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FROM EDUCATIONAL TO GREEN: THE TRANSFORMATION OF HOSPITAL IN INDONESIA

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Abstract

The UN Sustainable Development Goals (SDGs) require businesses to adopt sustainable practices. The sheer size of the healthcare industry and its digitally dominated practices require its constituents to adopt green practices. This current research, using Laughlin (1991) organizational change model as the theoretical underpinnings, aims to empirically explore the best practices to help healthcare sector constituents accomplish the 'green status' while successfully overcoming the associated financial challenges. University of Indonesia Hospital was used as the study 'site' to explore the sector's peculiar challenges and the effective strategies that helped it accomplish the objective of green status.

Originality: The study introduces a unique perspective to investigating the challenges for the healthcare sector's adoption of green practices by examining the specific strategies employed in the process of their transformation to green hospitals, while successfully confronting the associated economic challenges, using University of Indonesia Hospital (UIH) as the case study sites.

Methods: Employing the qualitative method approach, the study acquired data from interviews with key personnel at UIH, and secondary data from its respective green initiatives and strategies.

Findings: The study provided valuable insights into the subject hospitals' struggle in their pursuit of accomplishing green status, the potential economic obstacles and the strategies that proved effective. Industry and site-specific best practices that the study found to work to accomplish the aim of 'green status' include energy-efficient technologies, sustainable waste management systems, and green architectural designs. Economic challenges are primarily related to initial investment costs and lack of external funding. The findings were per the confines predicted under (Laughlin, 1991) theoretical underpinnings. The study outcomes

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emphasize a 'holistic' approach by healthcare institutions in light of Laughlin's doctrine and calls for increased support from policymakers and stakeholders to facilitate such transitions, emphasizing the pivotal role of educational hospitals in promoting sustainability within the healthcare sector.

1. Introduction

The rapid increase in digitization in today's era has raised important questions in the sustainability realm for practitioners and policymakers to answer in all major industry sectors, and the healthcare sector is not immune to this. A country's healthcare sector immensely contributes to its economic growth (Rahat, Sahni, & Nasim, 2024). The urgent need for environmental sustainability in healthcare has necessitated the transformation of educational hospitals into green hospitals to enable them to mitigate their ecological footprint and align with the UN sustainable development goals. Amidst global climate change and increased environmental awareness, the healthcare sector is at the forefront of adopting sustainable practices. Being one of the most populous countries in the world, the severity of the issue is even more intense for Indonesia. The transformation of educational hospitals into green hospitals represents not only a strategic move to mitigate environmental impacts but also opens opportunities for enhanced operational efficiency and long-term cost reductions (Dion, Evans, & Farrell, 2023). Given the similarity of the sustainability challenges for all countries, outcomes of robust academic enquiries can also inform policy-making and practice in other relevant sectors, in developing as well as developed economies. This current research aims to investigate what strategies would work best in helping educational hospitals transform into green hospitals while successfully confronting economic challenges along the path. The study highlights the importance of integrating sustainability initiatives into the infrastructure and operations of educational hospitals.

In an era where sustainability has become a global focus, hospital as one of the largest energy consumers in the public sector are faced with the demand to adapt their structures and operations accordingly. This current study primarily focuses on Indonesia's educational hospitals - UIH, as the country's prominent healthcare service providers and medical education centers. This institutions' pathway to transformation into green hospitals posed a series of unique challenges, especially from an economic perspective, including significant upfront costs, unpredictable ROI (Return on Investment), and the need to maintain or enhance the quality of medical education while implementing green practices (Brown, Bhatti, & Harris, 2023).

Several studies have revealed distinct best practices and economic challenges in the path of educational hospitals' pursuit of green status. Hien (2021) highlighted the importance of the green hospital model in achieving Sustainable Development Goals in Vietnam, emphasizing the strategic role of hospitals in pursuing sustainable development. Ryan-Fogarty, O'Regan, and Moles (2016) described the systematic implementation of environmental programs in a university hospital, showcasing waste reduction and contained energy usage as keys to success. Gerali, Paikopoulou, and Servitzoglou (2015) explored sustainability developments in the healthcare sector, while Sadatsafavai, Walewski, and Taborn (2014) asserted that green

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hospitals can operate at lower costs while increasing patient revenue. Azar, Farzianpour, Foroushani, Badpa, and Azmal (2015) evaluated green hospital dimensions, identifying critical factors supporting sustainability. Finally, Sherman et al. (2020) offer "The Green Print" for environmental sustainability advancement in hospitals, highlighting the need for innovation and adaptation in hospital practices. Furthermore, Rahat et al. (2024) in their recent study, conclude that the effect of sustainability initiatives on organizational performance has not been conclusive. The literature provides valuable insights into the journey towards green hospitals, revealing the need to balance environmental initiatives with economic considerations. A holistic approach to green hospitals not only involves reducing the carbon footprint and efficient energy use but also integrates aspects of sustainable health education and training Sherman et al. (2020) that would ensure a lasting and sustained impact on sustainability initiatives and outcomes. Thus, the economic challenges encountered in the transformation process necessitate in-depth analysis and innovative solutions to overcome financial barriers while maximizing environmental and social benefits.

Objectively exploring best practices successfully implemented in various educational hospitals worldwide and adapting own practices accordingly is the ideal path for other institutions to seek guidance on their journey towards sustainability. As Laughlin (1991) asserts, if core objectives are adapted in response to external environmental pressure, a holistic approach on the part of organizations is necessitated where all organizational elements must adapt and be compatible to the altered core objectives, rather than simple cosmetic changes around the organization. This current study aims to facilitate this process for other institutions seeking to accomplish the green status. Additionally, by understanding the economic dynamics underlying this transformation, stakeholders can be better prepared to face challenges and seize opportunities that arise on the path to accomplishing green hospital status (Lister et al., 2022; Vaishnavi & Suresh, 2023). This current research not only contributes to the academic literature but also offers practical insights for practitioners applicable to the strategic decision-making of educational hospitals in connection to their journey to becoming green. Rahat et al. (2024) recommend future research in the area of theoretical advancement and new economic and social contexts. This study contributes novel insights in both these areas. This research, resorting to the case study approach, aims to answer the question as to what approach and strategy educational hospitals must adopt to transition towards and accomplish green status, while aiming to effectively confront financial challenges along the path? The authors expect study outcomes to benefit other industries' constituents with similar socio-economic external and internal factors as well.

The remainder of the paper is structured into the following sections: The review of the literature is next, followed by section 3 that provides a theoretical framework for helping readers better comprehend the study and its outcomes in light of an established theory. The methodology section that follows briefly describes the methodological approach resorted to for gleaning and analyzing the data. Section 5 presents the study results and discussions, followed by the concluding section, which provides insights from the study for practice, policy, and theory.

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2. Review of the Literature

Although sustainability-related issues have been extensively researched, sustainability practices and the related aspects of organizational performance are relatively recent (Rahat et al., 2024). An environmentally sustainable healthcare sector would ensure efficient and effective healthcare services without negatively impacting the environment, thereby contributing to providing essential social services without the generally obscure costs of environmental damage. The necessity of certain social services should not make them immune to shouldering environmental sustainability responsibilities, and there has been a gradual rise in this connection (Rahat et al., 2024). Several factors, particularly in the recent past, including the global health crisis, widely spreading chronic diseases and climate change, have contributed to enhanced demand on the healthcare sector to migrate towards more environmentally friendly practices and operations (Zanobini, Riccio, Lorini, & Bonaccorsi, 2024). The rapidly evolving healthcare sector is crucial for public health on the one hand and its constituents' practices are causing sustainability and environmental degradation concerns on the other hand (Molero, Calabro, Vignes, Gouget, & Gruson, 2021).

A vast body of literature relevant to the research issue at hand demonstrates a significant increase in the adoption of the green hospital concept across educational hospitals, with a special focus on integrating environmentally friendly technology and sustainability principles in hospital operations. Dion et al. (2023) highlight the significance of transforming hospital management to enhance energy efficiency and promote environmental sustainability. Brown et al. (2023) highlight the role of cost-effective innovation, which has practical implications for bolstering the sustainability of the healthcare sector. The issue needs to be treated as utmost urgent and an integrated approach involving all stakeholders is crucial (Ossebaard & Lachman, 2021). This is particularly significant with regard to the healthcare sector, as it has been accused of constantly neglecting to adopt green practices, primarily due to the financial challenges they face, especially following the recent COVID-19 pandemic (Rahat et al., 2024). Additionally, Sherman et al. (2020) present "The Green Print" as a concrete example of a model designed to advance environmental sustainability within healthcare facilities

Climate change is a serious threat to life on earth, and the healthcare sector, with its about 4.6% contribution to global greenhouse gas emissions through several of its routine functions, ought to play a role in countering its environmental footprints (Tee, Yeo, Choolani, Poh, & Ang, 2024). The healthcare sector's constituents play a crucial role in the defence against the devastating effects of climate change (Shirali et al., 2025). Tee et al. (2024) assert that stakeholders are now more aware of the healthcare sector's contribution to environmental degradation, and, therefore, it is high time that it takes serious steps to mitigate the negative environmental effects and ensure "a rapid and sustained" drive to switch all operations to cleaner energy sources. Zanobini et al. (2024) note that the healthcare sector's operations are related to several aspects of global sustainability concerns, including social sustainability (through health literacy among stakeholders), economic sustainability (through health literacy and suitability of care), and environmental sustainability (through environmental health literacy), and, therefore, there's an urgent need for a prompt action on their part to switch to

International Journal of Applied Mathematics
Volume 38 No. 10s, 2025
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more greener initiatives. The authors further assert that a holistic approach, including all stakeholders, is required to effectively tackle the issue. Shirali et al. (2025) assert that empirical research studies involving healthcare sector constituents and the impact of their practices on the environment and their resilience to the consequences of climate change and its disastrous effects are crucial in order to advance academic debate and enquiry on related research issues. This study aims to contribute to theory, practice and policy-making in this direction.

With extensive damage to the environment, little progress in cutting greenhouse gas emissions and widespread ramifications of organizations' non-environmentally friendly practices over the past decades, stringent commitments and substantial investment are required on the part of stakeholders to effectively combat further environmental degradation and the resulting consequences (Molero et al., 2021; Ossebaard & Lachman, 2021). Molero et al. (2021) assert that sustainability initiatives required of stakeholders are multifaceted, encompassing financing, data and infrastructure, innovation, policies, and governance, all of which must prioritize sustainability at their core. The authors argue that sustainability initiatives are no longer seen as mere status-enhancing certifications for organizations; rather, these initiatives are now actively demanded by society and should be integral to all operations, including even waste disposal practices. It is vital that they are implemented meticulously. Efficient, safe and cost-effective disposal of healthcare waste management in an environmentally friendly way has gained significant attention in recent times (Thakur, Mangla, & Tiwari, 2021). Healthcare sector constituents' evaluation of performance in this regard depicted those three criteria dominated their performance outcomes on the most efficient, less costly and environment-friendly ways to dispose of and manage healthcare waste – technology and qualification, their capabilities and economic factors, Thakur et al. (2021) assert.

Aiming to deduce a viable framework for developing sustainable and value-based healthcare systems, MacNeill, McGain, and Sherman (2021) provided some principles to adhere to, which are briefly elaborated on below:

- First, a reduction in the demand for healthcare services would add a huge step forward in the accomplishment of the mission of making all healthcare service environmentally sustainable. The strategy would require a bigger and better support from the government in terms of enhanced spending on public health initiatives, making access to primary healthcare services more affordable, and taking other initiatives aiming at preventing diseases in the first place.
- Second, match the right cure to the relevant disease and avoid unnecessary investigations and treatment; the strategy will help avoid access as well as inadequate capacity; and,
- Third, curtailing the emissions of all healthcare services and applications through making them highly efficient and environmentally friendly.

The conversation highlights a pressing need for committed and collective action among all stakeholders in the healthcare sector. This includes healthcare providers, administrators, policymakers, and support staff who must recognize the significant environmental impacts stemming from their reliance on fossil fuel-based operations. An urgent and dedicated effort is crucial on the part of the healthcare sector's constituents to mitigate and reverse the negative environmental effects of their fossil fuel-based operations to cleaner energy sources. The

International Journal of Applied Mathematics
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healthcare industry, which plays a vital role in safeguarding public health, can contribute to a healthier planet by transitioning to cleaner energy sources. This shift not only aligns with global sustainability goals but also promotes long-term benefits for both human health and the environment. Adopting renewable energy technologies, implementing energy efficiency measures, and investing in sustainable practices should become priorities. Moreover, fostering partnerships with environmental organizations, engaging in community awareness programs, and influencing policy changes can amplify these efforts.

Finally, Tee et al. (2024) assert that a proactive approach to mitigating and reversing the detrimental effects caused by traditional energy practices is not merely an ethical obligation but a critical necessity for ensuring a sustainable future for both the healthcare sector and the communities it serves. By embracing these changes, the healthcare industry can lead by example, demonstrating that prioritizing environmental health is integral to enhancing public well-being. Zanobini et al. (2024) posit that given the issue's wide scope with far-reaching implications for many stakeholders, not only it is significant for individual organizations to play their role but a more organized, integrated and collaborative effort between secondary schools, curriculum developers and teachers is also crucial to help the sector do their part and secure a green status faster.

3. Theoretical Framework

The process of new social practices' construction and subsequent promulgation and legitimization as valid and legitimate, or their amendment, happens through societal players' free mutual interaction (Kilfoyle & Richardson, 2011). While several theories have been used to shed light on sustainability across several industries, depicting the topic's multi-disciplinary relevance Rahat et al. (2024) for the current study, given its case study design focusing on organizational performance and adaptation with regards to sustainability requirements and initiatives, the authors employed the (Laughlin, 1991) organizational change model.

For any business sector, sector-specific social and/or professional practices evolve over time as the sector, as a whole or through its constituents, confront various triggers for change, be they external or internal to the sector and its constituents. Consequently, all business sectors and their constituents function in what (Laughlin, 1991) terms a 'balanced state'. Such 'balance' continues to dominate the sector, normally resisting any pressure for a change, until an unavoidable, external and/or internal pressure for a change jolts the sector where it has limited options available to resist the change and maintain its existing 'balanced' state (Laughlin, 1991). The governance and management of the sector and its individual constituents play a significant role in the management of such external change pressures. Laughlin maintains that the severity of such change largely depends on the severity of the external pressure for change. Laughlin (1991) divides an organization into four distinct elements – 'design archetypes' (overall organization structure, decision processes, communication systems), 'interpretative schemes' (mission, purpose, beliefs, norms, values, culture, rules, philosophy), and the 'sub-systems' (tangible organizational elements such as staff, departments/divisions, business premises). All elements stay connected and bound to one another, thereby keeping the organization a complete whole, and a major change in one causes other elements to adapt

International Journal of Applied Mathematics
Volume 38 No. 10s, 2025
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accordingly (Greenwood & Hinings, 1988; Laughlin, 1991). Laughlin (1991) maintains that organizations prefer to resist change, exhibiting 'inertia' when hit by external pressure for change, and the extent of organizational adaptation to external pressure for change depends on the severity of the external pressure/force requiring such change. If the 'core' values of the organization or the sector as a whole are affected by the change, then the organization's or the sector's all structural elements must undergo a change to reach an 'acceptable' new 'balanced' state. Figure 1 below exhibits this phenomenon in a diagrammatic form.

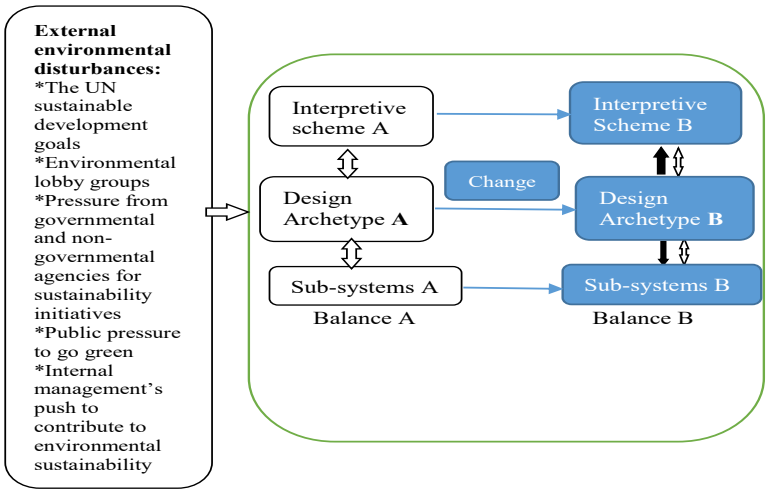

Figure 1: Laughlin's (1991) organizational change model

Source: (Laughlin, 1991)

The drive towards attaining a green status in the Indonesian healthcare sector represents such a situation, with the severity of the drive for change affecting the sector's 'core' objectives. Consequently, all the organizational elements of the subject institutions underwent a change to make them compatible with the new set of core objectives. In light of the study, they will continue to progress towards and accomplish a 'balanced' state, which will prevail until another set of internal and/or external pressure 'jolts' them, triggering another change initiative, depending on the strength and severity of such pressure. Figure 2 below demonstrates the holistic nature of the set of initiatives required of stakeholders to pursue sustainability.

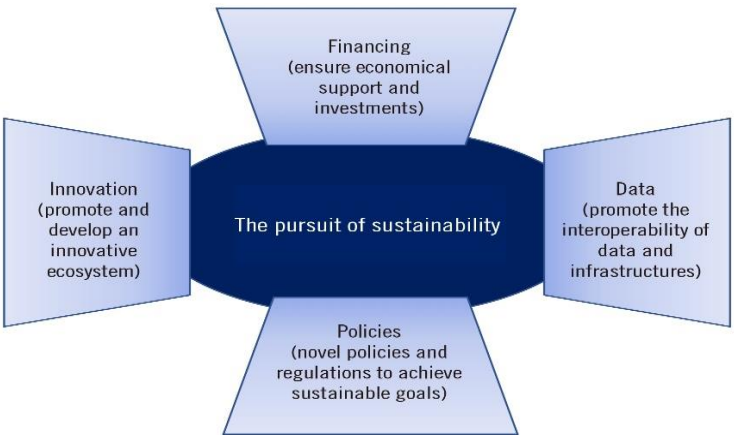

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Figure 2: The multi-faceted sustainability pursuit

Source: (Molero et al., 2021)

4. Methodology

This study utilized a qualitative approach (Creswell & Clark, 2017). By integrating in-depth interviews, document analysis, and case studies. Additionally, it explored the policies and strategies that have been implemented. The analysis employed thematic analysis techniques to provide comprehensive insights into the economic dynamics of sustainability transformation within educational hospitals. To ensure the reliability and validity of the findings, data validation will be achieved through triangulation, and all research processes will adhere to appropriate ethical standards.

5. Results and Discussion

This research was conducted on the site of a healthcare educational institutions, namely Universitas Indonesia Hospital (UIH). This institutions' journey towards the pursuit of green hospital status underscores the feasibility and benefits of such transformations, despite financial hurdles and challenges. The study delves into the transformation of educational hospitals into green hospitals and reveals the significance of adopting sustainable practices to address environmental issues while maintaining operational and financial efficiency. UIH demonstrated a commitment to sustainability by implementing various strategies such as efficient energy usage, sustainable waste management, and the adoption of the green hospital concept, all of which affirm the importance of a multidisciplinary approach in promoting sustainability in the healthcare sector (RSUI, 2024).

Transformation of hospitals into green facilities requires substantial initial investment and innovative financing strategies to address economic challenges. UIH's success in adopting a sustainable business model exemplifies the significant potential of cross-sector collaboration, where government, the private sector, and educational institutions work together, combining synergies, and thereby develop effective and efficient solutions (RSUI, 2024). Additionally, through the implementation of entrepreneurial education programs, UIH emphasizes the importance of human resource development in fostering innovation and sustainability within healthcare services.

Based on the study findings, the authors conclude that the transformation towards green hospitals is a complex process that requires cooperation, innovation, and strong commitment from all stakeholders. Economic challenges, though significant, can be overcome through creative financing strategies and a holistic approach to sustainability. Thus, educational hospitals like UIH play a crucial role in leading the healthcare sector towards a more sustainable future. In the same realm, this study, with its novel findings, adds a high value to the current academic discussion in the area. Table 1 below delineates sustainability practices UIH, showcasing institution's commitment to environmental stewardship through tailored initiatives and collaborations.

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Table 1. The Practices and Initiatives UIH In Indonesia Reflecting The Unique Approaches Towards Becoming Greener Institutions

Aspect	Practices and Initiatives
Green Hospital Concept	RSUI implements the green hospital concept, including using low-emission, environmentally friendly, and non-toxic materials.
Waste Management	Practices include sorting and minimizing waste, including the application of a waste bank in its 3R program - Reduce, Reuse, Recycle.
Energy Efficiency	Implementation of policies for the use of electrical devices at specific times, temperature and humidity monitoring, and building designs that maximize natural light and ventilation.
Water Management	Use of water-saving devices like automatic sensor faucets, recycled water for toilets, and rainwater harvesting.
Environmentally Friendly Materials	Procurement of environmentally friendly materials for hospital operations.
Environmentally Friendly Transportation	Facilitation of sustainable transportation such as electric bicycles, campus buses, commuter trains, yellow bikes, and pedestrian facilities.
Information Technology	Use of IT and Hospital Information Management Systems (SIMRS) for energy efficiency, consumables, and human resources management.
Environmental Awareness	Campaign roadshows in work units, information via electronic and print media, and evaluation of green hospital activities.
Hospital Waste Management	Adherence to sustainability principles in waste management.
External Collaboration	Collaboration with Universitas Indonesia, the Department of Environment, and the Health Department to support sustainable initiatives.

Source: interviews and secondary data sources

UIH has demonstrated a strong commitment to environmental sustainability through various initiatives and practices. This includes a comprehensive approach from waste management and energy efficiency to community engagement and awareness. Each step is taken and the policy adopted with a clear aim to reducing environmental footprint, while ensuring high-quality healthcare services.

Results from a qualitative analysis involving in-depth interviews with stakeholders in educational hospitals have depicted a strong awareness of the significance of transitioning to

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green hospitals. Respondents highlighted several best practices, including the adoption of energy-saving technologies, medical waste recycling programs, and efficient water management systems. However, they also signaled to economic challenges, such as the high initial costs associated with sustainable technologies and the absence of financial incentives from the government.

In the quantitative analysis, a survey of hospital staff revealed that more than 75% are convinced that transitioning to green hospitals would have a beneficial impact on both environmental sustainability and patient health. However, only 50% expressed confidence that the hospital possesses adequate financial resources to facilitate this transformation. The cost-benefit analysis of the green hospital projects implemented thus far indicates a positive return on investment over the long term, despite facing financial challenges in the short term.

Table 2. List of Best Practices Towards Green Hospital

Best Practices	Description	Reference	UIH
Energy Efficiency	Implementation of energy-saving technologies such as LED lighting, efficient HVAC systems, and renewable energy (solar panels).	Ryan-Fogarty, Y., O'regan, B., & Moles, R. (2016). Journal of Cleaner Production, 135, 578-586.	Implemented solar panels since 2017 and an energy management system since 2018 to reduce energy consumption.
Sustainable Waste Management	Effective waste management through sorting, recycling, and reducing waste production at the source.	Pham Thi Thu Hien. (2021). Journal of Science and Technology, 59(5), 52-60.	Started a medical waste recycling program in 2016 and a sustainable waste management system in 2017.
Environmentally Friendly Design	Using green building principles in construction or renovation, including sustainable materials and natural ventilation.	Sadatsafavai, H., Walewski, J., & Taborn, M. (2014). Journal of Green Building, 9(3), 163-177.	Designed environmentally friendly buildings with recycled materials since 2015.
Education and Training	Raising staff awareness and competence about sustainability through education and training.	Sherman, J., et al. (2020). Resources, Conservation and Recycling, 161.	Conducted training and workshops on sustainable practices for staff since 2014.

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Volume 38 No. 10s, 2025
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Sustainability Culture Campaign	Implementation of internal campaigns to raise awareness and encourage sustainable practices among staff and patients.	Hubbert, B., et al. (2020). The Lancet Planetary Health, 4(10), 445-446.	Organized campaigns on environmental sustainability and patient outreach since 2016.
Water Resource Management	Implementation of water use reduction strategies, such as installing sensor faucets and water recycling systems.	Faezipour, M., & Ferreira, S. (2014). Procedia Computer Science, 36, 27-32. And Naranjo-Gil, D. (2017). Water, 9(2), 1-13. And Fulton, L. V. (2018). Sustainability, 10(5), 1-17. And Maass et al. (1962). Harvard University Press.	Started using water-saving technology and efficient water use in 2019.
Use of Environmentally Friendly Materials	Procurement of environmentally friendly and non-toxic products and materials for daily hospital operations.	Laing, D. (2011). College Publishing, 6(4), 45-64. And Kaiser, B., Eagan, P. D., & Shaner, H. (2001). Environmental Health Perspectives, 109(3), 205-207	Used environmentally friendly building materials and medical equipment since 2016.
Environmentally Friendly Transportation	Encouraging the use of sustainable transportation for staff and visitors, including bicycle facilities and electric vehicles.	Rodriguez, R., Otero-Neira, C., & Svensson, G. (2020). Journal of Social Marketing, 10(2), 215-242.	Provided bus or shuttle services for staff and patients since 2018.
Self-Assessment and	Implementation of self-assessment tools	Kallio, H., et al. (2018). Journal of	Monitored energy and waste usage and

Volume 38 No. 10s, 2025
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Monitoring	to evaluate and monitor the progress of green hospital initiatives and identify areas for improvement.	Hospital Administration, 7(5), 56-69.	evaluated the sustainability of operational practices since 2015.

Source: UIH websites

Another important aspect is that UIH promotes the Green Hospital concept through a dedicated team responsible for developing and implementing environmentally friendly programs. This initiative includes using eco-friendly materials, effective waste management, and efficient use of water and energy. UIH's policy highlights the importance of using environmentally friendly materials and adopting sustainable practices in resource management (TREM UI).

The following conclusions present a refined summary of the implementation of sustainable practices at UIH :

Quadrant 1: High Importance, Low Performance

In line with the MacNeill et al. (2021) framework for sustainable healthcare sector, UIH demonstrated a robust awareness and commitment to environmental sustainability; however, UIH encounter challenges in optimizing the effectiveness of specific green practices, particularly concerning waste management and energy efficiency.

Quadrant 2: High Importance, High Performance

UIH excel in energy efficiency, environmental education, and sustainable partnerships, showcasing effective implementation of green practices.

Quadrant 3: Low Importance, Low Performance

UIH do not fall into this quadrant, as it has actively pursued sustainability initiatives.

Quadrant 4: Low Importance, High Performance

UIH has effectively integrated a variety of sustainability practices, often without explicitly designating these initiatives as primary components of their overall sustainability strategies. Notably, the adoption of advanced technologies aimed at enhancing energy efficiency exemplifies this approach.

UIH predominantly fall between Quadrants 1 and 2, indicating they are on the right path toward environmental sustainability with significant efforts in green practices. However, there are opportunities to improve and optimize certain practices further. Continuous improvement and a focused approach to underperforming areas will enhance their sustainability initiatives and

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leadership in the healthcare and education sectors. To build on current progress, UIH should consider implementing more comprehensive training programs for their staff and stakeholders about environmental responsibility. By fostering a culture of sustainability within organizations, it can ensure that green practices are not just adopted but are ingrained into the operational ethos.

Additionally, exploring innovative technologies and methodologies could provide pathways to further reduce their carbon footprint. For instance, integrating renewable energy sources and sustainable materials into their infrastructure and operations can create a more resilient and eco-friendlier environment. Similarly, partnerships with other institutions that emphasize sustainability can facilitate knowledge sharing and resource optimization. Engaging the wider community through workshops, seminars, and outreach programs could also play a crucial role in disseminating knowledge about sustainability practices. By involving students, faculty, and community members, UIH can foster collaboration and inspire a collective effort toward achieving their sustainability goals. Moreover, establishing measurable sustainability goals and regularly reporting on progress can help maintain accountability and transparency. This can not only demonstrate their commitment to sustainability but also inspire other institutions in the healthcare and education sectors to follow suit.

In summary, while UIH is making commendable strides in environmental sustainability, there exists a tremendous potential for growth. Through targeted initiatives, community engagement, and innovation, they can solidify their roles as leaders in promoting sustainable practices in their respective fields.

The following initiatives, if implemented prudently, would enhance the implementation of environmentally friendly practices in UIH:

1. Improve implementation and monitoring by regularly assess the performance of green hospital practices with a clear aim to identify areas requiring improvement.
2. Strengthen educational and training programs for staff and management on the importance and methods of effectively implementing environmentally friendly practices.
3. Expand the use of information technology and other innovations to improve energy efficiency and resource management.
4. Build more partnerships with government agencies, educational institutions, and the private sector to support green hospital initiatives.
5. Further invest in environmentally friendly infrastructure and sustainable building materials to enhance its overall environmental performance.

By implementing these steps, UIH can strengthen its position in applying environmentally friendly practices and contribute more significantly to environmental sustainability.

Conclusions

The study findings indicate a strong desire among educational hospital to transition towards more sustainable operations, highlighting an increasing commitment to environmental responsibility in the healthcare sector. Many best practices have already been identified and

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implemented within these institutions, showcasing innovative approaches to sustainability. However, economic barriers continue to pose a significant challenge to this transition, emphasizing the need for more creative and innovative financing strategies.

Public-private partnerships represent a promising avenue for overcoming financial hurdles. By collaborating with private entities, educational hospitals can leverage additional resources, expertise, and investment opportunities to fuel their sustainability initiatives. Moreover, grants specifically allocated for sustainable projects can provide the necessary financial injection to kickstart green programs without putting undue pressure on existing budgets. Fiscal incentives for green investments from both government and private sectors can also serve as powerful motivators, encouraging educational hospitals to adopt more sustainable practices by alleviating upfront costs associated with these initiatives.

In addition to financial considerations, the importance of education and training cannot be overemphasized. While there is a general willingness among staff to embrace change towards sustainability, results from various assessments show a notable gap in knowledge and skills related to the best methods for implementing and utilizing green technology effectively. This underlines an urgent need for educational hospitals to invest significantly in comprehensive training programs designed to enhance staff competencies in sustainability practices. Furthermore, integrating sustainability into the medical education curriculum would not only prepare future healthcare professionals to prioritize environmental stewardship but also foster a culture of sustainability from the ground up.

In terms of practical steps towards transforming educational hospital into green facilities, UIH stand out as exemplary models. This institution has proactively engaged in various sustainability initiatives that exemplify a robust commitment to energy efficiency practices, sustainable waste management, the adoption of environmentally friendly materials, and effective water management strategies. The collaboration with external partners, along with fostering increased environmental awareness among campus communities and patients, forms vital pillars of the Green Hospital concept. By adopting this holistic approach, UIH not only aim to minimize their environmental impact but also to enhance the overall well-being and health of patients and the surrounding community. This dual focus illustrates both the tremendous potential and inherent challenges of achieving comprehensive sustainability goals in the healthcare sector.

Moreover, the findings underscore the necessity of effective communication regarding the myriad long-term benefits associated with transitioning to green hospitals. Beyond the evident environmental benefits, there are significant economic and health advantages that can emerge from such transformations. By raising awareness about these benefits, educational hospitals can help to mitigate financial barriers, ultimately attracting support from various stakeholders, including government bodies, industry leaders, and societal members. This support is crucial in creating an encouraging environment for hospitals to invest in and commit to sustainability initiatives.

Transforming educational hospital into green facilities demands a steadfast, long-term commitment to environmental sustainability and operational efficiency. Despite the economic

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challenges present, the successful implementation of best practices can yield effective solutions to overcome these barriers, while simultaneously capitalizing on opportunities for improvement. Further research is vital in developing economic models that can assist educational hospitals in the effective and efficient implementation of green initiatives.

In addition to establishing short-term financial strategies, the research emphasizes the necessity of crafting robust economic models that consider the long-term savings associated with sustainability initiatives. These might include energy efficiency upgrades, waste reduction programs, and water conservation measures. By providing clear data and projections concerning return on investment, educational hospitals can present compelling cases for adopting greener practices to stakeholders who may initially be skeptical about the upfront costs involved.

The novelty of this research lies in the in-depth analysis of the economic challenges faced explicitly by educational hospitals on their journey to becoming more sustainable. One innovative aspect this current research boasts is the application of predictive and analytical models to assess the ROI of green hospital initiatives, as described by Vaishnavi and Suresh (2023) thereby introducing new methods in the financial evaluation of sustainability. This study also extends the scope of analysis to integrating sustainability education into the medical curriculum, hence supporting the idea that modern medical education must incorporate sustainability components to better prepare future healthcare practitioners. This reflects a paradigm shift in medical education and hospital practice, highlighting the need to update the curriculum and teaching methods to include sustainability aspects (Sherman et al., 2020).

Furthermore, this research offers new insights into financing strategies and economic models for sustainability projects in educational hospitals, addressing one of the biggest challenges in transitioning to greener operations. By exploring alternative financing mechanisms and government incentives, this study aims to provide practical solutions to overcome financial barriers that often hinder sustainability initiatives. Moreover, the study delves into the potential of public-private partnerships as a promising avenue for funding, especially in times of limited public sector resources to allocate to green initiatives. By fostering collaboration between educational institutions, healthcare providers, and private investors, these partnerships can stimulate innovative financing solutions that benefit both the healthcare sector and the environment. Highlighting the importance of a multidisciplinary approach involving technical, economic, and educational expertise, this study not only enriches the academic literature but also provides practical guidelines for educational hospitals planning to undergo a similar transformation. This affirms the importance of cooperation among stakeholders in achieving sustainability in the healthcare sector.

A holistic and robust approach is essential to directly and indirectly gear all healthcare operations towards sustainability (MacNeill et al., 2021). This study serves as a comprehensive guide for stakeholders within the educational hospital sector, offering not only theoretical frameworks but also actionable pathways towards achieving meaningful sustainability. In doing so, it aims to instigate broader dialogue about the crucial role that effective financial strategies play in promoting environmental stewardship within the healthcare industry, as well

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as the positive impact these practices can have on community health outcomes. By nurturing a commitment to sustainability that permeates all levels of operation and education, educational hospitals can lead the way in setting ambitious yet attainable goals for a healthier, more sustainable future.

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