

Green User and Green Buyer as Supporters for the Achievement of Green Buildings: A Review

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ABSTRACT

This paper reviews studies on Green User and Green Buyer as the supporting aspects to achieve Sustainable Development Goals (SDGs) through Green Building implementation, especially SDGs number 11 (Sustainable Cities and Communities). This paper focuses on previous studies that have been conducted on the factors that initiate Green Buyer candidates to buy green investments as the way to understand the correlation between the Green Users and Green Buyers. The development concept of Green Building involves multidisciplinary concern since it needs more than design and technology. In addition to reducing the environmental impacts, one of the main objectives of Green Buildings is to improve the quality of life of its users. Therefore, Green Buildings also require Green Users to be able to achieve sustainability. Previous studies have found that Green Building can nurture Green Users, and Green Users will eventually become Green Buyers. Green Buyers in an architectural context may refer to people who buy Green Residential Properties. The correlations were developed through reviewing several studies about Green Building, Green User, and Green Buyer in general. Several studies have also been conducted to classify the factors that influence a Green Buyer to purchase Green Residential Property, which is generally affected by the advantages offered by the concept of Green Buildings. As a result, correlations between the Green User, Green Buyer, and Green Building are synthesized. This paper may help readers to provide new insights into the relationship between Green Buildings and their users.

Keywords: *Green User, Green Buyer, Green Building, Green Residential Property, Sustainable Development Goals (SDGs)*

1. INTRODUCTION

In recent years, the concept of green building, also known as sustainable building has become one of the common interests in various scientific disciplines [1]. In addition to reducing environmental impacts, one of the main objectives in building "green" buildings is to improve the quality of life of its users [2]. Problems in green buildings in an effort to minimize environmental impact is not because of the wrong design and technology, but because in reality that the behaviour of building users also contributes greatly to the success of a green building. This is as stated by Xie (2017) [3], "Buildings do not use energy, but people do". In other words, green buildings also need green users to achieve sustainability. Several problems are found in realizing a green building, one of which is green building strategies that are not well-communicated to its users, as stated in the International Green Building Conference in 2013 [53].

Buyer's concern for green issues is now a subject that continually changes their behaviour to become more environmentally responsible [4]. Buyers in the architectural context, for example in buying a residential property or

apartment unit are now also encouraged to prioritize environmentally friendly aspects in choosing it.

In this paper, several studies have been conducted to classify the factors that influence a Green Buyer to purchase Green Residential Property in Indonesia, especially in Jakarta, which is generally affected by the advantages offered by the concept of Green Buildings.

As a result, correlations between the Green User, Green Buyer and Green Building are synthesized. This paper may help readers to provide new insights about the relationship between Green Buildings and their users.

The literatures discussed in this paper will later be developed and further research will be conducted in the field, specifically green buildings in Jakarta.

The method used in this paper is to review some literatures related to green building, green user, and green buyer which are then elaborated.

2. BACKGROUND

2.1. Green Building

Mohamad et al. [5] stated that green buildings are more preferred compared to conventional buildings because they consume less natural resources, such as energy, water, wood, and so on. Green buildings are also defined as new, old, or newly renovated buildings that are certified, or plan to be certified, by an authorized green building institution, or designed, built, maintained, or renovated in accordance with established guidelines, and will lead to sustainability (Wu , 2017)[6].

Green Buildings also have been defined as buildings that were designed to reduce impact on natural environment and on the occupant (Zigenfus, 2008) [7].

The word "green" is an abstract concept that requires the terms of sustainability, ecology, and building performance. Although there is a close relationship, each category remains independent and mutually exclusive (Attman, 2010) [8]. The theme of green building can be seen from a variety of scientific disciplines and currently becomes a broad topic, so that green building researchers will benefit from basic knowledge of environmental education or sustainability, and science to understand what and why to design green buildings, and ultimately how to engage in implementing a green building (Cole, 2019)[9].

Basic Green Building Principles

One of the current basic strategies is the implementation of green buildings which aims to reduce the environmental impact of building. (Isopescu, 2018) [10]. According to several sources, there are five basic principles in planning a green architecture building, such as Conserving Energy, Working with Climate, Minimizing New Resources, Respect for Site, and Respect for User as follows:

Table 1 Basic Green Building Principles

No.	Basic Principles	Descriptions	References
1	<i>Conserving Energy</i>	Reducing the energy consumption needed to extract, process, transport, material, and operate buildings	Brenda & Vale (1996), Sudarwani (2012).
2	<i>Working with Climate</i>	Utilizing conditions and natural energy sources	Brenda & Vale (1996), Siahaan (2017)

No.	Basic Principles	Descriptions	References
3	<i>Minimizing New Resources</i>	Optimizing existing materials by minimizing the use of new materials that can be reused	Siahaan (2017) & Nugroho (2011)
4	<i>Respect for Site</i>	Responding to the state of the site of the building	Siahaan (2017) & Nugroho (2011)
5	<i>Respect for User</i>	Paying attention to building users who are closely related to the building	Siahaan (2017) & Sudarwani (2012).

Sources: Brenda & Vale (1996), Sudarwani (2012), Siahaan (2017), Nugroho (2011) [11, 12, 13, & 14]

Vezolli and Manzini (2008) [15] in their book entitled "Design for Environmental Sustainability" also mentioned several building criteria that support the realization of a sustainable environment and also stated by Hidayat (2017) [16], including Minimizing Material Consumption, Minimizing Energy Consumption, Renewable and Bio-compatible Resources, Minimizing Toxic Emissions, Optimization of Product Lifespan, Improving Lifespan of Materials, and Design for Disassembly as follows:

Table 2 Building Criteria that Support Sustainable Environment

No.	Criteria	Descriptions	References
1	<i>Minimizing Material Consumption</i>	Aims to minimize the use of non-renewable materials.	Vezolli & Manzini (2008), Hidayat (2017)
2	<i>Minimizing Energy Consumption</i>	Energy efficiency in order to reduce environmental impacts	Vezolli & Manzini (2008), Hidayat (2017)
3	<i>Renewable and Bio-compatible Resources</i>	Maximize the use of materials that have been used with recycled content	Vezolli & Manzini (2008), Hidayat (2017)

4	<i>Minimizing Toxic Emissions</i>	Selecting materials and energy resources that are not harmful to the environment	Vezolli & Manzini (2008), Hidayat (2017)
5	<i>Optimization of Product Lifespan</i>	Optimizing product usability through reliable and adaptive design	Vezolli & Manzini (2008), Hidayat (2017)
6	<i>Improving Lifespan of Materials</i>	Increase material life by choosing and using it efficiently	Vezolli & Manzini (2008), Hidayat (2017)
7	<i>Design for Disassembly</i>	Designing buildings that are easy to re-use, both functional and material	Vezolli & Manzini (2008), Hidayat (2017)

Sources: Vezolli & Manzini (2008), Hidayat (2017) [15, 16]

Green Building Standardization

To realize a green building, a standard or benchmark is needed that can be used as a guide in designing and measuring the level of greenness of a building or environment (Nugroho, 2011) [14]. The results of this measurement are in the form of recognition of building greenness through a green certificate agency for buildings that pass the assessment. There are several green building measurement standards in several countries, for example BREEAM (Building Research Establishment's Environmental Assessment Method) which is a standard for buildings in the UK that includes 10 aspects, namely energy, management, health and quality of life, transportation, water, material, waste, land use, pollution and ecology. Another example of green building measurement standards is LEED (Leadership in Energy and Environmental Design) issued by the United States Green Building Council (USGBC) in 1998, with the main parameters of Sustainable Sites / Locations, Water Efficiency, Energy and Atmosphere, Materials and Sources Power, Indoor Environmental Quality, Design Innovation, and Regional Priorities.

Green building appraisal standards are also found in Australia called GREEN STAR, which was issued by the Green Building Council of Australia (GBCA) in 2002 in the categories of assessment: Management, Energy, Water, Land Use and the Environment, Environmental Quality in the Interior, Transportation, Materials, and Emissions.

Green criteria on buildings in Indonesia are expected to refer to the Indonesian climate, which is tropical humid. Tropical architecture is an architectural work that can overcome the problems caused by tropical climate through an architectural design. The design must be able to be a solution of problems around the weather, air temperature, humidity, or wind speed (Karyono, 2000) [17].

Following in the footsteps of several countries that have issued green building standards, Indonesia was finally formed by the Indonesian Green Building Council (GBCI) in 2009 and registered as a member of the World Green Building Council based in Canada (Nugroho, 2011) [14]. The rating system compiled by GBCI is divided into two building categories, namely New Buildings and Existing Buildings. GREENSHIP, like other green building appraisal tools, is trying to meet local local interests. GREENSHIP is divided into six aspects, including: Appropriate Land Use, Energy & Refrigerant Efficiency, Water Conservation, Material Sources & Cycles, Air Quality & Air Comfort, and Building Environmental Management. Each aspect has a credit with a certain value charge that will be obtained to determine the valuation.

There are some visible differences between the standardization of green buildings BREEAM, LEED, and GBCA with standardization in Indonesia.

The table below shows that several aspects were assessed by four green building standards, including energy efficiency, water conservation, and materials. While other aspects are seen in some standardization. The table below also shows that GBCI is a combination of BREEAM, LEED, and GBCA (see Table 2.):

Table 3. Green Building Standardizations

BREEAM	LEED	GBCA	GBCI
1. Energy	1. Sustainable Sites / Locations	1. Energy	1. Land Use
2. Management	2. Water Efficiency	2. Water	2. Energy Efficiency
3. Health & Quality of Life	3. Energy and Atmosphere	3. Land Use & Environment	3. Water Conservation
4. Transportation	4. Materials and Resources	4. Indoor Environmental Quality (IEQ)	4. Material Sources & Cycles
5. Water	5. Indoor Environmental Quality	5. Transportation	5. Air Quality & Comfort
6. Material	6. Design Innovation	6. Material	6. Building Environmental Management
7. Waste	7. Regional Priorities	7. Emissions	
8. Pollution			
9. Ecology			

2.3. Green User

Green User, or often also called Green Occupant. Green building users are educated or accustomed to doing green activities, such as conserving water, minimizing energy use in buildings, and so on. According to USGBC in 2016 [18], building users are divided into 2 types, namely regular building occupants (full-time occupants who spend 40 hours per week in buildings and part-time occupants), for example apartment dwellers, hotel tenants, full-time workers / part-time; and building visitors, such as retail customers, restaurants, educational students other than boarders.

Green User Parameters

There are several parameters of green user behaviour based on: (1) Behaviour Type, (2) Level of influence, and (3) Its role in buildings (Ones & Dilchert, 2012) [19] Ones & Dilchert's research (2012) [19], has mapped the types of green behaviour to add perspective on the behaviour, compared with other sources, gave examples of green behaviour of users in green buildings. These types of green behaviour are grouped according to their level of urgency and elaborate them with similar researches:

Table 4. Types of Green User Behavior

Category	Subcategory of Behaviour	Level of Urgency	Examples
Conserving	Recycling	Important & Critical	Recycle paper, bottles, ...
	Reusing		Reusing disposable products, food products, papers.
	Reducing	Important & Critical	Turn off the light, print a two-sided document.
Avoid losses	Pollution	Important & Critical	Prevent and reduce pollution by using public transportation
	Monitoring environmental impacts	Important but not critical	Monitor emissions released from

			building operations
Transforming	Choosing alternatives that are more environmentally friendly	Important but not critical	Buy and use environmentally friendly products.
Giving Influence	Educating and training others to behave in a sustainable manner	Important but not critical	Hire a continuing education coordinator to share advice on overcoming pollution in the work environment
Taking the Initiative	Starting and planning programs and policies	Important and critical	Start a new environmental program, take initiative to act environmentally friendly
	Prioritizing Environmental Interest	Important and critical	Reducing the use of Air Conditioning (AC)

According to Homburg and Stolberg (2006) [20], green user behaviour can be divided into 2, there are direct and indirect. This is because user motivation varies according to the type of behaviour they adopt (Ciocirlan, 2016; Manika et al., 2015; Ones & Dilchert, 2012) [21, 22, 19]. Homburg and Stolberg (2006) [20] also say that the direct influence significantly involves environmental problems by example reducing the energy consumption they use, while the indirect effect on the environment involves other organizational members to adopt environmentally friendly behaviour.

2.4. Green Behaviour

Green behaviour can be defined as actions and behaviours that involve users, relate and contribute to environmental sustainability (Ones & Dilchert, 2012) [19]. There is a reciprocal relationship between humans and their built environment, that the built environment influences a person's behaviour and vice versa, a person's behaviour can

also affect the built environment (Windley & McClure, 2011) [23].

Sustainability means considering environmental, economic, and social impacts. These three interrelated domains are often called the three pillars of sustainability (Elkington, 1997) [24]. The economic and environmental pillars are generally well defined and understood by many people, while the social pillars are not so (Colantonio, 2007) [25]. The term extends from social, can include personal responsibility, quality of life, health, well-being and happiness, democratic participation, and cooperative behaviour (Polesse and Stren, 2000; Baines and Morgan, 2004; Sinner et al., 2004; Colantonio, 2007) [26, 27, 28, 25]. The importance of these three pillars, it is very important to develop sustainable development, which means an effort to meet the needs of the present without compromising the fulfillment of future needs (WCED, 1987).

2.5. Green Buyer

Green Buyer is defined as someone who already has an awareness of environmental care and a willingness to spend more money to be more environmentally friendly. Green Buyers are also often referred to as Green Consumers.

Green Buying can be defined as the purchase and consumption of products that are environmentally friendly (Mainieri et al., 1997) [29]. The term purchasing behaviour used refers to the purchase of individuals, consumers, and households who buy goods and services for personal consumption (Armstrong and Kotler, 2003) [30]. Several studies have shown that there is a positive relationship between environmental awareness and green buying behaviour (Arbuthnot & Lingg, 1975) [31]. Previous research shows that consumers are price sensitive when it comes to buying green products (Mandese, 1991) [32]. However, the desire of consumers to spend more money for products that are more environmentally friendly, does not always indicate an environmentally friendly purchasing behaviour. For example, consumers who recycle waste might not want to buy products made from recycled materials. Pickett-Baker & Ozaki (2008) [33] suggested that someone who cares about the environment does not have to buy environmentally friendly products. To find out the behaviour of green buyers, several models have been used to develop a conceptual framework, which is classified as shown below (Eze & Ndubisi, 2013) [34]:

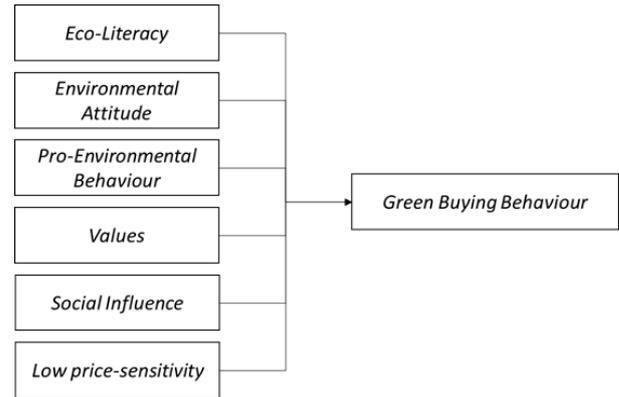


Figure 1. Framework Model for Green Buying Behavior
Source: Eze & Ndubisi (2013) [34]

The framework model above shows that there are six compilers of the formation of Green Buyer behaviour, including eco-literacy, environmental attitude, pro-environmental behaviour, values, social influence, and low price-sensitivity. Eco-literacy is the capacity to understand and interpret environmental system conditions and to take appropriate actions in maintaining, restoring and improving environmental conditions (Disinger & Roth, 1992) [35]. Environmental attitude is defined as an individual's assessment of environmental protection (Lee, 2008) [36]. Pro-environmental behaviour is an awareness behaviour to try to reduce the negative impact of one's actions on nature and the built environment (Kollmuss and Agyeman, 2002) [37]. The term Value in this context represents personal values that can enable a person to engage in green buying behaviour. Social Influence or social influence is a condition where someone adjusts their expectations to receive information obtained from others (Deutsch & Gerard, 1955) [38]. According to Grupta and Ogden (2009) [39], some green consumers tend to have high trust and hope that others will join to become a green buyer. Low price-sensitivity is the importance of a price in making one's decision (Hansen and Sorensen, 1993) [40]. What often happens is that high prices make people tend to discourage buying environmentally friendly products.

Buyers can reduce their impact on the environment and make a difference through their purchasing decisions (Ishaswini, 2011) [41]. The increase in buyers who are more likely to have a desire to consume environmentally friendly products creates opportunities for businesses with environmentally friendly labels as a component of their proposition.

Green Buyer Classifications

The more involved a consumer is with the environment, the more likely they are to buy environmentally friendly products. Therefore, Chan (1999) [42] grouped green buyers into 2 based on the level of usage and differences in perceptions and attitudes towards purchasing

environmentally friendly products, including Heavy Green Consumer (HGC) and Light Green Consumer (LGC).

1. **Heavy Green Consumer**
Someone who shows a high level of utilization of environmentally friendly products, tends to be more influenced by the opinions of others or the community of environmentalists, has a strong sense of identity and cares for the environment. A simple example that can be described as a Heavy Green Consumer is someone who is accustomed to using vegan-labeled skin care products and eating vegan foods. In the context of this study, people who have become heavy green consumers tend to choose properties that are more environmentally friendly without any doubt.
2. **Light Green Consumer**
Someone who shows far less use than a Heavy Green Consumer, and still thinks that ecological products are still hard to find. In contrast to Heavy Green Consumers who have felt the level of benefits in consuming green products, consumers in this group tend to make decisions in buying things based on curiosity and encouragement to try products that are more environmentally friendly. In the context of this study, people who are light green consumers will still consider m aspects in choosing property.

2.6. Green Residential Property

Green residential buildings are increasingly being considered by many people. However, the development of green residential buildings is limited due to the requirements of a single standard and the lack of multi-objective performance in designing it. At the same time, the evaluation system criteria for green residential buildings are also not comprehensive enough (Wu, Y & Wang, Z., 2017) [43].

Increased understanding and awareness of environmental problems and their impact on quality of life and human health provide hope for the creation of green residential buildings (Ismail et al., 2013) [44]. However, the development of green residential buildings is limited due to the requirements of a single standard and the lack of multi-objective performance in designing it. At the same time, the evaluation system criteria for green residential buildings are also not comprehensive enough (Wu, Y & Wang, Z., 2017) [43].

Several studies have been conducted to classify the factors that influence a buyer to buy a green property which is generally influenced by the advantages offered by the concept of green buildings that have been ordered according to the highest level of influence to the lowest, there are (1) Efficient usage of resources, (2) Lower operating cost, (3) Safe and healthier environment, (4) Access to green space, (5) Eco-mobility, (6) Community design and planning, and (7) Landscape (See Table 4):

Table 4. Types of Green User Behavior

GRP Factors	Descriptions	Sources
Efficient Usage of Resources	<ul style="list-style-type: none"> • Residential property to be purchased must have technology that is expected to reduce energy consumption, air conditioning, save water, use of green materials and so on • One of the green residential criteria needed by buyers is to use resources efficiently. • 40% of the total annual world energy consumption is caused by buildings with lighting, air conditioning, and the way to reduce them is to design buildings with economical energy use. 	Abidin et al., (2012) [45] Ismail et al., (2013) [43] Omer (2008) [46] Xia, Zhu, & Lin (2008) [47]
Lower Operating Cost	<ul style="list-style-type: none"> • The most important element in a green residential building is the aspect of savings during construction with resource efficiency. • An investment of 20% in a green residential property has 10 times greater savings over its lifetime. 	Ismail et al., (2013) Redavide (2013) [48]
Safe & Healthier Environment	<ul style="list-style-type: none"> • The influence of family members on the decision to buy property, for example parents who prefer to suit the needs of their children, such as being close to school, yard size, and a safe environment • Income factors, level of education, and people who already have children like higher environmental quality. 	Levy & Lee, (2004) [49] Bartington & Hite (2005) [50]

Access to Green Space	Green space and waters play an important role in enhancing landscape and recreational opportunities in urban areas and show that buyers are likely to pay more for environmental externalities.	Jim & Chen (2007) [51]
Eco-Mobility	Residential property buyers have the desire to use transportation with the aim of overcoming the distance from home to work, shops, hospitals, schools, business areas, visiting friends or relatives	Walsh et al., (2006) [52]
Community Design and Planning	The main reason why people in developed countries adopt green	Ismail et al., (2013)

	residential building features is because of their community arrangements that cover meeting human needs, ensuring security, sustainable comfort represented by public infrastructure, designs for security, and buildings that are easily adaptable	
Landscape	One of the points of sale of residential property is landscaping that can enhance aesthetics and also promote green building projects.	Abidin et al. (2012) [45]

3. CONCLUSION

After describing several references from various sources regarding Green Building, Green Users, and Green Buyers, it can be concluded that Green Buildings are new or old buildings designed to reduce the environmental and user impacts with the aim of achieving sustainability. In realizing a green building, Indonesia has a benchmark which is a combination of several benchmarks that apply throughout the world, called the GBCI. GBCI has six benchmarks, namely Land Use, Energy Efficiency, Water Conservation, Material Sources & Cycles, Air Quality and Comfort, and Building Management.

Green buildings are very closely related to building users, especially in their operation. This is as stated by Xie (2017), "Buildings do not use energy, but people do". In other words, green buildings also need green users.

As green building users who work in green buildings, they are educated or accustomed to doing green activities, such as conserving water, minimizing the energy loss in buildings, and so on. Followed by this habit, green building users will eventually become Green Buyers, especially in choosing and buying a place to live. There are supporting factors that increase one's interest in choosing a greener residence, such as: Efficient use of resources, low building operating costs, a safe and healthy environment, access to green space, mobility, community design and planning, and landscaping. (See Figure 2).

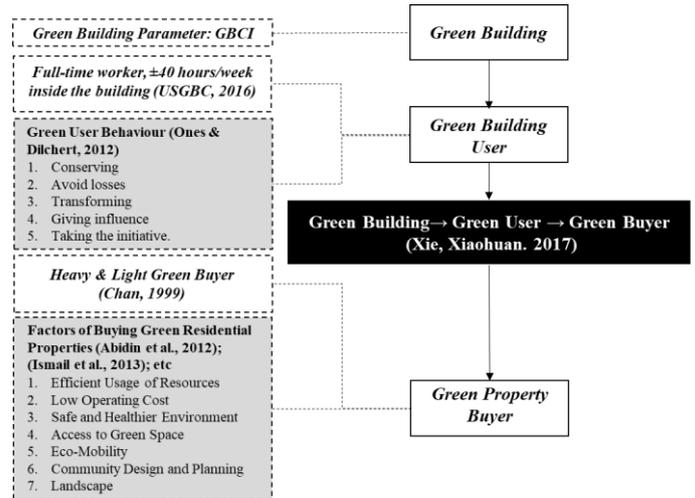


Figure 2. Diagram of Conclusion

It can also be concluded that in order to form green buyers' behaviour in building users, all aspects of green buildings must be successfully communicated to green users, especially the standardization of green buildings in Indonesia.

For that reason, it is necessary to carry out further research regarding how much influence a green building have in shaping its user's behaviour.

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