

IMPLEMENTATION OF GREEN BUILDING IN BALI: CHALLENGES AND OPPORTUNITIES IN SUSTAINABLE DEVELOPMENT

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ABSTRACT

The effects of global warming are now a concern for all parties and its implementation has begun to expand in almost all aspects and fields of human life, one of which is in the field of architecture and building construction. In the last decade, *green building* has become a hot topic that is often discussed by experts and has begun to be implemented in commercial and government-owned buildings and public housing. Although the application of green buildings can reduce environmental damage, not all new buildings are designed and built by applying the concept of green buildings. This is because the application of the green building concept is not easy, and besides that there are challenges and benefits of implementing the concept of green building in sustainable development. This study tries to describe the challenges that occur in the application of green building buildings and the benefits obtained in sustainable development. Data was obtained from field studies in the form of interviews with contractors, consultants, and *owners*. From the results of the interview, the challenges in realizing green building buildings are the lack of funding in building green buildings, lack of public attention to green buildings, and lack of commitment from administrative leaders to protect the environment. Meanwhile, the benefits according to the interview results are that Green Building can increase the value of building assets, reduce building operational costs, and improve the comfort and health of building users.

Keywords: green building, challenges, benefits, sustainable development

1. INTRODUCTION

The effects of global warming are now a concern for all parties and its implementation has begun to expand in almost all aspects and fields of human life, one of which is in the field of architecture and building construction. In the last decade, green building has become a hot topic that is often discussed by experts and has begun to be implemented in commercial and government-owned buildings and public housing.

Green buildings are buildings that pay attention to environmental aspects so that the building does not have a negative effect on the environment or emit emissions that are too high in emitting greenhouse effect emissions. The design of green building plans includes, among others, air circulation, managing energy and water sources, green land management, materials used and so on. The manifestation is an effort in the efficient use of energy, water and renewable energy to be one aspect of minimizing environmental damage.

One of the strategies to achieve the above is through energy efficiency in buildings. The building sector in general is the third largest energy user after the industrial and

transportation sectors and this figure will continue to increase. IESR, 2019 noted that there has been a 50% increase in electricity consumption in the last more than a decade, of which 40% of energy consumption is currently in the building sector. (BALI GOVERNOR Ruling Number 879/03-M/HK/2022)

The Bali Provincial Government began efforts to mitigate energy and environmental issues through the enactment of Governor Regulation Number 45 of 2019 concerning Bali Clean Energy. This regulation technically provides legal payment for efforts to develop and organize development that is environmentally friendly, sustainable, energy efficient and encourages the use of clean and renewable energy. Article 22 of this governor's regulation specifically regulates the adoption and development of Green Building as an effort to achieve energy savings and other natural resources in the building sector.

Green Building or Green Building is a building that is planned to reduce adverse impacts on the environment. Green Building not only has a positive impact on the environment but also provides many benefits in terms of finance, market, industry and positive impacts for users of the building. But besides that, there are challenges that hinder the application of the concept of green building. These challenges generally come from financial aspects, lack of public attention and knowledge, as well as other challenges from construction actors (Landman, 1999). Therefore, the purpose of this study is to find out how the challenges in realizing green buildings and the benefits of green buildings.

2. RESEARCH METHODOLOGY

This type of research is quantitative research which is interpreted as a research method based on the philosophy of positivism, used to examine certain populations or samples. This study aims to determine the status and phenomena that exist based on the collected data. (Sugiyono, 2012)

3. LITERATURE REVIEW

a. Understanding Green Building

Green Building or Sustainable Building is defined as a building that meets the technical standards of building buildings and has a significant measurable performance in saving energy, water, and other resources through the application of green building building principles in accordance with functions and classifications in each stage of its implementation (ps. 1 PP 16/2021 concerning UUBG Implementation Regulations).

Green buildings are buildings where from the planning, construction, operation to maintenance stages pay attention to aspects in protecting, saving, reducing the use of natural resources, maintaining the quality of indoor air quality, and paying attention to the health of its occupants who all adhere to the rules of sustainability. The development of green buildings is based on a study that shows that buildings consume 40% of building materials in the world, using 55% of wood for non-fuel use, 12.2% of total water consumption, 40% of total electricity use, producing 36% of carbon dioxide gas emissions (Hoffman & Henn, 2008). Because of the great influence on the environment, the green building movement was born which in essence is an increase in efficiency in construction projects in using resources and minimizing the negative impact resulting from the project on the environment (Retzlaff, 2008). According to PUPR Regulation Number 21 of 2021 concerning Building Performance Assessment, there are 7 criteria reviewed in green building buildings, including: 1. Site management; 2. Efficient use of energy; 3. Water use efficiency; 4. Indoor Air Quality; 5. The use of environmentally friendly materials; 6. Waste management; and 7. Wastewater management.

According to Chau et al. in Anggunmulia et al (2015), the challenges of green building can be divided into 3 categories, namely:

1. Commodity-related challenges.
 - Lack of public attention to green buildings
 - Knowledge gaps in the calculation of green building development
 - Risks and uncertainties in building green buildings
 - Lack of funding in building green buildings
 - Uncertainty of measurable benefits in realizing green buildings
2. Organizational and personal behavioral challenges.
 - Lack of incentives for investors to invest in green buildings
 - Lack of technical knowledge from project team members about green buildings
 - Lack of commitment from administrative leadership to protect the environment
 - Lack of communication between stakeholders and administrators
 - Resistance to change to build green buildings
3. Process-related challenges.
 - Lack of measurable requirements on green buildings
 - Lack of communication between project team members in building green buildings
 - Doubtful information about sustainable building methods
 - Unavailability of green products in the surrounding area

b. Benefits of Green Building

The purpose of green building development is to mitigate impacts arising from the establishment to use of a building. Thus the benefits of green building as conveyed by Utami (2017) are as follows:

1. Energy and water saving

One of the most visible benefits of *green building* is energy savings. With the use of efficient systems and renewable energy sources, green buildings can reduce energy consumption significantly.

Green buildings also generate significant water savings through technologies such as vacuum toilets. When compared to ordinary toilets that require about 6 liters, vacuum system toilets only require 0.5 - 1.5 liters of water for one use

2. Mengurangi emisi karbon

Based on the EPA report, at least buildings contribute as much as 30 percent of the world's carbon emissions. However, the concept of *green building* can minimize this impact by leaving a place for green space.

When a building has green space, it can at least help to reduce pollution and carbon emissions in the air. When CO₂ gas emissions are successfully suppressed, the problem of *global warming* can be solved.

3. Awet dan dapat dipakai hingga lama

The next benefit of green building is that it is durable. Quality green building materials certainly cause a long building life. A number of green buildings are like houses growing so that they can continue to grow.

4. Low operational costs

Buildings that apply the concept of *green building* are very likely to install solar panels. The existence of solar panels can reduce the use of electrical power by up to 10 percent every day. In addition, green buildings are also able to reduce operational costs because they are efficient in terms of water use.

Buildings are said to have implemented the concept of green building if they successfully go through an assessment evaluation process called the Rating System (Utami, 2017). In Indonesia, currently there are 2 (two) recognized rating systems prepared by the government through ministerial regulations and the Green Building Council Indonesia (GBCI).

The government's green building categorization system is differentiated based on, programming stage, planning stage, implementation stage, utilization stage and demolition stage (PUPR Regulation Number 02/PRT/M/2015).

Table 1. Comparison of Principles in Green Building Government and GBCI Version
(source: PUPR and GBCI)

No	Green Building Element	Minister of PUPR Ruling No. 21/2021	GBCI
1	Site	Site management	Appropriate site development
2	Energy	Energy use efficiency (re-use, reduce, recycle)	Energy Efficiency and Conservation
3	Water	Water use efficiency (re-use, reduce, recycle)	Water Conservation; Sub-metering
4	Air	Indoor air quality	Indoor health and comfort
5	Other materials	Use of environmentally friendly materials, Wastewater management; Waste management	Material resources and cycle
6	Management	Organization and governance	Building Environment Management

4. RESULTS AND DISCUSSION

The development of green buildings in Indonesia, especially in Bali, can be said to be slow despite the many benefits obtained. The number of green buildings in Indonesia is still very small, this is because there are challenges that hinder the realization of a green building. In Bali itself, only one green building, namely Sukawati Art Market, was built with an environmentally friendly concept (green, there is wind circulation, lighting system so it does not require air conditioning. With the issuance of Governor Regulation 45 of 2019 concerning Bali Clean Energy, followed by the issuance of Technical Guidelines for the Implementation of Green Building in the Framework of Bali Energy Implementation in Bali Province, it is gradually expected that existing buildings in Bali, especially for newly planned buildings, have adopted green buildings.

From the results of the survey conducted in terms of challenges to linkages with commodities, almost 66.7% of respondents said they strongly agreed with the lack of public attention to green buildings, 77.8% agreed with the knowledge gap in the calculation of green building development, 55.6% of respondents agreed with the risks and uncertainties in building green buildings and 55.6% said they agreed with the lack of funding in building green buildings.

In terms of organizational and personal challenges, 55.6% agreed with the lack of communication between stakeholders and administrators, and 44.4% strongly agreed with the lack of commitment from administrative leaders to protect the environment. In terms of process-related challenges, 77.8% agreed with the lack of

communication between project team members in building green buildings, 66.7% of respondents agreed with doubtful information about green building methods and 44.4% agreed with the lack of measurable requirements for green buildings.

While in terms of benefits to health and community, almost 66.7% strongly agree that it can improve the comfort and health of building users, 77.8% of respondents strongly agree that it can improve air, temperature and environmental lighting, and 77.8% strongly agree that it can contribute to improving the quality of life. Financial benefits, 55.6% said they agreed that the implementation of green buildings could increase the value of building assets, 55.6% of respondents said they strongly agreed that it could increase worker productivity, and 44.4% said they strongly agreed that it could reduce building operational costs.

As for the benefits in terms of the market, almost 44.4% of respondents agreed that it could lower promotional costs. And the benefits in terms of industry, a total of 55.6% said they agreed to open new jobs.

5. CONCLUSION

Based on the results of the research data processing mentioned above, it can be concluded that in the application of green building buildings in Bali there are still many challenges that will be faced such as the lack of knowledge and calculation of green building development. Meanwhile, in terms of benefits, most know the benefits of green building buildings on the environment. This must be a commitment from all parties, not only the government but from other stakeholders must also have a commitment in the implementation of green building in Bali, so that it can support sustainable development.

REFERENCE

- Anggunmulia, R., Widyanto, D. S., Chandra, H. P., Ratnawidjaja, S. (2015). Kriteria Bangunan Hijau dan Tantangannya pada Proyek Konstruksi di Surabaya. *Jurnal Dimensi Pratama Teknik Sipil*, Vol. 4, No. 2 (2015)
- PERMEN PUPR Nomor 02/PRT/M/2015 tentang Bangunan Gedung Hijau. 2015
- PERGUB BALI Nomor 879/03-M/HK/2022 tentang Pedoman Teknis Penyelenggaraan Bangunan Gedung Hijau Dalam Rangka Implementasi Bali Energi Bersih do Provinsi bali.
- Sentagi Sesotya Utami , Randy Frans Fela , Ressay Jaya Yanti , Dian Dianti Avoressi. 2017. *Menelusur Jejak Implementasi Konsep Bangunan Hijau dan Pintar di Kampus Biru*. ISBN: 978-602-386-189-7 Yogyakarta : Gadjah mada university press, 2017
- Sugiyono. (2011). *Metode Penelitian Pendidikan*, Alfabeta, Bandung, Indonesia