving; and waste reduction(Kats, Alevantis, Berman, Mills, & Perlman, 2003). This also includes benefits for building users such as health matters and work performance(Wyon, 2004).

Therefore, to invest in certified green office buildings is an advantage for competitions in current markets in which the development of real estates is conducted by the use of technology as well as design that take environmental effects and users into consideration more.

Besides, the selection of space rental in green buildings is frequently related to health and work performance of users. As it is widely known that a company's investment mostly comprise of investment with staff who must work indoor 5 days per week and 8 hours per day, what should be inevitably regarded in this investment is returns from human resource investment, that is, full exploitation of efficiency for highest returns in the buildings designed for sustainability and good health of users, which can lift up work performance. To work in pleasant environment, therefore, can positively assist building users regarding facility and reduced impacts that might happen to health, e.g. discomfort, losing concentration, or pollution from buildings. So, to rent certified offices help

influencing higher work performance under fine environment, e.g., temperatures, illuminace, natural light, decoration with proper color tones, noise control, work space design, and indoor air quality.

Green buildings embrace qualifications influencing satisfaction towards environments, temperatures, sceneries, attractiveness, noises from air coolers, working images, sleeping, emotional state, physical reactions, and low particles in the air. These qualifications are superior to general buildings (Newsham et al, 2012). Staying in buildings without green quality certification possibly links to sick building syndrome, which, in term of business outcomes, leads to more work absence or higher expenditures concerning staff's health, including lower work performance (Sentman, 2009).

The better improvement of indoor environment affects report of staff's sickness, sick building syndrome, allergies, asthma, and results of work. This means the reduction of expenditures on account of staff's poor health and getting back to higher work performance (Fisk, 2000). Or even changing some indoor qualifications, e.g., proper ventilation, confirms that benefits from work are higher than lost expenditures due to sick building syndrome or work absence due to sick leave. It also acts on work performance (Park & Yoon, 2011) and report of dissatisfaction towards indoor air quality when more air circulation is required. This can be interpreted that if staff perceive the circulation, it will raise satisfaction (Haghishata & Donnini, 1999). The increase of air circulation can drop down sick leave (Milton, Glencross, & Walters, 2000). At the same time, if staff work under improper temperatures, e.g., too high ones, it can touch on work competency, too (Seppänen & Lei, 2006). Or even designing workplace to get natural light with the visual of external sceneries can also make staff feel good towards their jobs (Linderberger and Zagicek, 2008) and feel that they are healthy (Heschong, 2003). This reveals that environment of buildings can bear on work performance.

In this study, the researcher paid particular attention to job satisfaction in the particular certifified green building in Thailand. Despite higher rental cost than other general buildings, most companies can make returns from work of their staff. We all perceive that hiring costs are usually higher than building expenditures. This allow higher work performance to speed up payback (Clements-Croome & Luck, 2003). Likewise, to motivate returns by motivating satisfaction so as to increase work performance can be done through the selection of buildings that can help keeping good health so that staff will work under nice environment.

For Thailand, according to the records of Real Estate Information Center, the country embraces green office buildings that passed the standard of U.S. orLEED: Leadership in Engineering and Environment Design. It is a green building standard evaluation, an eco-friendly evaluation system of buildings or constructions that has been accepted and applied worldwide most. The standard was developed by U.S. Green Building Council (USGBC), with the objectives to enhance building resource usage efficiency and to help reduce negative impacts on environments and

sanitation of building users. The whole life cycles of 5 buildings are pondered, i.e., park venture, SCG, AIA Capital, Sathorn Square, and Energy complex. There are over 60 buildings that have been under the process of approval request for the U.S. standard and Thai Green Building Institute (TREES). This indicates that there are still a few green buildings in Thailand of which structures are improved and designed to hold future sustainable innovations. This might be the consequence of lack of confidence among investors in real estate businesses towards spending money on extra investment in green buildings as they are not sure whether tenants will choose to rent the buildings or not, because those tenant do not see tangible benefits from larger payment for green building rental.

Moreover, so far there have been merely a few specific studies about certified green buildings. Also, as LEED quality certification is an international standard accepted worldwide with eco-friendly qualifications and helps job satisfaction, it is an interesting point to explore the factors of job satisfaction in an office building certified with LEED quality certification. The findings will be useful information to help tenants make decision more easily when they perceive benefits from renting certified office buildings.

Literature Review

In literature review, the researcher reviewed and concluded essential issues from relevant documents as follows:

Job Satisfaction

Job satisfaction is staff's feeling towards their jobs and workplace. So, it can be defined as satisfaction arisen from needs in workplace (Togia, Koustelios, & Tsigilis, 2004). It is for measure satisfaction towards jobs or other dimensions of work(Christian, Garza, & Slaughter, 2011; Ritz, 2009). Or it means the joy of work success or simply achieving work goals (Behson, Eddy, & Lorenzet, 2000).It is the feeling that is more than liking or disliking their jobs(Spector, 1997). As a whole, it is staff's feeling towards their job that refers to overall images of jobs, co-workers, or even incomes and conditions (Lu et al, 2005). It might also be a result from relations among co-workers, management systems, or office mates(Onsman, 1999). Job satisfaction might emerge from age, gender, educational level, work environment, co-workers, income, and work hours(Bodur, 2002). High job satisfaction has impacts on businesses both in terms of higher profits and higher consumer satisfaction. It brings about less job rotation in companies as well (Branham, 2005), because very satisfied staff will not want to leave their workplace(Hanson & Miller, 2002). Furthermore, it was also found that job satisfaction is another factor of organizational success (Sink, 1985).

The Relations between Perceived Workplace Environment and Job Satisfaction

Workplace environment means to prepare places for work in order to produce the most effective work outcomes. Workplace design must emphasize on ergonomics and the sequence of work implementation. Work outcomes or results are indicators of how to extend the effective use of work spaces(Hameed & Amjad, 2009). And when work starts to become a routine, be able to predict, and must meet standards; including work of which responsibilites need to be divided clearly or follow procedures for desion making, it is even more necessary to lean on workplace design according to processes and necessity for work communications (John et al., 2009). Hence, the suitable arrangement of workplace, air systems, illuminance, temperatures, cleanliness, and all-around areas is indispensable for workplace.

Previous studies showed qualifications indicating workplace environment and its influences on job satisfaction in rental office buildings. When considering those factors aforesaid, including researches that presented workplace environment associated with qualifications of office buildings with LEED quality certification as shown in Table 1, this study investigated the 4 main factors, i.e., indoor air quality, temperatures, visual, and noises.

Table 1 Qualifications of office buildings with LEED quality certification

Qualifications	Quality certifications
Sustainable Site:	<ol style="list-style-type: none">1. Reduce pollution from construction activities by controlling soil erosion, waterway sedimentation, and airborne dust.2. Protect the health of vulnerable populations by ensuring that the site is assessed for environmental contamination and that any environmental contamination has been remediated.3. Conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.

Table 1 Qualifications of office buildings with LEED quality certification (continued)

Qualifications	Quality certifications
Water Efficiency	<p>1. The “efficiency first” approach to water conservation in each prerequisite is designed to ensure that performance goals are addressed for all LEED v4 certified projects regardless of the source of the water (rainwater, reused or recycled water, etc.)</p> <p>2. Encourages projects to reuse water, including reclaimed wastewater, graywater, condensate, process water, and rainwater, for irrigation, toilet flushing and more.</p>
Energy & Atmosphere	<p>1. Support the design, construction, and eventual operation of a project that meets the owner’s project requirements for energy, water, indoor environmental quality, and durability.</p> <p>2. Reduce the environmental and economic harms of excessive energy use by achieving a minimum level of energy efficiency for the building and its systems.</p>
Material & Resources	<p>1. Reduce the waste that is generated by building occupants and hauled to and disposed of in landfills.</p> <p>2. Reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.</p> <p>3. Encourage adaptive reuse and optimize the environmental performance of products and materials.</p> <p>4. Encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts.</p>
Indoor Environmental Quality	<p>1. Contribute to the comfort and well-being of building occupants by establishing minimum standards for indoor air quality (IAQ).</p> <p>2. Promote occupants’ comfort, well-being, and productivity by improving indoor air quality.</p> <p>3. Reduce concentrations of chemical contaminants that can damage air quality, human health, productivity, and the environment.</p> <p>4. Establish better quality indoor air in the building after construction and during occupancy.</p> <p>5. Promote occupants’ productivity, comfort, and well-being by providing quality thermal comfort.</p>
Innovation in Design	<p>1. Encourage projects to achieve exceptional or innovative performance.</p>
Regional Priority Credit	<p>1. Provide an incentive for the achievement of credits that address geographically specific environmental, social equity, and public health priorities.</p>

Perceived Indoor Air Quality

For common people, over 90% of their time is spent indoor. Thus, indoor air quality certainly impinge users' feeling of comfort and health(Samaranayake & De Silva, 2010). For this reason, office buildings for rent should be in environment that promotes better work performance of indoor staff. Quality of indoor environment can produce both tangible and psychological effects on staff. In addition, investment for indoor environmental improvement can bring outcomes in a form of greater work performance as well (Bruhns, 1996; Sullivan, Baird, & Donn, 2013; U.S. Green Building Council, 2015). There were reports that most staff believe their job satisfaction increases when LEED quality is utilized indoor. This satisfaction takes place from gaining physical benefits of being green buildings (Kato, Too, & Rask, 2009). Apart from these, indoor environment also acts upon long-term commitment with companies (Heath et al., 2006). So, it can be said that indoor environmental quality is significant to job satisfaction (Kato et al., 2009; Kirsten, 2007).

H1: Perceived indoor air quality has positive relations with job satisfaction.

Perceived Thermal

The feeling of thermal comfort basically occurs to individuals with different thermal preference. In general buildings, most air coolers as well as heaters offer certain stable levels of temperatures (The Human Resources Social Network, 2005). Working under fine temperatures can lessen staff's tension and lead to gratifying work outcomes (Ajala, 2012).

H2: Perceived Thermal have positive relations with job satisfaction.

Perceived Visual

Lighting quality has impacts on work performance. Similarly, natural light plays an important role to work performance (Loftness, Hartkopf, Gurtekin, Hansen, & Hitchcock, 2003). It diminishes ocular fatigue, indoor accidents, and work errors due to using both eye sights and hands simultaneously. Less errors or mistakes definitely create better effects on companies (Ajala, 2012). Indoor lighting or illuminance is another crucial factor for work accomplishment. Working under inadequate lights causes ocular fatigue, headache, and frustration(Hameed & Amjad, 2009). The accessibility of natural light directly involves satisfaction towards job and quality of life. It also draws opposite outcomes pertaining to resignation(Leather, Pyrgas, Beale, & Lawrence, 1998; Newsham et al., 2009).

H3: Perceived visual has positive relations with job satisfaction.

Perceived Acoustics

Sounds are a way of communication with exact purposes while noises alludes to unwanted sounds which originate physical and psychological effects. Thereupon, noises can be regular sounds in workplace such as talks or telephone rings(Sundstrom, Town, Rice, Osborn, & Brill, 1994). Even so, they can cut down concentration on work(Banbury & Berry, 2005)although they are always heard all the time

like sounds from ventilation systems or repeated ones like non-stop pressing sounds or hits. These noises can decrease work accuracy. Those inevitable for work, e.g., talks or telephone rings usually heard in open office spaces can also cause tension to staff. Furthermore, more annoyance against noises can result in higher risk of high blood pressure, too (Lercher, Hortnagl, & Kofler, 1993). Following the experiment of Evans & Johnson, 2000, it was found that low intensity noises did not have effects on basic work, but a tension hormone had been discovered after about 3 hours even though staff wrote down in the questionnaires that those noises neither had any impacts on their mental states nor work motivation at all.

Other than those, perceived noises in workplace also entail the loss of concentration. Consequently, work performance drops, huge mistakes on work occurs, and work tension rises. The reduction of noises during work can relieve tension, especially for staff who have to work on information input. It can also accrue work accuracy, work achievement, and work effectiveness (Ajala, 2012).

H4: Perceived Acoustics have positive relations with job satisfaction.

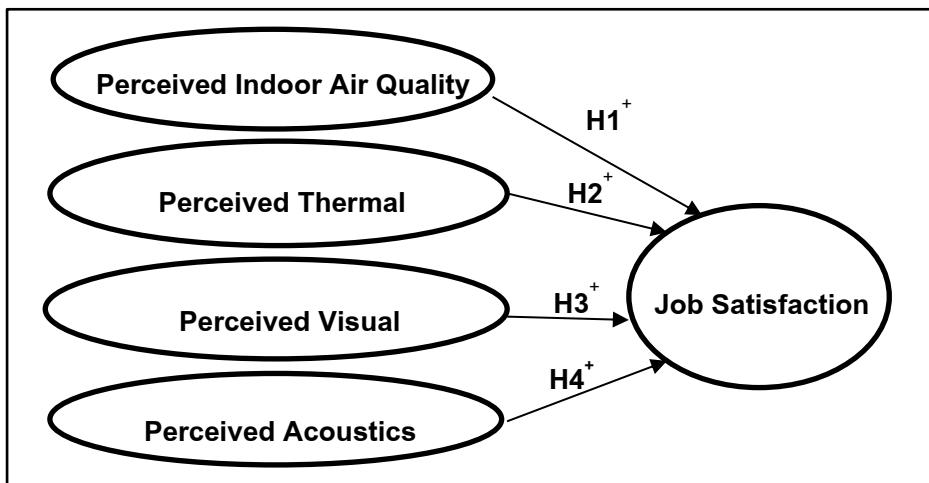


Figure 1: Conceptual Framework of This Study

Research Methodology

Researcher using Quantitative methods to study the impact of perceived qualifications of office buildings with LEED quality certification to employee Job Satisfaction Questionnaires were direct distributed at LEED certificated office building in Bangkok and via Google Doc.

Population and Sampling

- I. Population : Employee in green office buildings
- II. Sampling : Employee in LEED certificated office building in Bangkok such as Park Venture, Sathorn Square, AIA Sathorn, AIA Capital and SCG 100 years building

Data Collection

This research collected data from the office buildings with LEED quality certification in Bangkok, i.e., Park Venture, Sathorn Square, AIA Sathorn, and AIA Capital. A set of questionnaires were used to collect the data through convenient sampling. All of them were distributed directly to the samples who worked in the subjected offices. Meanwhile, online questionnaires are required to be sent through Google Doc as well, during 7 – 20 February 2016.

The research used questionnaires as the instrument. Pre-test was completed by 10 respondents in order to evaluate the lucidity of questions, and to revise incomprehensible or unclear ones. Cronbach's alpha was applied to examine the validity of each construct. Exploratory factor analysis was brought to group relating variables all together in the same components for fewer variables. All questions had been revised again to get the ones that cover the objectives of the research and all targeted factors before real data was collected from at least 200 samples.

Results and Discussion

Table 2 Results derived from multiple regression analyses toward Job Satisfaction

Model Summary				
Model	R	R Square ^b	Adjusted R Square	Std. Error of the Estimate
1	.555 ^a	.308	.298	.83626804

a. Predictors: REGR factor score 4 for analysis 4, REGR factor score

3 for analysis 4, REGR factor score 2 for analysis 4, REGR factor score 1 for analysis 4

b. For regression through the origin (the no-intercept model), R Square measures the proportion of the variability in the dependent variable about the origin explained by regression. This CANNOT be compared to R Square for models which include an intercept.

Table 2 Results derived from multiple regression analyses toward Job Satisfaction (continued)

ANOVA^{c,d}

Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	87.785	4	21.946	31.381
	Residual	197.215	282	.699	
	Total	285.000 ^b	286		

a. Predictors: REGR factor score 4 for analysis 4, REGR factor score 3 for analysis 4, REGR factor score 2 for analysis 4, REGR factor score 1 for analysis 4

b. This total sum of squares is not corrected for the constant because the constant is zero for regression through the origin.

c. Dependent Variable: REGR factor score Job

d. Linear Regression through the Origin

Coefficients^{a,b}

Model	Unstandardized Coefficients			Standardized Coefficients	t	Sig.
	B	Std. Error	Beta			
1	REGR factor score_Thermal	.159	.050	.159	3.201	.002
	REGR factor score_Indoor	.433	.050	.433	8.739	.000
	Air Quality					
	REGR factor score_Visual	.277	.050	.277	5.598	.000
	REGR factor score_Acoustic	.136	.050	.136	2.753	.006

a. Dependent Variable: REGR factor score Job

b. Linear Regression through the Origin

According to the study results of the relations as shown in Table 2, it demonstrated that the factors of perceived temperatures, indoor air quality, visual, and noises could be manipulated to analyze job satisfaction. It was revealed that perceived indoor air quality affected job satisfaction most, followed by perceived visual, temperatures, and noises, respectively. In this case, ANOVA Test was exploited as shown in Table 2. F = 31.381 and Sig = 0.002 0.000 0.000 and 0.006, in order. The values were below the statistical significance at 0.05. Those variables composed of the independent variables that could explain changes of the dependent ones or job satisfaction as 0.298 or 29.8%. And from Table 2, it can be concluded that the independent variables that influenced job satisfaction with statistical significance could be displayed in a form of equations as per below:

$$\text{Job Satisfaction} = 0.159(\text{Thermal})^{**} + 0.433(\text{Indoor Air Quality})^{**} + 0.138(\text{Visual})^{**} + 0.277(\text{Acoustic})^{**}$$

** p-value<0.01

* p-value<0.05

In this study, Factor Score of each Independent Variables are entered to Stepwise linear regression as a result shown in Table 3

Table 3 Results from Regression Analysis : Stepwise

Independent Variable Dependent Variable	Perceived Thermal	Perceived Indoor Air Quality	Perceived Visual	Perceived Acoustic
Job Satisfaction	0.159**	0.433**	0.277**	0.136**
R ²		0.308		
Adjusted R ²		0.298		
F		31.381		
Sig.F		0.000		

Remarks: - Regression Coefficients: Standardized Coefficients

- ** p-value<0.01

- * p-value<0.05

The study found that perceived thermal, indoor air quality, visual, and acoustics impacted job satisfaction. Hence, this research confirmed Hypothesis 1, 2, 3, and 4. All of them proved that the subjected indoor environmental factors positively related to job satisfaction. The results conformed with the former study of Qasim, Cheema, & Syed, 2012; Waqas et al., 2014, who investigated the factors influencing job satisfaction. However, in this research, the environmental factors described changes towards the relations with job satisfaction as 29.8%. That is because job satisfaction can actually comprises of other several factors apart from indoor environment, for example, organizational cultures, work contents, welfare, rewards, acceptance, etc. These are all factors that have effects on job satisfaction as well (Hong, Hamid, & Salleh, 2013; Qasim et al., 2012; Sypniewska, 2013; Tutuncu & Kozak, 2008; Waqas et al., 2014).

Conclusions and Discussion

This research was the analysis of the relations of perceived indoor environmental quality towards job satisfaction in the green buildings. The study pointed that to place an importance to indoor environment should be responded by tenants, especially on perceived indoor air quality. The variables that should be paid special attention to included no frustration with indoor air, no unpleasant odours, choosing nontoxic decorations, good ventilation or air circulation, and fresh indoor air, consecutively. Nonetheless, the variables used to measure perceived visual were not clear, so the component separation of variables in each involved factor arised and they could not be joined with other components. This did not match other existing studies. It, therefore, can be inferred that the designed questions were not quite good representative questions for indicating perceived visual towards job satisfaction. Or there might be some defects about the lucidity of the questionnaires, which made the respondents confused. Above all, perceived temperatures presented the variables that should be kept an eye on, i.e., stable temperatures, coldness as well as heat that encouraged work, and humidity as a factor that could evidently indicate perceived temperatures, subsequently. Indoor and outdoor noises, and sounds from air-conditioners were also the variables that explicitly clarified the meanings of perceived noises, in turn.

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