How "Green" are the Green Buildings: Roles of the Government

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ABSTRACT

This study aimed to explore whether green building disclosures based on the Green Building Council Indonesia (GBCI) have been comprehensively disclosed to stakeholders. The sample was collected from 2020 to 2022, with a total research sample of 94 observations. This study used content analysis in green building disclosure. Data was obtained through annual reports, sustainability, and company websites. The results of the content analysis showed that the disclosure of green building on the website was most on the website (100%) compared to the annual report (73%) and sustainability report (17%). Companies that obtained platinum certification were proven to make higher disclosures than gold and silver. These findings can be used by the Ministry of Public Works and Housing to actively evaluate, control, and direct building owners, contractors, architects, and the public to understand the importance of green building in protecting the environment. In addition, these findings can be used as an evaluation by companies not only in Indonesia but other countries to report green building disclosures to attract investors and provide information on environmental, social, and governance (ESG) performance.

Keywords: *Green Building Disclosure, Green Building Council Indonesia, Government*

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INTRODUCTION

Increasing industrialization and global urbanization have consumed a large portion of non-renewable energy and released a large amount of greenhouse gases, resulting in a rise in global temperature and causing various environmental degradation problems (Chen et al., 2022). Buildings that were once only made of wood, and straw are now changing to use more sturdy building structures such as concrete and even more weather-resistant concrete. This change is related to different environmental conditions, and one of the efforts to adapt building conditions to environmental conditions is through green building.

Green building is one of the efforts of the Indonesian government which is committed to reducing greenhouse gas emissions as an effort to tackle climate change, as well as realizing one of the missions of the Ministry of Public Works and Public Housing in 2030, namely the achievement of 100 percent smart living. To realize this mission, the government as a regulator has an important role in adjusting the content of regulations and synchronizing various upstream regulations to support green building regulations downstream (Sumiyati & Purisari, 2020). However, although regulations about green building are currently available, the implications still need more effort and integration with extensive evaluation and monitoring (Zepeda-Gil & Natarajan, 2020). Green building research is conducted by many parties focusing on climate change, energy use, technology, and waste management (Medineckiene et al., 2015; Shad et al., 2017; Berawi et al., 2019).

Although many abroad, similar research is still limited in Indonesia, Berawi et al. (2019) showed that most professionals in the building sector prefer to consider environmental issues as the main concern in constructing new buildings rather than social and economic sustainability aspects. Several other studies explain the technical aspects in the form of construction and civil conditions of existing buildings, but there are still very limited studies that describe the communication of performance disclosure from companies that obtain green building certificates to stakeholders (Berawi et al., 2020; Gomaa Mayhoub et al.Murti & Muslim, 2023).

According to Latief et al.,(2017) there are always gaps between implementation and disclosure, and therefore analyzing disclosures can significantly provide better understanding of the facts. Benefits from disclosures provided by companies regarding *green building* can provide trust and joint participation to stakeholders, especially investors to further entrust their funds to our company to be processed further in developing the environment together, one of which is with *green building* (Lee et al., 2022)*.* The challenge of *green building* disclosure is how companies can adequately disclose all green building applications through disclosure, but not just a check list and only known to internal parties, but presented to all parties (Yook et al., 2017). This research is expected to contribute to increasing awareness to implement environmentally friendly behavior and build infrastructure that is also environmentally friendly. Thus the acquisition of green building certification can really be a reference to support the achievement of sustainable development goals.

Given the importance of adequate disclosure in providing green building performance information, instead of only providing information in acquiring certification, this study aimed to evaluate the disclosures from publicly available information, such as annual and sustainability reports, as well as the companies' websites during 2020 to 2022. Content analysis was performed and a conclusion was drawn to provide insights for the future research, not only for Indonesian companies, but also for other companies in different countries. The most and the least disclosures are provided to be discussed why such information was provided and why some was not.

LITERATURE REVIEW

Self- Determination Theory (SDT)

The Self-determination Theory (SDT) is a psychological theory, proposing that motivation to perform an action varies in number or level and differs from level to level (Olanipekun et al., 2018). Within the SDT Theory, green building adoption is believed to be a strong commitment from a company, so there is an effort to follow the certification process and maintain environmental performance.

The phenomenon of buildings that adopt the concept of green building in Indonesia is still limited, even though buildings are contributors to greenhouse gas emissions and many efforts to reduce greenhouse gases are echoed by the Government (Wiryomartono, 2015). So, it is obvious that acquiring green building certification needs SDT (Olanipekun et al., 2018). On the other hand, SDT may explain that consistent commitment is the foundation to obtain green building certification.

Green Building

Green building according to the World Green Building Council (Zhang et al., 2019) is a building that, in its design, construction, or operation reduces or eliminates negative impacts, and can create positive impacts, on our climate and natural environment. According to Chi et al., (2020) the definition of green building emphasizes the use of energy, water and materials and reduces the impact on human health and the environment throughout the building. Adopting green building offers a range of significant sustainability benefits that are not possible from adopting traditional buildings. In addition, many researchers and organizations have shown that adopting green buildings provides environmental, economic, and social benefits such as improved water efficiency, increased productivity, improved human health and well-being, improved environmental quality and higher property values (Chan et al., 2018).

According to Zhang et al., (2019) there are still poor green building design projects that lead to higher energy consumption than non-certified buildings. Stakeholders' understanding of green building needs to be improved. The lack of understanding of what constitutes a green building, nearly zero energy building (NZEB), or carbon neutral building (CNB) is a challenge in implementing green building.

Green Building Counciling Indonesia (GBCI)

The concept of green building is a concept that meets the requirements based on measurable performance in aspects of saving water, energy, other resources. One of the requirements and measurable calculations to assess green buildings in Indonesia is called *greenship.* In Indonesia, the institution that assesses is called the *Green Building Council Indonesia (GBCI).*

Greenship is a green building measurement system in Indonesia that is different from other countries with its own benchmarks and names. The *Greenship new building assessment* system version 1.2 is a development of the Greenship NB Version 1.0 assessment tool from the Greenship New Building benchmark summary version 1.1 and the scoring results from GBCI appear on the web http://www.gbcindonesia.org/cerbuilding

This research refers to research Berawi et al., (2019) by developing keywords from aspects of the GBCI criteria to ensure meaningful disclosure. There are six keywords namely Appropriate Site Development (ASD), Energy Efficiency & Conservation (EEC), Water Conservation (WAC), Material Resource & Cycle (MRC), Indoor Air health & Comfort (IHC), and Building Environment Management (BEM). This research used all dimensions and indicators contained in GBCI. There are 6 aspects of GBCI and are adaptations of all disclosure items taken internationally which use international standards from the categories of planning and design construction, energy, water efficiency conservation, material conservation and resources and environmental quality adaptations from the California Green Building Standards code (CALGreen code), ICC 700 National green building standards (NGBS), IES Standard 189.

Framework

This research conducted a content analysis through disclosures in annual reports, sustainability reports, and company websites. Disclosures were made in accordance with green building criteria with 6 aspects and 38 indicators, the results of which are presented in Table 1. Figure 1 shows the framework
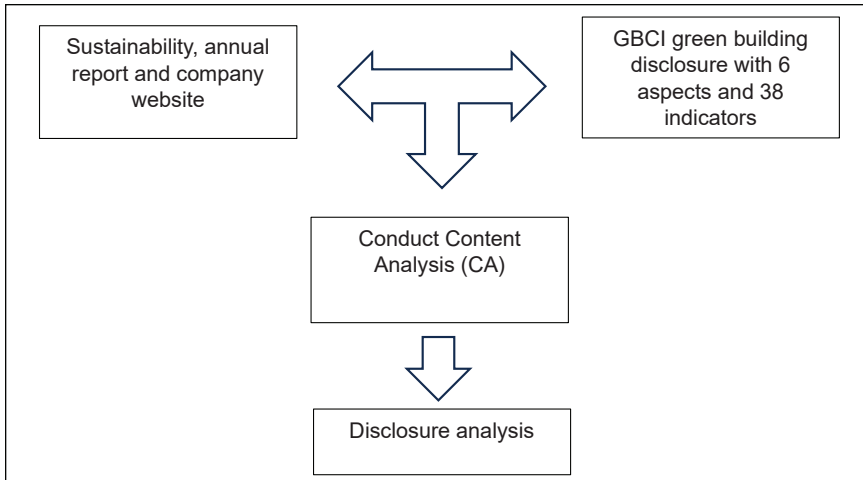
Figure 1: Framework
Source: developed by authors

METHODOLOGY

Data and Sampling

The population of this study were all companies that had obtained green building certification from GBCI from 2020 to 2022. The basic idea to carry out the content analysis was that the disclosure informs the environmental performances for each significant indicators as the sample was certified green building companies. Since there were four levels of certifications (platinum, gold, silver, and bronze), this study attempted to gather all available data as samples. The period of this study was 2020 to 2022. In 2020 there were 25 companies, in 2021 there were 28 companies and in 2022 there were 41 companies, so the total research sample was 94 observations.

Method of Analysis

The research method used was the content analysis method. According to Hsieh & Shannon (2005) there are three approaches to qualitative content analysis methods, namely conventional, directed, and combined. This research used content analysis with the three types of conventional, directed, and combined in order to achieve comprehensive analysis results.

Conventional content analysis was used through an observation approach by reading the company's financial statements, reading GBCI data for 2020, 2021, 2022 and coding each indicator. Content directed analysis was used through observation of the annual report and sustainability report as well as the company's website as a whole through analyzing each disclosure item from GBCI. The merging analysis was used through content analysis which was used to analyze all existing disclosure items by calculating the average score obtained from each disclosure criteria. The purpose of content analysis was to provide an overview of the disclosure of the Company's performance (Torelli et al., 2020).

Table 1 describes six aspects and 38 indicators with weights for each indicator under six aspects. The largest weight was on the EEC indicator because there was a dimension of energy saving measures which was the dominant factor for building owners to implement green building. Indoor health and comfort (IHC) had the smallest weights because IHC only focussedon monitoring cigarette smoke, outdoor views, visual and thermal only from the aesthetic side and did not provide renewable energy in it compared to other disclosure item components. This criteria was considered by GBCI as a green building rating that couldsignificantly reduce energy costs (Berawi et al., 2019).

Table 1: Weight for Each Indicator Under Six Dimensions

Aspects	ASD	EEC	WAC	MRC	IHC	BEM	Total
Total Indicators	7	5	6	6	7	7	38
weight	16,8%	25,7%	20,8%	13,9%	9,9%	12,9 %	100%

Theme Analysis

The sample selection in this study used the population as a sample, so no criteria were used. The theme used in the analysis regarding green building with the type of analysis used was a qualitative analysis of content analysis, where measurements were made by giving a score of 0 to 2. According to Gallego-Álvarez et al., (2011); Bisogno et al., (2014); Brusca et al., (2019) rather than adopting the common dichotomous procedure, we followed a scoring system that assigned the values of 0, 1, and 2. This methodology considered that all items as equally important and allowed for reduction of subjectivity issues.

Guidelines for scoring were carried out with an emphasis on aspects that were considered important in the preparation of systematic *content analysis* procedures, in providing insights and clarity (Krippendorff: 2004). The determination of the score was adjusted to the guidelines applied. The guidelines for research were carried out in a way including:

1. Understand all 38 indicators of disclosure items that make up the performance of green building reporting guidelines.

2. Read text and detailed information on annual reports, sustainability reports and company websites from 2020 to 2022.

3. Conduct a content analysis and give a score of 0 (zero) if there is no relevant information in accordance with GBCI indicators.

4. Conduct a content analysis and give a score of 1 (one) if there is information reported and disclosed but only done in a narrative manner.

5. Score 2 (two) for complete information reported and disclosed in terms of narrative, figures, graphs and trends.

6. Summing up the calculated scores to describe the level of disclosure in the green building report. The higher the score means that the disclosure of the performance of companies that obtain green building certification with GBCI performance indicators is also higher.

7. Calculating the average score to get the extend of disclosure. The higher the average score, the more comprehensive the green building disclosure in accordance with the GBCI indicators.

Average Score

The average total disclosure count is done by :

$$average\ score = \frac{total\ score\ obtained}{total\ disclosure\ items\ x\ maximum\ score}$$

Or

$$average\ score = \frac{total\ scores\ obtained}{38x2}$$

RESULT AND DISCUSSION

Green building disclosures in annual reports were calculated using averages due to the different number of samples each year. Gold certificate holders experienced a significant increase of 110% from 2020 to 2022 (10% from 2020 to 2021, 91% for 2021 to 2022), platinum increased by 42% from 2020 to 2022 (17% from 2020 to 2021, and 22% from 2021 to 2022). These increases indicated a significant increase in the number of certification recipients, especially in 2022, and increased efforts by companies to implement more environmentally friendly building processes. The number of green building certificate recipients was likely to continue to increase in the coming years.
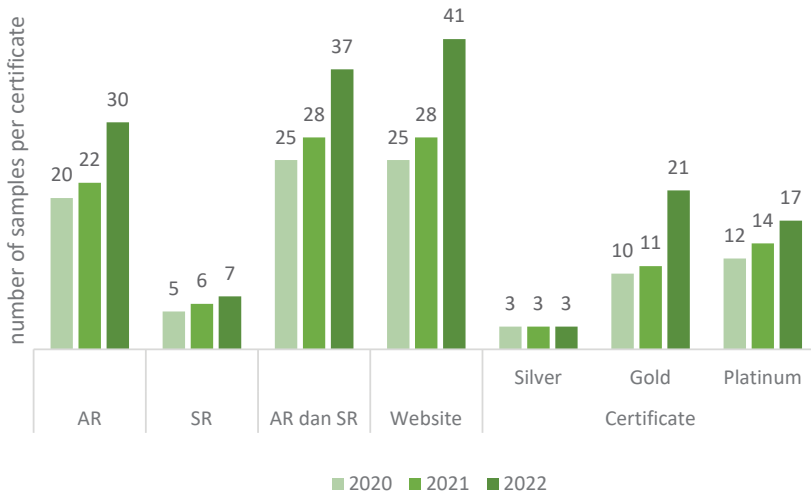

Figure 2: Number of AR, SR, Website and GBCI Samples

The disclosure location results showed differences in the number of companies that had AR, SR, and a website. Not all companies disclosed green building in AR and SR reports, but all (100%) companies reported green building disclosure on the company website. Disclosure on the

company website indicated that green building information had not been comprehensively carried out in the annual report and sustainability repost because there may be no regulations for this disclosure (Sumiyati & Purisari, 2020). Meanwhile, according to Cormier et al.,(2009) companies are more likely to convey information on the website because it is faster, more updated, and more accessible.

On the other hand, the Ministry of Public Works and Housing through the Directorate General of New, Renewable Energy and Energy Conservation was implementing policies related to the green environment. However, according to the Central Bureau of Statistics in 2022, the increase in the number of green building certificate recipients remained low (3.8%) compared to the number of buildings throughout Indonesia. This data showed that the implementation of green building in Indonesia was still very low.

Some of the reasons why green building implementation was still low included a lack of understanding of the importance and benefits of green building (Zhang et al., 2019), the assumption that the cost of building a green building is still relatively higher than the usual development process (Chan et al., 2018; Susanto & Sujana, 2023), and other assumptions that the behavior of residents in green buildings has also not changed much so that the level of efficiency has not been maximized (Chowdhury et al., 2019). Another thing is the lack of rewards and punishments from the Government, socialization related to green building to stakeholders, and community participation that has not been maximized (Berawi et al., 2019). The existence of the Subroto Award in the field of efficiency and energy since 2019 by the Ministry of Public Works and Housing was considered insufficient to increase the commitment to implementing green building in Indonesia.

Figure 3: Results Average Score Per Aspect

As shown in Figure 3 the highest average score was in appropriate site development. This disclosure was widely made probably because all companies had selected the right site location for their buildings, the right building with the availability of transportation facilities and good landscaping. While the lowest average score was energy efficiency and conservation. The low disclosure in the aspect of energy and conservation of

renewable energy in the site was because until now companies in Indonesia have not been able to process resources into new energy, for example solar panels that can convert solar energy into electrical energy, unlike other countries such as Japan which can make renewable energy (Wimala et al., 2016).

Of the six disclosure aspects, there were 38 disclosure indicators and Table 2 illustrates the order of highest to lowest disclosure.

Table 2: Order of Disclosure 38 Disclosure Items

No.	Aspects and Indicators	Average Score Total
1	ASDP-ASD 1 Site Selection	2,29
2	EEC- EEC 1 Energy Efficiency Measures	2,21
3	ASDP-ASD 2 Community Accessibility	2,01
4	EEC-'EEC 2 Natural Lighting	1,91
5	WAC-WAC 1 Water Use Reduction	1,82
6	IHC-IHC 2 Environmental Tobacco Smoke Control	1,62
7	IHC-IHC 4 Outside View	1,62
8	IHC- IHC 5 Visual Comfort	1,58
9	BEM- BEM 5 Green Building Submission Data	1,53
10	EEC-'EEC 3 Ventilation	1,53
11	ASDP- ASD 3 Public Transportation	1,50
12	WAC-WAC 3 Water Recyling	1,39
13	ASDP-ASD 5 Site Landscaping	1,37
14	MRC-MRC 2 Environmentally Friendly Material	1,37
15	IHC-IHC 1 CO2 Monitoring	1,37
16	WAC-WAC 6 Water Efficiency Landscaping	1,33
17	MRC-MRC 1 Building and Material Usage	1,33
18	WAC-WAC 4 Alternative Water Resources	1,29
19	BEM P- BEM 1 GP as a Member of Project Team	1,29
20	BEM- BEM 2 Pollution of Construction Activity	1,25
21	MRC- MRC 5 Prefab Material	1,20
22	ASDP-ASD 6 Micro Climate	1,17
23	BEM-BEM 4 Proper Commissioning	1,17
24	WAC-WAC 2 Water Fictures	1,12
25	MRC-MRC 4 Certified Wood	1,09
26	BEM P-BEM 3 Advanced Waste Management	1,09
27	ASDP-ASD 7 Stormwater Management	1,05
28	BEM-BEM 6 Fit Out Agreement	1,05
29	WAC-WAC 5 Rainwater Harvesting	0,99
30	IHC- IHC 6 Thermal Comfort	0,97

31	IHC- IHC 7 Acoustic Level	0,97
32	BEM P- BEM 7 Occupant Survey	0,93
33	EEC-EEC 4 Climate Change Impact	0,92
34	EEC-'EEC 5 On Site Renewable Energy	0,91
35	IHC- IHC 3 Chemical Pollutant	0,88
36	MRC-MRC 3 Non ODS Usage	0,86
37	MRC-MRC 6 Regional Materials	0,84
38	ASDP-ASD 4 Bicycle Facility	0,43

Source: content analysis results

Notes:
The first word is aspect, while the second word is an indicator of each of the disclosure items. Example: ASDP is a named aspect of site development corresponding to Site Selection ASD 1
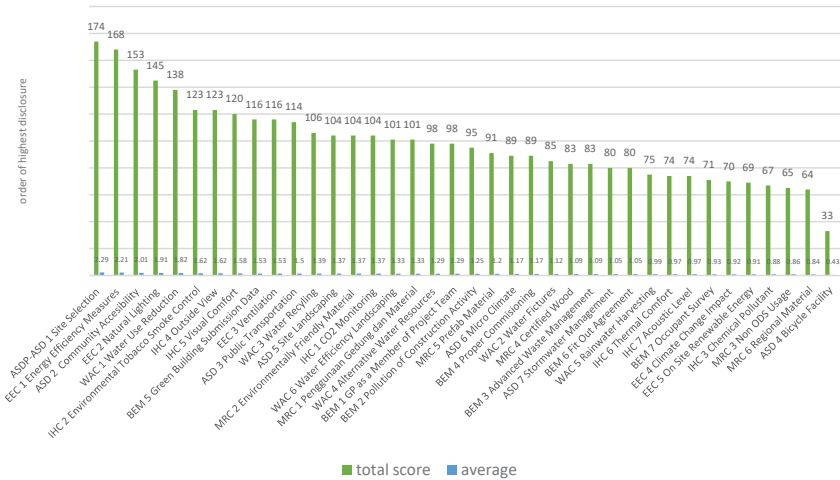

Figure 4: Highest Order of Disclosure

As shown in Figure 4 the highest disclosure with an average score of 2.29 was on the Site Selection indicator (in Aspect ASD). In line with the high disclosure of ASD compared to disclosure on other aspects, information was conveyed because location in development is a major factor (Huo et al., 2017; Zhang et al., 2017). According to Huo et al.,(2017) before building a building, the company must pay attention to the selection of the place, the soil structure for the strong foundation of the green building and the right composition in each green building applied. The Ministry of Public Works and Housing also needs to control through land and building certificates that the company wants to build so that the structure of the land and buildings is in accordance with the requirements of green building.

Although the Energy and Conservation aspect had the lowest disclosure, for renewable energy, the energy efficiency disclosure indicator is quite widely disclosed, with an average score of 2.21. Companies were increasing energy efficiency, which indicated increased awareness and starting to do calculations (Chowdhury et al., 2022). Several efforts hadbeen made by the company so far, for example saving paper, electricity and water in every operational activity. It appeared from the disclosure of indicators that many efficiency effortswere disclosed because of the disclosure of costs. In addition to energy efficiency, companies also disclosed a lot of water efficiency information. This disclosure received an average score of 1.82, after the disclosure of energy efficiency. The Ministry of Public Works and Public Housing needs to conduct socialization through workshops on how to convert ordinary energy into renewable energy so that companies can be more efficient and effective in saving energy. In addition, the Ministry of Public Works and Public Housing can provide grants or subsidies for the purchase of equipment to convert energy into renewable energy, to protect the environment from global boiling.

The lowest disclosed indicator was ASD4- Bicycle Facility with an average score of only 0.43. This low disclosure may be because companies in Indonesia provide very few bicycle facilities (Berawi et al., 2019). People predominantly use motorcycles, cars and public transportation to travel, so there is very little information related to this. The government has provided access to bicycles in all Indonesian cities, as evidenced by the car free day program to foster public interest in cycling. However, this has not been maximized, perhaps because the air is a lot of pollution and heat, so doing bicycle activities is not comfortable (Worden et al., 2020).

Indicator MRC 6 Regional materials with an average score of 0.84 was the lowest indicator after ASD4- Bicycle Facility. This low disclosure may be due to Indonesia's transportation mode consumes high fuel so that the carbon emission gas produced by the company is higher. (Zhang et al., 2017). The government has made regulations related to electric vehicle regulations in reducing the carbon footprint of transportation modes, but the use of electric vehicles in Indonesia is still rarely used by companies. This is a challenge for the government in an effort to accelerate the battery-based electric motor vehicle program in Indonesia.

Indicator IHC 3 Chemical pollutants with an average score of 0.88 was also the lowest indicator. This low level of information may be due to the difficulty of calculating chemical pollutants and perhaps because the need for this information is still low. In addition, pollution in Indonesia is still not well resolved compared to other countries, both land, water and air pollutants, so many companies do not convey this information because it is considered less positive (Bahaudin et al., 2014). For this reason, the government must start simultaneously realizing policies to reduce land, water and air pollutants, for example with non-plastic policies, carbon emission taxes and sanction fines for companies that pollute, besides that sanctions or fines must be realized firmly, not just regulations (Wiryomartono, 2015).

Not all companies had disclosed all the green building indicators,. The limited disclosure could mostly be due to the lack of information needs, the unavailability of good data and information, the lack of supervision and performance evaluation, and the limited ability to convey information in the report. Understanding related to green building indicators also needs to be improved so that companies better understand why these indicators need to be conveyed so that the information presented in reports, both annual and sustainability reports, can be more in line with GBCI criteria (Wimala et al., 2016).

This study also showed that the disclosure results weredifferent for companies that received silver, gold, and platinum certificates (no companies that received bronze were found).
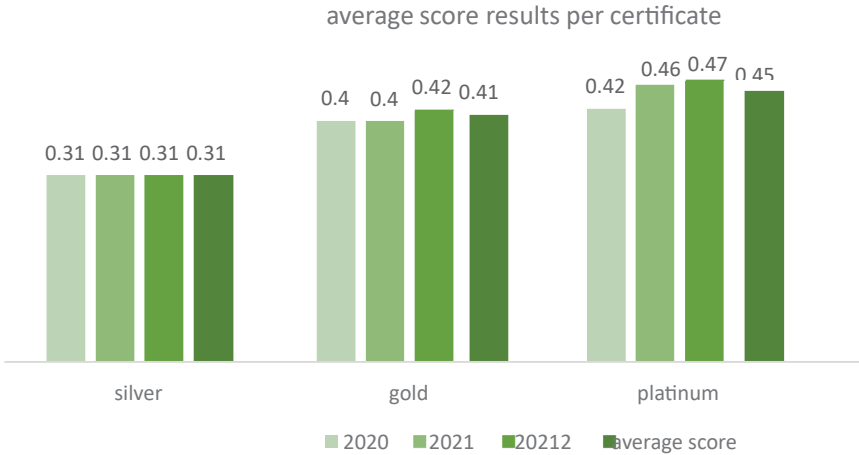
Figure 5: Average Score Per Certificate

As shown in Figure 5 green building disclosures from platinum certificate holders were better than gold and silver. It was also be seen that the average score of platinum companies showed a slight increase from 2021 to 2022, while silver and gold recipient companies delivered relatively the same disclosures throughout 2020, 2021, 2022 (the same in 2020 to 2021, up 7% from 2021 to 2022), while Platinum increased constantly from 2020 to 2022 (up 9,1% from 2020 to 2021, up 9,7% from 2021 to 2022). The increase in the average score showed that many companies were more likely to disclose green building disclosures compared to the previous year. In the future, it is hoped that the disclosure of green buildings can continue to increase so that the benefits of green buildings can motivate energy efficiency, waste management, reduce emissions, and change to a healthier and higher quality lifestyle. Finally, the results of this study in 2022 revealed that information about the company's green building on the website was 100% (41 data) more than the annual report 73% (30 data) and sustainability report 17% (7 data). Table 3 shows the disclosure of green building information sources.

Table 3: Disclosure of Green Building Information Sources

2022		
AR	SR	Website
30 (73%)	7 (17%)	41 (100%)

This research supports the SDT which explains that motivation becomes a basis for taking actions that are in accordance with the level of motivation (Olanipekun et al., 2018). So the SDT theory explains that green building adoption can be done if the company has a strong motivation to adjust to changes and transform to become more environmentally friendly.

CONCLUSION AND RECOMMENDATIONS

Companies that had obtained platinum certification were proven to make higher green building disclosures (10%) than gold (0,45 average score platinum and 0,41 average score gold) and 48% compared to silver (0,45 average score platinum and 0,31 average score silver). Overall, most disclosures were made in the Appropriate Site Development aspect, namely in the ASD 1 Site Selection indicator (ASD aspect average score of 9,55 and ASD-1 indicator with an average score of 2,29). The ASD 1 aspect on the Bicycle Facility indicator was disclosed the least with an average of 0,43. The low overall disclosure illustrates the need to measure green building performance, especially energy efficiency and emission reduction. The social aspects related to green building, such as healthy lifestyles also need to be improved so that the existence of green building is supported by behavioral changes.

The role of the Ministry of Public Works and Public Housing can be seen from the existence of policies and regulations related to green building. However, the effectiveness of the regulations is still not optimal, as seen from the low level of disclosure and the number of green building implementations that have not been maximized. In the future, it is expected that the government will be more active in evaluating, controlling and directing building owners, contractors, architects, and the public to understand the importance of implementing green building for efficiency and protecting the environment. The quality of life in the application of green building is also one of the benefits for us and future generations.

On the other hand, the government also needs to support the implementation of green building through tax incentives for companies that can produce green materials for buildings, as well as companies that implement green building well. The government needs to support the process of availability and verification of official documents through land and building certificates to comply with green building criteria. In addition, to achieve smart living in achieving Net Zero Healthy, the Government needs to increase literacy through counseling, seminars and green building workshops so that it can foster concern for the environment. The Ministry of Public Works and Housing can also provide grants or subsidies for the application of technology, especially in supporting the use of renewable energy. The government must begin to integrate in realizing policies to reduce land, water and air pollutants, for example with non-plastic policies, carbon emission taxes and sanction fines for companies that pollute. Sanctions or fines, as well as appreciation should be realized firmly, not just regulation alone, through mechanisms that are transparent, easy, and involve trusted parties. The implementation of green building needs to be supported by all stakeholders and all roles of society, including companies.

This study should encourage companies to pay more attention to the environment through efficiency, energy, water and waste management. Understanding that the implementation of green building is needed that through efficiency and behavior change, companies can also support the achievement of sustainable development goals. In addition, companies must begin to be able to change the behavior of employees, building occupants, and the surrounding community to jointly pay attention to energy efficiency which is an important part of green building implementation. In addition to improving performance, the Company is expected to more comprehensively disclose information on green building aspects, both in annual reports and sustainability reports that can be accessed on the Company's website. This disclosure will be useful for the Company in attracting investors and providing information on its environmental, social and governance (ESG) performance.

This research has several limitations. First, not all companies disclosed information from green building indicators in annual reports, sustainability reports, so the research sample is still limited. In addition, the use of the content analysis method is inseparable from the element of subjectivity

in scoring or assessment, so that understanding of indicators needs to be improved. Therefore, the scoring process in conducting the analysis needs to be done by more than one person, as in this study, so that the limitations of subjectivity can be reduced.

Future research needs to increase the number of samples which will definitely be more because of the increasing number of companies that receive green building certificates in the future. Interviews and discussions can be conducted to add to the discussion after conducting a content analysis of the disclosures. In addition, green building research is expected to continue to be part of research, not only for green buildings in companies, but also for other institutions, such as green universities or smart living residences.

REFERENCE

Agyekum, K., Opoku, A., Oppon, A. J., & Opoku, D.-G. J. (2022). Obstacles to green building project financing: an empirical study in Ghana. *International Journal of Construction Management*, *22*(15), 2922-2930.

Ansah, M. K., Chen, X., Yang, H., Lu, L., & Lam, P. T. I. (2019). A review and outlook for integrated BIM application in green building assessment. *Sustainable Cities and Society*, *48*, 101576.

Bahaudin, A. Y., Elias, E. M., & Saifudin, A. M. (2014). A comparison of the green building's criteria. *E3S Web of Conferences*, *3*, 1015.

Berawi, M. A., Basten, V., Latief, Y., & Crévits, I. (2020). Green building incentive model during design recognition to ensure the reliability of green building operation and maintenance achievement. *IOP Conference Series. Earth and Environmental Science*, *426*(1). https://doi.org/https://doi.org/10.1088/1755-1315/426/1/012020

Berawi, M. A., Miraj, P., Windrayani, R., & Berawi, A. R. B. (2019). Stakeholders' perspectives on green building rating: A case study in Indonesia. *Heliyon*, *5*(3).

Chan, A. P. C., Darko, A., Olanipekun, A. O., & Ameyaw, E. E. (2018). Critical barriers to green building technologies adoption in developing countries: The case of Ghana. *Journal of Cleaner Production*, *172*, 1067-1079. https://doi.org/https://doi.org/10.1016/j.jclepro.2017.10.235

Chen, L., Msigwa, G., Yang, M., Osman, A. I., Fawzy, S., Rooney, D. W., & Yap, P.-S. (2022). Strategies to achieve a carbon neutral society: a review. *Environmental Chemistry Letters*, *20*(4), 2277-2310.

Chi, B., Lu, W., Ye, M., Bao, Z., & Zhang, X. (2020). Construction waste minimization in green building: A comparative analysis of LEED-NC 2009 certified projects in the U.S. and China. *Journal of Cleaner Production*, *256*, 120749.

Chowdhury, M. A., Sabrina, H., Zzaman, R. U., & Islam, S. L. U. (2022). Green building aspects in Bangladesh: A study based on experts opinion regarding climate change. *Environment, Development and Sustainability*, *24*(7), 9260-9284.

Cormier, D., Ledoux, M.-J., & Magnan, M. (2009). The use of Web sites as a disclosure platform for corporate performance. *International Journal of Accounting Information Systems*, *10*(1), 1-24.

Gallego-Álvarez, I., Rodríguez-Domínguez, L., & García-Sánchez, I. (2011). Information disclosed online by Spanish universities: content and explanatory factors. *Online Information Review*, *35*(3), 360-385.

Government Regulation No. 16 of 2021 on the Implementation Regulations of Law No. 28 of 2002 on Buildings

Ha, C. Y., Khoo, T. J., & Loh, J. X. (2023). Barriers to green building implementation in Malaysia: A systematic review. *Progress in Energy and Environment*, 11-21.

Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, *15*(9), 1277-1288. https://gbcindonesia.org/certbuilding

Huo, X., Yu, A. T. W., & Wu, Z. (2017). A comparative analysis of site planning and design among green building rating tools. *Journal of Cleaner Production*, *147*, 352-359. https://doi.org/https://doi.org/10.1016/j.jclepro.2017.01.099

Latief, Y., Berawi, M. A., Basten, V., & Budiman, R. (2017). Construction performance optimization toward green building premium cost based on Greenship rating tools assessment with value engineering method. *Journal of Physics: Conference Series*, *877*(1), 12041.

Lee, C. L., Gumulya, N., & Bangura, M. (2022). The role of mandatory building efficiency disclosure on green building price premium: Evidence from Australia. *Buildings*, *12*(3), 297.

Medineckiene, M., Zavadskas, E. K., Björk, F., & Turskis, Z. (2015). Multi-criteria decision-making system for sustainable building assessment/certification. *Archives of Civil and Mechanical Engineering*, *15*(1), 11-18. https://doi.org/https://doi.org/10.1016/j.acme.2014.09.001

Minister of Public Works and Public Housing (PUPR) Regulation No. 21 of 2021 concerning green building performance assessment

Olanipekun, A. O., Chan, A. P. C., Xia, B., & Adedokun, O. A. (2018). Applying the self-determination theory (SDT) to explain the levels of motivation for adopting green building. *International Journal of Construction Management*, *18*(2), 120-131.

Regulation of the Minister of Environment (LH) No. 8 of 2010 on Criteria and Certification of Green Buildings

Samosir, D. K. B. M. T. (2022). OPTIMIZING BUSINESS PERFORMANCE IN PROPERTY MANAGEMENT WITH GREEN BUILDING EVIDENCE IN INDONESIA. *Accounting, Auditing & Information Research Media*, *22*(2), 301-320.

Shad, R., Khorrami, M., & Ghaemi, M. (2017). Developing an Iranian green building assessment tool using decision making methods and geographical information system: Case study in Mashhad city.

Renewable and Sustainable Energy Reviews, *67*, 324-340. https://doi.org/https://doi.org/10.1016/j.rser.2016.09.004

Sumiyati, Y., & Purisari, R. (2020). The Constraints of Green Building Implementation in Indonesia. *Journal of Physics: Conference Series*, *1485*(1), 12050.

Susanto, J. W., & Sujana, C. M. (2023). Barrier of Green Building Implementation in Construction Projects in Indonesia. *IOP Conference Series: Earth and Environmental Science*, *1169*(1), 12018.

Torelli, R., Balluchi, F., & Furlotti, K. (2020). The materiality assessment and stakeholder engagement: A content analysis of sustainability reports. *Corporate Social Responsibility and Environmental Management*, *27*(2), 470-484. https://doi.org/https://doi.org/10.1002/csr.1813

Wimala, M., Akmalah, E., & Sururi, M. R. (2016). Breaking through the Barriers to Green Building Movement in Indonesia: Insights from Building Occupants. *Energy Procedia*, *100*, 469-474. https://doi.org/https://doi.org/10.1016/j.egypro.2016.10.204

Wiryomartono, B. (2015). 'Green building' and sustainable development policy in Indonesia since 2004. *International Journal of Sustainable Building Technology and Urban Development*, *6*(2), 82-89.

Worden, K., Hazer, M., Pyke, C., & Trowbridge, M. (2020). Using LEED green rating systems to promote population health. *Building and Environment*, *172*, 106550. https://doi.org/https://doi.org/10.1016/j.buildenv.2019.106550

Yook, K.-H., Song, H., Patten, D. M., & Kim, I.-W. (2017). The disclosure of environmental conservation costs and its relation to eco-efficiency. *Sustainability Accounting, Management and Policy Journal*, *8*(1), 20-42. https://doi.org/10.1108/SAMPJ-07-2016-0039

Zepeda-Gil, C., & Natarajan, S. (2020). A review of "green building" regulations, laws, and standards in Latin America. *Buildings*, *10*(10), 188.

Zhang, Y., Wang, H., Gao, W., Wang, F., Zhou, N., Kammen, D. M., & Ying, X. (2019). A survey of the status and challenges of green building development in various countries. *Sustainability*, *11*(19), 5385.

Zhang, Y., Wang, J., Hu, F., & Wang, Y. (2017). Comparison of evaluation standards for green building in China, Britain, United States. *Renewable and Sustainable Energy Reviews*, *68*, 262-271. https://doi.org/https://doi.org/10.1016/j.rser.2016.09.139