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INDONESIA AND ASEAN+ GREEN VS NON-GREEN HOSPITAL PERFORMANCE COMPARISON

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Abstract

This study aims to compare the financial performance of green and non-green hospitals in Indonesia and the broader ASEAN+ region. Using statistical time-series analysis, the research evaluates trends and patterns across key financial ratios from 2014 to 2022. The findings reveal that green hospitals in Indonesia consistently outperform their non-green counterparts across most financial indicators—such as cash and cash equivalents, total assets, and equity—over the entire study period. Conversely, in the ASEAN+ region, non-green hospitals generally show stronger financial performance, except in 2021, when green hospitals briefly outperformed. These results underscore the strategic role of green hospitals in advancing sustainability and addressing climate-related challenges, particularly within the Indonesian context. This study contributes to the growing body of literature on the green economy by offering a quantitative, region-specific comparison of sustainability performance in the healthcare sector across Southeast Asia.

Keywords: ASEAN; green hospital; sustainability; green economy

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INTRODUCTION

Environmental issues are gaining attention all over the world including Indonesia. Global warming, air pollution, deforestation and climate change can't be ignored. It is argued that healthcare industry contributes at a certain point in the ecological problem. In the United States, healthcare's total floorspace accounts for 4% of commercial buildings but consumes nearly 6% of energy sources. Energy consumption of the unit building area of hospitals can reach up to 2–3 times than that of other public buildings (The U.S. Energy Information Administration, 2022). The sector is responsible for an estimated 4-5% of total global greenhouse gas (GHG) emissions, indicating a substantial role in climate change (Lum et al., 2022; Sherman et al., 2021; Tripathi et al., 2023). This level of emissions is comparable to that of several industrial sectors, thereby highlighting the urgency for healthcare systems to adopt sustainable practices to mitigate their ecological impact (Thiel et al.,

2015; Sherman et al., 2021). Serious efforts are needed to create a cleaner and healthier environment. Green economy development, an economic concept that encourage sustainable development with an efficient resource utilization and minimize negative effect to the nature is the main focus of the government. Green economic innovation can be a catalysator of sustainable and inclusive economic growth that can be used in a political campaign (World Economic Forum, 2023). A variety of studies have highlighted that the carbon footprint associated with healthcare is largely the result of the 'embodied' emissions resulting from energy consumption, procurement of medical supplies, and waste management practices (Cimprich et al., 2019; Lenzen et al., 2020). For instance, the emissions from surgical procedures, which significantly contribute to healthcare's environmental impact, underline the need for more ecologically conscious practices within this sector (Rizan et al., 2020; Wyssusek et al., 2018). Innovations in the use of bio-plastics in surgical procedures and greening initiatives aimed at reducing waste are potential pathways to foster sustainability within healthcare (North, 2022; Wyssusek et al., 2018). Investors these days are paying attention to ethical concerns when they are explaining their reasons and motives for investing (Lewis, 2001). Sustainability which is related to green economy development is still evolving until now.

According to the Notre Dame Global Adaptation Initiative (ND-GAIN) Country Index, which evaluates countries based on their exposure, sensitivity, and capacity to adapt to climate change effects, Singapore consistently ranks as one of the most prepared nations in Southeast Asia, with Malaysia following closely behind. This ranking highlights Singapore's advanced planning and infrastructure, which prioritize resilience in the face of climate disturbances (Hadida et al., 2022; Halkos et al., 2020). The index serves as a comprehensive measure of a country's vulnerability and adaptive capacity and is widely utilized to assess the relative resilience of nations against climate change (Halkos et al., 2020; Garschagen et al., 2021). Indonesia's position in the ND-GAIN index demonstrates significant fluctuations over the years. It held the third spot from 2004 to 2013, but its ranking has changed in subsequent years due to various factors, including shifts in climatic conditions, infrastructure readiness, and policy implementations regarding climate resilience (Nahruddin et al., 2023). While efforts are underway in Indonesia to enhance adaptive capacities—such as engaging in climate resilience planning and investing in green infrastructure—these initiatives face challenges due to deforestation, food security, and socio-economic conditions, which complicate the nation's overall adaptive potential (Nahruddin et al., 2023; Goh et al., 2024). In terms of regional comparisons, the differences in ND-GAIN scores among ASEAN countries signify varying degrees of readiness and capacity to address climate issues. Singapore's governance model and proactive policies, including multi-level governance strategies, have enabled it to maintain a leading position (Nahruddin et al., 2023). Meanwhile, Malaysia shows a strong commitment to climate resilience, but Indonesia's periodic declines in rank reflect ongoing vulnerabilities that require significant attention and resources (Halkos et al., 2020; Waluyo, 2019). As the impacts of climate change become increasingly prevalent, the need for integrated approaches across ASEAN nations, particularly focused on infrastructure resilience and sustainable practices, is critical for enhancing regional adaptability (Nahruddin et al., 2023; Goh et al., 2024).

Indonesia's ND-GAIN Index has experienced fluctuations, particularly ranking significantly in response to its efforts in addressing vulnerabilities and enhancing resilience to climate change. Among the strategies to improve this standing is the establishment of green hospitals. This concept aligns with a global trend toward sustainable economic practices that address both health and environmental concerns (Aini et al., 2023). The notion of green hospitals represents an essential intersection of healthcare and environmental sustainability, functioning as a model for green innovations within the health sector. These facilities are designed to promote patient health while minimizing negative environmental impacts. The implementation of green hospital practices is supported by effective Green Human Resource Management (GHRM), which has been recognized as a key factor in improving the ecological performance of healthcare facilities. For example, the study at West Pasaman Regional General Hospital highlights how GHRM practices can significantly influence the adoption of green initiatives within healthcare settings (Aini et al., 2023). Furthermore, integrating sustainable practices within healthcare facilities can enhance health outcomes, especially in regions impacted by environmental degradation. Indonesia's air quality issues have been shown to adversely affect public health, contributing to

respiratory and cardiovascular problems (Hanif et al., 2024). By adopting green practices, hospitals can help mitigate these health risks while simultaneously addressing environmental challenges. The current environmental crisis necessitates a unified approach to align health services with ecological responsibility, thus fostering a sustainable health sector that positively impacts the ND-GAIN Index and national resilience (Hadida et al., 2022). The healthcare sector should also adopt innovative approaches to enhance efficiency and sustainability. This includes utilizing renewable energy, improving waste management, and employing sustainable materials in hospital design and operations. With Indonesia's low environmental quality ranking compared to other nations, there is an urgent need for comprehensive strategies, such as green hospitals, that yield benefits for both public health and the environment (Hanif et al., 2024).

According to Notre Dame Global Adaptation Initiative Country Index which measure a country's exposure, sensitivity, and capacity to adapt on the climate change effects, Singapore is the most prepared country leaving beind other countries in ASEAN followed by Malaysia in the all the period. Indonesia's ND-GAIN Index fluctuated alongside the period with being in the third place in 2004 until 2013. One of the ways to achieve the objective is through the development of green hospital. In line with the global trend to adopt a sustainable economic approach, green hospital appeared as a successful study case that merge the health and environment aspect in green economic innovation. The concept of green hospital is referred to a healthcare facility that comprises environment as part of its quality services and cares about the sustainable design of edifices (Lattanzio et al., 2022). According to (Dhillon & Kaur, 2015), green and healthy hospital is the one that promotes public health by continuously reducing its environmental impact and ultimately eliminating its contribution to the burden of disease. A green and healthy hospital recognizes the connection between human health and the environment and demonstrates that understanding through its governance, strategy and operations. By employing simple, smart and sustainable measures, healthcare institutions can greatly reduce their environmental footprint.

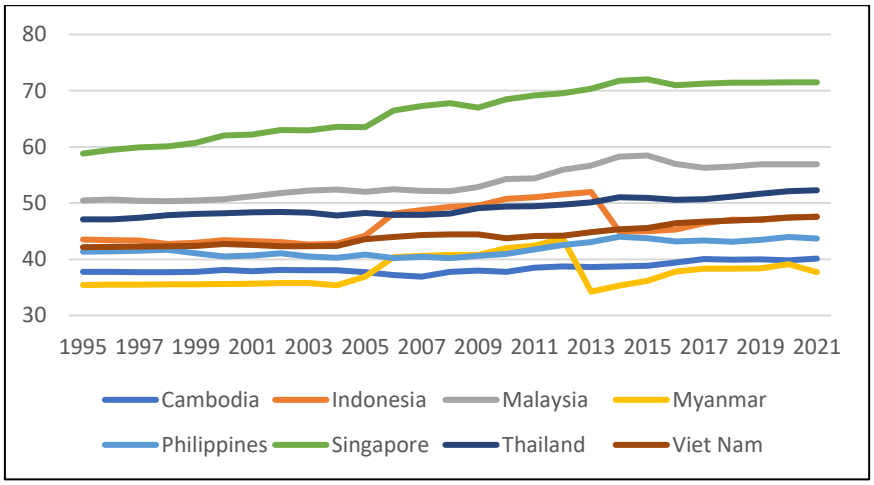

Figure 1. ND-GAIN Index in ASEAN
Source: (University of Notre Dame, 2023)

However, there are some challenges in realizing green economic criteria in Indonesia. From a general perspective, (Lauder et al., 2015) stated that awareness of sustainability remains low in society in Indonesia in general. A survey by Katadata Insight Center (2021) found that only 15% of Indonesians consider environmental sustainability a priority in their daily lives. This is lower than Singapore, where 70% of citizens express concern about sustainability issues (National Climate Change Secretariat, 2022), and Malaysia, where 50% of respondents reported actively engaging in sustainable practices (Ipsos, 2021). The adoption of green building principles in Indonesia also lags behind other ASEAN countries. According to the Global Sustainability Index (2022), Singapore leads the region in green building certifications, followed by Malaysia and Thailand, while Indonesia remains behind due to regulatory and financial constraints. In the health sector, the average number of bed Indonesian hospitals are 1.2 for every 1000 citizen which is way below the global average with 2.9 beds for every 1000 citizen (WHO, 2022). Besides that, the healthcare quality in Indonesia

also needs to be increased. There are limitations in both sectors such as capital which is a crucial factor that affect the implementation of green economic innovation in Indonesia.

The significance of the green economy has been emphasized in numerous prior studies. Research on green hospitals has been explored by several scholars, including Chías and Abad (2017), Dhillon and Kaur (2015), and Kumari and Kumar (2020). Chías and Abad (2017) focused on identifying opportunities to enhance healthcare facilities in line with green hospital concepts, addressing aspects such as site planning, accessibility, resource efficiency (particularly water and energy), waste reduction, utilization of renewable and low-emission materials, and design features that contribute to user well-being. Dhillon and Kaur (2015) examined the environmental footprint of healthcare institutions, revealing that hospitals—due to their resource-intensive nature—consume significant quantities of electricity, water, food, and construction materials. They also identified potential strategies to mitigate the sector's contribution to climate change. Kumari and Kumar (2020) investigated the foundational principles of green hospitals, emphasizing the need for environmentally and patient-friendly designs, identifying influencing factors in sustainable healthcare architecture, and informing future green hospital development.

Globally, healthcare systems are increasingly embracing green practices, demonstrating that quality patient care and environmental sustainability are not mutually exclusive. Lattanzio et al. (2022) investigated waste generation within healthcare settings and proposed a multifactorial waste management approach, highlighting the "5Rs" principle—reduce, reuse, recycle, rethink, and research—as a framework for minimizing environmental impact. Meanwhile, Zhan et al. (2022) developed a fuzzy, simulation-based pre-evaluation model using Building Information Modelling (BIM) to assess the green performance of hospital buildings during the design phase. The model supports cyclic optimization and offers quantifiable insights to inform sustainable design. From an Indonesian perspective, Putri et al. (2016) assessed the preparedness of Indonesian hospitals to adopt green practices by 2020, revealing limited readiness. Sunarto (2016) examined Persahabatan Hospital's efforts to become environmentally sustainable, highlighting initiatives such as green education programs and therapeutic healing gardens. This study contributes a pioneering quantitative perspective to green hospital literature in the ASEAN context. Furthermore, Rupiwardani et al. (2022) assessed both environmental and managerial aspects of Batu Baptist Hospital, finding that the hospital remains in the early stages of implementing the green hospital concept. In addition, Sadatsafavi et al. (2014) conducted a comparative study between green and non-green hospitals, showing that green hospitals incurred higher operational and facility expenses. While their study provided general insights, this research aims to address a gap by focusing on financial comparisons between green and non-green hospitals in Indonesia and the broader ASEAN+ region. Such an analysis is essential for evaluating the financial viability of green hospital initiatives in emerging economies.

METHOD

This study employs a quantitative comparative research design to analyse and compare the financial performance of green hospitals and non-green hospitals across Indonesia and ASEAN+ countries. The population in this study consists of all hospitals operating in these regions, while the sample includes hospitals that publicly provide annual financial reports on their websites or through Bloomberg terminals. Green hospitals are defined as those that publish dedicated sustainability reports accessible via their official websites, whereas non-green hospitals are those that do not offer such report.

The study utilizes secondary data in the form of time-series financial statements, drawn from annual reports and Bloomberg financial databases. Purposive sampling was applied to select hospitals that met the criteria of data availability and classification as green or non-green. The primary research instrument is a structured data extraction form developed to ensure consistency in capturing key financial indicators across institutions.

Data analysis is conducted using time-series statistical methods to examine trends, fluctuations, and correlations over time. In the preliminary phase, descriptive statistics such as mean, standard deviation,

minimum, and maximum values are calculated to provide an overview of central tendencies and data dispersion. The mean offers insight into directional trends—whether increasing, decreasing, or stable—while standard deviation captures variability and volatility in financial data. Minimum and maximum values are useful for detecting outliers and understanding the range of financial performance.

Subsequent analysis includes time-series trend analysis and correlation analysis between variables. Correlation is used to assess the strength and direction of relationships between key financial ratios, including cash and cash equivalents, current assets, total assets, current liabilities, total liabilities, total equity, and total revenue. In reference to Sadatsafavi et al. (2014), this study adapts a comparative approach to evaluate the financial feasibility of green hospital models in the context of emerging economies.

RESULTS

Table 1 provides the descriptive statistics for five key financial indicators: Return on Assets (ROA), Total Assets, Capital Adequacy Ratio (CAR), Financial Risk (LN_FR), and Return on Equity (ROE). The mean ROA stands at 0.228 with a standard deviation of 0.142, indicating moderate variability in asset utilization efficiency across the sample. The minimum and maximum ROA values are 0.013 and 0.788, respectively, demonstrating significant differences in profitability performance among institutions. The average Total Asset amounts to IDR 3,390,770.15 million, with a high standard deviation of IDR 4,204,913.25 million, reflecting substantial disparities in the size of institutional asset holdings. The lowest recorded value is IDR 11,813.28 million, while the highest reaches IDR 24,958,078.84 million, illustrating the extent of asset scale differences.

Regarding the Capital Adequacy Ratio (CAR), the mean value is 0.642 with a standard deviation of 0.235. Although most institutions appear to maintain adequate capital buffers, the minimum CAR of -0.178 suggests that some entities experience negative capital adequacy, potentially indicating financial instability. The Financial Risk (LN_FR) variable exhibits a mean of -1.239 and a standard deviation of 0.682, implying a generally low level of financial risk when expressed in logarithmic terms. The observed values range from -3.102 to 0.164, indicating a relatively wide dispersion in risk exposure. The ROE shows a mean of 0.837 but is associated with a high standard deviation of 2.998, highlighting considerable variability in equity-based returns. The minimum and maximum ROE values, at -2.204 and 25.531 respectively, confirm the wide range of equity performance across the entities analyzed. In summary, the descriptive statistics indicate significant variability across all financial indicators, underscoring the heterogeneity in financial structure and performance among the institutions under study.

Table 1. Descriptive Statistic

	ROA	Total Asset	CAR	LN_FR	ROE
Mean	0.228	3390770.147	0.642	-1.239	0.837
Standard Error	0.014	367384.976	0.021	0.060	0.286
Median	0.233	2052080.875	0.701	-1.209	0.320
Std. Deviasi	0.142	4204913.250	0.235	0.682	2.998
Min.	0.013	11813.275	-0.178	-3.102	-2.204
Max.	0.788	24958078.844	0.955	0.164	25.531

Source: Author analysis (2025)

Figure 1 illustrates the comparative position of cash and cash equivalents among hospitals in ASEAN, focusing on green and non-green hospital categories. In Indonesia, green hospitals show consistently higher cash and cash equivalent holdings compared to non-green hospitals across all observed periods. This trend contrasts with the broader Southeast Asian context, where green hospitals generally report lower cash and equivalent levels than their non-green counterparts, except for a notable reversal in 2021. Despite these regional disparities, the overall trend in both Indonesia and Southeast Asia shows a positive trajectory for cash and cash equivalent growth in green and non-green hospitals alike, with bar charts indicating an upward progression that peaks at the end of the period. The superior liquidity performance of green hospitals in Indonesia across all periods serves as a proxy indicator for successful innovation within the green economy.

This observation is further supported by various favorable institutional and policy environments in Indonesia. For example, the government's commitment to low-carbon development and sustainable infrastructure, as outlined in the National Medium-Term Development Plan (RPJMN 2020–2024), has driven greater resource allocation to eco-friendly sectors, including green healthcare. Additionally, technological innovations, such as smart energy systems and digital waste tracking, are increasingly integrated into hospital operations, enhancing both financial and environmental efficiency.

The data shows that green hospitals in Southeast Asia have fewer total assets than non-green hospitals. This may reflect broader systemic challenges in regional integration and financing models. Given Indonesia's relatively strong performance, there is an opportunity for it to take a leading role in advancing green hospital innovation within ASEAN, promoting knowledge transfer and cross-border collaboration. In summary, the consistently strong cash and cash equivalent position of green hospitals in Indonesia, supported by national policy initiatives and the adoption of green technologies, provides evidence that innovation in the green economy is progressing effectively—at least within the Indonesian healthcare sector. Regional disparities, however, highlight the need for enhanced coordination and policy harmonization across Southeast Asia to replicate this success more broadly.

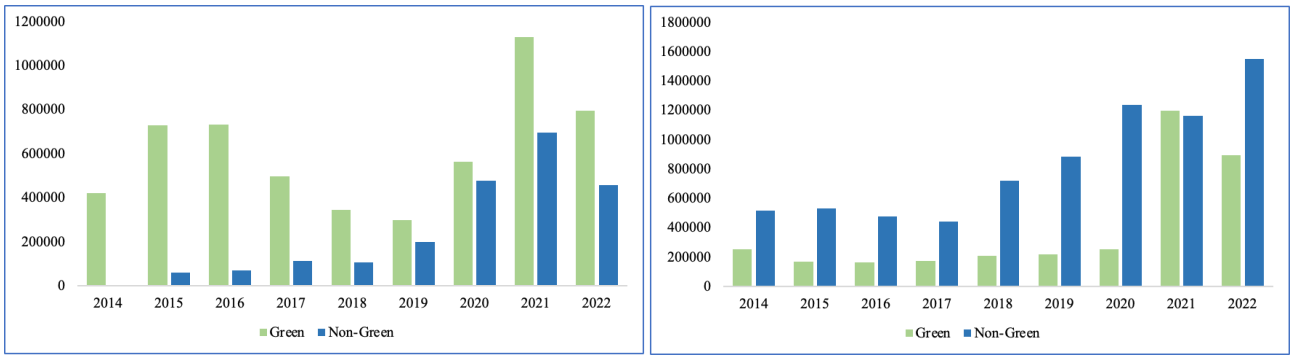

Figure 2. Cash and Cash Equivalent of Green Hospitals and Non-Green Hospitals in Indonesia and ASEAN+ 2014 – 2022
Source: (Bloomberg, 2023)

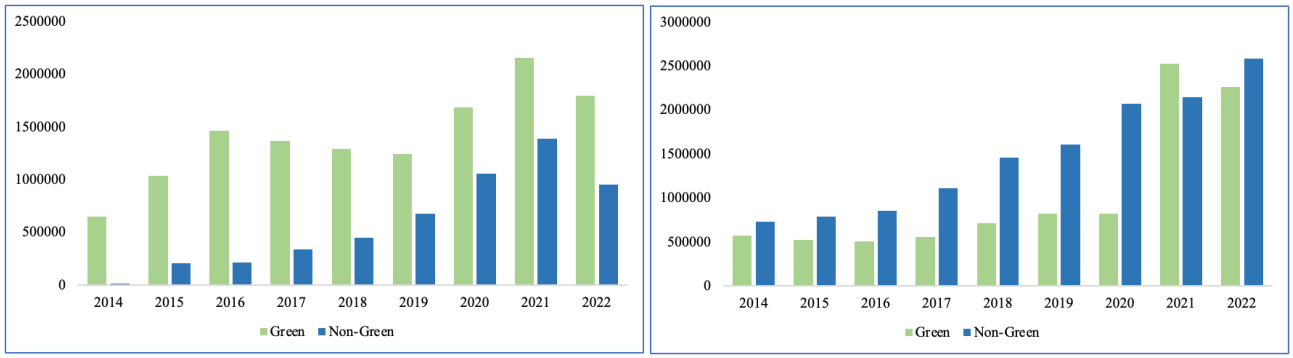

Figure 3. Current Asset of Green Hospitals and Non-Green Hospitals in Indonesia and ASEAN+ 2014 – 2022
Source: (Bloomberg, 2023)

Figure 3 illustrates the current asset position of hospitals across ASEAN, with a specific comparison between green and non-green hospitals. In Indonesia, green hospitals consistently report higher levels of current assets than non-green hospitals throughout all observed periods. In contrast, in the broader Southeast Asian region, non-green hospitals generally maintain superior current asset levels, except for 2021, when green hospitals briefly outperformed. Overall, the data reveal a growth trend in current assets across both green and non-green hospitals in Indonesia and Southeast Asia. In Indonesia, current assets peaked in 2021, whereas in Southeast Asia, the trend continued upward until the final year of the observation period. The superior current asset performance of green hospitals in Indonesia, when compared to non-green hospitals, suggests that

innovation in the green economy is advancing, particularly within the Indonesian healthcare sector. This finding aligns with the cash and cash equivalent trends previously discussed, further supporting the argument that green hospitals in Indonesia benefit from more effective financial positioning.

This financial strength may be attributed to the integration of sustainable operational and financial practices. Green hospitals typically adopt advanced working capital management strategies, which not only improve liquidity but also support ongoing investments in environmentally sustainable technologies. Effective management of current assets—comprising cash, inventories, accounts receivable, and prepaid expenses—is essential for maintaining service continuity, especially in capital-intensive sectors like healthcare (Wanjuki, 2021). Moreover, research by Siedlecki et al. (2021) highlights that hospitals with higher profitability often exhibit longer cash conversion cycles, underscoring the role of robust cash and asset management in promoting both operational stability and sustainability. In comparison, non-green hospitals may prioritize efficiency but may lack the structured financial frameworks that align with long-term environmental commitments.

Hence, the higher current asset holdings in green hospitals not only reflect better liquidity but also indicate a strategic alignment between financial management and sustainability goals. These findings suggest that green hospitals are more likely to achieve fiscal resilience while simultaneously advancing environmental stewardship, reinforcing the broader value of innovation in the green economy (Siedlecki et al., 2021; Wanjuki, 2021).

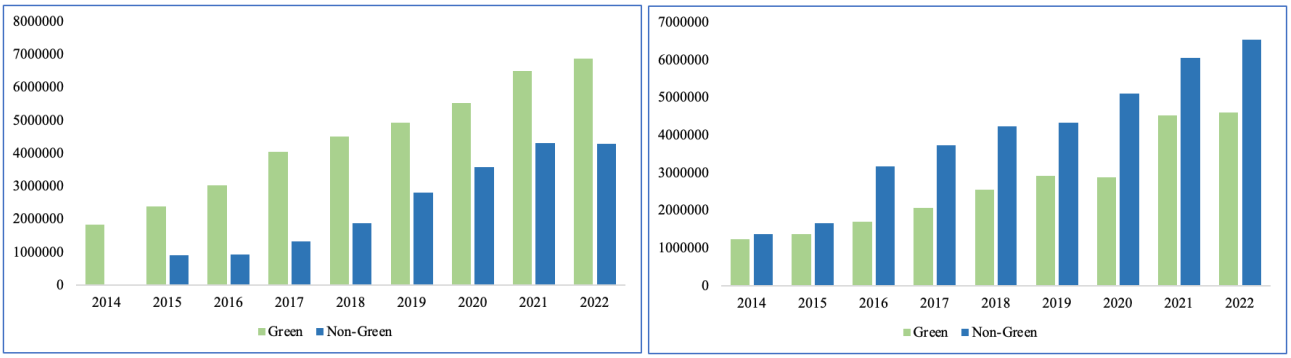

Figure 4. Total Assets of Green Hospitals and Non-Green Hospitals in Indonesia and ASEAN+ 2014 – 2022
Source: (Bloomberg, 2023)

Figure 4 presents the total asset positions of hospitals in ASEAN, comparing green and non-green institutions. In Indonesia, green hospitals consistently report higher total assets than their non-green counterparts across all observed periods. This pattern contrasts with the broader Southeast Asian region, where green hospitals lag non-green hospitals in terms of total assets throughout the entire timeframe. Despite these regional disparities, both green and non-green hospitals in Indonesia and Southeast Asia demonstrate an upward trend in total asset growth, with all bar charts peaking at the end of the observed period. The consistently strong asset performance of green hospitals in Indonesia serves as a robust indicator of the country's progress in advancing the green economy, particularly within the healthcare sector. This development reflects not only increased capital investment but also the integration of sustainable infrastructure and environmental management practices. Green hospitals in Indonesia have implemented energy-efficient systems, pollution control technologies, and environmentally friendly construction, thereby enhancing both operational efficiency and service quality (Lestari et al., 2023). These measures contribute to long-term financial resilience while supporting national sustainability goals.

Moreover, the Green Building Council of Indonesia has issued guidelines that align green hospital initiatives with broader public health and environmental policies. Hospitals adopting sustainable practices—such as digital energy monitoring, waste reduction, and the use of eco-friendly materials—tend to report stronger asset growth and operational performance (Sutanto et al., 2020; Tampubolon et al., 2019). Empirical evidence further suggests that such hospitals achieve higher profitability due to cost savings and growing public preference for environmentally responsible healthcare services (Sumiati & Isnaini, 2024). Conversely, the weaker asset performance of green hospitals in other ASEAN countries signals a lack of enabling conditions such as financing mechanisms, policy incentives, or technical capacity. This situation underscores

the potential for Indonesia to lead regional efforts by sharing its success stories, policy models, and implementation frameworks. Strengthening cross-border collaboration, joint investment schemes, and regional policy harmonization could significantly accelerate the adoption of green healthcare practices across Southeast Asia (Sutanto et al., 2020).

In conclusion, Indonesia's experience demonstrates that sustainable financial management and environmental responsibility are mutually reinforcing. Leveraging this success at the regional level could play a vital role in promoting inclusive and resilient healthcare systems across the ASEAN region.

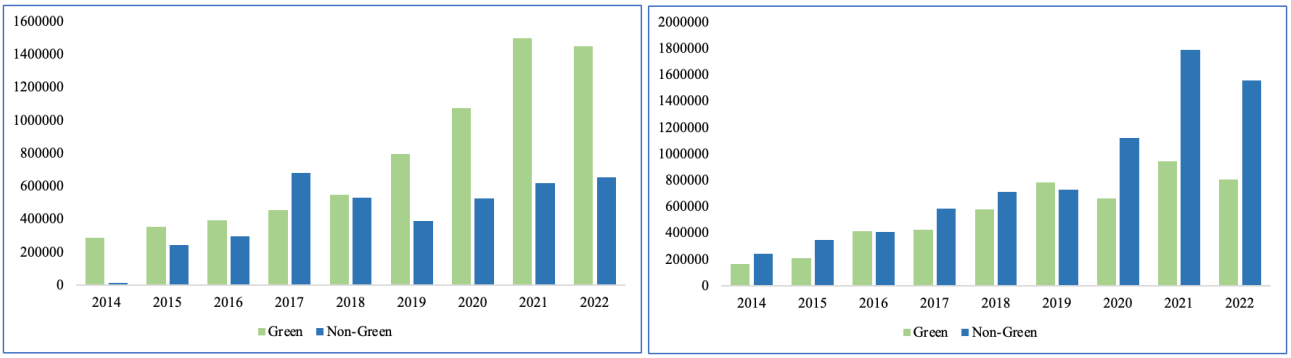

Figure 5. Current Liabilities of Green Hospitals and Non-Green Hospitals in Indonesia and ASEAN+ 2014 – 2022
Source: (Bloomberg, 2023)

Figure 5 explains the current liabilities position of hospitals in ASEAN. The current liabilities position of green hospitals in Indonesia is higher than non-green hospitals in all periods, except 2017. This is in contrast to the situation in Southeast Asia, where the current liabilities of green hospitals are below those of non-green hospitals in all periods except 2019. Current liabilities in green hospitals and non-green hospitals in Indonesia and Southeast Asia has a positive trend in general where all bar graphs increase from the beginning of the period to the end of the period and peaked at the end of the period. The current liabilities position of green hospitals in indicates that innovation in the green economy is going well. This is in contrast to what is shown by the total assets of green hospitals in Southeast Asia where the majority are below non-green hospitals. This fact suggests that Indonesia's role in the Southeast Asia region needs to be increased and to be transmitted to neighbouring countries. Figure 4 illustrates the current liabilities position of hospitals in ASEAN. In Indonesia, green hospitals generally exhibit higher current liabilities than non-green hospitals throughout the observed periods, except in 2017. This pattern contrasts with the broader Southeast Asia region, where green hospitals consistently report lower current liabilities than non-green hospitals, except in 2019. Despite these differences, both green and non-green hospitals in Indonesia and Southeast Asia demonstrate an overall upward trend in current liabilities, peaking at the end of the period. The elevated current liabilities of green hospitals in Indonesia suggest underlying financial and operational challenges. These liabilities may arise from the significant costs associated with adopting and maintaining environmentally friendly practices, which often require substantial upfront investment without immediate financial returns.

Additionally, inconsistencies in financial oversight have been highlighted as a contributing factor. Maharani and Tampubolon (2016) note that Indonesia's hospital corporatization process has not been accompanied by sufficient financial monitoring, leading to increased liabilities without corresponding accountability. Another factor influencing current liabilities is the growing role of green financing instruments, such as green sukuk, which have gained prominence in Indonesia. These financial mechanisms provide essential funding for sustainable hospital development but can also contribute to short-term liability burdens if not managed effectively (Affandi & Rahmawati, 2023; Suwanan et al., 2022). While green sukuk facilitate environmental progress, strategic financial planning is required to ensure that they do not exacerbate debt levels. In contrast, Southeast Asian green hospitals typically exhibit lower liabilities compared to their non-green counterparts. This could be due to supportive government policies and economic structures that integrate sustainability into hospital financial planning more effectively. Research indicates that hospitals operating

under strong financial frameworks and government incentives tend to enhance their financial performance while keeping liabilities in check (Lestari et al., 2023). These differing liability trends underscore the need for Indonesia to develop localized financial strategies tailored to green hospitals. Strengthening financial oversight, optimizing funding mechanisms, and implementing structured financial support policies could enhance operational sustainability and mitigate liability risks (Maharani & Tampubolon, 2016; Lestari et al., 2023). Through these improvements, Indonesia's experience in green hospital development can serve as a model for neighboring countries in the ASEAN region.

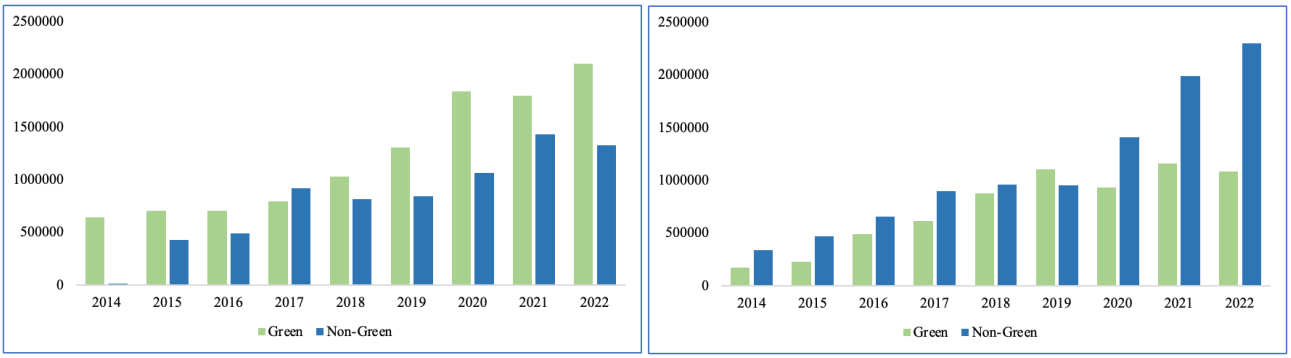

Figure 6. Total Liabilities for Green Hospitals and Non-Green Hospitals in Indonesia and ASEAN+ 2014 – 2022
Source: (Bloomberg, 2023)

Figure 6 illustrates the total liabilities of green hospitals and non-green hospitals in Indonesia and Southeast Asia in the period 2014 - 2022. The position of total liabilities for green hospitals in Indonesia is higher than for non-green hospitals in all periods except 2017. Meanwhile, the position of total liabilities green hospitals in Southeast Asia are below non-green hospitals, except for 2019. The position of total liabilities at green hospitals and non-green hospitals in Indonesia and Southeast Asia fluctuates with a positive trend. The trend in the position of total liabilities at green hospitals in Indonesia increased from the beginning of the period to the end of the period. The trend in the position of total liabilities for non-green hospitals in Indonesia is also positive from the beginning of the period until it reached its peak in 2017. Decreased in 2019, the trend increased again until the end of the period. The same trend in hospitals in Indonesia is also followed by green and non-green hospitals in Southeast Asia, where the position of total liabilities fluctuates with a positive trend until it reaches a peak in 2021 and then decreases at the end of the period. The position of total liabilities for green hospitals in Indonesia which is higher than non-green hospitals shows that innovation in the green economy is going well. The fact shown by the total liabilities of green hospitals in Southeast Asia, the majority of which are below non-green hospitals, suggests that Indonesia's role in the Southeast Asia region needs to be increased. The success of domestic innovation in developing the green economy needs to be transmitted to neighbouring countries.

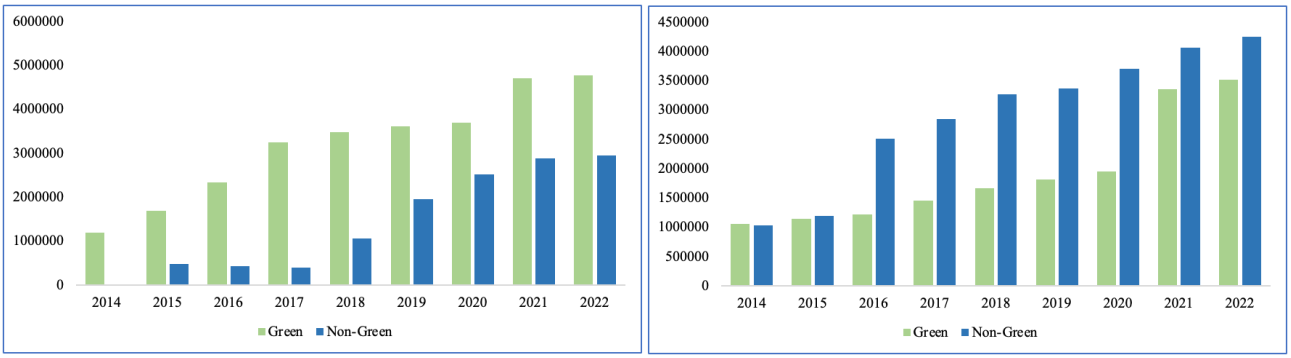

Figure 7. Total Equity of Green Hospitals and Non-Green Hospitals in Indonesia and ASEAN+ 2014 – 2022
Source: (Bloomberg, 2023)

Figure 7 explains the total equity of green hospitals in non-green hospitals in Indonesia and Southeast Asia in the period 2014 - 2022. The total equity position in green hospitals in Indonesia is higher than non-green hospitals in all periods. A different thing is shown by total equity in Southeast Asia where green hospitals are below non-green hospitals in all periods except 2014. The total equity position in green hospitals and non-green hospitals in Indonesia and Southeast Asia has a positive trend. The trend of the total equity position in green and non-green hospitals in Indonesia increased from the beginning of the period to the end of the period. The total equity position in green hospitals and non-green hospitals in Indonesia and Southeast Asia has a generally positive trend where all bar graphs increase from the beginning of the period to the end of the period. All bar graphs also show a peak at the end of the period. The total equity position in green hospitals in Indonesia is higher than non-green hospitals, indicating that increased innovation in the green economy is underway. The total equity situation of green hospitals in Southeast Asia where the majority are under non-green hospitals suggests that Indonesia's role in the Southeast Asia region needs to be increased. The success of domestic innovation in developing the green economy needs to be transmitted to neighbouring countries.

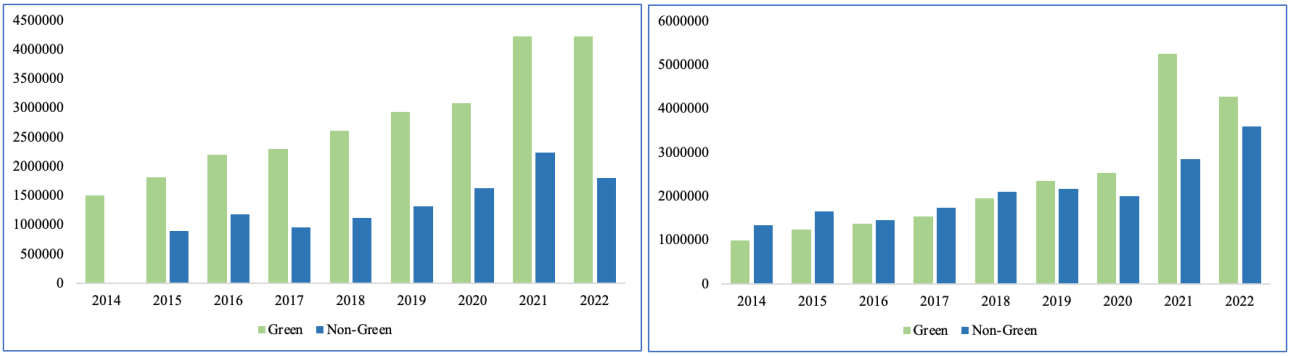

Figure 8. Total Revenue of Green Hospitals and Non-Green Hospitals in Indonesia and ASEAN^{+} 2014 – 2022
Source: (Bloomberg, 2023)

DISSCUSSION

Analysis of hospital performance in Indonesia and Southeast Asia is carried out considering three aspects which are financial performance, growth and volatility. This is done using a correlation graph, a graph that depicts data in the form of bubbles depicting different variables explained sequentially.

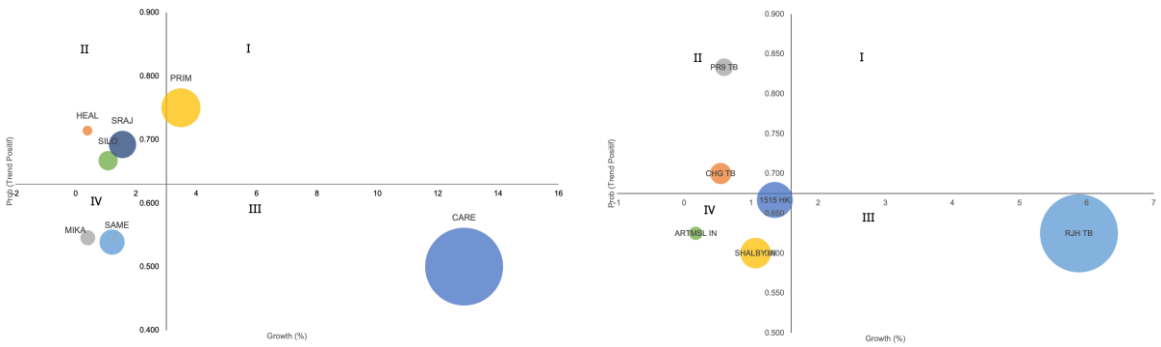

Figure 9. Cash and Cash Equivalent of Selected Hospital in Indonesia and ASEAN+
Source: Authors

Figure 9 illustrates the growth patterns and volatility of cash and cash equivalents among selected hospitals in Indonesia and Southeast Asia. The horizontal and vertical axes represent growth and trend direction, respectively, while bubble size denotes volatility, reflecting the degree of fluctuation in cash and cash equivalent balances over time. On the left side of the figure, which presents data for Indonesian hospitals, only one hospital, Royal Prima Tbk PT, is in Quadrant I, signifying both above-average growth and a positive trend. Three

hospitals—Sejahtera Raya Anugrah Jaya, Medikaloka Hermina, and Siloam International Hospitals—fall within Quadrant II, indicating below-average growth but an above-average positive trend. Metro Healthcare Indonesia, located in Quadrant III, demonstrates above-average growth but a trend below the average, suggesting some inconsistency in performance. Meanwhile, Mitra Keluarga Karya Sehat and Sarana Meditama Metropolitan are placed in Quadrant IV, reflecting below-average trends despite growth.

In terms of volatility, as reflected in bubble size, Metro Healthcare Indonesia shows the largest bubble among Indonesian hospitals, suggesting significant variability in its cash and cash equivalent values—possibly due to fluctuating revenues or capital expenditures. In contrast, Medikaloka Hermina displays the smallest bubble, indicating relatively stable financial management in this indicator. The right side of the figure displays the cash and cash equivalent dynamics for hospitals in Southeast Asia. Only one hospital, Rajthanee Hospital, appears in Quadrant I, exhibiting above-average growth and a strong positive trend. Praram 9 Hospital and Chularat Hospital, located in Quadrant II, show below-average growth but above-average positive trends. Quadrant III includes one hospital, while Quadrant IV contains three hospitals—Artemis Medicare Services, Shalby, and China Resources Medical Holdings—all of which report both growth and trend performance below average. In terms of volatility, Rajthanee Hospital has the largest bubble size, signifying the highest level of variability in cash and cash equivalent holdings across Southeast Asian hospitals. Conversely, Praram 9 Hospital shows the smallest bubble, suggesting the lowest variability and the most consistent asset management.

When comparing the two regions, Indonesian hospitals show fewer entries in Quadrant IV than their Southeast Asian counterparts, implying relatively stronger performance in terms of growth and trend consistency. This suggests that Indonesian hospitals may be more effective in managing liquidity and implementing cash flow innovations, which could be attributed to institutional reforms, adoption of digital financial systems, or sustainable management practices. On the other hand, the larger bubble sizes in Southeast Asia indicate greater volatility in financial ratios, which may point to less stable financial performance or more exposure to market uncertainties. In conclusion, Indonesian hospitals demonstrate a more stable and growth-oriented profile in managing cash and cash equivalents compared to hospitals in other Southeast Asian countries. This relative stability can be interpreted as evidence of greater financial discipline, policy-driven innovation, and possibly a more mature approach to liquidity management within Indonesia's green and conventional hospital sectors.

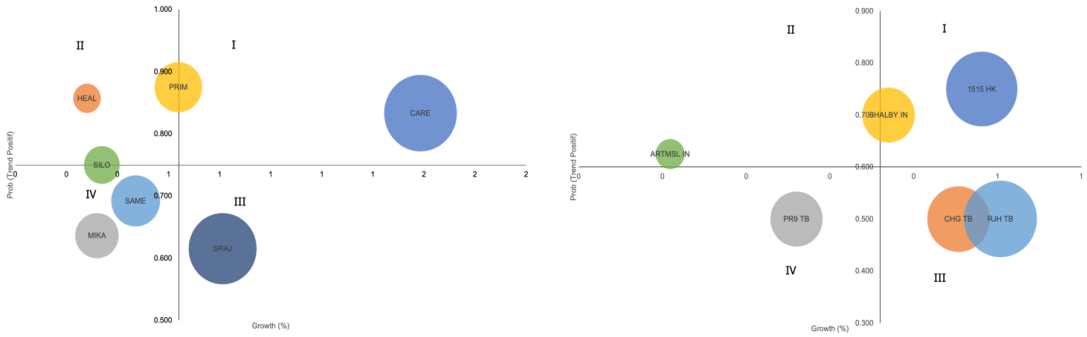

Figure 10. Current Asset of Selected Hospital in Indonesia and ASEAN+
Source: Authors

Figure 10 presents the growth patterns and trend trajectories of current assets among selected hospitals in Indonesia and Southeast Asia. The size of each bubble reflects the volatility or diversity of current assets over time. The left panel of the figure depicts Indonesian hospitals.vIn Indonesia, only one hospital, Metro Healthcare Indonesia, appears in Quadrant I, which represents both above-average growth and an above-average positive trend. This suggests that the hospital is performing strongly in terms of expanding its current assets while maintaining an upward financial trajectory. Quadrant II includes three hospitals—Medikaloka Hermina, Royal Prima, and Siloam International Hospitals—all of which display below-average growth but an above-average trend, indicating potential for future asset expansion. In Quadrant III, Sejahtera Raya Anugrah Jaya demonstrate above-average growth with a below-average trend, reflecting uneven performance that may require

strategic adjustments. Quadrant IV, typically indicating both weak trend and growth, includes Mitra Keluarga Karya Sehat and Sarana Meditama Metropolitan, suggesting relatively weaker asset development profiles.

In terms of volatility, Metro Healthcare Indonesia has the largest bubble, implying the highest variability in current asset values among the Indonesian sample—potentially due to fluctuations in receivables, inventories, or operational cash. Conversely, Medikaloka Hermina has the smallest bubble, reflecting relatively stable current asset management and lower volatility over the observed period.

The right panel of the figure depicts current asset dynamics among Southeast Asian hospitals. Quadrant I features Shalby and China Resources Medical Holdings, with both showing above-average growth. Notably, China Resources Medical Holdings also records an above-average trend, while Shalby has a trend that is only partly above average. Artemis Medicare Services, positioned in Quadrant II, shows below-average growth but a positive trend, suggesting potential for recovery. Quadrant III includes Chularat Hospital and Rajthanee Hospital, which report above-average growth but below-average trends, pointing to inconsistent performance. Meanwhile, Praram 9 Hospital, located in Quadrant IV, shows both below-average growth and trend, indicating limited progress in current asset development.

Regarding volatility, China Resources Medical Holdings possesses the largest bubble, signaling the highest current asset diversity among Southeast Asian hospitals. In contrast, Artemis Medicare Services has the smallest bubble, implying relatively stable current asset levels. When comparing the two regions, fewer Indonesian hospitals appear in Quadrant IV—the weakest performance quadrant—than their Southeast Asian counterparts. This suggests that Indonesian hospitals demonstrate stronger consistency in current asset growth and trend behavior, which may be attributed to more structured financial planning, stronger regulatory alignment, or earlier adoption of sustainable hospital management practices. Additionally, the smaller average bubble sizes in Indonesia suggest lower volatility in current assets, indicating greater financial stability and risk control relative to hospitals in other Southeast Asian countries.

These findings reinforce the argument that Indonesian hospitals are comparatively more advanced in applying innovative financial and operational strategies aligned with green economy principles. Meanwhile, the higher volatility and underperformance of several Southeast Asian hospitals underscore the need for regional capacity building, financial governance reform, and cross-border collaboration to enhance financial resilience in healthcare institutions.

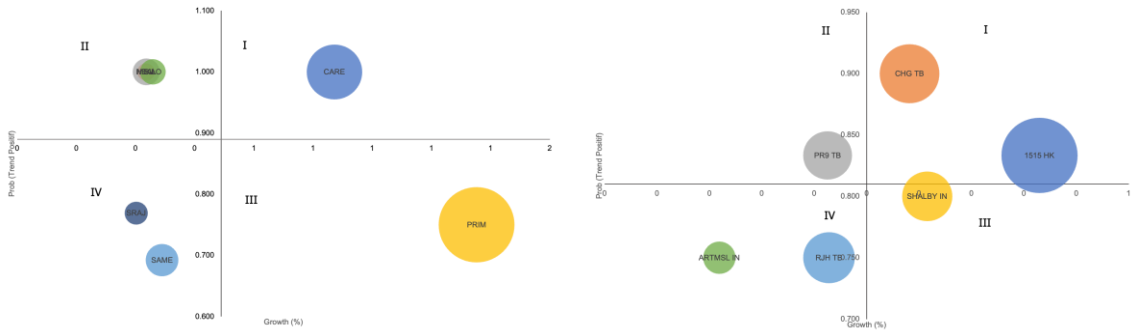

Figure 11. Total Assets of Selected Hospitals in Indonesia and ASEAN+
Source: Authors

Figure 11 presents the growth and trend performance of total assets among selected hospitals in Indonesia and Southeast Asia. The bubble size represents the volatility or dispersion of total asset values, indicating financial stability or variability. In Indonesia (left panel), Metro Healthcare Indonesia is the only hospital located in Quadrant I, indicating both above-average growth and a partially above-average positive trend. Medikaloka Hermina, Royal Prima, and Siloam International Hospitals appear in Quadrant II, which reflects below-average growth but a strong positive trend, suggesting forward momentum despite slower asset expansion. Sejahteraraya Anugrahjaya, in Quadrant III, demonstrates above-average growth with a weaker trend, pointing to possible short-term gains without sustained progression. In Quadrant IV, Mitra Keluarga

Karyasehat and Sarana Meditama Metropolitan exhibit below-average trends despite some growth, reflecting more modest or inconsistent asset development.

Regarding asset volatility, Metro Healthcare Indonesia shows the largest bubble, indicating the highest variability in asset management among Indonesian hospitals—potentially due to strategic investments or operational fluctuations. In contrast, Medikaloka Hermina exhibits the lowest volatility, suggesting more stable and predictable asset performance. In Southeast Asia (right panel), Shalby and China Resources Medical Holdings appear in Quadrant I, signaling robust asset growth and strong trends. Artemis Medicare Services, in Quadrant II, shows below-average growth but an above-average trend, indicating a potential turnaround. Chularat Hospital and Rajthanee Hospital, positioned in Quadrant III, report above-average growth but weaker trends, while Praram 9 Hospital, in Quadrant IV, shows the weakest performance across both metrics. China Resources Medical Holding's bubble is the largest in the region, reflecting the highest asset volatility, whereas Artemis Medicare Services Ltd displays the lowest variability.

Notably, fewer Indonesian hospitals fall into Quadrant IV, compared to those in Southeast Asia, highlighting better overall performance in Indonesia in terms of total asset growth and trend strength. This supports the argument that Indonesian hospitals demonstrate more innovative and stable financial management, possibly due to national policies promoting green and sustainable infrastructure investment. Additionally, larger bubble sizes in Southeast Asiaindicate greater financial instability, with wider gaps between peak and minimum asset values, signaling higher risk or inconsistent asset expansion.

Figure 11 evaluates the current liabilities of the same hospital groups. In Indonesia, Sejahteraraya Anugrahjaya, Medikaloka Hermina, and Metro Healthcare Indonesia occupy Quadrant I, reflecting above-average growth and partially above-average positive trends in current liabilities—suggesting an active financing or short-term obligation management strategy. Mitra Keluarga Karyasehat and Siloam International Hospitals, located in Quadrant II, exhibit below-average growth with a positive trend, while Royal Prima (Quadrant III) shows above-average growth but declining trends. Sarana Meditama Metropolitan, in Quadrant IV, reflects below-average growth and trend, indicating weaker performance. Metro Healthcare Indonesia Tbk PT again demonstrates the highest volatility, whereas Medikaloka Hermina maintains the lowest variability in current liabilities. In Southeast Asia, China Resources Medical Holdings is the only hospital in Quadrant I, indicating strong growth and trend. Chularat Hospital, in Quadrant II, has lower growth but a positive trend, whereas Shalby Ltdand Rajthanee Hospital fall into Quadrant III, showing growth without positive momentum. Praram 9 Hospital, located in Quadrant IV, reflects the weakest performance. China Resources Medical Holdings again shows the greatest volatility, while Artemis Medicare Services has the lowest, pointing to stable liability management.

Compared to Southeast Asia, Indonesia has fewer hospitals in Quadrant IV, suggesting better performance and more consistent financial strategies in current liability management. Furthermore, greater volatility among Southeast Asian hospitals, reflected in larger bubble sizes, suggests greater financial uncertainty or exposure to market dynamics. In conclusion, both figures indicate that Indonesian hospitals generally outperform their Southeast Asian counterparts in terms of financial trends, innovation, and volatility control, particularly in managing total assets and current liabilities. These outcomes may reflect policy support, organizational reform, and the early integration of green and digital financial innovations within the Indonesian healthcare sector.

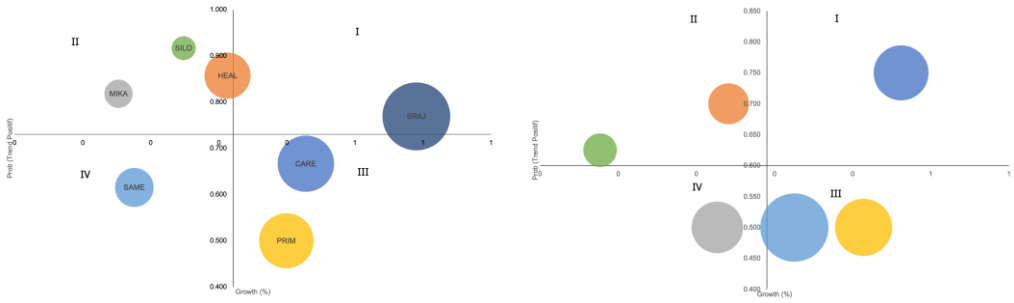

Figure 12. Current Liabilities of Selected Hospitals in Indonesia and ASEAN+
Source: Authors

Figure 12 visualizes the relationship between growth and trend direction in total liabilities among selected hospitals in Indonesia and Southeast Asia. The size of each bubble represents the volatility or variability in total liabilities, reflecting financial stability or exposure to liability risk. In the Indonesian context (left panel), only Sejahteraraya Anugrahjaya is in Quadrant I, indicating above-average liability growth with a positive trend that is only partially above average. This suggests that while liabilities are increasing, their trend stability remains moderate. Quadrant II includes Medikaloka Hermina, Mitra Keluarga Karyasehat, and Siloam International Hospitals. These hospitals exhibit below-average liability growth but above-average positive trends, implying gradual improvements in liability trends, possibly due to controlled debt financing or improved payment structures. In Quadrant III, Metro Healthcare Indonesia, Royal Prima, and again Sejahteraraya Anugrahjaya (intersecting between quadrants) report above-average growth in liabilities with below-average positive trends. This combination may signal short-term expansions in obligations that are not yet aligned with sustainable financial planning. Sarana Meditama Metropolitan, located in Quadrant IV, demonstrates positive but below-average trends and growth, suggesting relatively weaker performance in managing total liabilities.

Regarding volatility, Metro Healthcare Indonesia has the largest bubble, signifying the highest variability in total liabilities among Indonesian hospitals. This could be linked to fluctuating loan structures or irregular payment cycles. In contrast, Mitra Keluarga Karyasehat exhibits the smallest bubble, indicating low variability and potentially stable liability management. This pattern suggests that while several Indonesian hospitals are expanding their liability structures, few are doing so in a consistently stable manner. The presence of multiple hospitals in Quadrants II and III implies a dynamic but uneven liability landscape—highlighting the need for more strategic debt oversight and long-term financial alignment. The comparative absence of hospitals in Quadrant IV reinforces that Indonesian hospitals generally manage liability growth better than their Southeast Asian counterparts, as supported by previous figures.

This observation adds to the broader argument that Indonesian hospitals are ahead in aligning financial practices with innovation and sustainability goals, although greater emphasis on balancing liability expansion with trend stability is needed. Future policy could support this through risk-adjusted borrowing frameworks, credit performance benchmarks, and incentives for consistent liability trend improvements.

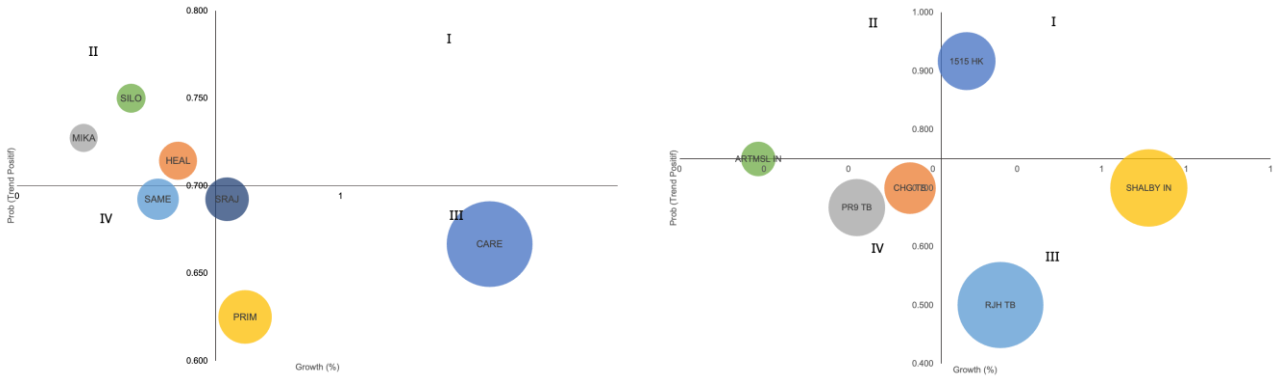

Figure 13. Total Liabilities of Selected Hospitals in Indonesia and ASEAN^{+}
Source: Authors

The right panel of Figure 13 illustrates the distribution of total liabilities among selected hospitals in Southeast Asia, emphasizing both growth rates and trend directions. Two hospitals, Shalby and China Resources Medical Holdings, are positioned in Quadrant I, indicating strong performance with both above-average growth and positive trend trajectories. Among them, China Resources Medical Holdings exhibits consistently high results across both dimensions, while Shalby shows a positive trend that is only partially above average. Artemis Medicare Services, located in Quadrant II, demonstrates below-average liability growth, yet maintains a positive trend that exceeds the regional average, suggesting a gradual recovery or conservative financial management. In Quadrant III, Rajthanee Hospital exhibits above-average growth but

a below-average trend, which may reflect inconsistent performance or short-term financial restructuring. Chularat Hospital and Praram 9 Hospital, both situated in Quadrant IV, display positive but below-average growth and trends, suggesting weaker overall performance in liability management.

In terms of volatility, represented by bubble size, Rajthanee Hospital records the largest bubble, indicating the highest variability in total liabilities, possibly due to fluctuating debt levels or uneven capital structure. On the other hand, Artemis Medicare Services Ltd shows the smallest bubble, suggesting relatively stable and predictable liability patterns. When comparing the distribution of hospitals in Quadrant IV between Indonesia and Southeast Asia, Indonesia features more hospitals in this lower-performing quadrant. This could indicate that Indonesian hospitals, on average, face greater challenges in aligning liability growth with sustained positive trends. From a traditional financial performance perspective, this places Indonesian hospitals at a comparative disadvantage.

However, a deeper interpretation suggests that higher positioning in Quadrant IV and lower volatility may also reflect a transitional phase, where Indonesian hospitals are engaging in more experimental or innovative financing mechanisms, such as green financing, debt restructuring for infrastructure adaptation, or early-stage sustainability investment. In contrast, many Southeast Asian hospitals in higher quadrants may be following more conventional and conservative financial strategies that favor consistency over innovation. Furthermore, the larger bubble sizes in Southeast Asia suggest greater volatility in financial liabilities, implying less stability and higher sensitivity to market or operational fluctuations. This reinforces the view that, while Indonesian hospitals may currently appear weaker in growth-trend metrics, they may be more aligned with forward-looking financial innovation, whereas Southeast Asian hospitals are optimizing for short-term stability.

In conclusion, the analysis reveals a complex trade-off between innovation and consistency. Indonesian hospitals may be navigating new financial pathways with higher risk and lower immediate returns, while Southeast Asian hospitals display stronger short-term metrics but potentially at the cost of long-term strategic transformation. This highlights an opportunity for cross-regional learning to balance innovation with financial sustainability.

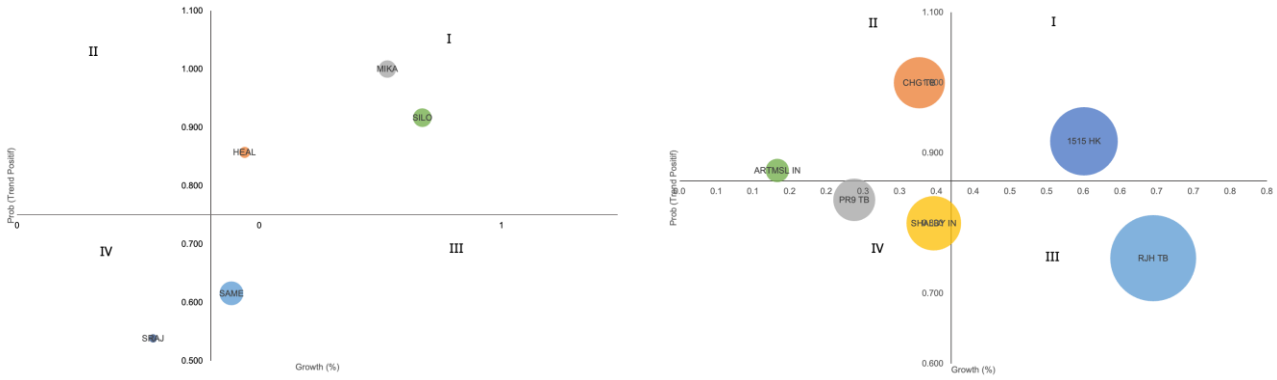

Figure 14. Total Equity of Selected Hospitals in Indonesia and ASEAN+
Source: Authors

Figure 14 presents the relationship between growth and trend direction in total equity among selected hospitals in Indonesia and Southeast Asia, with bubble size representing the volatility or variability of each hospital's equity position. In the left panel, which illustrates Indonesian hospitals, four hospitals—Royal Prima, Mitra Keluarga Karyasehat, Siloam International Hospitals, and Medikaloka Hermina—are positioned in Quadrant I, indicating above-average growth with positive trends, several of which also exceed the trend average. This suggests that these hospitals have been successful in increasing shareholder value while maintaining consistent upward momentum. Notably, Quadrants II and III are unoccupied, reflecting the absence of hospitals with below-average growth but positive trends, or vice versa. In Quadrant IV, Metro Healthcare Indonesia, Sarana Meditama Metropolitan, and Sejahteraraya Anugrahjaya exhibit growth in

equity, but their trend trajectories fall below average, suggesting short-term expansion that may not be sustained over time.

In terms of volatility, Metro Healthcare Indonesia shows the largest bubble, indicating the highest variability in equity levels, possibly driven by fluctuating reinvestment patterns or market revaluations. Conversely, Sejahteraraya Anugrahjaya demonstrates the lowest volatility, implying more stable equity accumulation. The right panel, which displays equity dynamics for Southeast Asian hospitals, reveals a different configuration. Only China Resources Medical Holdings occupies Quadrant I, with both above-average equity growth and a strong positive trend, suggesting a solid and consistent expansion of shareholder value. Artemis Medicare Services Ltdand Chularat Hospital appear in Quadrant II, reflecting below-average growth with positive trends, which may imply gradual recovery or conservative capital accumulation strategies. In Quadrant III, Rajthanee Hospital reports above-average growth but with a trend below average, potentially signaling short-term gains with longer-term uncertainties. Quadrant IV includes Praram 9 Hospital and Shalby, both showing positive but below-average growth and trends, suggesting relatively weaker or stagnant equity development. With respect to volatility, Rajthanee Hospital has the largest bubble, indicating the greatest fluctuation in equity levels, which may stem from unstable earnings retention or capital adjustments. On the other hand, Artemis Medicare Services records the smallest bubble, reflecting high consistency and low variability in equity growth. When comparing the two regions, Indonesian hospitals are underrepresented in Quadrant IV, which represents weaker performance, whereas several Southeast Asian hospitals fall into this category. This distribution implies that, overall, Indonesian hospitals exhibit stronger alignment between equity growth and trend stability, possibly supported by more proactive capital management and reinvestment strategies.

Moreover, while hospitals in Southeast Asia tend to have larger bubble sizes, indicating greater volatility in equity performance, Indonesian hospitals appear more financially stable. This suggests that, despite some performance variability, Indonesian hospitals may be leveraging more innovative equity financing and capital allocation strategies, aligned with long-term sustainability goals. In conclusion, Indonesian hospitals generally outperform their Southeast Asian counterparts in terms of equity growth-trend alignment, with lower volatility reinforcing greater financial resilience. Meanwhile, the higher variability observed in some Southeast Asian hospitals reflects less consistent equity expansion, signaling the need for more structured equity management in the region. These patterns highlight opportunities for cross-regional policy learning, particularly in integrating innovation with financial stability in hospital equity management.

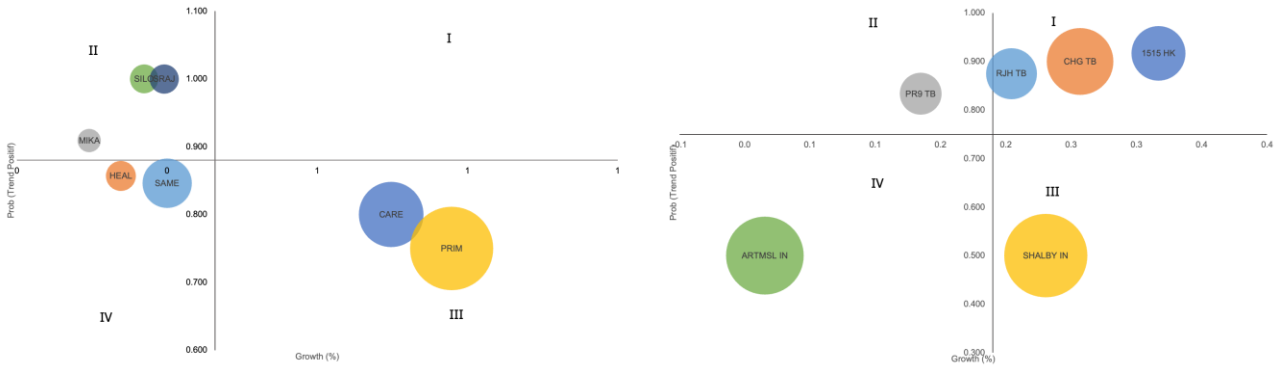

Figure 15. Total Income of Selected Hospitals in Indonesia and ASEAN+
Source: Authors

Figure 15 illustrates the relationship between growth and trend direction of total income among selected hospitals in Indonesia and Southeast Asia, with bubble size representing the volatility or fluctuation in income over time. In the left panel, which visualizes Indonesian hospitals, no hospitals are positioned in Quadrant I, indicating the absence of institutions achieving both above-average income growth and positive trend

performance. Three hospitals—Sejahteraraya Anugrahjaya, Mitra Keluarga Karyasehat, and Siloam International Hospitals—are in Quadrant II, reflecting below-average growth but above-average positive trends, suggesting a potential for recovery or gradual income improvement over time. Quadrant III includes Metro Healthcare Indonesia and Royal Prima, both demonstrating above-average income growth with trends below average, signaling short-term gains that are not yet consistently maintained. Meanwhile, Medikaloka Hermina and Sarana Meditama Metropolitan, found in Quadrant IV, display both below-average growth and trend, indicating stagnation or weak income performance.

Regarding volatility, Metro Healthcare Indonesia has the largest bubble, denoting the highest variability in income, possibly due to irregular revenue streams or inconsistent service expansion. In contrast, Medikaloka Hermina shows the smallest bubble, reflecting the lowest income fluctuation among the Indonesian hospitals, suggesting a more stable but potentially limited growth profile. The right panel of the figure depicts income performance among Southeast Asian hospitals. Notably, Chularat Hospital PCL, Rajthanee Hospital, and China Resources Medical Holdings are in Quadrant I, indicating strong performance with both above-average income growth and trends. This suggests that these institutions are effectively expanding their revenue base while maintaining upward income momentum. Praram 9 Hospital appears in Quadrant II, showing below-average growth but a positive trend, indicating potential for future improvement. In Quadrant III, Shalby records above-average growth with below-average trends, reflecting a similar short-term advantage as seen in some Indonesian hospitals. Artemis Medicare Services, located in Quadrant IV, presents below-average performance in both income growth and trend.

Interestingly, Artemis Medicare Services Ltd has the largest bubble, indicating high income volatility, while also being noted again (likely intended correction needed) as having the lowest diversity, which presents a contradiction. Assuming the latter is a typo, this hospital likely has the highest income variability among Southeast Asian hospitals, whereas institutions like Praram 9 Hospital or Chularat Hospital may exhibit more stable patterns.

In comparing the two regions, Indonesian hospitals have fewer entries in Quadrant IV, indicating relatively stronger performance in terms of income growth-trend alignment. This implies that, despite limitations in achieving high growth, Indonesian hospitals are showing resilience in sustaining income trends, potentially reflecting effective revenue optimization strategies or adaptive service models in the face of market pressures. Furthermore, hospitals in Southeast Asia generally exhibit larger bubble sizes, indicating greater volatility in income performance. This suggests a higher degree of uncertainty in income flows, possibly linked to external market dependencies, regulatory fluctuations, or varied business models. By contrast, Indonesian hospitals demonstrate lower volatility, suggesting more consistent financial control, although perhaps at the expense of rapid income expansion.

In conclusion, while Southeast Asian hospitals may dominate in Quadrant I with strong performance leaders, Indonesian hospitals demonstrate greater consistency and trend resilience, indicating a more stable and potentially innovation-driven approach to income management. The findings point to a trade-off between rapid growth and financial stability, underscoring the need for tailored income strategies that balance expansion with risk mitigation across both regions.

CONCLUSION

Not all hospitals publish standalone sustainability reports; some integrate Environmental, Social, and Governance (ESG) disclosures within their annual financial reports. This study investigates the financial performance of green and non-green hospitals in Indonesia and the broader ASEAN+ region from 2014 to 2022, utilizing a time-series analysis of key financial ratios. The research offers important insights into the evolving relationship between sustainability practices and financial outcomes in the healthcare sector, particularly in emerging economies where policy frameworks and market maturity vary widely.

A core finding of this study is the contrasting financial outcomes observed between green and non-green hospitals across the two regions. In Indonesia, green hospitals consistently outperformed their non-green counterparts in metrics such as cash and cash equivalents, total assets, equity, and revenue. This pattern suggests that sustainability practices may serve as a strategic asset, enhancing brand value, operational

efficiency, and stakeholder trust—consistent with the resource-based view (RBV) of competitive advantage. In the Indonesian context, growing environmental awareness, supportive government regulations, and a culturally rooted emphasis on social responsibility may provide fertile ground for the integration of green strategies.

In contrast, across the ASEAN+ region, non-green hospitals generally demonstrated stronger financial performance, except for specific time periods. This divergence underscores the importance of contextual contingencies, including institutional support, regulatory enforcement, market demand for sustainability, and investor expectations. The limited and inconsistent performance of green hospitals outside Indonesia reflects the contingency perspective, highlighting that sustainability-driven financial returns are not universally guaranteed but are shaped by enabling environments and policy coherence.

The study also conducted a volatility analysis, revealing that Indonesian hospitals tend to exhibit greater financial stability than their ASEAN+ counterparts. While this may point to more robust financial structures or disciplined management practices, some institutions still demonstrated high volatility, suggesting that firm-specific factors—such as size, governance quality, or external funding reliance—play a crucial role in shaping financial outcomes. In terms of trend analysis, both green and non-green hospitals across regions showed positive financial trajectories over the period examined, signaling the resilience of the healthcare sector. However, regional disparities remain pronounced, reinforcing the idea that sustainability's impact on financial performance is contingent upon national policy environments, organizational capabilities, and stakeholder ecosystems.

This research contributes a novel comparative perspective on the financial implications of green initiatives in healthcare across diverse institutional settings. The integration of time-series methods with cross-regional comparisons allows for a more nuanced understanding of how sustainability practices intersect with financial performance. The findings also extend theoretical discussions within the resource-based view (RBV) by emphasizing the conditional role of institutional and market factors in transforming sustainability efforts into measurable financial gains.

Nonetheless, several limitations must be acknowledged. The classification of "green hospitals" was based solely on the availability of sustainability reporting, which may not fully reflect the depth or authenticity of environmental practices. Future studies should adopt standardized environmental certifications (e.g., LEED, ISO 14001, Green Building Index) for more robust and comparable classification. Moreover, the analysis was limited using publicly available financial data, which constrained the granularity and depth of the financial indicators examined. Access to more comprehensive, institution-level datasets would significantly enhance the validity and reliability of future research.

The study also faces geographical limitations, with findings primarily applicable to Indonesia and the ASEAN+ region. Broader generalization would require comparative studies involving additional regions with diverse policy landscapes. Furthermore, while time-series methods reveal associations over time, this research is correlational in nature; future work should apply causal inference models or panel data econometrics to assess the directionality and robustness of observed relationships.

Moving forward, future research should aim to refine the operationalization of green performance, incorporating more comprehensive sustainability indicators such as carbon emissions, energy consumption, waste management, and climate resilience practices. Expanding the analysis to include cross-sectoral comparisons could yield valuable insights into the financial and strategic dynamics of sustainability across industries. Moreover, longitudinal studies examining the durability of financial benefits linked to sustainability practices would be instrumental in shaping long-term policy and investment strategies.

A stakeholder-centered analysis is also essential, exploring how sustainability initiatives impact patients, healthcare professionals, and local communities. Finally, integrating social and governance dimensions—the full ESG spectrum—will allow for a more holistic assessment of hospital performance. Conducting cost-benefit analyses of green initiatives would provide actionable insights for hospital managers, policymakers, and investors seeking to align healthcare performance with broader sustainability goals.

REFERENCES

Aini, F., Irianto, A., & Amar, S. (2023). Green Building, Green Innovation and Green HRM: Determinants of Green Hospital Implementation at West Pasaman Regional General Hospital. *International Journal of Sustainable Development and Planning*, *18*(9). https://doi.org/10.18280/ijsdp.180927

Affandi, M. and Rahmawati, F. (2023). Do determinants of behaviors influence the intention to invest in green sukuk?. *Jurnal Ekonomi Syariah Teori Dan Terapan*, 10(4), 403-414. https://doi.org/10.20473/vol10iss20234pp403-414

Alatas, H., & Ayuningtyas, D. (2019). Implementasi Green Hospital di RSUD R. Syamsudin, SH dengan Kriteria Kerangka Kinerja Ekselen Malcolm Baldrige. *Jurnal Administrasi Rumah Sakit Indonesia*, *5*(2), 85–96. https://doi.org/10.7454/arsi.v5i2.3197

Bloomberg. (2023, October 19). *Bloomberg Terminal*. Retrieved from Bloomberg Professional Services : https://www.bloomberg.com/professional/solution/bloomberg-terminal/

Chías, P., & Abad, T. (2017). Green hospitals, green healthcare. *International Journal of Energy Production and Management*, *2*(2), 196–205. https://doi.org/10.2495/EQ-V2-N2-196-205

Cimprich, A., Santillán-Saldivar, J., Thiel, C. L., Sonnemann, G., & Young, S. B. (2019). Potential for Industrial Ecology to Support Healthcare Sustainability: Scoping Review of a Fragmented Literature and Conceptual Framework for Future Research. *Journal of Industrial Ecology*, *23*(6), 1344–1352. https://doi.org/10.1111/jiec.12921

Dhillon, V. S., & Kaur, D. (2015). Green hospital and climate change: Their interrelationship and the way forward. *Journal of Clinical and Diagnostic Research*, *9*(12), LE01–LE05. https://doi.org/10.7860/JCDR/2015/13693.6942

Garschagen, M., Doshi, D., Reith, J., & Hagenlocher, M. (2021). Global Patterns of Disaster and Climate Risk—an Analysis of the Consistency of Leading Index-Based Assessments and Their Results. *Climatic Change*, *169*(1–2). https://doi.org/10.1007/s10584-021-03209-7

Global Sustainability Index. (2022). *Ranking of Green Building Adoption in ASEAN*. Retrieved from www.globalsustainabilityindex.org

Goh, K. C., Kurniawan, T. A., Goh, H. H., Zhang, D., Jiang, M., Dai, W., Khan, M. I., Othman, M. H. D., Aziz, F., Anouzla, A., & Meidiana, C. (2024). Strengthening Infrastructure Resilience for Climate Change Mitigation: Case Studies From the Southeast Asia Region With a Focus on Wastewater Treatment Plants in Addressing Flooding Challenges. *Acs Es&t Water*, *4*(9), 3725–3740. https://doi.org/10.1021/acsestwater.4c00591

Hadida, G., Ali, Z., Kästner, T., Carr, T. W., Prentice, A. M., Green, R., & Scheelbeek, P. (2022). Changes in Climate Vulnerability and Projected Water Stress of the Gambia's Food Supply Between 1988 and 2018: Trading With Trade-Offs. *Frontiers in Public Health*, *10*. https://doi.org/10.3389/fpubh.2022.786071

Halkos, G., Skouloudis, A., Malesios, C., & Jones, N. (2020). A Hierarchical Multilevel Approach in Assessing Factors Explaining Country-Level Climate Change Vulnerability. *Sustainability*, *12*(11), 4438. https://doi.org/10.3390/su12114438

Hanif, N. A., Utomo, E. P., & Husein, R. (2024). Comparative Study of Indonesia and Denmark in Creating a Smart Environment. *Jurnal Pengelolaan Sumberdaya Alam Dan Lingkungan (Journal of Natural Resources and Environmental Management)*, *14*(1), 160–173. https://doi.org/10.29244/jpsl.14.1.160-173

Ipsos. (2021). *Public Awareness and Engagement in Sustainability: Malaysia Report*. Retrieved from www.ipsos.com

Katadata Insight Center. (2021). *Sustainability Awareness in Indonesia: Survey Report*. Retrieved from www.katadata.co.id

Kumari, S., & Kumar, R. (2020). Green hospital - A necessity and not option. *Journal of Management Research and Analysis*, *7*(2), 46–51. https://doi.org/10.18231/j.jmra.2020.010

Lattanzio, S., Stefanizzi, P., D'ambrosio, M., Cuscianna, E., Riformato, G., Migliore, G., Tafuri, S., & Bianchi, F. P. (2022). Waste Management and the Perspective of a Green Hospital—A Systematic Narrative

Review. *International Journal of Environmental Research and Public Health*, *19*(23), 15812. https://doi.org/10.3390/ijerph192315812

Lauder, A., Sari, R. F., Suwartha, N., & Tjahjono, G. (2015). Critical review of a global campus sustainability ranking: GreenMetric. *Journal of Cleaner Production*, *108*, 852–863. https://doi.org/https://doi.org/10.1016/j.jclepro.2015.02.080

Lenzen, M., Malik, A., Li, M., Fry, J., Weisz, H., Pichler, P.-P., Chaves, L. S. M., Capon, A., & Pencheon, D. (2020). The Environmental Footprint of Health Care: A Global Assessment. *The Lancet Planetary Health*, *4*(7), e271–e279. https://doi.org/10.1016/s2542-5196(20)30121-2

Lestari, M., Sari, S., & Arso, S. (2023). Literature review: green marketing strategy and green hospital to achieve sustainable competitive advantage. *International Islamic Medical Journal*, 4(1), 38-43. https://doi.org/10.33086/iimj.v4i1.3854

Lewis, A. (2001). A focus group study of the motivation to invest: 'ethical/green' and 'ordinary' investors compared. *The Journal of Socio-Economics*, *30*(4), 331–341. https://doi.org/https://doi.org/10.1016/S1053-5357(01)00103-2

Lum, B. X., Tay, H. M., Phang, R. X., Tan, S. B., & Liu, E. H. (2022). Evaluating a Hospital's Carbon Footprint – A Method Using Energy, Materials and Financial Data. *Journal of Hospital Administration*, *11*(2), 33. https://doi.org/10.5430/jha.v11n2p33

Maharani, A. and Tampubolon, G. (2016). The double-edged sword of corporatisation in the hospital sector: evidence from indonesia. *Health Economics Policy and Law*, 12(1), 61-80. https://doi.org/10.1017/s174413311600027x

Nahruddin, Z., Nara, N., Ibrahim, M. A., & Nurdiansyah, W. (2023). Multi-Level Governance in Addressing Climate Change in Indonesia, Malaysia and Singapore: Systematic Literature Review. *Kne Social Sciences*. https://doi.org/10.18502/kss.v8i17.14178

National Climate Change Secretariat Singapore. (2022). *Public Perception on Climate Change and Sustainability in Singapore*. Retrieved from www.nccs.gov.sg

North, K. (2022). Environmental Stewardship in Healthcare: Use of Bio-Plastics in Surgery. *International Health Trends and Perspectives*, *2*(3), 16–26. https://doi.org/10.32920/ihtp.v2i3.1698

Putri, C. F., Purnomo, D., & Astuti, E. (2016). Analisis Kesiapan Rumah Sakit Menuju Penerapan Ramah Lingkungan (Green Hospital). *Seminar Nasional Inovasi Dan Aplikasi Teknologi Di Industri (Seniati) 2016*, C–12. https://doi.org/10.36040/seniati.vi0.1943

Rizan, C., Steinbach, I., Nicholson, R., Lillywhite, R., Reed, M., & Bhutta, M. F. (2020). The Carbon Footprint of Surgical Operations. *Annals of Surgery Open*, *272*(6), 986–995. https://doi.org/10.1097/sla.0000000000003951

Rupiwardani, I., Widodo, A., Djati, M. S., Ciptadi, G., & Handoyo, S. (2022). The Green Hospital Implementation through the Criteria of Management Performance Framework and Environmental Performance. *NeuroQuantology*, *20*(16), 4313–4325. https://doi.org/10.48047/NQ.2022.20.16.NQ880438

Sadatsafavai, H., Walewski, J., & Taborn, M. (2014). Comparison of a sample of green hospitals with non-green hospitals with respect to operating expenses and patient revenue. *Journal of Green Building*, *9*(3), 163–188. https://doi.org/10.3992/1943-4618-9.3.163

Sherman, J. D., McGain, F., Lem, M., Mortimer, F., Jonas, W. B., & MacNeill, A. (2021). Net Zero Healthcare: A Call for Clinician Action. *BMJ*, n1323. https://doi.org/10.1136/bmj.n1323

Siedlecki, R., Prędkiewicz, P., Bem, A., & Szpulak, A. (2021). Working capital management in hospitals: evidence from poland. *European Research Studies Journal*, XXIV(Special Issue 1), 836-850. https://doi.org/10.35808/ersj/2099

Sunarto, S. (2016). Manajemen Lingkungan Rumah Sakit Dalam Rangka Mewujudkan Green Hospital. *Proceeding Biology Education Conference*, 757–762.

Suwanan, A., Munir, S., & Merlinda, S. (2022). Analisis analisis peran dan tantangan sukuk hijau bagi ketahanan perubahan iklim pada wilayah rentan selama pandemi covid-19. *Al-Kharaj Jurnal Ekonomi Keuangan & Bisnis Syariah*, 4(4), 978-989. https://doi.org/10.47467/alkharaj.v4i4.767

Thiel, C. L., Eckelman, M. J., Guido, R., Huddleston, M. H., Landis, A. E., Sherman, J. D., Shrake, S. O., Copley-Woods, N., & Bilec, M. M. (2015). Environmental Impacts of Surgical Procedures: Life Cycle Assessment of Hysterectomy in the United States. *Environmental Science & Technology*, *49*(3), 1779–1786. https://doi.org/10.1021/es504719g

Tripathi, A., Al-Saadi, N., Wall, M. L., & Garnham, A. (2023). Delivering Greener Surgery; Small Changes Matter. *Journal of Vascular Societies Great Britain and Ireland*, *3*(1), 2–4. https://doi.org/10.54522/jvsgbi.2023.099

Waluyo, W. (2019). Does Computerized Accounting System Increase the Supply Chain Accuracy? An Empirical Evidence From Indonesian Supply Chain Companies. *Uncertain Supply Chain Management*, 541–552. https://doi.org/10.5267/j.uscm.2018.11.002

Wanjuki, E. (2021). Relationship between cash management and financial performance of private hospitals in nairobi county, kenya. *Journal of Finance and Accounting*, 5(2), 128-146. https://doi.org/10.53819/81018102t40010

WHO. (2022, September 8). *Health in Indonesia - Statistics & Facts.* Retrieved from Statista: https://www.statista.com/topics/4873/health-in-indonesia/

World Economic Forum. (2023). *The Global Risks Report 2023 18th Edition.* Zurich: World Economic Forum. Retrieved from https://www3.weforum.org/docs/WEF_Global_Risks_Report_2023.pdf

Wyssusek, K., Keys, M. T., & Zundert, A. v. (2018). Operating Room Greening Initiatives – The Old, the New, and the Way Forward: A Narrative Review. *Waste Management & Research the Journal for a Sustainable Circular Economy*, *37*(1), 3–19. https://doi.org/10.1177/0734242x18793937

Zhan, Z., Xu, W., Xu, L., Qi, X., Song, W., Wang, C., & Huang, Z. (2022). BIM-Based Green Hospital Building Performance Pre-Evaluation: A Case Study. *Sustainability (Switzerland)*, *14*(4), 1–21. https://doi.org/10.3390/su14042066