

An Analysis on Tenants' Satisfaction Based on The Perception on The Application of Green Building Criteria at Office Building Graha Merah Putih, Jalan Putri Hijau Medan

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Abstract: Green building is a plan and design through the process which is concerned with environment and the use of human resources efficiently in all building life cycle, starting from base, design, construction, occupation, maintenance, renovation, and building changes. There are many factors which influence the satisfaction of tenants who rent office buildings with green building concept, some of them are land appropriateness, conservation and energy efficiency, water conservation, material cycle and sources, health and comfort in rooms, and building environment management. The research used quantitative method which was aimed to analyze the perception on the satisfaction of tenants who rented buildings, viewed from the aspects of land appropriateness, conservation and energy efficiency, water conservation, material cycle and sources, health and comfort in rooms, and building environment management. The data were gathered by using questionnaires and interviews and analyzed by using multiple linear regression analysis. The population was 50 tenants who rented office building, Graha Merah Putih at Jalan Putri Hijau No.1, Medan Barat which consisted Of Bank BNI, Bank HSBC, Coffee Bean, Ericsson, Telkomsel, Indomaret, and Mitratel. The Result of the research showed that the perception on the factors of land appropriateness, conservation and energy efficiency, water conservation, material cycle and sources, health and comfort in rooms, and building environment management simultaneously had the influence on the satisfaction of the tenants who rented office building, Graha Merah Putih at Jalan Putri Hijau No.1 Medan.

Keywords: Perception of Satisfaction, Tenant, Green Building, Office Building.

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I. Introduction

The importance of creating eco-friendly and energy-efficient buildings amidst the recent impact of global warming can make the concept of green building becomes a distinctive image for the concept of the development of energy efficient and eco-friendly modern office building. By using the concept of green building, it is expected to reduce the energy use and the impact of pollution, and design of building can be applied in the principles of friendly environment (Sudarwani, 2011).

Green building can conceptually be defined as the building that applies of aspects of energy and water efficiency, maintenance of healthy indoor air quality to bring the comfort, protection of employees' health, increase of work productivity, reduction and minimization of waste, pollution, and environmental degradation, which are implemented from the process of its planning, development, and operation as well as its maintenance.

In order to satisfy the occupants of green concept building, there are 6 (six) criteria that must be met: appropriate site development, energy efficiency, water conservation, eco-friendly materials, indoor air quality, and high-priority waste management.

In accordance with the definition of green building stipulated in according to Ministry of Public Works Regulation No. 02/PRT/M/2015 concerning the green building, which stated that green building should meet the requirements of buildings and having significant measurable performance in efficiency of energy, water and other resources through the application of green building principles that based on its function and classification in each the stage of its development and operation.

It also applies to the old Telkom building that located in Jalan Putri Hijau, Medan, which was constructed in 2001 and being renovated in order to bring the satisfaction to building occupants.

However, in reality, these six criteria had not been maximally implemented due to the lack of green concept. Conservation and efficiency of energy were still unimplemented, which could be indicated by the presence of leaky air conditioner and unstable lighting systems. In addition, the criteria of health and indoor

health and comfort had not also been adequately met and it brought the dissatisfaction for the tenants/ occupants of the building. Moreover, the conservation and efficiency of energy as well as the indoor health and comfort are the two of six criteria of green building concept with the most significant score.

Lack of access to many location due to the heavy traffic had been often experienced by the building tenants, and it brought the negative impact that manifested as traffic noise pollution around the building, which disturbed the occupants. This problem could be minimized by providing written appeal in the form of building stickers, emails and so on. The provision of cross-and-vehicle-free pedestrian facilities, bus stop facility within 300 meters from the building and other measures are considered being able to increase the occupants' satisfaction.

Based on this dissatisfaction of the tenants of old Telkom Building, Graha Merah Putih Office Building on Jalan Putri Hijau, Medan, started to apply the concept green building in 2012 with its six criteria that consists of appropriate site development, conservation and efficiency of energy, water conservation, cycle and material source efficiency, health and environmental comfort as well as environmental management of the building. However, significant numbers of Graha Merah Putih's tenants are still unsatisfied with the management of Graha Merah Putih office building in Medan.

The importance of the application of green building criteria to satisfy the tenants or occupants was also emphasized in Andini's study (2014) that titled the title Analysis of the Impact of Implementation of Green Building Concept on the Investment Decision in National Hospital Surabaya, and the study found that the green building concept in National Hospital Surabaya was manifested in 3 concepts: Green Design, Green Material, and Green Technology. Green design was implemented by proper building positioning, building size, and building design. Green Material was implemented by the use of sunergy glass, and Green Technology was implemented by the use of eco-friendly tools such as AC VRV III, LED Lights, Centralized Vacuum Cleaner.

The importance of management of water conservation was also discussed by Steviani et al (2015) in the Study of Application of Water Conservation Principles Based on the Standard of Greenship New Building Version 1.2, a Case Study: Christian University of Petra Surabaya's Buildings P1 and P2, and their research found that these office buildings used AC VRV system (Variable Refrigerant Volume) to utilize condensed water from the air conditioner as an alternative of water sources. In order to estimate the amount of condensed water produced by the air conditioner (AC) in office building, web spreadsheets will be required with the data inputs that consist of outdoor and indoor temperature and humidity, which result in 546.49 gallons/hour or 2.068 m³ of water per hour.

Based on such phenomenon of tenants' dissatisfaction, the researcher is interested to determine the effect of perception of green building criteria application on the satisfaction of tenants of Graha Merah Putih Building Office on Jalan Putri Hijau, Medan, which based on the aspects of appropriate site development, conservation and efficiency of energy, water conservation, efficiency of cycle and material resources, indoor health and comfort as well as environmental management of buildings. Therefore, the researchers conducted the research with the title: Analysis of Tenants' Satisfaction Based on the Perceptions on the Application of Green Building Criteria in Graha Merah Putih Office Buildings on Jalan Putri Hijau, Medan.

II. Theoretical Review

2.1 Definition of Satisfaction

Engel, James F., Blackwell, Roger D. & Miniard, Paul W (2005) stated that the satisfaction is a post-consumption evaluation in the selection of alternatives to meet the expectations. Band in 1991 (in Nasution, 2004) stated that satisfaction could be achieved if obtained quality meets and exceeding the expectations and needs of customers. Conversely, if the quality does not meet and exceeding the expectations and needs of customers then the satisfaction would not be achieved, and those who are not satisfied with the consumed goods or services will seek other companies that are able to provide their needs.

Customers' satisfaction is the extent to which the benefits of a product can be perceived that based on their expectation (Amir, 2005). Kotler (2003) stated that the customers' satisfaction is the level of customers' perception after the comparison between what they perceive and what they expect on the performance of products. Either customers' satisfaction or dissatisfaction is a response on the evaluation of disconfirmation between the expectation and actual performance quality of perceived products (Nasution, 2004).

Oliver and Band 1991 (in Nasution, 2004) argued that the satisfaction will be achieved if the quality of perceived products and services are able to meet and exceeding the expectations and needs of customers. Conversely, if the quality of perceived products and services are unable to meet and exceeding the expectations and needs of customers, then the satisfaction will not be achieved. The customers who are not satisfied with the goods or services they consume, then they will seek other companies that are able to meet their needs.

2.1.1 Components of Satisfaction

Wilkie in Manurung Dinary SH (2009) argued that there are five elements in the customers' satisfaction are:

1. Expectations

The customers expectation on the quality and performance of goods or services have been formed before they purchase goods or services. In the process of purchasing, the customers expect that received goods or services must meet be in accordance with their expectations, desires and beliefs. Goods or services that meet the customers' expectations will definitely satisfy them.

2. Performance

The consumer's experience of the actual performance of the goods or services when used without being influenced by their expectations. When the actual performance of goods or services is successful then the consumer will be satisfied.

3. Comparison

This component is conducted by comparing between the expectations of the performance/ quality of goods or services before the process of purchasing and the actual performance or quality of the goods or services. The customers will be satisfied if their expectations before the process of purchasing meet and exceeding their perception on the actual performance or quality of the product.

4. Confirmation/disconfirmation

Customers' expectations are influenced by their distinctive experience of the use of brands of goods or services. The confirmation will occur if the expectations are in accordance with the actual performance of the products. In contrary, the disconfirmation will occur if customers' expectations are higher or lower than the actual performance or quality of the products, and if the confirmation or disconfirmation occur then the customers will be satisfied.

2.1.2 Characteristics of Satisfaction

Kotler, (2003) argued that there are three characteristics of customers' satisfaction:

1. Loyalty to the product. Satisfied customers tend to be loyal to products that have met their satisfaction, which make the customers conduct repurchasing the products from the same manufacturer.
2. Positive viva voce communication. Positive word-of-mouth or viva voce communication manifests in the form of recommendation to other potential customers on the positive image of products and their manufacturers or companies.
3. Company or manufacturer. Company or manufacturer is one of the considerations for the customers to purchase the products, in which the companies or manufacturers that are able to satisfy the customers will become the priority of customers' consideration in the process of products purchasing.

2.1.3 Factors that Affect the Satisfaction

Lupiyoadi (2001) argued that there are five factors relating to customers' satisfaction:

- a. Quality of product. Customers will be satisfied if the results of their evaluation indicate that the utilized products have good quality. The product will considered as qualified if it is able to provide the customers need (Montgomery in Lupiyoadi, 2001). There are external and internal qualities of product. The external quality of product includes the brand of product, and satisfied customers tend to maintain their loyalty to the products or the same manufacturer.
- b. Quality of Service. The customers will be satisfied if they are able to obtain good services that are in accordance with their expectations.
- c. Emotional. The customers will be satisfied if they are praised due to their capability to afford expensive branded products.
- d. Price of Products. The customers will prefer the cheaper products with the similar quality of the expensive products.
- e. Cost of consumption. The customers will be satisfied if they do not have to pay the extra cost or requiring extra time to obtain the products and services.

2.2 Definition of Perception

Perception is one of the important psychological aspects for human in responding to the presence of various aspects and symptoms around them. Perception has a very broad sense that encompasses internal and external aspects. Some experts provide various definitions of the perception, although in principle their

suggested definitions have the similar meaning. According to the Great Dictionary of Indonesian Language, perception is a direct response (reception) to anything. It is the process for a person to observe and knowing objects or phenomena through their five basic senses (Wulan, 2015).

Jalaludin Rachmat (2007) argued that the perception is an observation about objects, events or relationships obtained through the process of information conclusion and messages interpretation. Meanwhile, Suharman (2005) argued: "perception is a process of interpretation of information that are obtained through the system of the human senses". He stated that there are three aspects of perception that are considered being relevant to the human cognition, namely the sensing process, pattern recognition, and attention.

Based on the explanation, the researchers concluded that the perception is a process that starts from the use of senses to form the response and reception in the human mind, which makes the human realize the presence of objects and phenomena around by using their five senses.

2.2.1 Factors that Influence the Perception

According Thoha Miftah (2003) in Asrori (2009), there are two main factors that influence the perception:

1. Internal factors: individual feelings, attitudes and personalities, prejudices, desires or expectations, attention (focus), learning process, physical condition, psychiatric disorders, values, needs, interests, and motivation.
2. External factors: family background, acquired information, knowledge and needs, intensity, size, vulnerability, repetition of motion, novelty and familiarity of the objects.

2.3 Definition of Green Building

According to Glavinich (2008), green building can be defined as follows: it is a planning and managing a construction project in accordance with the contract document in order to minimize the impact of the construction process on the environment. In other words, green building is a planning and design of the building through a process that focuses on the sustainable environment and the use of efficient resources throughout the life cycle of the building, starting from the site processing, design, construction, occupancy, maintenance, renovation and changes of building.

The term "green building (green construction)" is used as the efforts to construct the building by using the eco-friendly processes, efficient use of resources during the building's life cycle, starting from the process of planning, development, operation, maintenance, renovation and even in the process of building demolition (Glavinich, 2008).

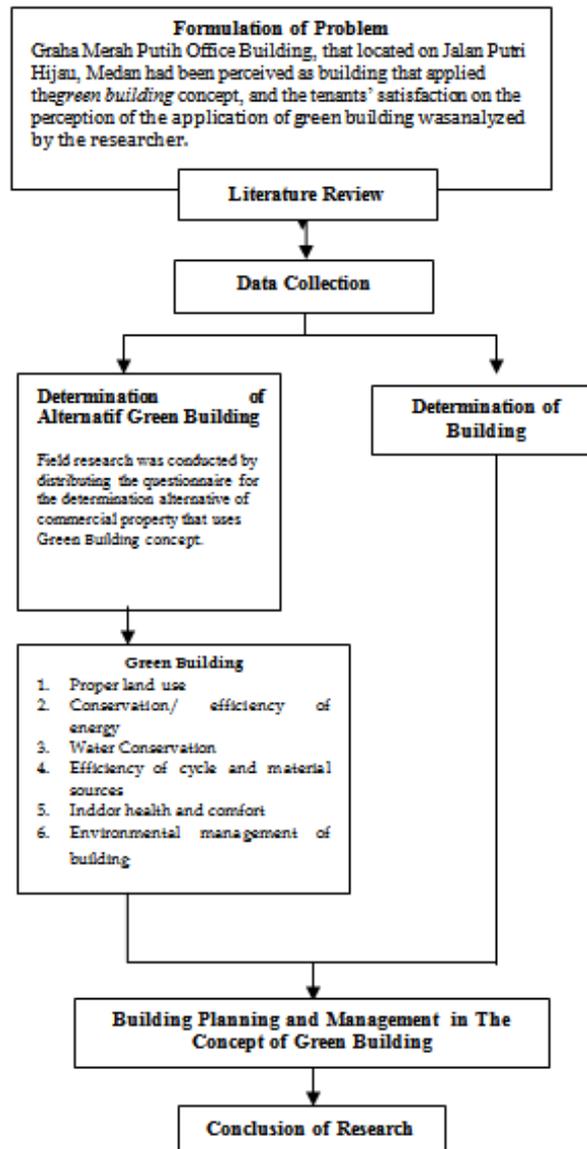
2.3. 1 Benefits of the Application of Green Building

The application of green building is generally required to:

- a. Overcoming the climate change
- b. Improving the quality of life
- c. Making the green building concept as the economically wise investment

2.4 Conceptual Framework of Research

In order to provide the direction and guidance, the researchers formulated the conceptual framework of research, which is aimed to conform the description and analysis with the formulation of problem of research.



III. Research Method

3.1 Type of Research

The type of this research is quantitative research, in which the phenomena that are observed by the researcher can be classified, relatively fixed, concrete, observable, measurable, and having cause and effect pattern. The collected data are analyzed by using statistics and econometrics, and therefore, the researchers are able to conclude the formulated hypothesis to be tested (Sugiyono 2010).

The researchers used inferential statistics that studied the technique of conclusion drawing from the whole population that based on data obtained from the sample. The econometrics can be defined as a quantitative analysis of real economic phenomena that based on the development of theory and observation associated with inference method (Suliyanto 2011).

3.2 Time and Location of Research

This research was conducted in Graha Merah Putih that located on Jalan Putri Hijau No. 1, West Medan. This research was conducted from June 2015 to October, 2015. The object of this research was a building owned by Telkom Group. Currently, Telkom Group through its subsidiary named Telkom Property runs office building leasing. Initially, Telkom Property applied conventional development system that used many room dividers, which required relatively higher electrical power for the room lightings system. Consequently, the indoor comfort will be decreased due to insufficiency ventilation system.

3.3 Population and Sample

Research population is a generalization area that consists of objects/ subjects that have certain qualities and characteristics, which are set by the researchers to be studied to draw the conclusions, while research sample is a significant part of the population (Sugiyono, 2010). The researchers involved all employees of tenants of Graha Merah Putih office building as the population of research. Graha Merah Putih office building is located on JalanPutri No. 1, West Medan, which leased by Bank Mandiri, Bank BRI, Coffee/Bean, Ericsson company, Telkomsel, BNI Bank, Indomaret, Common Wealth, Partner Power and Podomoro, in which the researchers involved their employees as the population of research, totaling 50 subjects.

Suharsimi (2010) stated that if the the subjects are less than 100 individuals, the researcher should prefer to involve all of them in a population research. Given the relatively small number of research populations (50 subjects), then the researchers conducted total sampling method to involve the entire population. Sample or Object in this research is an office building located on Jl. Putri Hijau No.1, Medan Barat with the area of building of 24,573 m². The size of its semi gross area was 13,200 m², which was 70% of the total green open space area and 30% of building physical area.

3.4 Technique of Data Collection

In order to obtain complete data of research object, then the researcher conducted:

1. Questionnaire
Questionnaire is a tool to collect the data of research that consists of a number of questions to be answered in writing form by the respondents (Sugiyono, 2010). In this research, the researchers distributed the questionnaire to the tenants of Graha Merah Putih office building, located on Jl. Putri Hijau, Medan.
2. Interview
Interview was directly conducted with the experts of the application of green building.
3. Documentation
Documentation is the process of collection of data that obtained from the written references, which includes of text books, magazines and other sources of references.

3.5 Type and Source of Data

The type of data in this research was cross section data. According to the theories of Sangaji and Sopiah (2010), cross section data is the data of objects collected at a certain time in order to describe certain situation and circumstances.

The data used in this research are:

1. Primary Data. Primary data were directly obtained from the respondents in the form of respondents' answers of the distributed questionnaire.
2. Secondary Data. Secondary data was aimed to support and complementing the primary data obtained from the documents of tenants such as the history of the establishment of tenants' companies, the number of employees, the type of business, and its operational scope, etc.

3.6 Aspects of Research

The aspects of this research that would be studied are described in Table 3.1.

Table 3.1: Aspects of Research

No	Topic	Indicator	Measurement
1	Appropriate site development	<ol style="list-style-type: none"> 1. Conformity with the design 2. Conformity with the appropriate site development 	<ol style="list-style-type: none"> 1. Appropriate site development – if the total score > the average score, then it will be considered in good category. 2. Appropriate site development – if the total score = the average score, then it will be considered in adequate category. 3. Appropriate site development - if the total score < the average score, then it will be considered in poor category. (Sugiyono,2010).
2	Conservation and efficiency of energy	<ol style="list-style-type: none"> 1. Energy/ power saving for lightning system 2. Energy/ power saving for air conditioning system 	<ol style="list-style-type: none"> 1. Conservation and efficiency of energy - if the total score > the average score, then it will be considered in good category. 2. Conservation and efficiency of energy - if the total score = the average score, then it will be considered in adequate category. 3. Conservation and efficiency of energy - if the total score < the average score, then it will be considered in poor category.
3	Water conservation	<ol style="list-style-type: none"> 1. Water saving in the use of toilet 2. Collecting rain water 	<ol style="list-style-type: none"> 1. Water conservation - if the total score > the average score, then it will be considered in good category. 2. Water conservation - if the total score = the average score, then it will be considered in adequate category. 3. Water conservation - if the total score < the average score, then it will be considered in poor&good category.
4	Cycle and source of	<ol style="list-style-type: none"> 1. Decoration 2. Material recycling 	<ol style="list-style-type: none"> 1. Cycle and source of material – if the total score > the average score,

	material		<p>then it will be considered in good category.</p> <p>2. Cycle and source of material – if the total score = the average score, then it will be considered in adequate category.</p> <p>3. Cycle and source of material – if the total score < the average score, then it will be considered in poor category.</p>
5	Indoor health and comfort	<p>1. Management of indoor air temperature</p> <p>2. Free smoking area</p>	<p>1. Health and comfort – if the total score > the average score, then it will be considered in good category.</p> <p>2. Health and comfort - if the total score = the average score, then it will be considered in adequate category.</p> <p>3. Health and comfort – if the total score < the average score, then it will be considered in poor category.</p>
6	Environmental management of building	<p>1. Management of surrounding environment</p> <p>2. Waste recycling</p>	<p>1. Environmental management – if the total score > the average score, then it will be considered in good category.</p> <p>2. Environmental management – if the total score = the average score, then it will be considered in adequate category.</p> <p>3. Environmental management – if the total score < the average score, then it will be considered in poor category.</p>

3.7 Technique of Data Analysis

The researchers conducted the following data analyses:

1. Descriptive Analysis. Descriptive Analysis is an analysis of data that is intended to descriptively describe the characteristics of research samples such as age, sex, education and duration of work as well as description of research variables
2. Multiple Linear Regression Analysis. Hypothesis was conducted by using Multiple Linear Regression in order to determine the influence of some independent variables on the dependent variables (Sugiyono, 2010):
 - a. F test

F-test was simultaneously used to determine the simulant effect of independent variable on dependent variable (change of allocation of land) with the following formula:

$$F = \frac{RJK_{reg}(b/a)}{RJK_{sisa}}$$

- b. t test

T-test was partially used to determine the partial influence of each independent variable on dependent variable (allocation of residential land into business area) with the following formula:

$$t = \frac{r_{xy} \sqrt{N-2}}{\sqrt{1-r_{xy}^2}}$$

- c. Regression Coefficient

Coefficient of R²Determination was aimed to measure the magnitude or significance of simultaneous effect of independent variable on the change of dependent variable. If R²obtained from the calculation was almost 1 (one) or 0≤R²≤1, the influence of the independent variable was more significant on the dependent variable. Conversely, if R²was almost zero, then the influence of independent variables on the dependent variable was insignificant.

- d. Equation of Regression

Equation of regression is expressed as follows:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + e$$

IV. Result and Discussion

4.1 Result

Perception on Appropriate Site Development

The perception of tenants on appropriate site development was measured by 4 items of questions with the following answer distributions:

Table 4.1: Perception of Respondents on Appropriate Site Development

No	Questions	Answers				
		TA	A	SA	D	STS
1	Environment based land selection	2 (4.0%)	1 (2.0%)	27 (54.0%)	20 (40.0%)	-
2	Utilization of used area	3 (6.0%)	25 (50.0%)	20 (40.0%)	1 (2.0%)	1 (2.0%)
3	Large building area to accommodate parking area	4 (8.0%)	28 (56.0%)	17 (34.0%)	1 (2.0%)	-
4	Green surrounding for natural green roof	5 (10.0%)	1 (2.0%)	18 (36.0%)	23 (46.0%)	3 (6.0%)

Source: The U.S. Green Building Council (USGBC), 1999

Table 4.1 shows that the majority of respondents (54.0%) slightly disagreed with the selection of environmentally-based building sites. It indicates that the respondents generally considered that the selection of building site was not based on environmental consideration, for example, inadequate number of trees around the building. Moreover, the majority of respondents (56.0%) agreed that the location of building on Jalan Putri Hijau, Medan had large area and spacious yard for parking facilities. The majority of respondents (46.0%) disagreed that the surrounding area of GMP building was adequately green for natural roof.

Perception on Conservation and Efficiency Energy

The perception of tenants on appropriate site development is measured by 4 items of questions with the following distribution of answers:

Table 4.2: Perception on Conservation and Efficiency Energy

No	Statements	Answers				
		TA	A	SD	D	STS
1	The use of energy saving energy equipments	2 (4.0%)	3 (6.0%)	18 (36.0%)	27 (54.0%)	-
2	The use of energy saving fluorescent lamps	2 (4.0%)	1 (2.0%)	20 (40.0%)	25 (50.0%)	2 (4.0%)
3	The use of Low-E glasses	4 (8.0%)	1 (2.0%)	18 (36.0%)	27 (54.0%)	-
4	Optimalization in the use of air conditioner	2 (4.0%)	3 (6.0%)	28 (56.0%)	17 (34.0%)	-

Source: The U.S. Green Building Council (USGBC), 1999

TA: Totally Agree

A: Agree

SD: Slightly Disagree

D: Disagree

Table 4.2 shows that the majority of respondents (54.0%) did not agree that GMP office building on Jalan Putri Hijau Medan used energy saving equipments. It means that respondents generally did not acknowledge that GMP office building on Jalan Putri Hijau GMP, Medan used low energy equipments. The majority of respondents (40.0%) did not agree that GMP office building used energy saving fluorescent lamps. It means that respondents generally did not acknowledge that GMP Office building on Jalan Putri Hijau Medan used energy saving lamp. The majority of respondents (54.0%) did not agree with the statement that the GMP Office building on Jalan Putri Hijau Medan used Low-E glasses. The majority of respondents (56.0%) disagreed that the GMP office building on Jalan Putri Hijau, Medan had been conducting optimalization of air conditioning system.

Perception on Water Conservation

The perception of tenants on water conservation (water conservatism) was measured by 2 items of questions with the following answers distribution:

Table 4.3: Perception of Respondents on Water Conservation

No	Statements	Answers				
		TA	A	SD	D	TD
1	The availability of water management	18 (36.0%)	25 (50.0%)	4 (8.0%)	2 (4.0%)	1 (2.0%)
2	The efficiency of water use	19 (38.0%)	26 (52.0%)	3 (6.0%)	2 (4.0%)	-

Source: The U.S. Green Building Council (USGBC), 1999

Table 4.3 shows that the majority of respondents (50.0%) agreed to the statement that water management was conducted in GMP office building on Jalan Putri Hijau Medan. It means that the water treatment and management was available in GMP office building on Jalan Putri Hijau, Medan. The majority of respondents (52.0%) agreed on the statement that the efficiency of water use was conducted in GMP office building on Jalan Putri Hijau, Medan. It means that the GMP Office Building on Jalan Putri Hijau, Medan had already conducted the efficiency of water use.

Perception on the Cycle and Material Resource

Perception of tenants on the cycle and material resources was measured by 4 items of questions with the following answer distributions:

Table 4.4: Perception of Respondents on the Cycle and Material Resources

No	Statements	Answers				
		TA	A	SD	D	TD
1	The use of light and natural materials	12 (24.0%)	15 (30.0%)	21 (42.0%)	1 (2.0%)	1 (2.0%)
2	The use of fly ash and concrete slag	6 (12.0%)	12 (24.0%)	28 (56.0%)	4 (8.0%)	0 (0.0%)
3	The use of local materials	12 (24.0%)	31 (62.0%)	5 (10.0%)	1 (2.0%)	1 (2.0%)
4	The use of innovation of technology in soundproofing	4 (8.0%)	17 (34.0%)	26 (52.0%)	2 (4.0%)	1 (2.0%)

Source: The U.S. Green Building Council (USGBC), 1999

TA: Totally Agree

A: Agree

SD: Slightly Disagree

D: Disagree

TD: Totally Disagree

Table 4.4 shows that the majority of respondents (42.0%) did not agree with the statement that GMP office on Jalan Putri Hijau Medan had used natural and light materials. This means that respondents generally acknowledged that GMP office building on Jalan Putri Hijau, Medan had not used natural and lightweight materials. The majority of respondents (56.0%) slightly disagreed with the statement that GMP office building on Jalan Putri Hijau, Medan had used fly ash and concrete slag. This means that the respondents generally did not acknowledged the use of fly ash and concrete slag in GMP office building on Jalan Putri Hijau, Medan. The majority of respondents (62%) agreed with the statement that GMP office building on Jalan Putri Hijau, Medan had used local materials. The majority of respondents (52.0%) disagreed that GMP office building on Jalan Putri Hijau Medan used innovation of technology in sound proofing system.

Perception on Indoor Health and Comfort

The perception of tenants on indoor health and comfort was measured by 4 items of questions with the following distribution of answers:

Table 4.5: Perception of Respondents on Indoor Health and Comfort

No	Questions	Answers				
		TA	A	SD	D	TD
1	The respondents feel comfort inside the building	9 (18.0%)	11 (22.0%)	25 (50.0%)	4 (8.0%)	1 (2.0%)
2	The building has adequate air control system to remove CO2	5 (10.0%)	12 (24.0%)	28 (56.0%)	3 (6.0%)	2 (4.0%)
3	The building has adequate air circulation system	12 (24.0%)	31 (62.0%)	5 (10.0%)	1 (2.0%)	1 (2.0%)
4	The building has specific smoking area and no-smoking signs in the rooms in the building	4 (8.0%)	17 (34.0%)	26 (52.0%)	2 (4.0%)	1 (2.0%)
5	The availability of fresh, clean and healthy air (free from CO2 and other chemical substances)	12 (24.0%)	15 (30.0%)	21 (42.0%)	1 (2.0%)	1 (2.0%)
6	The availability of windows with translucent glasses	6 (12.0%)	12 (24.0%)	28 (56.0%)	4 (8.0%)	0 (0.0%)
7	The building has good lightning system	12 (24.0%)	31 (62.0%)	5 (10.0%)	1 (2.0%)	1 (2.0%)
8	The building has cigarette smoking control	4 (8.0%)	17 (34.0%)	26 (52.0%)	2 (4.0%)	1 (2.0%)

Source: The U.S. Green Building Council (USGBC), 1999

Table 4.5 shows that the majority of respondents (50.0%) slightly disagreed with the statement that room temperature of building was comfortable. This means that respondents generally acknowledged that the room temperature in GMP office building on JalanPutriHijau Medan was not comfortable. The majority of respondents (56.0%) slightly disagreed with the statement that GMP office building on JalanPutriHijau, Medan had adequate air control. The majority of respondents agreed with the statement that the building had adequate air circulation system. The majority of respondents (52.0%) slightly disagreed with the statement that the building had specific smoking area and displaying smoking ban signs in the rooms of GMP office building on JalanPutriHijau, Medan. This means that respondents generally acknowledged that there were no smoking ban signs nor specific smoking area in GMP office building on JalanPutriHijau, Medan.

Perception of Respondents on Environmental Management of Building

The perception of tenants on the environmental management of the building was measured by 4 items of questions with the following answer distribution:

Table 4.6
Perception of Respondents on Environmental Management of Building

No	Questions	Answers				
		TA	A	SD	D	TD
1	The availability of integrated waste management	19 (38.0%)	28 (56.0%)	-	1 (2.0%)	2 (4.0%)
2	The availability of indoor waste sorting facilities (organic, inorganic and chemical)	21 (42.0%)	24 (48.0%)	1 (2.0%)	2 (4.0%)	2 (4.0%)

Source: The U.S. Green Building Council (USGBC), 1999

Table 4.6 shows that the majority of respondents (56.0%) agreed that Graha Merah Putih Office Building on Jalan Putri Hijau Medan had integrated waste management. The majority of respondents (48.0%) stated that the building had segregated indoor trash cans (organic, inorganic and chemical). The majority of respondents (50.0%) agreed that the Graha Merah Putih Office Building on Jalan Putri Hijau Medan had instructions and suggestion signs for the occupants to dispose the garbage in their specific places, and the majority of respondents (42.0%) agreed that Graha Merah Putih Office Building on Jalan Putri Hijau, Medan conducted green environment management. Thus it can be concluded that the respondents generally acknowledged that Graha Merah Putih Office Building on Jalan Putri Hijau Medan had good environmental building management.

Tenants' Satisfaction

Tenants' satisfaction as the dependent variable in this research was measured by 6 criteria of green building with the following distribution of answers:

Table 4.7: Frequency Distribution of Respondents' Answers on Tenants' Satisfaction

No	Criteria of Green building	Answers				
		TS	S	SU	U	TU
1	Tenants are satisfied with the applied appropriate site management	2 (4.0%)	1 (2.0%)	27 (54.0%)	20 (40.0%)	-
2	Tenants are satisfied with the applied system of conservation and efficiency of energy	4 (8.0%)	1 (2.0%)	18 (36.0%)	27 (54.0%)	-
3	Tenants are satisfied with the applied water conservation method	18 (36.0%)	25 (50.0%)	4 (8.0%)	2 (4.0%)	1 (2.0%)
4	Tenants are satisfied with the cycle and material resources	12 (24.0%)	15 (30.0%)	21 (42.0%)	1 (2.0%)	1 (2.0%)
5	Tenants are satisfied with building indoor health and comfort	9 (18.0%)	11 (22.0%)	25 (50.0%)	4 (8.0%)	1 (2.0%)
6	Tenants are satisfied with building environment spacing	20 (40.0%)	21 (42.0%)	5 (10.0%)	4 (8.0%)	-

Source: The U.S. Green Building Council (USGBC), 1999Note:

- TS: Totally Satisfied
- S: Satisfied
- SU: Slightly Unsatisfied
- U: Unsatisfied
- TU: Totally Unsatisfied

Table 4.7 shows that the majority of respondents (54.0%) were slightly unsatisfied with the land use applied by GMP Office building on Jalan Putri Hijau, Medan. The majority of respondents (54.0%) were not satisfied with the conservation and efficiency of energy applied by GMP Office building on Jalan Putri Hijau, Medan. The majority of respondents (50.0%) were satisfied with the water conservation applied by GMP Office

building located on Jalan Putri Hijau, Medan. The majority of respondents (42.0%) were slightlyunsatisfied with cycle and material resources. The majority of respondents (50.%) were slightly unsatisfied with the quality of indoor health and comfort in GMP Office Building on Jalan Putri Hijau, Medan. The majority of respondents (42.0%) were satisfied with environmental building spacing in GMP Office Building on Jalan Putri Hijau Medan.

Simultaneous F-Test

F test was simultaneously conducted by the researchers to determine whether or not the 5 independent variables: X₁ (Appropriate land use/ site development). X₂ (conservation and efficiency of energy), X₃ (water conservation), X₄ (cycle and material source). X₅ (indoor health and comfort) and building environmental management (X₆) gave the influence to the dependent variable Y (tenants' satisfaction).

Table 4.8: Result of Simultaneous F-test

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	123.972	6	20.662	19.336	.000 ^a
	Residual	45.948	43	1.069		
	Total	169.920	49			

a. Predictors: (Constant), X₆, X₅, X₂, X₃, X₁, X₄

b. Dependent Variable: Y

Source: Result of Simultaneous F-test

Table 4.8 shows that the value of F_{-value} = 19.336 with the value of significance (p-value) = 0.000. When compared with the value of F_{-table} = 2.46 (for N = 50 or df = 43), it can be seen that F_{-value} (19.336) > F_{-table} (2.46) and sig-p (0.000) < 0.05, therefore the researchers concluded that 6 independent variables: X₁ (appropriate site development), X₂ (conservation and efficiency of energy), X₃ (water conservation), X₄ (cycle and material resources), X₅ (indoor health and comfort) and also X₆ (building environmental management) simultaneously give a positive influence on the dependent variable Y (tenants' satisfaction).

Result of Partial t-Test

In order to determine the effect of each independent variable on dependent variable Y (tenants' satisfaction), then the researchers conducted partial t-test with the following result:

Table 4.9: Hasil Uji-t Secara Parsial

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.979	3.434		.576	.568
	X1	.397	.188	.449	2.112	.041
	X2	.167	.080	.195	2.084	.043
	X3	.517	.182	.392	2.836	.007
	X4	.394	.187	.449	2.104	.041
	X5	.214	.100	.211	2.146	.038
	X6	.277	.095	.336	2.928	.005

a. Dependent Variable: Y

Source: Result of Data Processing of Partial t-Test

The Effect of Appropriate Site Development (X₁) on Tenants' Satisfaction (Y)

Table 4.9 shows that the value of t_{-value} of X₁ (appropriate site development) = 2.112 with the significance (p-value) of 0.041. When compared with the value of t_{-table} (N = 50 or df = 37) of 1.96 (obtained from the table list of t-test (see the attachment) and sig-α = 0.05, then we could find that t_{-value} X₁ (2.112) > t_{-table} (1.96) and p-value (0.005) < 0.05 The results of this analysis meet the requirements of hypothesis testing, in which if t_{-value} > t_{-table} and p-value < 0.05, then H_a is accepted or H_o is rejected. Therefore, the researchers conclude that variable of X₁ (Appropriate Land Use/ Development Site) partially affect dependent variable Y (tenants' satisfaction).

The Effect of Perception of Tenants/Respondents on Conservation and efficiency of energy(X₂) on Tenants' Satisfaction (Y)

Table 4.9 shows that the value of t_{value} of X₂ (Conservation and efficiency of energy) is 2.084 with its significance (p-value) of 0.043. When compared with the value of t_{table} (N = 50 or df = 37) of 1.96 (obtained from the table of t_{table} (see the attachment) and $\text{sig-}\alpha = 0.05$, it can be seen that t_{value} of X₂ (2.084) > t_{table} (1.96) and p-value (0.043) < 0.05. The result of this analysis meets the requirements of hypothesis testing, in which $t_{\text{value}} > t_{\text{table}}$ and p-value < 0.05, and it means that H_a is accepted or H_o is rejected. Therefore, the researchers conclude that variable X₂ (conservation and efficiency of energy) partially affects the dependent variable Y (tenants' satisfaction).

The Effect of Perception of Water Conservation (X₃) on Tenants' Satisfaction (Y)

Table 4.9 shows that the value of t_{value} of X₃ (Water conservation) is 2.836 with its significance (p-value) of 0.007. If compared with the value of t_{table} (N = 50 or df = 37) of 1.96 (obtained from the table of t_{table} (see the attachment) and $\text{sig-}\alpha = 0.05$, then it is revealed that t_{value} of X₃ (2.836) > t_{table} (1.96) and p-value (0.007) < 0.05. The result of this analysis meets the requirements of hypothesis testing, in which if $t_{\text{hitung}} > t_{\text{table}}$ and p-value < 0.05, and it means that H_a is accepted or H_o is rejected. Therefore, the researchers concludes that variable X₃ (water conservation) partially affects the dependent variable Y (tenants' satisfaction).

The Effect of Perception of Cycle and Material Resources (X₄) on Tenants' satisfaction (Y)

Table 4.9 shows that the value of t_{value} of X₄ (Cycle and Material Resources) is 2.104 with its significance (p-value) of 0.041. If compared with the value of t_{table} (N = 50 or df = 37) of 1.96 (obtained from the table of t_{table} (see the attachment) and $\text{sig-}\alpha = 0.05$, then it is revealed that t_{value} of X₄ (2.104) > t_{table} (1.96) and p-value (0.041) < 0.05. The result of this analysis meets the requirements of hypothesis testing, in which if $t_{\text{hitung}} > t_{\text{table}}$ and p-value < 0.05, and it means that H_a is accepted or H_o is rejected. Therefore, the researchers concludes that variable X₄ (Cycle and Material Resource) partially affects the dependent variable Y (tenants' satisfaction).

The Effect of Perception of Indoor Health and Comfort (X₅) on Tenants' Satisfaction (Y)

Table 4.9 shows that the value of t_{value} of X₅ (Indoor Health and Comfort) is 2.146 with its significance (p-value) of 0.038. If compared with the value of t_{table} (N = 50 or df = 37) of 1.96 (obtained from the table of t_{table} (see the attachment) and $\text{sig-}\alpha = 0.05$, then it is revealed that t_{value} of X₅ (2.146) > t_{table} (1.96) and p-value (0.038) < 0.05. The result of this analysis meets the requirements of hypothesis testing, in which if $t_{\text{hitung}} > t_{\text{table}}$ and p-value < 0.05, and it means that H_a is accepted or H_o is rejected. Therefore, the researchers concludes that variable X₅ (indoor health and comfort) partially affects the dependent variable Y (tenants' satisfaction).

The Effect of Perception of Building Environmental Management (X₆) on Tenants' Satisfaction (Y)

Table 4.9 shows that the value of t_{value} of X₆ (Building Environmental Management) is 2.928 with its significance (p-value) of 0.005. If compared with the value of t_{table} (N = 50 or df = 37) of 1.96 (obtained from the table of t_{table} (see the attachment) and $\text{sig-}\alpha = 0.05$, then it is revealed that t_{value} of X₆ (2.928) > t_{table} (1.96) and p-value (0.005) < 0.05. The result of this analysis meets the requirements of hypothesis testing, in which if $t_{\text{hitung}} > t_{\text{table}}$ and p-value < 0.05, and it means that H_a is accepted or H_o is rejected. Therefore, the researchers concludes that variable X₆ (building environmental management) partially affects the dependent variable Y (tenants' satisfaction).

Result of R Determination Test

In order to determine the significance of the effect of 6 independent variables on the dependent variable Y (tenants' satisfaction), then the researchers conducted R determination test with the following results:

Table 4.10: Result of R Determination Test

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.854 ^a	.730	.692	1.03371

a. Predictors: (Constant), X₆, X₅, X₂, X₃, X₁, X₄

b. Dependent Variable: Y

Source: Result of Data Processing of R Determination Test

Table 4.10 shows that the value of adjusted $r_{\text{-square}}$ is 0.692, and this means the significance of the effect of independent variables on the dependent variable Y (the tenants' satisfaction is $0.692 \times 100\% = 69.2\%$.) In other words, 69.2% of tenants' satisfaction variable can be explained 5 independent variables (appropriate land use/ site development, conservation and efficiency of energy, water conservation, cycles and material resources, and indoor health and comfort), and the remaining percentage of tenants' satisfaction (30.8%) can be explained by other factors.

4.2 Discussion

Analysis of Tenants' Satisfaction That Based on Their Perception on Appropriate Land Use/ Site Development

The result of descriptive analysis proves that the majority of respondents (54%) were slightly unsatisfied with the application of appropriate land use/ site development conducted by Graha Merah Putih Office Building on Jalan Putri Hijau Medan, and 42% of respondents were satisfied with the office building environmental spacing in GMP office building on Jalan Putri Hijau, Medan, which was based on the 6 existing criteria. This shows that there is a linear relationship between the tenants' perception on the application of appropriate land use/ site development in GMP Medan office building and their satisfaction. In other words, better perception on the application of appropriate site development could increase the tenants' satisfaction. Similar result is also obtained from quantitative analysis, in which appropriate land use/ site development significantly affects the tenants' satisfaction, which is indicated by $t_{\text{-value}}$ of X_1 ($2.112 > t_{\text{-table}}$ (1.96) and $p\text{-value}$ ($0.005 < 0.05$).

Analysis of Tenants' Satisfaction That Based on Their Perception on Conservation and efficiency of energy

The result of descriptive analysis proves that the majority of respondents (68%) had poor perception on the application of conservation and efficiency of energy conducted in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan, that based on 6 existing criteria. It shows that there is a correlation between perception of tenants on the application of conservation and efficiency of energy and the their satisfaction in GMP office building on Jalan Putri Hijau, Medan. In other words, better perception of tenants on the application of conservation and efficiency of energy could increase the tenants' satisfaction. Similar result is also obtained from quantitative analysis that indicates that conservation and efficiency of energy significantly affects the tenants' satisfaction, which is indicated by $t_{\text{-value}}$ of X_2 ($2.084 > t_{\text{-table}}$ (1.96) and $p\text{-value}$ ($0.043 < 0.05$).

Analysis of Tenants' Satisfaction That Based on Their Perception on Water Conservation

The result of descriptive analysis proves that the majority of respondents (42,0%) had good perception on the application of water conservation conducted in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan, and the majority of respondents (62%) stated that they were slightly unsatisfied with GMP office building on Jalan Putri Hijau, Medan, that based on 6 existing criteria. It shows that there is a correlation between perception of tenants on the application of water conservation and the their satisfaction in GMP office building on Jalan Putri Hijau, Medan. In other words, better perception of tenants on the application of water conservation could increase the tenants' satisfaction. Similar result is also obtained from quantitative analysis that indicates that water conservation significantly affects the tenants' satisfaction, which is indicated by $t_{\text{-value}}$ of X_3 ($2.836 > t_{\text{-table}}$ (1.96) and $p\text{-value}$ ($0.007 < 0.05$).

Analysis of Tenants' Satisfaction That Based on Their Perception on Cycle and Material Resources

The result of descriptive analysis proves that the majority of respondents (60,0%) had poor perception on cycle and material resources in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan, and the majority of respondents (62,0%) stated that they were slightly unsatisfied with GMP office building on Jalan Putri Hijau, Medan, which was based on 6 existing criteria. It shows that there is a correlation between perception of tenants on the criteria of cycle and material resources and the their satisfaction. In other words, better perception of tenants on the application of criteria of cycle and material resources could increase the tenants' satisfaction. Similar result is also obtained from quantitative analysis that indicates that the variable of cycle and material resources significantly affects the tenants' satisfaction, which is indicated by $t_{\text{-value}}$ of X_4 ($2.104 > t_{\text{-table}}$ (1.96) and $p\text{-value}$ ($0.041 < 0.05$).

Analysis of Tenants' Satisfaction That Based on Their Perception on Indoor Health and Comfort

The result of descriptive analysis proves that half of the total respondents (50,0%) had poor perception on indoor health and comfort in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan, and the majority of respondents (62,0%) stated that they were slightly unsatisfied with GMP office building on Jalan Putri Hijau, Medan, which was based on 6 existing criteria. It shows that there is a correlation between

perception of tenants on the criteria of indoor health and comfort and the their satisfaction. In other words, better perception of tenants on the criteria of indoor health and comfort could increase the tenants' satisfaction. Similar result is also obtained from quantitative analysis that indicates that the variable of indoor health and comfort significantly affects the tenants' satisfaction, which is indicated by $t_{\text{value}} \text{ of } X_5 (2.146) > t_{\text{table}} (1.96)$ and $p\text{-value} (0.038) < 0.05$.

Analysis of Tenants' Satisfaction That Based on Their Perception on Building Environmental Management

The result of descriptive analysis proves that the majority of respondents (58,0%) had good perception on building environmental management conducted in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan, and the majority of respondents (62,0%) also stated that they were slightly unsatisfied with the GMP office building on Jalan Putri Hijau, Medan, which was based on 6 existing criteria. It shows that there is a correlation between perception of criteria of environmental building management and the their satisfaction. In other words, better perception of tenants on the criteria of environmental building management could increase the tenants' satisfaction. Similar result is also obtained from quantitative analysis that indicates that the variable of environmental building management significantly affects the tenants' satisfaction, which is indicated by $t_{\text{value}} \text{ of } X_6 (2.928) > t_{\text{table}} (1.96)$ and $p\text{-value} (0.005) < 0.05$.

V. Conclusion and Suggestions

Conclusion

Based on the results of data analysis on the effect of appropriate site development, conservation and efficiency of energy, water conservation, cycles and material resources, indoor health and comfort in space, and personal competence on satisfaction of tenants in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan, it could be concluded that:

1. Most of the respondents had perception that the application of appropriate land use/ site development in Graha Merah Putih Office Building on Jalan Putri Hijau Medan was not optimal, and the majority of respondents (62%) stated that they were slightly unsatisfied with GMP Office building on Jalan Putri Hijau Medan that based on the 6 existing criteria. Factor of appropriate site development could significant affect the satisfaction of tenants in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan.
2. Most of the respondents had poor perception on the application of conservation and efficiency of energy conducted in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan, and the majority of respondents (62%) stated that they were slightly unsatisfied with GMP Office building on Jalan Putri Hijau, Medan that based on the 6 existing criteria. Factors of conservation and efficiency of energy could significant affect the satisfaction of tenants in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan.
3. Most of the respondents had good perception on the application of water conservation conducted in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan, and the majority of respondents (62%) stated that they were slightly unsatisfied with GMP Office building on Jalan Putri Hijau, Medan that based on the 6 existing criteria. Factor of water conservation could partially affect the satisfaction of tenants in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan.
4. Most of the respondents had poor perception on cycle and material resources in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan, and the majority of respondents (62%) stated that they were slightly unsatisfied with GMP Office building on Jalan Putri Hijau, Medan that based on the 6 existing criteria. Factors of cycle and material resources could partially affect the satisfaction of tenants in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan.
5. Most of the respondents had poor perception indoor health and comfort in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan, and the majority of respondents (62%) stated that they were slightly unsatisfied with GMP Office building on Jalan Putri Hijau, Medan that based on the 6 existing criteria. Factor of indoor health and comfort could partially affects the satisfaction of tenants in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan.
6. Most of the respondents had good perception on the building environmental management conducted in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan, and the majority of respondents (62%) stated that they were slightly unsatisfied with GMP Office building on Jalan Putri Hijau, Medan that based on the 6 existing criteria. Factor of building environmental management could significantly affects the satisfaction of tenants in Graha Merah Putih Office Building on Jalan Putri Hijau, Medan.
7. Factors of appropriate site development, conservation and efficiency of energy, water conservation, cycles and material resources and indoor health and comfort simultaneously affect the satisfaction of tenants in Graha Merah Putih Office Building located on Jalan Putri Hijau Medan. Among 6 variables, the most

prominent indicators of tenants' satisfaction are energy efficiency, water efficiency and comfort of indoor temperature.

8. Poor quality of spatial design such as poor air conditioning and lighting system in Graha Merah Putih Office Building that located on Jalan Putri Hijau, Medan caused high level of tenants complaint and dissatisfaction. This condition should be resolved in order to improve the satisfaction of tenants.

Suggestions

Due to the limitations of this research, the researchers provide the following suggestions for further researches:

The researchers suggested that Graha Merah Putih Office Building Office on Jalan Putri Hijau, Medan should be able to improve the quality of employees training programs relating to the improvement of quality of land use/ site development and personal competences in order to increase the satisfaction of tenants.

The researchers also suggested that the employees of Graha Merah Putih Office Building that located on Jalan Putri Hijau Medan should be able to improve the quality of personal human resources by joining the education and training programs in order to increase the tenant's satisfaction through the improvement of quality of land use and personal competency.

It is required to make a policy of the reduction of number of vehicles that involves several measures to reduce the number and the use of private vehicles through the provision of public feeder bus and passenger vouchers to use public transportation.

The researchers suggest the future researchers to add research scales including the number of research sample in order to produce more accurate research results.

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