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Identification of the Application Green Construction Concept using the Assessment Green Construction Model (MAGC)

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ABSTRACT

Environmental damage is a topic of global discussion, so there is a need to reduce the impact of this environmental damage in various sectors, including the construction sector. In the construction industry, one of the efforts is the need to implement green construction. Green construction is one part of sustainable development that is expected to be able to participate in maintaining environmental sustainability and harmony in its implementation. Until now, the application of the green construction method in sumatra has been considered to be relatively immature. This research aims to identify the application of the green construction concept using the green construction assessment model. This research is quantitative research. The data are collected through questionnaires. The assessment instrument uses the green construction assessment model (MAGC) which is combined with the analytical hierarchy process process (AHP) method for calculating aspect weights and green construction factors. This research uses six aspects, 16 factors, and 55 green assessment indicators. construction that is obtained through the green construction assessment model. Based on the results of the analysis and data processing through the Ms.Excel software, we obtained an aspect weighting result of 0.134 and a factor weight of 0.209. This value is used as a calculation for the green construction assessment model, which is obtained by a green construction value (NGC) of i3.15 which does not yet meet the ideal NGC value of 10.10.

Keywords: *Construction Industry; Green Construction; Environment.*

INTRODUCTION

Infrastructure development in Indonesia currently continues to develop to meet community needs, which is expected to have a positive impact on community welfare. Construction implementation will have the potential to cause negative impacts on the environment around the project, such as project waste which can damage the environment. The reduction in green land has an impact on the increase carbon emissions which is said to be one of the contributors to the increase in greenhouse gases commonly known as global warming[1] [2]. The impact of global warming is directly felt, namely that the earth's temperature increases day by day. According to Carbor Brief analysis, three greenhouse gases are the main triggers for global warming this year. These three gases are carbon dioxide (CO2) which contributes 50% of heat radiation, methane (CH4) as much as 29% and nitric oxide (N2O) as much as 5%. The remaining 16% comes from carbon monoxide, carbon black and holocarbons, including hlorofluorocarbons (CFCs) or Freon[3].

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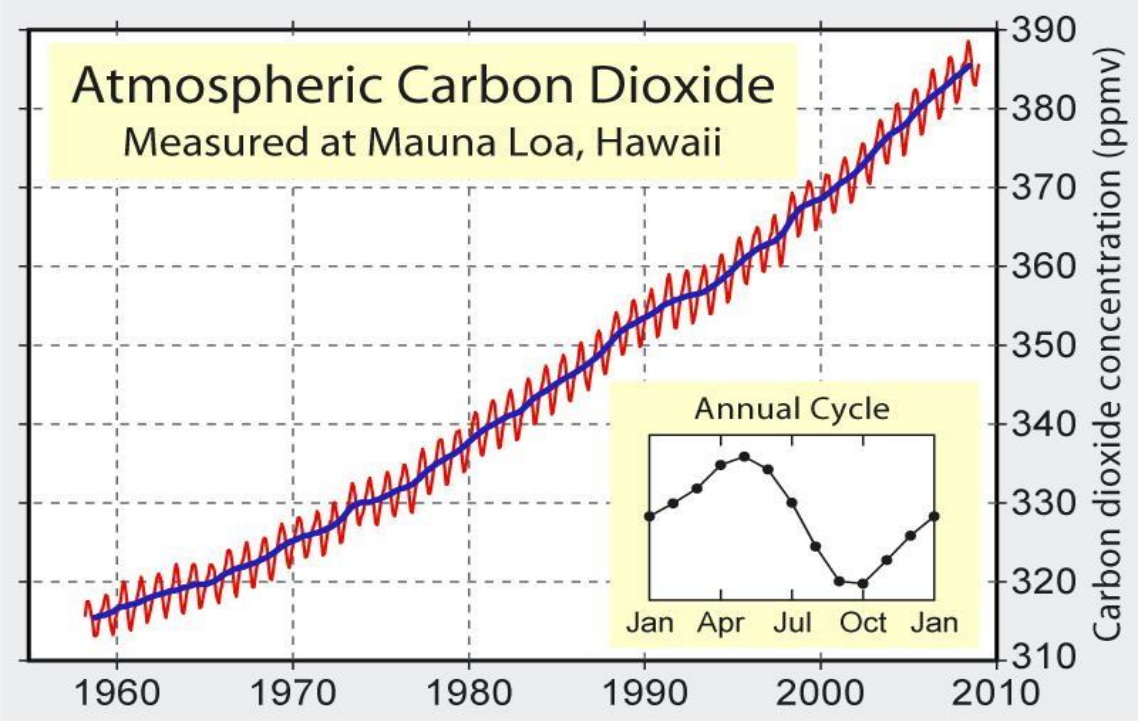

Figure 1 CO2 levels in the Earth's atmosphere

Green construction is defined as planning and implementing construction stages that refer to the contract to reduce the negative impact of the process on the environment. The aim is to create a balance between environmental sustainability and human needs, both for current and future generations[4]. In the implementation of green construction, it is regulated in PUPR Ministerial Regulation No. 02 in 2015 concerning green buildings as stated that green buildings are buildings that meet the requirements for green buildings and have significant measurable performance in saving energy, water and other resources [5]. Through the application of green building principles in accordance with the function and classification in each stage of implementation and specifically for green construction, namely to achieve an environmentally friendly building, a construction process with a series of environmentally friendly activities is needed and a physical green building can be realized. [6] [7].

The Green Construction Assessment Model (MAGC) is an assessment system developed by Ervianto which focuses on assessing green or environmentally friendly construction processes. In Indonesia, the MAGC model has been widely applied to construction projects in Indonesia for several decades and has obtained positive results[8]. This research will identify the percentage and factors of efforts to implement green construction in West Sumatra province using the green construction assessment model.

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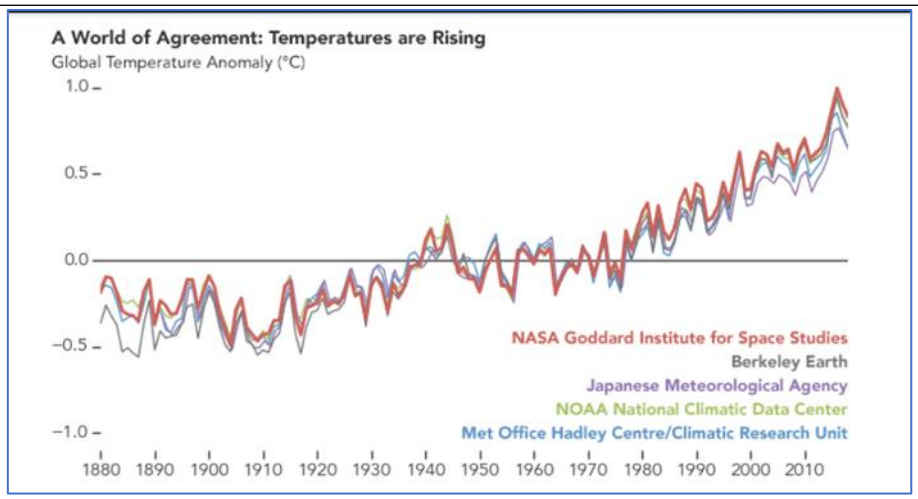

Figure 2 Annual temperature anomalies from 1880 to 2018, NASA Earth Observer

METHOD

This research is a case study to analyze and assess how far green construction has been implemented by conducting surveys, observing related matters. Indicators for implementing green construction were continued by distributing questionnaires to respondents.
This research was carried out by measuring the assessment of variables in the assessment green construction (MAGC) model by means of a questionnaire assessment. The following variables are used as benchmarks in the research.

Table 1. Research variables

No	Variable
A1	**Occupational Health and Safety**
F1	Occupational health and safety program
F2	Health of the construction phase work environment
A2	**Air quality and comfort**
F3	Construction stage air quality
F4	Selection and operation of construction equipment
F5	Construction project planning and scheduling
A3	**Building Environmental Management**
F6	Documentation
F7	Environmental Management of construction projects
F8	Training for subcontractors
F9	Construction waste management
A4	**Resources and Material Cycles**
F10	Material sources and cycles (material management)
F11	Material storage and protection
A5	**Appropriate use of land**
F12	Land management
F13	Reduction of the ecological footprint of the construction phase
F14	Job site planning and protection
A6	**Water and Energy Conservation**
F15	Water conservation and efficiency
F16	Energy conservation and efficiency

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RESULT AND DISCUSSION

This research uses 6 aspects, 16 factors and 55 green construction assessment indicators obtained through the green construction assessment model. Based on the results of data analysis and processing using Ms. Excel software, the aspect weighting results were 0.134 and the factor weights were 0.209. This value is used as a calculation for the green construction assessment model, obtaining a green construction (NGC) value of 3.15 which does not meet the Ideal NGC value of 10.10. The following are the results of the Green Construction Value (NGC) calculation which can be seen in table 2.

Table 2. NGC Calculation

No	Variable	NIGC	NFGC	Total NIGC	NAGC
A1	**Occupational Health and Safety**			2,66	0,36
F1	Occupational health and safety program	2,24	0,47		
F2	Health of the construction phase work environment	10,48	2,19		
A2	**Air quality and comfort**			2,42	0,32
F3	Construction stage air quality	4,36	0,91		
F4	Selection and operation of construction equipment	3,56	0,74		
F5	Construction project planning and scheduling	3,64	0,76		
A3	**Building Environmental Management**			2,93	0,39
F6	Documentation	2,12	0,44		
F7	Environmental Management of construction projects	3,76	0,79		
F8	Training for subcontractors	4,24	0,89		
F9	Construction waste management	3,88	0,81		
A4	**Resources and Material Cycles**			2,71	0,36
F10	Material sources and cycles (material management)	6,36	1,33		
F11	Material storage and protection	6,6	1,38		
A5	**Appropriate use of land**			5,77	0,77
F12	Land management	7,56	1,58		
F13	Reduction of the ecological footprint of the construction phase	9,8	2,05		
F14	Job site planning and protection	10,24	2,14		
A6	**Water and Energy Conservation**			7,06	0,95
F15	Water conservation and efficiency	11,4	2,38		
F16	Energy conservation and efficiency	22,36	4,67		

CONCLUSION

After the questionnaire data was processed, the average value (mean) for the level of implementation of green construction in the West Sumatra area was 100.7. This means that the implementation of green construction in the West Sumatra area is moderate because the value of 100.7 is between (92-119). In this research, the green construction value achieved was 3.15 from the NGC_ideal of 10.10. The achievement value in implementing green construction does not meet the NGC_ideal value. The Green Construction Aspect Value (NAGC) for occupational health and safety is 0.36, air quality and comfort is 0.32, building environmental management is 0.39, resources and material cycles are 0.36, appropriate land use is 0, 77 and water and energy conservation, namely 0.95.

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REFERENCE

[1] E. Wulfram I, "Capaian *Green Construction* dalam Proyek Bangunan Gedung Menggunakan Model Assessment *Green Construction*," *Konf. Nas. Tek. Sipil*, vol. 9, pp. 1–8, 2015.

[2] J. I. Reynaldy, "Analisis *Green Construction* Pada Proyek X Di Bandung Dengan Metode Assessment *Green Construction* Sistem Wulfram," 2017.

[3] E. Wulfram I, "Implementasi *Green Construction* sebagai Upaya Mencapai Pembangunan Berkelanjutan di Indonesia," *Makal. Konf. Nas. Forum Wahana Tek. ke-2*, pp. 1–7, 2015.

[4] A. W. D. P. I Putu, A. P. W. I Nyoman, and Y. Gede, "Analisis Implementasi Konstruksi Hijau Menggunakan Model Assessment *Green Construction* (Studi Kasus Proyek Pembangunan Pasar Umum Gianyar)," *Proceedings*, vol. 9, no. 1, pp. 21–31, 2021. https://ojs2.pnb.ac.id/index.php/proceedings/article/download/259/157

[5] S. . Donald and C. P. J. Byond, *Terjemahan Sudinarto. Manajemen konstruksi professional jilid kedua*. Jakarta, Erlangga 1993.

[6] A. Bayu, "Pengaruh Penerapan Konsep *Green Construction* Pada Bangunan Gedung Terhadap Penambahan Biaya Pada Pelaksanaan Proyek," 2010.

[7] T. . Saaty, *Pengambilan Keputusan Bagi Para Pemimpin, Proses Hirarki Analitik Untuk Pengambilan Keputusan Dalam Situasi Yang Kompleks*. Pustaka Binama Pressindo, 1993.

[8] U. T. Firdha, "Implementasi Konstruksi Hijau dalam Proyek Bangunan Gedung Menggunakan Model Assessment *Green Construction* (Studi Kasus: Proyek Apartemen Grand Sungkono Lagoon Tower Caspian Surabaya)," 2018. http://repository.unej.ac.id/handle/123456789/88178