Global J. Environ. Sci. Manage., 9(SI): 61-76, Autumn 2023

Global Journal of Environmental Science and Management
(GJESM)

Homepage: https://www.gjesm.net/

Podcasts

SPECIAL ISSUE: Eco-friendly sustainable management
ORIGINAL RESEARCH PAPER

Sustainable development model toward environmentally friendly hospital

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ARTICLE INFO

Article History:
Received 21 April 2023
Revised 25 June 2023
Accepted 01 August 2023

Keywords:
Environmentally friendly hospital
Green building
Green human resource management
Green hospital
Green innovation

DOI: 10.22034/GJESM.2023.09.SI.05

ABSTRACT

BACKGROUND AND OBJECTIVES: This study aims to create an environmentally friendly hospital at West Pasaman regional public hospital by implementing a sustainable development model, which consists of the green hospital, green building, green innovation, and green human resource management. The researchers previously discussed the physical aspects of the building, efficiency related to energy saving and hospital waste management. However, from several references obtained, it has not yet been discussed what is the extent of the benefits derived from the entire implementation of the green hospital. Thus, this study contributes to creating an environmentally friendly hospital model mediated by a green hospital and it is influenced by green building, green innovation, and green human resource management.
METHODS: The study method uses a survey, which uses a questionnaire as a data collection tool. The population in this study consisted of employees, visitors, and the community around West Pasaman regional public hospital. The selection of the sample in this study was based on the proportionate cluster random sampling approach, which was analyzed using the structural equation modeling–partial least square method.
FINDINGS: There are ten findings for analysis at the West Pasaman regional public hospital. First, green building has a significant effect of 0.187 on the green hospital. Second, green innovation has a significant effect of 0.230 on the green hospital. Third, green human resource management has a significant effect of 0.235 on the green hospital. Fourth, green building has a significant effect of 0.263 on the environmentally friendly hospital. Fifth, green innovation has a significant effect of 0.192 on the environmentally friendly hospital. Sixth, green human resource management has a significant effect of 0.197 on the environmentally friendly hospital. Seventh, the green hospital has a significant effect of 0.241 on the environmentally friendly hospital. Eighth, green building has a significant effect of 0.045 on the environmentally friendly hospital mediated by the green hospital. Ninth, green innovation has a significant effect of 0.055 on the environmentally friendly hospital mediated by the green hospital. Tenth, green human resource management has a significant effect of 0.057 on the environmentally friendly hospital mediated by the green hospital.
CONCLUSION: Implementation of the sustainable development model as a form of environmental management policy at the West Pasaman regional public hospital is optimally needed in order to achieve an environmentally friendly hospital. This study recommends employees, visitors the community around the West Pasaman regional public hospital to increase the green hospital, green building, green innovation, and green human resource management in achieving an environmentally friendly hospital.

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
58	1	7

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Note: Discussion period for this manuscript open until April 1, 2024 on GJESM website at the "Show Article".

INTRODUCTION

An environmentally friendly hospital (EFH) is a concept of implementing activities in a hospital that prioritizes public health by continuing to reduce environmental impacts and eliminate their damaging effects (Gao *et al.,* 2016). There are several key components of a sustainable development model to create EFH (Li *et al.,* 2013). First, life cycle costs and environmental impact, which is achieved through energy life cycle analysis of zero energy buildings including renewable energy. This involves an energy life cycle accounting technique for assessing the energy efficiency and emission implications of either a building or a particular renewable energy technology; Second, climate change, where recent reviews of the impact of climate change on the energy sector in particular have highlighted the vulnerability of energy systems and buildings to climate change (Puno *et al.,* 2021; Asnawi *et al.,* 2022); Third, and which is important for monitoring the impact of energy policy in the social, economic, and environmental dimensions, social policy issues related to energy as a key component in the overall strategy for sustainable development (Drobyazko *et al.,* 2021; Moghadam and Samimi, 2022; Ramli *et al.,* 2022). However, the existing hospital actually contributes a lot of waste to the environment because this waste is often disposed of freely without proper management, such as uncontrolled burning and irresponsible burial (Bucătaru *et al.,* 2021). Furthermore, attracting the attention of the world community because it is in line with the issue of global warming, which is caused by the negative contributions of buildings, such as water and electricity consumption, carbon footprint emission and waste disposal (Thiel *et al.,* 2017), the use of energy in hospitals is still inefficient, thus making it a contributor to environmental damage (García-Sanz-Calcedo *et al.,* 2019; González *et al.,* 2018; Vourdoubas, 2018). Business or building owners tend to be reluctant to implement it because it is difficult to apply green principles, including to hospitals because the initial investment costs are higher (Shabaani *et al.,* 2016). This research refers to several relevant articles to find out the state-of-the-art of our studies, including by Hwang and Tan (2012) analyzing green building (GB) for sustainable development. Here, they found that government incentives are needed to overcome obstacles to implementing GB, such as the use of green products and technology. Then, a more specific study was conducted by Azar *et al* (2015), in which they evaluated green hospital (GH) in teaching and private hospitals covered by Tehran University of Medical Sciences. The results of the study found that, compared to government hospitals, private hospitals scored higher on all aspects of GH apart from management and leadership, but there was no statistically significant difference between dimensions and type of hospital in government and private hospitals, because the hospitals studied did not fulfill GH well. Furthermore, this study is expanded by Khan and Zubair (2019) in their study, in which they propose that sustainable adoption and environmentally friendly practices are needed in organizations in the form of green human resource management (GHRM) and which involves the role of GHRM in achieving sustainable development. On the other hand, Khan *et al.* (2021) analyzed the adoption of Organisasi Standardisasi Internasional (ISO) 56002-2019 and green innovation (GI) reporting enhance the firm's sustainable development goal performance, in which they found that GI will increase business transparency due to the development of sustainable corporate goal performance. In addition, Benzidia *et al.* (2021) conducted a recent study on green supply chain process integration and EFH, which provides valuable insights for managers in improving environmental performance. Based on explanations from various empirical phenomena that studies on environmental management for hospitals are still limited and that the concept of EFH, which is driven by the sustainable development model, still tends to be ignored, this research will fill this void by involving the roles of GH, GB, GI, and GHRM adopted from previous research variables as components of the sustainable development model to achieve EFH. Hospitals can adopt EFH and sustainable supply practices to support sustainable goals through the involvement of a green physical and nonphysical environment because it requires support from all aspects. The physical environment consists of GB and GH. Meanwhile, the nonphysical environment consists of GI and GHRM. West Pasaman Regional Public Hospital (WPRPH) is one of the hospitals that is working toward EFH. However, the phenomenon that has occurred for the implementation of GB so far is that, because in making the nonoptimal initial master plan, it conditioned the existing buildings and adjusted them to the continuity of services by using existing infrastructure, the implementation of this master plan is flawed because the development of the land is still not quite right.

Table 1: Research population

Population	Total
WPRPH employees	536
WPRPH visitors	38.158
community around WPRPH	57

Furthermore, the phenomenon that has occurred for the implementation of GI so far is that medical waste has increased over the past five years, which requires GI efforts to overcome this increase so that it can be reused. Besides that, the phenomenon that has occurred for the implementation of GHRM so far is that they have not implemented special training related to environmentally friendly attitudes, such as green compensation. In particular, this study has explored relevant literature studies regarding the concept of sustainable development, which consists of GH, GB, GI, and GHRM to achieve EFH as a solution to problems that occur in WPRPH, which is based on what factors encourage or hinder this implementation. Based on explanations from various empirical phenomena and facts, the study aims are as: 1) Investigate the effect of GB, GI and GHRM on GH; 2) Investigate the effect of GB, GI, GHRM and GH on EFH; 3) Investigate whether GH is able to mediate between GB, GI, and GHRM to EFH. This study was conducted at the West Pasaman Regional Public Hospital in Indonesia in 2022.

MATERIALS AND METHODS

Data types and sources

The type of data used in this study is quantitative, the data obtained from distributing questionnaires to employees, visitors, and the community around WPRPH from May to December 2022. Then, the data source used in this study is primary data, which uses a questionnaire distributed to respondents as measured by a Rating scale (1–5).

Data collection

The population in this study refers to several data sources, including WPRPH employees, WPRPH visitors, and the community around WPRPH, which is summarized in Table 1.

Based on the information in Table 1, the sampling technique used is proportionate cluster random sampling, which pays attention to the sample area of the population elements. Furthermore, to determine the sample size in this study using the Slovin in Eq. 1 (Tejada and Punzalan, 2012).

$$n = \frac{N}{1 + Ne^2} \quad (1)$$

Where; n = Sample size, N = Population size, e^2 = 10% error

First, the selection of samples for WPRPH employees was determined using several criteria, including employees with casual daily worker status, regional honorarium, and civil servants; has a working period of more than 4 years; minimum high school education for management staff and functional staff; and minimum postgraduate education for field heads and section heads. Based on these various criteria, the number of samples for WPRPH can be seen in Eq. 2 (Tejada and Punzalan, 2012).

$$n = \frac{536}{1 + 536(0,1)^2} = 84.27, \text{ then set to 84 employees} \quad (2)$$

Based on the calculation of the number of samples at in Eq. 2, the characteristics of the respondents for WPRPH employees can be seen in Table 2.

Based on Table 2, it can be explained that the distribution of the number and percentage of respondents is for WPRPH employees. First, female employees respond more to efforts to achieve EFH. Second, employees aged 36–45 years respond more to efforts to achieve EFH. Third, employees with postgraduate education respond more to efforts to achieve EFH. Fourth, employees who have income >235 USD/month respond more to efforts to achieve EFH. Fifth, employees who have worked for 10–19 years respond more to efforts to achieve EFH. Further, the selection of samples for WPRPH visitors was determined using several criteria, including visitors having a minimum age of 25 years; visitors have visited more than twice in 2021; and visitors have at least high school education. Based on these various criteria, the number of samples for year WPRPH visitors can be seen in Eq. 3 (Tejada and Punzalan, 2012).

$$n = \frac{38.158}{1 + 38.158(0,1)^2} = 99.73, \text{ then set to 100 visitors} \quad (3)$$

Table 2: Characteristics of WPRPH employees

Characteristics	Option	Achievements	
		Frequency (Person)	Percent (%)
Gender	Man	21	25
	Woman	63	75
Age	26–35 years	19	22.6
	36–45 years	48	57.1
	46–55 years	17	20.2
Education	Senior high school	4	4.8
	Diploma	20	23.8
	Bachelor	26	31.0
	Postgraduate	34	40.5
Income	<100 USD/month	12	14.3
	100–165USD/ month	6	7.1
	166 –235 USD/ month	13	15.5
	>235 USD/ month	53	63.1
Length of work	≤4 years	11	13.1
	5–9 years	27	32.1
	10–19 years	45	53.6
	≥20 years	1	1.2

Table 3: Characteristics of WPRPH visitors

Characteristics	Option	Achievements	
		Frequency (Person)	%
Gender	Man	52	52
	Woman	48	48
Age	25–35 years	32	32
	36–45 years	32	32
	46–55 years	34	34
	55–65 years	2	2
Education	Senior high school	76	76
	Diploma	8	8
	Bachelor	14	14
	Postgraduate	2	2
Income	<100 USD /month	29	29
	100–235 USD/ month	60	60
	>235 USD/ month	11	11
Number of visits	≤2 times	9	9
	3–5 times	49	49
	6–10 times	24	24
	≥10 times	18	18

Based on the calculation of the number of samples at Eq. 3, then the characteristics of the respondents for WPRPH visitors can be seen in Table 3.

Based on Table 3, the distribution of the number and percentage of respondents for WPRPH can be explained. First, male visitors respond more to efforts to achieve EFH. Second, visitors aged 46–55 years respond more to efforts to achieve EFH. Third, visitors with senior high school education respond more to efforts to achieve EFH. Fourth, visitors who have an income of 100–235 USD/month respond more to efforts to achieve EFH. Fifth, visitors who have visited 3–5 times respond more to efforts to achieve EFH. Third, the selection of samples for the community around WPRPH is determined using several criteria: These include people who live around a radius of 50 meters in the WPRPH environment and who have lived for more than one year; people who are at least 25 years old; the community has at least a senior high school education; and the public who know about the WPRPH environment. Based on previous information, the total population for the community around

Table 4: Characteristics of communities around WPRPH

Characteristics	Option	Achievements	
		Frequency (Person)	%
Gender	Man	28	49.1
	Woman	29	50.9
Age	25–35 years	15	26.3
	36–45 years	38	66.7
	46–55 years	4	7
Education	Senior high school	45	78.9
	Diploma	3	5.3
	Bachelor	7	12.3
	Postgraduate	2	3.5
Income	<100 USD /month	20	35.1
	100–235 USD/ month	33	57.9
	>235 USD/ month	4	7.0
Length of stay	≤1 year	1	1.8
	2–10 years	14	24.6
	11–20 years	10	17.5
	≥20 years	32	56.1

Table 5: Operational definitions of research variables

Variable	Definition	Measurement Items	Source
GB	The structure and use of building processes that are environmentally responsible and resource-efficient throughout the building's life cycle	11 items	Alwan *et al.,* 2015; Hwang and Tan, 2012
GI	Innovate in technology for energy saving, pollution prevention, waste recycling, and green product design	10 items	Khan *et al.,* 2021; Wang and Yang, 2020
GHRM	Implementation of human resource management policies and practices for sustainable resource utilization	6 items	Opatha and Arulrajah, 2014
GH	Hospitals that are designed, built, renovated, operated, and maintained by considering the principles of health and environmental sustainability	14 items	Azar *et al.,* 2015 Shaabani *et al.,* 2020
EFH	Hospitals that implement sustainable development, optimizing the use of natural resources and human resources by harmonizing human activities with the ability of natural resources to support them	17 items	Khan *et al.*, 2021 Li *et al.,* 2013

WPRPH is 57 family cards, which is very small because it is less than 100. Based on this condition, this study uses the entire population as a research sample, so the characteristics of the respondents for the community around WPRPH can be seen in Table 4.

Based on Table 4, it can be explained that the distribution of the number and percentage of respondents is for the community around WPRPH. First, women's society responds more to efforts to achieve EFH. Second, people aged 36–45 years respond more to efforts to achieve EFH. Third, people with senior high school education respond more to efforts to achieve EFH. Fourth, people who have an income of 100–235 USD/month respond more to efforts to achieve EFH. Fifth, people who have lived ≥20 years respond more to efforts to achieve EFH.

Research variable

The variables analyzed in this study consisted of exogenous variables (GB, GI, GHRM) and endogenous variables (GH and EFH), where indicators of each of these variables can be seen in Table 5.

This study also builds a research model to link variables in one unified research framework, which so far has been neglected. Then, each variable will contribute to other variables to create an EFH at WPRPH (Fig. 1).

The influence of GB on GH

The implementation of GB will be much faster and

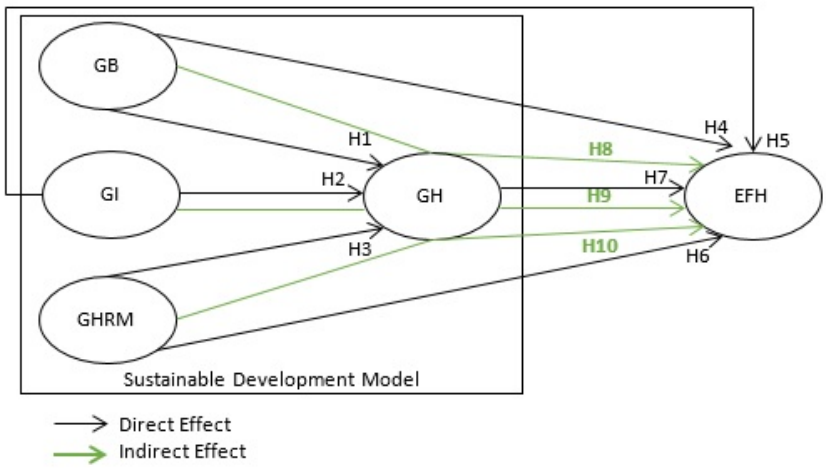

Fig. 1: Research variable linkages

have lower maintenance operational costs because the GB concept will be paired with solar panels to save electricity costs (AbdRahman *et al.,* 2021). Then, where it is seen that the increase in carbon accumulation will increase the number of inpatients in the hospital (Salvaraji *et al.,* 2023), the GB concept will also minimize reducing carbon footprint because it can reduce damage to the atmosphere and the earth's environment (Amran and Muhtazaruddin, 2018; Dhillon and Kaur, 2015). In addition, the use of GB will be more durable and longer because it is related to the use of quality construction materials (Zhan *et al.,* 2022).

H1: GB has a significant effect on GH

The influence of GI on GH

The GI aspect consists of management, process, product and technological innovation criteria (Issa and Jabbouri, 2022). Greater government efforts in this area will increase the incentives of companies to increase green proactivity. Governments that focus on increasing the availability of information regarding corporate environmental practices will intensify the positive effects of differentiation through GI (Aragón-Correa *et al.,* 2013).

H2: GI has a significant effect on GH

The influence of GHRM on GH

GHRM can be very effective in developing a green culture in an organization. So, to achieve GH, green practices must be identified and implemented (Gupta., 2018; Roberts *et al.,* 2016). GHRM increases employee commitment and leads to eco-friendly behavior by staff (Jackson *et al.,* 2014; Kim *et al.,* 2019).

H3: GHRM has a significant effect on GH

The influence of GB on EFH

The application of a project management framework for GB construction should be developed to overcome obstacles, such as promoting the adoption of sustainable construction in future projects (Al-Ghamdi and Bilec, 2017; Wood *et al.,* 2016). The construction of eco-friendly health infrastructure will use local and sustainable supplies of building materials to achieve EFH (Dhillon and Kaur, 2015).

H4: GB has a significant effect on EFH

The effect of GI on EFH

GI will drive process, product, and organizational improvements by increasing technological capabilities, but also by preventing pollution and saving energy, which will support the creation of EFH (Khan *et al.,* 2021).

H5: GI has a significant effect on EFH

The effect of GHRM on EFH

GHRM can be more useful if it is adopted by an organization as part of a broader sustainable development or green management philosophy rather than just a time bound small isolated step (Pinzone *et al.,* 2016). GHRM implementation can help organizations to improve company performance, especially environmental performance and achieve a green corporate culture (Khan and Zubair, 2019).

H6: GHRM has a significant effect on EFH

The effect of a GH on EFH

The implementation of GH is a hospital concept that is designed by empowering natural potential as the main resource so that it is friendly to the environment and saves energy expenditure (Renko *et al.,* 2018), where creating an environmental management system in the hospital requires serious and sustained action and coherent views from managers (Mohrman and Winby, 2018; Shaabani *et al.,* 2020).

H7: GH has a significant effect on EFH

The effect of GB on EFH mediated by GH

GB has an influence on EFH so that the basic structure level, the life cycle of construction materials assessed, such as concrete construction and steel construction, and meaning that steel structures in buildings are more environmentally friendly than reinforced concrete structures (Najjar *et al.,* 2022), shows that cement and steel have a higher impact than steel beams (Kumari and Kumar, 2020). Furthermore, its implementation must be supported by a design that empowers natural potential as the main resource (Kamath *et al.,* 2019).

H8: GB has a significant effect on EFH mediated by GH

The effect of GI on EFH mediated by GH

GI consists of green product innovation, recycling, and green publicity. Business sustainability also has three dimensions, namely financial performance, environmental performance, and social performance. The results of the study show that GI has a significant effect on business continuity in the future (Arfi *et al.,* 2017; Li *et al.,* 2020). GI can express a positive and significant impact on an organization's environmental performance through the implementation of environmentally friendly practices (Seman *et al.,* 2019).

H9: GI has a significant effect on EFH mediated by GH

The effect of GHRM on EFH mediated by GH

GHRM consists of cultural, organizational, and individual factors, which reinforce attitudes and environmental performance in hospitals. GHRM implementation with support from managers can provide a context for hospital environmental activities using environmentally friendly facilities (Rawashdeh, 2018), whereby, then, the necessary green structures will systematically accelerate the steps toward the goals of the hospital's green management (Paillé *et al.,* 2020). In addition, it also improves GH performance and staff motivation to participate in green activities (Seyedein and Mesbahi, 2020).

H10: GHRM has a significant effect on EFH mediated by GH

Data analysis technique

The analysis technique used in this study is the structural equation model or commonly called the Structural Equation Modeling (SEM)-Partial Least Square (PLS). SEM is a multivariate analysis technique that combines factor analysis and regression analysis with the aim of examining the relationship between variables in a model, both between indicators and their constructs and relationships between constructs. Where PLS is an alternative approach that shifts from a covariance-based SEM approach to a variance-based one, SEM makes it possible to see the relationship between variables simultaneously and take into account direct and indirect effects between variables.

RESULTS AND DISCUSSION

Outer loading

Outer loadings are tables containing loading factor (LF) to show the correlation between indicators and latent variables. The LF value must be greater than 0.7 then it is said to be valid. However, if the LF value is less than 0.7, then the indicator must be removed and the model must be recalculated. After evaluating the LF value, the next step is to evaluate the value of composite reliability (CR) to measure the actual reliability value of a variable with the provision that the value must be more than 0.6. Then, the next stage is to evaluate the average variance extracted (AVE) value, this describes the magnitude of the variance or diversity of manifest variables that can be owned by the latent construct, with the provision that the value must be more than 0.5. The last stage is evaluating the value of Cronbach alpha (CA), which measures the lower limit of the reliability value of a construct with the provision that the value must be more than 0.6. Based on this explanation, the results for LF, CR, AVE and CA can be seen in Table 6.

Table 6 informs about the outer loading results that have been carried out for this study. First, the LF results for all items for all variables are declared valid because the resulting values are greater than 0.7. Second, the

CR results for all variables show reliable values. Third, the AVE results for all variables are above the minimum criterion of 0.5, so that more than half of the diversity of the indicators. Fourth, CA results for variables are those with values above 0.6, which indicates a reliable value.

Discriminant validity

Discriminant validity (DV) is the degree to which a construct really differs from other constructs by empirical standards. This study uses the heterotrait-monotrait ratio (HTMT) approach to analyze DV. HTMT is the ratio of the correlation between traits with the correlation within the trait with the provision that the value must be less 0.85. This explanation; the results for DV using the HTMT ratio approach for this study can be seen in Table 7, where all HTMT ratio values are below the recommended value. So, within the same model the GB, GI, GHRM, GH, and EFH constructs differ from each other.

Then, Table 7 summarizes the results of testing the hypothesis of this study using a confidence level of α = 5% (0.05). This stage can be obtained after going through the process of analyzing the outer model and inner model, so that the results of the hypothesis testing arrive at the coefficients that correspond to each hypothesis. Based on the analysis that has been done, if the Probability (P) value is less than 0.05, then the hypothesis is proven to be accepted and vice versa. Parameters considered for the proposed sustainable development model are represented by GH, GB, GI and GHRM because all of these variables support each other so that EFH can be realized in WPRPH. The hypotheses in this study are divided into two categories, including H1 to H7 analyzing a direct relationship. Meanwhile, H8 to H10 analyze an indirect relationship because there is a mediating effect.

Table 7 informs that all the hypotheses put forward in this study are proven to be accepted because the p value for each hypothesis is less than 0.05. Furthermore, the direction coefficient for the hypothesis consisting of direct and indirect relationships in this study is positive for all hypotheses.

The effect of GB on GH at WPRPH

Implementation of GB will encourage the achievement of GH in WPRPH, where the contribution is 0.187 and has a significant effect on α 1 per cent (0.008).The use of environmentally friendly alternative materials such as mild steel for the roof framework at WPRPH. Furthermore, the use of environmentally friendly raw materials can save costs and reduce the impact on ecosystems on the environment, such as the use of alternative materials in the form of mild steel which will reduce costs and help maintain environmental ecosystems by avoiding the use of wood and destruction of the forest environment. Apart from that, the use of gypsum in room insulation will also reduce the risk of an earthquake due to the use of light and strong materials, so that the building life cycle according to the GH concept will be realized. Then, a new building at WPRPH has been designed by making piles buried underground as an earthquake-resistant foundation with a tested structure. Meanwhile, the old WPRPH building was demolished because it was not in accordance with the hospital development plan (master plan). However, for buildings that can still be utilized, renovations have been carried out to make them equivalent to new buildings, so as to create EFH. This will continue to be done until the next stage of development can be carried out. On the other hand, so as to encourage savings in electricity use, WPRPH also has good windows and glass, so that sunlight can enter employees' work rooms and inpatient rooms for patients. his condition is also supported by the availability of a good and comfortable waiting room, such as for outpatient care which has been neatly arranged and placed in one building with sufficient lighting and during the day can take advantage of sunlight in the room because the partition between the waiting room and the courtyard uses a very wide glass partition. This condition is in line with the results of research by Alwan *et al.* (2015), in which they argue that GB modeling will lead to cleaner production in the construction industry.

The influence of GI on GH at at WPRPH

Implementation of GI will encourage the achievement of GH in the WPRPH, where the contribution is 0.230 and has a significant effect on α per cent (0.003). Implementation of online registration services and conducting online consultations using social media such as WhatsApp, so that EFH services at WPRPH run effectively and efficiently. In addition, receiving input, suggestions, and complaints from patients, visitors and employees via the website and social media has gone well, in which all complaints submitted can be used as evaluations in the future and contribute to creating EFH.

Table 6: The assessment results of LF, CR, AVE, and CA

Indicator	LF	CR	AVE	CA
GB		0.952	0.659	0.948
The construction of the building uses raw materials with Indonesian national standards	0.741			
Building materials using environmentally friendly materials	0.876			
All 6xced have been used according to their function	0.770			
Waste installations are placed properly and neatly	0.816			
Clean 6xced installation 6xced well	0.823			
The generator building is placed in an 6xce that does not generate noise	0.823			
Doors and 6xcedes use aluminum	0.792			
Gypsum is used to insulate the room	0.812			
Mild 6xced is used for the roof frame as a substitute for Wood	0.838			
The building has an earthquake-resistant design	0.837			
The building makes use of doors, 6xcedes and ventilation to allow sunlight throughout the room	0.796			
GI		0.954	0.686	0.949
Accept patient registration with the online system	0.837			
Receive suggestions and complaints from the public through the WPRPH website and social media	0.871			
Using a hospital management information system application in providing service data	0.819			
Harnessing solar power for outdoor lighting	0.816			
Provide free wifi facilities for employees and visitors	0.817			
Perform online prescription delivery services to the designated pharmacy	0.822			
Using a temporary solid medical waste storage machine	0.859			
Using an WWTP machine to treat liquid medical waste	0.857			
Collaborating with the Environmental Service in realizing EFH	0.853			
Using an online system for ordering hospital products	0.724			
GHRM		0.939	0.762	0.938
Hospital employees sort medical and nonmedical waste before placing it in a landfill	0.850			
Hospital employees collaborate with visitors in preserving the environment	0.898			
Employees, visitors, and the community around the hospital reduce the use of plastic bags	0.867			
Refill 6xced is available for employees and visitors	0.861			
Hospital employees and visitors use 6xced only as needed	0.875			
Hospital employees and visitors prefer to use public transportation to the hospital	0.887			
GH		0.957	0.634	0.955
Hospital leaders establish pro-environmental policies	0.702			
The hospital manages chemicals well	0.846			
The hospital carries out waste management and the processed products are safe for disposal into public waste channels after being tested for the level of contamination	0.768			
The hospital conducts periodic checks of liquid waste in the health laboratory	0.822			
The hospital separates medical and nonmedical waste	0.807			
Hospitals pack solid medical waste according to its type	0.850			
The hospital carries out special packaging of radioactive waste	0.786			
The hospital periodically measures radiation levels	0.800			
The hospital uses a lighting system in the room by utilizing sunlight except at night	0.816			
Hospitals use alternative energy / substitute for electrical energy such as solar electricity	0.786			
The hospital periodically checks expired medicines and pharmaceutical materials	0.787			
Hospital use of medical equipment that does not cause noise	0.716			
The hospital uses operational vehicles that are fuel efficient	0.778			
The hospital conducts outreach to the community to 6xcede EFH	0.860			
EFH		0.956	0.579	0.954
There are plants as oxygen producers outside the building	0.710			
The air still feels fresh outside the building	0.774			
There is no noise when in a hospital environment	0.769			
The smell of sewage does not cause disturbance to visitors	0.704			
Cool and comfortable air in the room for patients and employees	0.791			
Adequate lighting throughout the room	0.768			
All 6xced are clean and trash free	0.730			
The local community can increase their income by trading or other businesses	0.803			
Hospitals absorb labor and reduce unemployment for local people	0.753			
The presence of WPRPH brought local investors to open businesses around the hospital	0.789			
The people of West Pasaman and its surroundings can easily reach health services	0.778			
Provide health insurance to employees	0.776			
The hospital is also an educational institution for employees and the community.	0.755			
The hospital is also a research facility for students and students	0.758			
Hospital employees carry out Friday sharing activities with the patient's family	0.819			
Convey messages about environmental protection	0.730			
Minimizing the use of engines that produce emissions	0.719			

Table 7: DV test results (HTMT ratio)

Variable	GB	GH	GHRM	GI
GB				
GH	0.461			
GHRM	0.571	0.475		
GI	0.591	0.469	0.535	
EFH	0.608	0.559	0.575	0.568

Then, innovations to technology at WPRPH such as online prescription delivery services to hospital pharmacies or other pharmacies have been running on an ongoing basis, so as to make it easier for patients to obtain drugs. This is also evidenced by the implementation of an online system for ordering products for hospital needs, so that it can reduce the cost of obtaining products and minimizing the use of time to obtain products. On the other hand, while, according to Aguilera-Caracuel (2013), GI incorporates technological improvements that save energy, are environmentally friendly or enable waste recycling for corporate environmental management, which contributes to business sustainability, WPRPH has also improved its services to visitors in managing waste through temporary solid medical waste storage machines so as not to have an impact on the hospital environment and the surrounding environment.

The influence of GHRM on GH at WPRPH

Implementation of GHRM will encourage the achievement of GH in WPRPH, where the contribution is 0.235 and has a significant effect on α 1 per cent (0.000). WPRPH employees sort medical and nonmedical waste before placing it in a landfill. Then, WPRPH employees collaborate with visitors and the community around WPRPH in preserving the environment in a program that is a form of creating EFH owing to the reason that, by increasing the competence of employees, visitors, and the surrounding community, it is easier to build EFH. The results of this study are also supported by the findings of Opatha and Arulrajah (2014), in which the aim of GHRM is to create, improve, and maintain greenery for every employee so as to provide maximum contribution to the role of preservation, conservation, nonpolluting or nonpolluting sources. Meanwhile, Yong *et al.* (2020), in their study argue that the implementation of GHRM is a resource, and that economic development or human activity in the workplace will not have a negative impact on the environmental ecosystem.

The influence of GB on EFH at WPRPH

Implementation of GB will encourage the achievement of EFH in WPRPH, where the contribution is 0.263 and has a significant effect on α 1 per cent (0.000). GB has had a good impact on sustainable development as WPRPH has done by using aluminum as a substitute for wood for frames, doors and windows. This action has a positive impact on the hospital environment such as the lack of use of wood and results in a reduction in the use of materials derived from nature. The results of this study are in line with several relevant studies, including Hwang and Tan (2012), who found that GB was built based on sustainable construction principles, which took into account ecological, social, and economic issues. Meanwhile, according to Dhillon and Kaur (2015) unsustainable and inefficient buildings, unsafe disposal of hospital waste and untreated waste create an unhealthy environment. Furthermore, the GB rating system measures a building's sustainability by applying a series of criteria organized into various categories, such as site selection, energy, water, resources, materials, and environment (Nilashi *et al.* 2015).

The influence of GI on EFH at WPRPH

Implementation of GI will encourage the achievement of EFH in WPRPH, where the contribution is 0.192 and has a significant effect on α 1 per cent (0.014). GI at WPRPH is good and has implemented services in the form of online registration, providing information through the application system, thereby reducing the use of paper, reducing expenses for patients to meet in person and reducing the use of fuel oil which results in reduced sources of emissions from vehicles. Then, medical waste management has also been carried out using innovative equipment to create EFH in the form of providing medical waste processing machines, so that the waste can be reused or recycled. The results of this study are in line with several relevant studies, including sustainable development units, which are

sustainable health care as something that provides high-quality environmental maintenance and improves public health without causing severe ecological damage (Khan *et al.,* 2021). Buildings without energy and related design techniques and technologies will be cost efficient in life cycle and impact on environment, climate change and social policy issues (Li *et al.,* 2013).

The influence of GHRM on EFH at WPRPH

Implementation of GHRM will encourage the achievement of EFH in WPRPH, where the contribution is 0.197 and has a significant effect on α 1 per cent (0.003). GHRM on WPRPH is quite high in receiving environmentally friendly information. The concern of employees, visitors, and the surrounding community for the environment can be seen from their attitude and behavior in handling waste, in which they want and care to sort waste according to its type. In addition, employees and visitors have also used water as needed (Le Dinh *et al.* 2022; Brotosusilo *et al.* 2022; Sivakumar *et al.* 2022; Ghazali *et al.* 2021). The results of this study are also supported by several relevant studies, including Masri and Jaaron (2017), in which they found that GHRM is used to promote the use of sustainable resources for environmental sustainability. According to Khan and Zubair (2019), it is stated that steps that can be taken by organizations to support an environmentally friendly mission need to adopt sustainable and GHRM management practices.

The influence of GH on EFH at WPRPH

Implementation of GH will encourage the achievement of EFH in WPRPH, where the contribution is 0.241 and has a significant effect on α 1 per cent (0.000). Respondents rated the WPRPH leader's pro-environmental policy as quite good, so with this it is necessary to maintain and even increase environmentally friendly behavior in order to create EFH. Then, the management of chemicals that has been carried out is very good, so that it can help encourage sustainable development that is carried out. This is evidenced by providing a place to store chemicals that can have a negative impact on the hospital environment and the surrounding community. Furthermore, the management of waste and its processed products is considered quite well because testing for the level of pollution is carried out routinely. In addition, the segregation of medical and nonmedical waste has been carried out well, so that medical waste can be collected according to its type. In addition, the use of direct sunlight is very good which is supported by most of the glass building materials, thereby minimizing spending on electricity costs. In general, for the building and the availability of facilities in an effort to create EFH in WPRPH, the respondents considered it good because it has rooms with clean conditions starting from inpatient rooms, toilets, prayer rooms, and waiting rooms. This makes employees, visitors, and the surrounding community feel comfortable. The results of this study are also supported by several relevant studies, including environmentally sound development toward sustainability which can involve economic, social, and environmental aspects of human and organizational activities at the local, national and international levels Renko (2018). GH is to eliminate the role of the hospital in the weight of the waste burden (Setyowati *et al.,* 2013). The same thing was conveyed by Shaabani *et al.* (2020) that GH is one that supports public health by reducing environmental risks.

The influence of GB on EFH mediated by the GH at the WPRPH

GH mediates GB in increasing EFH in WPRPH, where the contribution is 0.045 and has a significant effect on α 1 per cent (0.036). GH certainly already has environmentally friendly buildings such as using national standard building materials and using alternative building materials that do not pose a risk to the building itself or to the employees, visitors, and the surrounding community (Opatha and Arulrajah, 2014). Alternative building materials can certainly streamline hospital expenses because they have affordable prices and are durable. After the creation of GH which is supported by GB, hospital management can be more flexible in carrying out environmentally friendly sustainable development which can have a positive impact on all parties involved in it. The benefit for employees and visitors to the hospital is that all activities around the hospital can run well because the risks that arise have been minimized from environmentally friendly buildings. This being the case while the benefits for the surrounding community can increase their standard of living by carrying out an activity that has high value and is useful for others which can ultimately improve the economic, social, environmental, and maintenance and rehabilitation of the environment.

The influence of GI on EFH mediated by GH at WPRPH

GH mediates GI in increasing EFH in WPRPH, where the contribution is 0.055 and has a significant effect on α 1 per cent (0.022). GH was created from geographic information system (GIS) that have been implemented by hospital management, including using technological developments effectively so that hospitals can implement an online patient registration system and accept complaints or suggestions given by visitors via the information web provided by Shaabani *et al.* (2020). Then, GH is also a supporter in the implementation of sustainable development in the present and the future effectively because the hospital is based on an EFH. Ajbar *et al.* (2023) revealed that it is necessary to innovate waste treatment in hospitals because medical waste can endanger health workers and patients. Furthermore, a good GI can facilitate all aspects related to health services because the easier it is to get services, the more satisfied visitors are with the services provided. So with that, GH is able to mediate GIS in increasing EFH, so that the goals set by hospital management are to provide the best service for employees, visitors, and the surrounding community.

The influence of GHRM on EFH mediated by GH at the WPRPH

GH mediates GHRM in increasing EFH in WPRPH, where the contribution is 0.057 and has a significant effect on α 1 per cent (0.015). With the most important GHRM practices being identified and prioritized, measured by several criteria, such as the willingness of employees to sort waste and place it according to its type, in order to assist hospital leaders in creating better hospital development, it is necessary to have contributions from GH and GHRM in the sense of having competence, behavior, and attitudes that are in favor of hospital development. In addition, employees are also able to collaborate with visitors and the surrounding community to preserve the environment and what is very important is that employees are able to use hospital support facilities effectively and efficiently in order to minimize hospital operating costs (Khan and Zubair, 2019). So with that, GHRM can determine the sustainable development of hospitals that are supported by GH.

CONCLUSION

The conclusion of this study consists of three important points. First, GB, GI, and GHRM have a positive and significant effect on GH and EFH in WPRPH. Second, GH has a positive and significant effect on EFH at WPRPH. Third, GH mediates GB, GI, and GHRM in increasing EFH at WPRPH. This study finds a novelty as an important finding, in which the sustainable development model consisting of GH, GB, GI, and GHRM is a driving factor in achieving the context of EFH in WPRPH. In addition, the role of GH needs to be increased to strengthen the influence of GB, GI, and GHRM on EFH in WPRPH. The recommended modeling application from the results of this study is the application of EFH which is able to contribute to environmentally sound development because WPRPH has packaged solid medical waste according to its type, provided a special room for chemical storage, carried out routine and periodic checks on the chemical and bacteriological content of its liquid waste. The attention of management is needed to determine pro-environmental policy directions, for example by making regulations in the form of director's regulations related to hospital environmental management, in addition to the following rules and sanctions for violations of the rules set by the director's regulations regarding hospital environmental sustainability. The policies that can be implemented to achieve this include there being the necessity in the implementation of GB to make EFH work properly by implementing environmentally friendly indicators, especially those related to GB, both those related to GB material quality, the use of modeling building information to reduce construction dematerialization and the use of substitution and material specifications as well as the use of designs for the building life cycle, which needs to be applied when the development process is underway. Innovative approaches to achieving sustainable infrastructure and design games in creating EFH include reusing all used materials that can still be used and still meet the requirements in order to reduce the amount of construction waste and minimize the carbon footprint, using wood materials that are legally certified according to Government Regulations of wood origin and legally free from illegal timber trade and rooms with high occupant density equipped with installation of carbon dioxide gas sensors in the room of no more

than 1,000 ppm. Then, in the implementation of GI it is necessary to maximize the existing cold storage as medical waste storage because if it is not maximized its use will cause problems, such as aesthetics, physical, and psychological health for all employees, visitors, and the community around WPRPH. Furthermore, if medical waste exceeds the capacity of the existing cold storage, the hospital should budget for additional purchases of cold storage, so that medical waste can be accommodated properly. On the other hand, GI can be integrated into hospital settings to improve environmental performance including energy efficiency and conservation, in which hospital buildings are equipped with electricity meters for each electricity load sub-system separately, especially between hospital and medical service facilities, perform electricity calculations, measure energy efficiency, use natural lighting, equipped with ventilation, calculate local climate change impacts through measuring CO_2 emissions and using new and renewable energy sources. While in the implementation of GHRM it is necessary to increase knowledge of medical waste management in order to better understand how to manage medical and nonmedical waste and the importance of outreach to all employees in carrying out medical waste management so that waste managers and producers work together to maximize waste management in WPRPH, another innovation is water conservation, in which the hospital building is equipped with a water meter, reducing water use, using water-efficient water fixtures, installing waste water recycling installations, using alternative water sources, making efforts to absorb rainwater and water efficiency for watering gardens. In addition, in the implementation of GH it is necessary to carry out continuous supervision between GB, GI and GHRM because this is an integral component so that EFH in WPRPH can be realized to encourage sustainable development through controlling environmental, economic, social, and climate change. Governments and policy makers support the adoption of EFH through incentives, such as holding a GH contest to promote hospitals that have a more environmentally perspective in hospital management, especially in terms of waste management, environmentally friendly materials, efficient use of resources, and other innovations. Then, it can also go through regulations such as policies: these being, first, promoting the commitment of hospital managers to implement GH principles; Second, striving to protect health, safety, and create comfort for hospital residents by controlling negative environmental impacts resulting from hospital activities; Third, implementing the principle of efficient use of energy, water, and material resources. Although this study makes a number of important contributions to the study of WPRPH, it still has some limitations: First, this study uses a proportionate cluster random sampling technique as a sample, so that it becomes a limitation in sampling because it consists of three criteria, namely employees, visitors, and the community. For further research, it is expected to use accidental sampling as a sampling technique so that the sampling is done in one direction only and the results are more specific; Second, the object of research is only carried out in one hospital, so there are no other hospitals as a comparison, so future researchers need to add research objects that are engaged in the same field, so that the insights obtained from research are broader; Third, this study only relied on the data collection process using a questionnaire, so future researchers need to combine questionnaires and interviews as a data collection technique.

AUTHOR CONTRIBUTIONS

F. Aini, the corresponding xced, has contributed in prepared all the tables and figure and interpretation of the results, participated in the interpretation of the SEM-PLS results and manuscript preparation. A. Irianto, has contributed in supervising the first xced in prepared all the tables and figure and interpretation of the results, participated in the interpretation of the SEM-PLS results and manuscript preparation. S. Amar, has contributed in supervising the first xced in prepared all the tables and figure and interpretation of the results, participated in the interpretation of the SEM-PLS results and manuscript preparation.

ACKNOWLEDGENMENT

The authors would like to thank Universitas Negeri Padang to support facilitator to carry out this study.

CONFLICT OF INTEREST

The author declares that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication, and/or falsification, double publication and/or submission, and redundancy have been completely observed by the authors.

ABBREVIATIONS

%	Percent
α	Alpha
=	Similarity
()	Parenthesis
+	Plus
AVE	Average variance extracted
CA	Cronbach Alpha
CR	Composite reliability
DV	Discriminant validity
E	Error
et al.	Et Alia
Eq.	Equation
EFH	Environmentally friendly hospital
GB	Green building
GIS	Geographic information system
Fig.	Figure
GH	Green hospital
GHRM	Green human resource management
GI	Green Innovation
H	Hypothesis
H1	Hypothesis 1
H2	Hypothesis 2
H3	Hypothesis 3
H4	Hypothesis 4
H5	Hypothesis 5
H6	Hypothesis 6
H7	Hypothesis 7
H8	Hypothesis 8
H9	Hypothesis 9
H10	Hypothesis 10
HTMT	Heterotrait-Monotrait
LF	Loading Factor
n	Sample Size
N	Population Size
P	Probability
PLS	Partial Least Square
P-value	Probability of obtaining results
SEM	Structural equation modeling
USD	United States Dollar
WPRPH	West Pasaman Regional Public Hospital

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HOW TO CITE THIS ARTICLE

Aini, F.; Irianto, A.; Amar, S, (2023). Sustainable development model toward environmentally friendly hospital. Global J. Environ. Sci. Manage., 9(SI): 61-76.

DOI: 10.22034/GJESM.2023.09.SI.05

URL: https://www.gjesm.net/article_706538.html