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Evaluation of Hospital Sustainability Initiatives in South-east Asia

Ari Nurfikri[1,2]*, Rachmadi Purwana[1], Tri Edhi Budhi Soesilo[1], Deni Danial Kesa[2]

[1] School of Environmental Science, Universitas Indonesia, Jakarta, Indonesia
[2] Vocational Education Program, Universitas Indonesia, Depok, Indonesia

*Correspondence: arinurfikri@ui.ac.id

The increasing growth of hospitals in South-east Asia has not been in line with awareness and commitment to sustainability in healthcare facilities. Hospitals play an important role in maintaining public health and contributing to environmental sustainability. However, due to the region's vulnerability to the impacts of climate change, hospitals in South-east Asia have not yet fully transformed into green healthy hospital. This study compares the sustainability of each hospital in South-east Asia that is a member of the Global Green Healthy Hospital (GGHH) based on ten sustainability agendas. This study employs secondary data analysis sourced from the official GGHH website and utilises descriptive quantitative design techniques that include frequency and percentage calculations. The highest percentage of sustainability agenda implementation in the South-east Asia region is waste (72.3%), energy (63.49%), and leadership (52.48%). The lowest percentages are transportation (16.77%), pharmacy (24.92%), and chemicals (31.20%). Hospitals in South-east Asia show a low level of awareness about the implementation of green and healthy hospital practices. Only two countries, the Philippines and Indonesia, have healthcare facilities capable of implementing ten sustainability agendas.

Keywords: South-east Asia; Green Hospital; Sustainability

INTRODUCTION

In 2014, global healthcare facilities produced a climate footprint of 2 gigatons of CO2. In 2015, healthcare facilities in England generated a carbon footprint of 22.8 million tonnes, or 4.4% of global net emissions. Hospitals in Germany require 17 million kilowatt-hours of electricity each year (Alotaiby & Krenyácz, 2023). Healthcare facilities in the United States are more extensive than those in Australia, which accounts for about 7% of the total national emissions (Gan et al., 2019).(Gan et al., 2019) Transitioning to Asia, China and India have emerged as the fourth-largest producers of mercury globally, with healthcare institutions in both countries contributing 5% to the national carbon footprint (Pichler et al., 2019). Malaysia's electricity consumption averages 44,637,966 kilowatt-hours per year, with air conditioning accounting for 65% and lighting 17% (Alotaiby & Krenyácz, 2023).

Global warming is accelerating due to the negative effects of the hospital industry. In 2010, global warming caused 300,000 deaths and material losses amounting to $15.9 billion. To address this issue, the UN held a climate change conference and set the SDG agenda for 2030. This aims to eliminate poverty, hunger, health, well-being, quality education, gender equality, clean water and sanitation, affordable clean energy sources, decent work, economic growth, industrial innovation, and infrastructure (Tseng et al., 2020).

Even without climate change, South-east Asian countries have faced uncontrolled disease outbreaks due to their proximity to the Pacific Ocean, high migration rates, rampant deforestation, and increased food production. Climate change exacerbates the environmental, economic, and social inequalities already acknowledged by these countries (Gan & Madders, 2024). South-east Asia has also become an early site for the emergence of infectious diseases (Miranda et al., 2023). The increase in the number of hospitals, health budgets, medical research and development, and per capita income has resulted in a larger ecological footprint in South-east Asia (Murjani et al., 2020). South-east Asia is one of the regions most vulnerable to climate change. Currently, the World Health Organisation (WHO) identifies climate change as the greatest threat to humanity. This decline is due to the epidemic of infectious diseases and issues within the food system. Global warming will accelerate the spread of vector-borne diseases, such as dengue fever. Foodborne diseases will increase if there are issues with the food system. Excessive ocean warming causes floods by resulting in more rainfall (Miranda et al., 2023).

Adapting to climate change in South-east Asia necessitates comprehensive plans to tackle specific environmental concerns and improve the resilience of healthcare facilities in responding to environmental (Lugten & Hariharan, 2022). Scarce resources, proficient

personnel, and the absence of cohesive policies present challenges (Sherman et al., 2023). The government is instrumental in executing climate change initiatives via the COP (Conference of the Parties) and the Asean Health Cluster (Miranda et al., 2023). Four essential domains in tackling these challenges are the augmentation of human resources, the dissemination of knowledge and training, the increase of environmental quality, and the use of technology and renewable energy (Corvalan et al., 2020). Three primary strategies for ensuring sustainability include the execution of environmental sustainability, the incorporation of climate data, and the establishment of a framework for adapting to and withstanding extreme weather events (Mani et al., 2016); (Corvalan et al., 2020); (Lugten & Hariharan, 2022); (Chand & Loosemore, 2013).

The Global Green and Healthy Hospital (GGHH) initiative supports hospitals and healthcare facilities across 86 countries in their journey towards sustainability. This transformation is guided by ten key agendas: leadership, waste management, water conservation, building practices, energy efficiency, transportation, pharmaceuticals, food systems, procurement strategies, and chemical safety (Health Care Without Harm, 2020). The ten agendas outlined have the potential to significantly advance sustainability, thereby enhancing the health of patients, communities, and the environment (Global Green and Healthy Hospitals, 2024). The region of South-east Asia comprises eleven members: Indonesia, Malaysia, Singapore, Thailand, Vietnam, Myanmar, Laos, Brunei Darussalam, Cambodia, and Timor Leste. At present, six countries in South-east Asia are part of the Global Green and Healthy Hospital initiative. These include Indonesia, which has nine hospitals; Malaysia with five; the Philippines, boasting 22 hospitals; Vietnam with one; Singapore with four; and Thailand with ten (Global Green and Healthy Hospitals, 2024). Given the region's susceptibility to the effects of climate change, it is essential to transition towards sustainable healthcare facilities. The increasing awareness and dedication to achieving sustainability in healthcare facilities does not coincide with the growth of hospitals in South-east Asia.

This research aims to compare the sustainability of each hospital in South-east Asia that is a member of the Global Green Healthy Hospital (GGHH) based on ten sustainability agendas. Previous researchers have conducted sustainability studies on healthcare facilities at the global level, but there has not been much research specifically on hospitals in the South-east Asian region. This study addresses that gap by focusing on the sustainability agendas of hospitals in South-east Asia that are members of GGHH, thereby assessing their position in relation to global sustainability standards.

METHOD

This study uses a descriptive quantitative design with frequency and percentage analysis. The author collected secondary data from hospitals in South-east Asia that are members of GGHH. The author gathered data from ten GGHH agendas, which serve as indicators of sustainability. These agendas include leadership, waste, water, buildings, energy, transportation, pharmaceuticals, food, procurement, and chemicals. The leadership agenda has indicators such as the existence of green and healthy policies, having a green team, and having a roadmap for periodic sustainability implementation reporting. The waste agenda has indicators for proper hazardous waste management, waste volume reduction, and waste recycling. The water agenda has indicators for reducing water usage and ensuring a clean water supply in hospitals. The building agenda has indicators for design and construction referring to green building and the use of environmentally friendly building materials. The energy agenda has indicators for measuring and reporting carbon emissions by implementing energy efficiency and the use of renewable energy. The transportation agenda has indicators for strategies on the use of environmentally friendly transportation for patients and hospital staff. The pharmacy agenda has indicators for the proper and safe management of pharmaceutical products to prevent environmental pollution. The food agenda has indicators for the purchase and provision of food produced sustainably to support the health of patients and the environment. The procurement agenda has indicators for the purchase of safe and sustainable products and materials. The chemical agenda has indicators for replacing hazardous chemicals with safer alternatives (Global Green and Healthy Hospitals, 2024).

GGHH data is collected from each of its members in the form of self-assessment, GGHH Connect to report indicators from the ten sustainability agendas and report progress achievements, actively participate in training organised by GGHH, and discuss with other members. The data used for analysis is the 2024 sustainability agenda data. Indicator assessment does not meet the achievement criteria if the hospital is not committed to self-assessment, does not report data from each sustainability agenda indicator, does not show progress, and is not active in training and discussions with other members (Global Green and Healthy Hospitals, 2024). The author processes the collected data based on sustainability indicators and country of origin, allowing for a descriptive analysis of the performance of each hospital in the South-east Asia region on a scale suitable for further analysis. Hospitals that are able to achieve the sustainability agenda are given a score of 1, and hospitals that have not yet achieved the sustainability agenda are given a score of 0. The researchers calculate the sustainability agenda achievements of each hospital in the South-east Asia region and compare them.

RESULT AND DISCUSSION

Research results show that the number of hospitals in Asia that are members of GGHH is still very low. Table 1 below will show the percentage of hospitals in South-east Asia that are members of GGHH. The source of the data on the number of hospitals in Asian countries comes from the Statista website (Statista, 2025). The percentage of hospitals that are members of GGHH in South-east Asia

is highest in Singapore, at 14.81%. The lowest percentage is in Vietnam, with 0.075% of hospitals. In Southeast Asia, 51 hospitals are affiliated with GGHH, representing 0.90% of the total 5,699 hospitals in the region. The author did not calculate percentages for each country due to inconsistencies in the total number of hospitals. Proportions cannot be combined arithmetically to produce a single, unified proportion.

Table 1
The Proportion of Hospitals that Joined GGHH in South-east Asia

Nation	Number of GGHH Member Hospitals	Total Number of Hospitals	%
Indonesia	9	1.072	0.84 %
Malaysia	5	145	3.45 %
Singapura	4	27	14.81 %
Vietnam	1	1.332	0.075 %
Thailand	10	1.363	0.73 %
Philipina	22	1.760	1.25 %
Total	**51**	**5.699**	**0.90 %**

Source : Secondary Data GGHH, 2024 and Statista, 2025

The potential of hospitals to contribute to environmental pollution and the spread of diseases through the waste they produce requires the implementation of sustainability practices (Aini et al., 2023). The health sector has a responsibility to address climate change and its impacts, including building resilient and sustainable health systems (Sambath et al., 2022). Consider the limited number of hospitals in South-east Asia that have transformed into resilient and sustainable healthcare facilities in response to climate change. Urgent reforms are needed to meet the evolving health needs of a growing and ageing global population (Vallée, 2024). There is an urgent need to address the public health crisis arising from the negative impacts of healthcare services. To achieve a sustainable healthcare system, we need a transformational vision (Sherman et al., 2020). The challenge of climate change, which negatively impacts hospital operations, poses risks to the developing health industry and development efforts in South-east Asia (Pongsiri & Arthakaivalvatee, 2020).

Among the nine members of the GGHH sustainability agenda in Indonesia, only one hospital, RSUD R Syamsudin, SH Sukabumi, is able to implement ten sustainability agendas. The green hospital assessment at RSUD R. Syamsudian, SH Sukabumi, using the Malcolm Baldrige performance framework, received a score of 620.1 out of a maximum score of 1,000. This score positions RSUD R. Syamsudin, SH Sukabumi, as an emerging industry leader in the implementation of green hospitals. The challenges faced in the implementation of a green hospital are budget availability, knowledge, and community support. The positive economic impact of implementing a green hospital at RSUD R Syamudin, SH Sukabumi, is the increase in the number of patients and achieving savings of 5-20% each year (Alatas & Ayuningtyas, 2019). The evaluation of the hospital sustainability agenda in Indonesia can be seen in Figure 1.

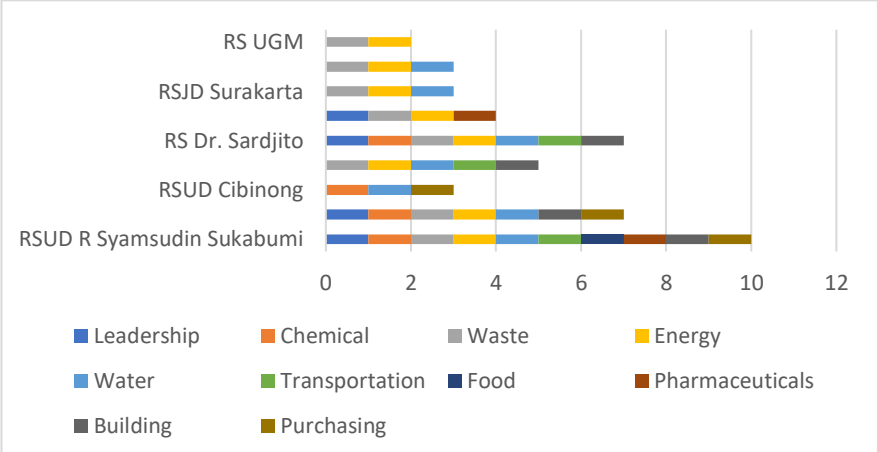

Figure 1. Evaluation of the Sustainability Agenda in Indonesian Hospitals
Source : Secondary Data GGHH, 2024

Only a few hospitals, particularly those that can fulfil the entire sustainability agenda, are dominated by only part of the agenda, and some hospitals have not fulfiled the agenda at all. Out of its twenty-two members, only three hospitals in the Philippines are able to fully implement the Global Green and Healthy Hospital sustainability agenda. This is because, in 2015, according to the Global Climate Risk Index, the Philippines was one of the top countries most affected by climate change. Its hospitals began to realise the need to transform into environmentally friendly hospitals, and by 2020, they ranked fifth. The Philippines has already reduced its dependence on renewable fuels that can decrease greenhouse gas emissions contributing to climate change. The Philippines is committed to reducing energy emissions by 70% by 2030 and achieving energy independence by reducing dependence on fossil fuel-producing countries. The investment costs incurred by hospitals in the Philippines are quite high, but the results will be socially, economically, and politically beneficial in the long term (Alcazaren & Singh, 2020). The factors influencing the performance of environmentally friendly hospitals in the Philippines are political, economic, social, and technological. Government policies, which implement energy efficiency programmes, indicate the political factor. Hospitals' limited capacity to make large investments for the implementation of green hospitals reflects the economic factor. Stakeholders' lack of communication during the green hospital implementation process is a sign of the social component. The lack of understanding in leveraging technology to design green hospitals indicates the technological factor (Billanes et al., 2018). The evaluation of the GGHH sustainability agenda in Philippine hospitals can be seen in Figure 2 below.

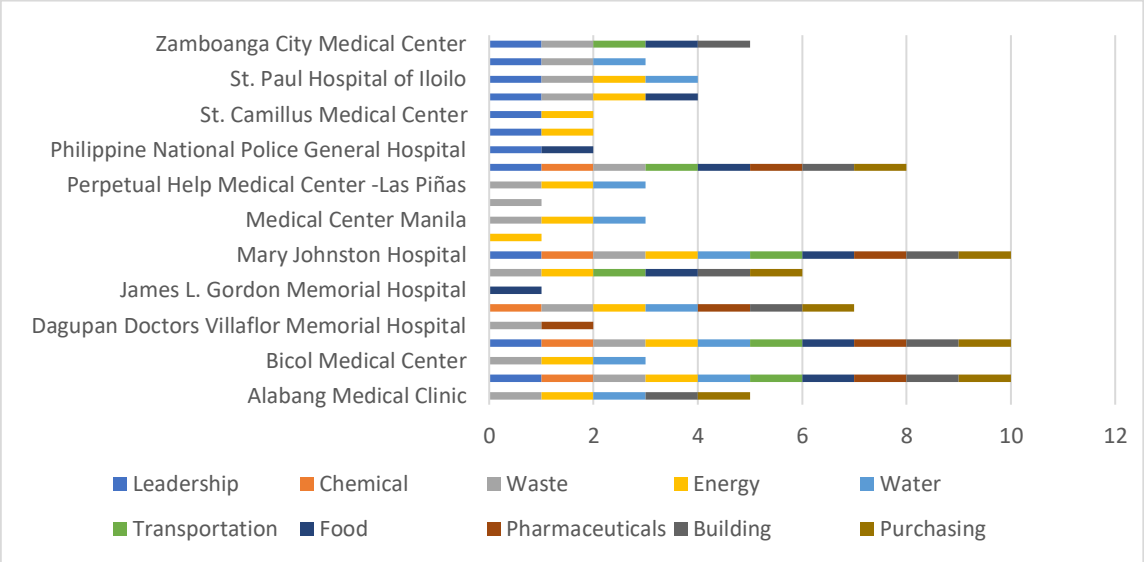

Figure 2. Evaluation of the Sustainability Agenda in Philippine Hospitals
Source : Secondary Data GGHH, 2024

The fulfilment of the Global Green and Healthy Hospital sustainability agenda in Vietnam is only carried out by one hospital implementing nine sustainability agendas, namely Hai Phong Medical University Hospital. The transportation sustainability agenda remains unimplemented. The situation in Vietnam is that the implementation of sustainable development goals in hospitals is still not integrated and is sporadic. Vietnam needs a hospital model that can align and systematise sustainable criteria in hospital development (Thi Thu Hien, 2021). Figure 3 below provides an evaluation of Vietnam's hospital sustainability agenda.

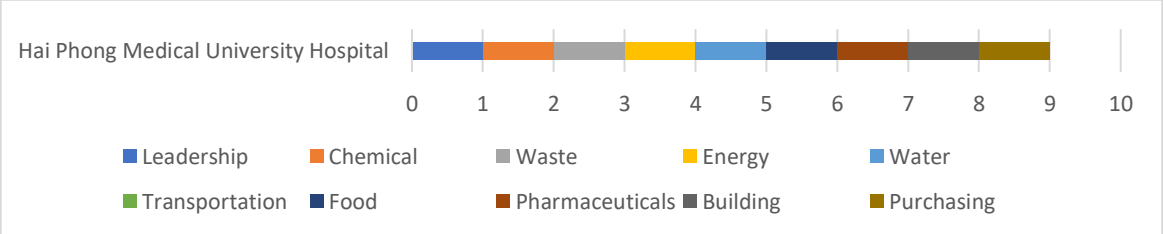

Figure 3. Evaluation of the Sustainability Agenda in Vietnam Hospitals
Source : Secondary Data GGHH, 2024

The fulfilment of the Global Green and Healthy Hospital sustainability agenda in Malaysia: out of six members, only three hospitals are able to implement the seven sustainability agendas. The Malaysian government

is committed to environmental sustainability, having established a policy that all hospitals must obtain green building certification (Abd Rahman et al., 2021). Malaysia has a strong motivation for sustainable development, thus requiring efforts to transform towards environmentally friendly hospitals. Figure 4 below provides an evaluation of the sustainability agenda of hospitals in Malaysia.

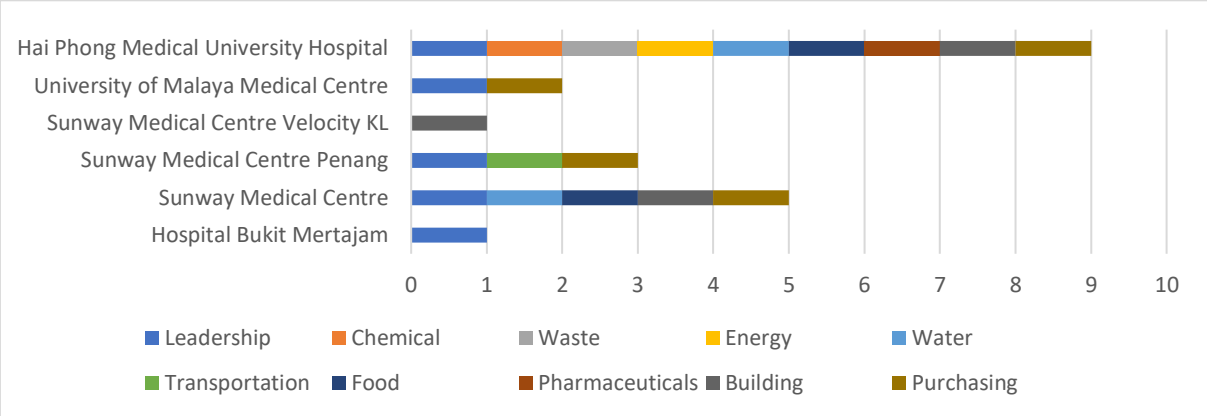

Figure 4. Evaluation of the Sustainability Agenda in Malaysian Hospitals
Source : Secondary Data GGHH, 2024

The fulfilment of the GGHH sustainability agenda in Thailand shows that out of ten hospitals, only one hospital is able to implement seven sustainability agendas. One hospital, the National Health Care System, does not meet any of the GGHH sustainability agendas. Hospitals in Thailand focus on waste reduction, energy conservation, efficient resource use, and sustainable supply chain usage (Ngamwititwong & Sirovetnukul, 2022). The evaluation of the sustainability agenda of hospitals in Thailand can be seen in Figure 5 below.

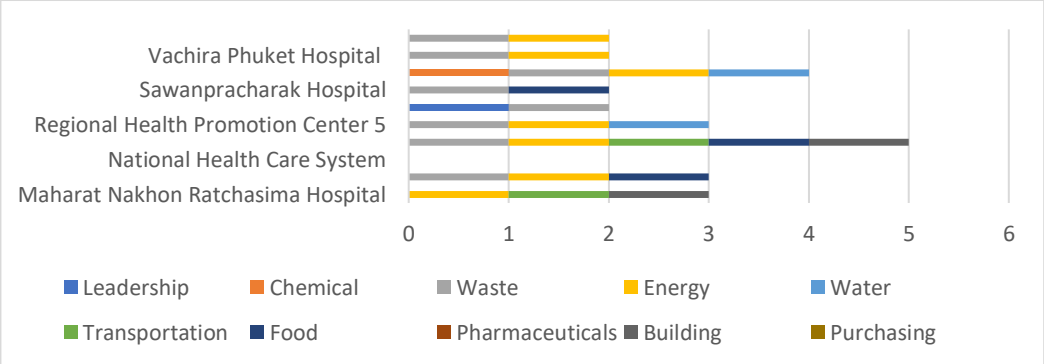

Figure 5. Evaluation of the Sustainability Agenda in Thai Hospitals
Source : Secondary Data GGHH, 2024

The fulfilment of the Global Green and Healthy Hospital sustainability agenda in Singapore: out of five members, only one hospital is able to implement all five sustainability agendas. In 2022, healthcare spending in Singapore will surpass national defence spending. This is based on Singapore having hospitals with medical tourism that allocate a significant amount of resources. There is a need for a balance between a strong healthcare system and sustainable fiscal policies (Ang, 2023). Singapore must balance its high healthcare demand with a sustainability agenda. Figure 6 below provides an evaluation of the sustainability agenda of hospitals in Singapore.

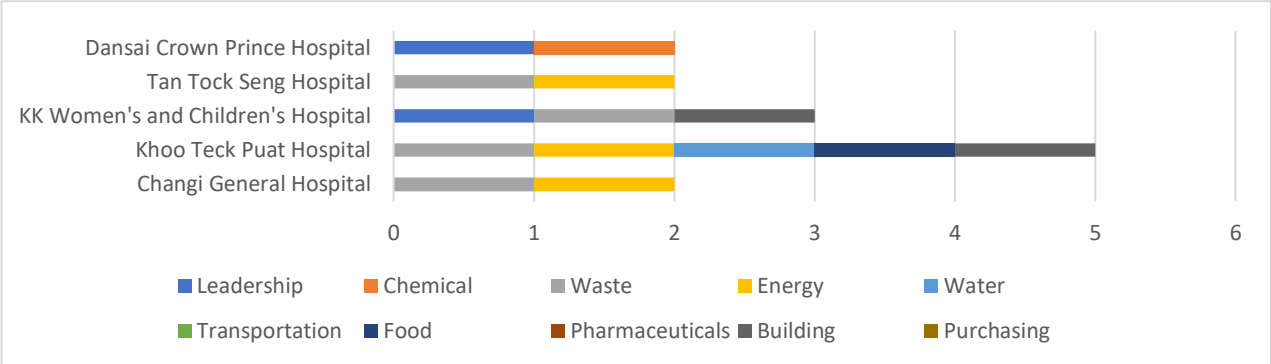

Figure 6. Evaluation of the Sustainability Agenda in Singapore Hospitals
Source : Secondary Data GGHH, 2024

The plan to change hospitals into eco-friendly health facilities needs patients to want green health services, data-based actions, and comparisons with other hospitals in South-east Asia to meet sustainability goals (Sherman et al., 2023). International collaboration plays a crucial role in generating government policies to support the implementation of Global Green and Healthy Hospitals in the South-east Asian region. Implementing collaboration on the sustainability agenda among South-east Asian countries remains a challenge, especially in areas such as chemicals, transportation, pharmaceuticals, food, buildings, and procurement. The difference in the achievement of sustainable development goals among South-east Asia countries, when viewed from an economic perspective, is due to the different financial resources they possess. Hospitals with high financial resources are better able to implement sustainability agendas compared to hospitals with low financial resources (Sandra et al., 2025). From a social perspective, differences in achieving the sustainability agenda can be influenced by the presence or absence of a shared consensus among stakeholders in determining sustainability indicators and ensuring their continued implementation (Wallis, 2006). Government incentives are essential in the policy dimension that governs the execution of sustainability agenda (Petrini et al., 2017). Assistance for executing the sustainability agenda may derive from international and national policies within each nations, which can expedite the attainment of the SDGs in Southeast Asia (Alawsi et al., 2025) (Lyytimäki et al., 2021).

Hospitals in countries that have already implemented sustainability agendas can share best practices as frameworks and models, as well as create standard policies for implementation (Garg, 2024). The percentage of achievement of sustainability agendas from each country in the South-east Asian region shows that the highest agenda, with an average achievement of 72.3%, is waste, followed by the energy agenda at 63.49% and leadership at 52.48%. The three lowest sustainability agendas, with an average achievement of 16.77%, are transportation, followed by the pharmaceutical agenda at 24.92% and the chemical agenda at 31.20%. Several factors contribute to the superior performance of waste management in Southeast Asia relative to other sustainability initiatives. Primarily, hospitals in the region prioritize waste management due to the substantial impact of methane gas emissions from waste on climate change (Lee et al., 2016) (Papageorgiou et al., 2009) (Mathur et al., 2020). The second factor is that if waste management is not properly handled, it will have severe consequences, polluting water, air, and soil, as well as increasing the incidence of disease in the community (Marfe et al., 2024). The third factor is that good waste management can improve the recycling process and promote a circular economy, which provides direct incentives to the surrounding community (Al Jadidi & Al Ghassani, 2025) (Papageorgiou et al., 2009). Developing country governments and international organizations continue to prioritize waste management agendas as a means to mitigate climate change. International organizations support such goals by providing funding to developing countries to help with good waste management (Seager et al., 2020). The transportation agenda is more complex compared to the waste management and energy efficiency agendas (Mason, 2006). Energy efficiency, the use of renewable energy, and waste management are considered priorities, urgent, and more impactful in reducing the carbon footprint generated by hospitals (Schwab et al., 2025) (Richie, 2020). Nothing should take precedence over anything else in the implementation of the green hospital sustainability agenda. In reality, transportation is still not considered a primary focus. Some hospitals have started programs to offer free or discounted patient transport, but they are still constrained by a lack of infrastructure support and support from global organizations (Kaplan et al., 2016) (Angelov et al., 2024). Figure 7 shows the percentage of the sustainability agenda achieved by each country in the South-east Asian region. The environmental dimension continues to dominate, despite the need for a balance between the environmental, social, and economic dimensions. To ensure sustainability, hospitals are required to implement the green hospital concept that can reduce negative impacts on the environment (Tarkar, 2022).

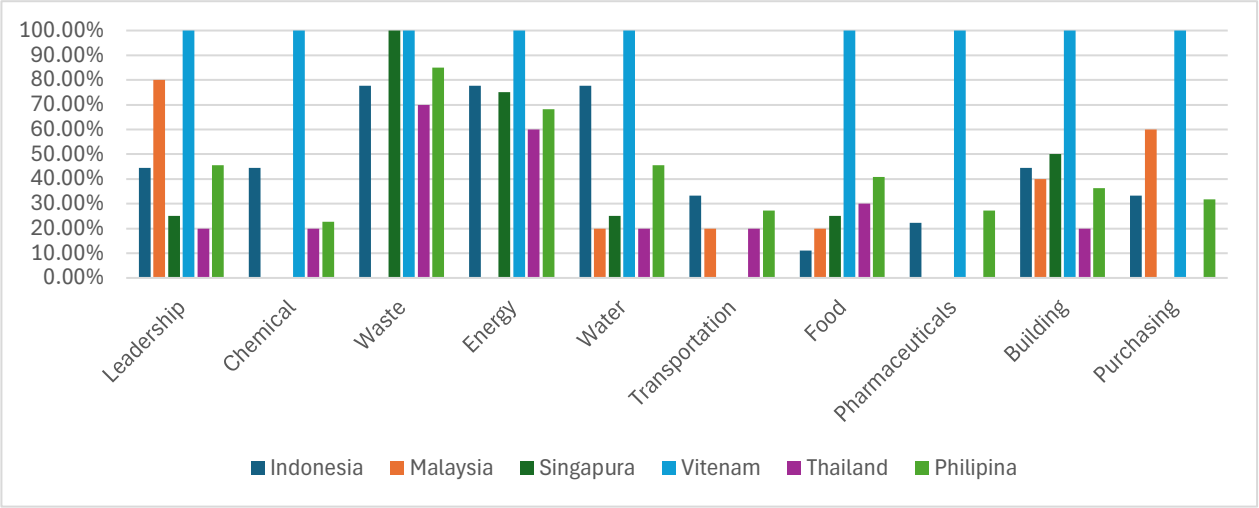

Figure 7. Percentage of Sustainability Agenda Achieved by Hospitals in South-east Asia
Source : Secondary Data GGHH, 2024

Enhancing collaboration among countries in the South-east Asian region involves connecting stakeholders to collectively address the challenges and obstacles faced. However, the role of the government in each country will differ according to an approach that aligns with its national philosophy. In the United States, the role of the economic dimension is higher compared to the social and environmental dimensions. Conversely, the social dimension has a significant influence in Asia, particularly due to the philosophy and values of the society that promote environmentally sustainable practices (Freeman & Low, 2014).

Green hospitals are the provision of healthcare services that are viable, fair, and acceptable within the three pillars of sustainability: environmental, economic, and social. The implementation of green hospitals can maintain public health while ensuring no resource wastage and no threat to the environment (Tushar et al., 2023). The Global Green and Healthy Hospital concept promotes sustainability and resilience to climate change by reducing the impact of healthcare facilities on the surrounding environment. The percentage of sustainability agendas achieved by countries in South-east Asia still shows disparities among them. Hospitals in South-east Asia do not yet have a standardised approach to implementing climate-resilient healthcare facilities. This requires each country to have flexible and adaptive policies with a unique perspective on environmental, social, and economic dimensions in the region (Gan & Madders, 2024). The Philippines, as the country most affected by climate change in the South-east Asian region, needs to implement a sustainability agenda. Other countries still do not feel the need and face various limitations, so not many have implemented the sustainability agenda. The second factor influencing the still minimal awareness of hospitals in implementing the sustainability agenda within the GGHH concept is that in the South-east Asian region, there is still a conflict between economic development and environmental sustainability (Gan & Madders, 2024). The third factor from the economic dimension is the limited funding to implement the sustainability agenda, which requires government policies and support to address this issue (Weimann & Patel, 2017). The fourth factor in the social dimension is the change in behaviour of hospital staff. Education and training for the successful implementation of the sustainability agenda can be carried out (Gan & Madders, 2024).

Several focus areas to address the factors contributing to the low awareness of hospitals in South-east Asia in implementing the GGHH concept are initiatives to reduce and manage waste, energy consumption, and food. Hospitals can use energy from alternative energy sources and reduce water consumption. In waste management, they can recycle and replace non-recyclable materials with environmentally friendly alternatives (Weimann & Patel, 2017).This trend is evident in Figure 7, where the average achievement of the sustainability agenda for leadership, water, waste, building, and energy is already quite high. The average achievement of the sustainability agenda for chemicals, transportation, pharmaceuticals, purchasing, and food is still relatively low. The formulation of government policies and strategies that support sustainability must accommodate environmental, social, and economic dimensions (Gan & Madders, 2024).The three dimensions of sustainability, according to the World Commission on Environment and Development, are economic, environmental, and social. The economic dimension optimises income, the social dimension maintains the resilience and strength of biological and physical systems, and the social dimension preserves social and cultural stability (Supriatna & Lenz, 2022). The limitation of this research is that the author could not access detailed achievement data of the ten agendas, which includes self-assessment, GGHH Connect for reporting indicators of the ten sustainability agendas and reporting progress, reports of active participation in training organised by GGHH, and discussions with other members. This restriction is because only hospitals that are already members of GGHH can access it. The author can only see the achievements of each hospital regarding the ten sustainability agendas.

CONCLUSIONS

Hospitals in South-east Asia show a low level of awareness in implementing the GGHH concept. Only two countries have hospitals capable of implementing ten sustainability agendas, namely the Philippines and Indonesia. The sustainability agenda most implemented by hospitals in South-east Asia is waste from the environmental dimension, and the least implemented is transportation from the social dimension. The focus of the sustainability dimension of the government in each country varies but is dominated by the environmental dimension.

SUGGESTION

The implementation of the sustainability agenda requires a balance of environmental, social, and economic dimensions that encompass the ten GGHH sustainability agendas. The role of the government in each country is necessary to raise hospitals' awareness of the importance of implementing the ten GGHH sustainability agendas.

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