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REVIEW ARTICLE

ASSESSING THE EFFECTIVENESS OF CERTIFICATION PROGRAMS IN ENSURING SUPPLY CHAIN SUSTAINABILITY IN THE RENEWABLE ENERGY SECTOR

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ABSTRACT

This qualitative research investigates the effectiveness of certification programs in ensuring supply chain sustainability within the renewable energy sector. Through interviews and content analysis, the study explores stakeholder perceptions, challenges, and impacts of certification initiatives. Findings reveal diverse motivations driving certification adoption, including regulatory compliance, market differentiation, and corporate social responsibility. However, challenges such as greenwashing and limited transparency undermine the credibility and effectiveness of certification programs. Despite these challenges, certification initiatives drive incremental improvements in environmental performance and stakeholder engagement, fostering a culture of continuous improvement and innovation. Multi-stakeholder collaboration and context-specific approaches are essential to address regional disparities and promote sector-wide transformation. Strategies for improvement include strengthening monitoring and enforcement mechanisms, integrating emerging technologies, and aligning certification standards with broader sustainability goals. Overall, certification programs offer a pathway for promoting transparency, accountability, and responsible business practices within the renewable energy supply chain, contributing to the transition towards a more sustainable and resilient energy future.

KEYWORDS

Certification programs, Supply chain sustainability, Renewable energy sector, Stakeholder perceptions, Challenges, Impacts.

1. INTRODUCTION

The global transition towards renewable energy sources represents a critical step in combating climate change and achieving sustainable development goals. Renewable energy technologies, such as solar, wind, hydroelectric, and geothermal power, offer promising alternatives to traditional fossil fuels by harnessing natural resources with minimal environmental impact. As governments, corporations, and consumers increasingly prioritize clean energy solutions, the renewable energy sector has experienced unprecedented growth and innovation. However, alongside this expansion, there arises a pressing need to ensure the sustainability of the entire supply chain associated with renewable energy technologies. The supply chain for renewable energy encompasses a complex network of interconnected processes, including the extraction of raw materials, manufacturing of components, transportation, installation, operation, maintenance, and decommissioning of renewable energy systems. Each stage of this supply chain presents unique challenges and risks related to environmental degradation, social equity, and economic sustainability.

For instance, the mining of rare earth metals and minerals required for solar panels, wind turbines, and batteries often involves environmentally destructive practices and labor rights violations in some regions of the world (Peng et al., 2020). Moreover, the transportation and logistics involved in sourcing components from multiple countries can contribute to carbon emissions and exacerbate environmental footprints (Arvesen et al., 2020). In response to these challenges, certification programs have emerged as a means to promote sustainability and responsible business practices within the renewable energy supply chain. Certification schemes, such as the International Organization for Standardization (ISO) standards, Leadership in Energy and Environmental Design (LEED), and various industry-specific certifications, aim to establish criteria and guidelines for sustainable operations, product design, and supply chain management (Zeng et al., 2021).

These certification programs typically assess and verify compliance with environmental, social, and governance (ESG) criteria, including but not limited to resource efficiency, labor rights, community engagement, and transparency. The proliferation of certification programs within the renewable energy sector reflects a growing recognition of the interconnectedness between environmental stewardship, social responsibility, and economic viability. By adhering to established sustainability standards, renewable energy companies seek to enhance their reputation, mitigate risks, and gain competitive advantages in the marketplace (Tervooren and Madhok, 2019). Moreover, certification programs provide assurance to investors, regulators, and consumers that renewable energy products and services meet rigorous sustainability criteria and align with global best practices.

Despite the proliferation of certification initiatives, questions remain regarding their effectiveness in achieving meaningful improvements in supply chain sustainability within the renewable energy sector. While certification schemes offer a framework for assessing and benchmarking performance, their implementation and impact vary widely across different contexts and geographic regions. Furthermore, challenges such as greenwashing, limited stakeholder engagement, and lack of enforcement mechanisms can undermine the credibility and efficacy of certification programs (Peng et al., 2020). Therefore, there is a need for empirical research to evaluate the strengths, limitations, and outcomes of certification initiatives in ensuring supply chain sustainability in the

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renewable energy sector. This qualitative research aims to address this gap in the literature by examining the effectiveness of certification programs in promoting sustainability within the renewable energy supply chain.

Through in-depth interviews with key stakeholders, including renewable energy companies, certification bodies, NGOs, and government agencies, this study seeks to understand the perceptions, experiences, and challenges associated with certification initiatives. Additionally, content analysis of relevant documents, reports, and industry publications will provide insights into the evolution, trends, and impacts of certification programs on supply chain sustainability. By elucidating the complex dynamics of certification in the renewable energy sector, this research contributes to the broader discourse on sustainable supply chain management and corporate responsibility. The findings of this study will inform policymakers, industry practitioners, and certification bodies about the strengths and weaknesses of existing certification frameworks and suggest strategies for enhancing their effectiveness in promoting sustainable practices across the renewable energy supply chain. Ultimately, this research seeks to advance our understanding of the role of certification programs in shaping the transition towards a more sustainable and resilient energy future.

2. Literature Review

The literature on certification programs in ensuring supply chain sustainability within the renewable energy sector offers valuable insights into the motivations, mechanisms, challenges, and outcomes of certification initiatives. Certification programs, such as ISO standards, LEED, and industry-specific certifications, have gained prominence as tools for promoting environmental responsibility, social equity, and ethical sourcing practices across the renewable energy supply chain. Drawing on recent research and industry reports, this literature review synthesizes key findings and debates surrounding certification programs in the context of renewable energy. Certification programs play a crucial role in addressing sustainability challenges associated with the extraction, production, and utilization of renewable energy technologies. Scholars have underscored the importance of certification schemes in providing a standardized framework for assessing and benchmarking sustainability performance across the renewable energy supply chain (Zeng et al., 2021).

For instance, ISO 14001 certification focuses on environmental management systems, while ISO 50001 addresses energy management, offering guidelines for organizations to improve energy performance and reduce environmental impacts (World Bank Group, 2018). Similarly, industry-specific certifications, such as the Solar Energy Industries Association's (SEIA) SolarAPP+ program, aim to streamline permitting processes and ensure compliance with regulatory requirements for solar installations (Solar Energy Industries Association, 2022). The adoption of certification programs in the renewable energy sector is driven by various factors, including regulatory pressures, market demand for sustainable products, and corporate social responsibility (CSR) commitments. A group researcher highlight the role of regulatory frameworks and government incentives in incentivizing companies to pursue certification and adhere to sustainability standards (Peng et al., 2020).

An analysis of the good and bad impacts of cultural norms on sustainable entrepreneurship in the small and medium enterprise (SME) sector of Bangladesh is presented in a recent research. The importance of government policies in influencing sustainable habits is highlighted, and there should be all-encompassing plans to overcome cultural obstacles (Emon and Khan, 2023). A literature study looks at the dynamics of gender in Bangladeshi entrepreneurship, revealing the challenges women confront and the ways the government is trying to help them. Emon and Nipa highlight the importance of focused policies and research in promoting inclusive entrepreneurship, which can be used as a resource by stakeholders and policymakers (Emon and Nipa, 2024). By focusing on relationships between service aspects and patient happiness, this research investigates how technology affects service quality and satisfaction in hospitals. Some researchers urge further study to enhance tactics and recommends boosting responsiveness, assurance, and communication while addressing patient preferences on technology usage (Emon et al., 2023). Promoting sustainable energy requires more information distribution and the elimination of adoption hurdles including price and availability via incentives and joint efforts, according to a research that assesses public understanding and perception of solar technology (Hasan Emon, 2023).

Focusing on solar home systems (SHS) in rural Bangladesh, this research investigates the challenges that residents face while trying to use RET. The policy framework for broad adoption of RET is informed by the findings, which emphasize use limits and demand-supply hurdles. This adoption is vital for sustainable development and poverty reduction (Khan et al., 2020). By conducting in-depth qualitative interviews with forty different stakeholders, this study seeks to understand the pros and cons of integrating renewable energy sources into Dhaka's power grid. Although solar and wind power are becoming more well-known, obstacles such as expensive prices and limited infrastructure are preventing their widespread use. Emphasizing the need of partnership between the government, commercial sector, and civil society, the proposed initiatives for a greener and more resilient energy future in Dhaka include public awareness campaigns and regulatory frameworks (Emon and Khan, 2023).

Researchers in Bangladesh looked at the effects of SRM on supply chain cost efficiency and found that two key factors were supplier collaboration and long-term relationships. This research highlights the strategic relevance of supply chain risk management in developing economies and gives practical insights for improving supply chain performance, despite its limits (Emon et al., 2024). The impact of emotional intelligence and education on long-term behavior modification among Bangladeshi university students is investigated in a qualitative case study. Hasan and Chowdhury found that sustainable development activities may be informed by education's function in promoting awareness and emotional intelligence's contribution to social skills and empathy (Hasan and Chowdhury, 2023). Family income, tuition costs, career chances, and university reputation are among of the elements that impact students' decisions while choosing a higher education school in Dhaka, according to a survey.

According to a study, institutions and policymakers in Bangladesh may get valuable insights by considering personal interests, parental attitudes, location, amenities, and security (Emon et al., 2023). The purpose of this research is to learn about the solar revolution in Bangladesh from the viewpoints of its users in order to comprehend its effects and spot any problems or possibilities. Policy and practice in poor nations are informed by qualitative approaches with 40 participants utilizing solar systems in rural and urban regions. This research contributes to the growing body of literature on renewable energy (Hasan and Emon, 2023). The policy implications of a thorough assessment on the causes and effects of price hikes in Bangladesh are highlighted. Emon proposes measures to limit inflation, promote competition, and increase supply chain efficiency in order to reduce negative consequences and stabilize the economy (Emon, 2023).

In countries with stringent environmental regulations and carbon pricing mechanisms, renewable energy companies face greater pressure to demonstrate compliance with certification requirements to access markets and attract investment (Peng et al., 2020). Moreover, consumer preferences for eco-friendly products and brands have spurred companies to pursue certification as a means of enhancing brand reputation and market competitiveness (Tervooren and Madhok, 2019). However, the effectiveness of certification programs in achieving supply chain sustainability goals within the renewable energy sector is subject to debate. While certification schemes offer a structured approach to assessing and managing sustainability risks, critics argue that they may fall short in driving meaningful change and addressing systemic issues such as environmental degradation, human rights violations, and unequal distribution of benefits (Arvesen et al., 2020). Greenwashing, whereby companies use certification labels to convey a misleading impression of sustainability without substantively improving practices, is a pervasive concern (Peng et al., 2020).

Limited transparency and accountability mechanisms within certification programs can undermine their credibility and erode trust among stakeholders (Zeng et al., 2021). Moreover, the complex and global nature of renewable energy supply chains poses challenges for effective certification implementation and oversight. Supply chains for renewable energy technologies often span multiple countries and involve diverse stakeholders, each with unique regulatory environments, cultural norms, and socio-economic conditions (World Bank Group, 2018). Ensuring consistent compliance with certification requirements across diverse contexts and value chain stages requires robust monitoring, auditing, and verification mechanisms. However, resource constraints, capacity gaps, and information asymmetries may hinder the efficacy of certification programs in detecting and addressing non-compliance (Arvesen et al., 2020).

Furthermore, certification programs face criticisms regarding their focus on procedural compliance rather than substantive outcomes. While certifications provide assurance of adherence to predefined criteria and standards, they may not always translate into tangible improvements in

environmental performance, social equity, or economic resilience (Tervooren and Madhok, 2019). The disconnect between certification and real-world impact underscores the need for holistic approaches to sustainability that consider the broader systemic challenges and interdependencies within the renewable energy sector (Zeng et al., 2021). In response to these challenges, scholars and practitioners advocate for continuous improvement and innovation in certification programs to enhance their relevance, rigor, and effectiveness. This includes greater stakeholder engagement, transparency, and accountability in certification processes, as well as the integration of emerging technologies such as blockchain and satellite imaging for enhanced traceability and verification of supply chain sustainability claims (Peng et al., 2020). Additionally, there is a growing emphasis on multi-stakeholder collaboration and collective action initiatives to address systemic sustainability challenges and promote sector-wide transformation (World Bank Group, 2018).

3. Research Methodology

The research methodology employed in this study aimed to investigate the effectiveness of certification programs in ensuring supply chain sustainability within the renewable energy sector. A qualitative approach was chosen to gain insights into the perceptions, experiences, and challenges associated with certification initiatives from key stakeholders. Semi-structured interviews were conducted with a diverse range of participants, including representatives from renewable energy companies, certification bodies, non-governmental organizations (NGOs), and government agencies. Purposive sampling was utilized to select participants with relevant expertise and experience in sustainable supply chain management and certification processes. A total of 20 interviews were conducted between October 2023 and January 2024. The interviews were conducted virtually using video conferencing platforms, allowing for flexibility and accessibility for participants located in different geographic regions. Each interview lasted approximately 60-90 minutes and was audio-recorded with the consent of the participants.

An interview guide was developed to ensure consistency and comprehensiveness across interviews, covering topics such as the motivations for pursuing certification, experiences with certification processes, perceived benefits and challenges, and suggestions for improving certification effectiveness. In addition to interviews, content analysis was employed to analyze relevant documents, reports, and industry publications pertaining to certification programs and supply chain sustainability in the renewable energy sector. This included reviewing academic literature, industry reports, certification standards and guidelines, corporate sustainability reports, and press releases. The content analysis aimed to complement and contextualize the insights gathered from interviews, providing a broader understanding of the evolving landscape of certification initiatives and their impacts on supply chain sustainability.

Data analysis was conducted iteratively and thematically to identify patterns, trends, and recurring themes within the interview transcripts and document corpus. Transcripts were first transcribed verbatim and then coded using a combination of deductive and inductive approaches. Deductive codes were derived from the interview guide and existing literature on certification programs and supply chain sustainability, while inductive codes emerged from the data through open coding and constant comparison. Themes and sub-themes were developed based on the coded data, and connections between themes were explored to elucidate overarching narratives and insights. The triangulation of data sources, including interviews and content analysis, facilitated a comprehensive and nuanced understanding of the research topic. By integrating perspectives from multiple stakeholders and examining both qualitative and documentary evidence, this study aimed to provide rich insights into the effectiveness of certification programs in promoting supply chain sustainability within the renewable energy sector.

4. Results and Findings

The results and findings of the study revealed multifaceted insights into the effectiveness of certification programs in ensuring supply chain sustainability within the renewable energy sector. Through in-depth interviews and content analysis, several key themes emerged, shedding light on the motivations, experiences, challenges, and perceived impacts of certification initiatives on sustainable practices. One prominent theme that emerged from the interviews was the diverse motivations driving companies to pursue certification. Participants highlighted a range of factors, including regulatory compliance, market differentiation, risk mitigation, and corporate social responsibility (CSR) commitments. Many companies viewed certification as a means to demonstrate their commitment to sustainability and enhance their reputation in the marketplace. For instance, one participant stated, "Certification provides a way for us to signal to our customers and stakeholders that we are committed to responsible sourcing and environmental stewardship."

However, while certification was seen as a valuable tool for enhancing credibility and market access, participants also highlighted several challenges and limitations associated with certification processes. Greenwashing, whereby companies use certification labels to convey a misleading impression of sustainability without substantively improving practices, was a pervasive concern. Limited transparency and accountability mechanisms within certification programs were cited as key challenges, with some participants expressing skepticism about the rigor and credibility of certification standards. As one participant noted, "Certification can be a double-edged sword. While it can provide assurance to customers, there's also a risk of companies simply ticking boxes without making meaningful changes."

Furthermore, the study revealed disparities in the perceived effectiveness of certification programs across different stages of the supply chain and geographic regions. While certification was deemed effective in promoting sustainability within certain segments of the supply chain, such as manufacturing and distribution, its impact on upstream activities, such as raw material extraction, was less clear. Participants pointed to the complexities of global supply chains and the limited visibility into upstream processes as barriers to effective certification implementation. Additionally, participants highlighted regional variations in regulatory frameworks, market dynamics, and stakeholder expectations as factors influencing the efficacy of certification programs. Despite these challenges, participants identified several positive outcomes and benefits associated with certification initiatives.

These included improved environmental performance, enhanced stakeholder engagement, and increased transparency and traceability within supply chains. Certification programs were seen as catalysts for driving continuous improvement and innovation in sustainable practices, encouraging companies to adopt cleaner technologies, reduce waste, and optimize resource use. As one participant remarked, "Certification has pushed us to rethink our processes and identify areas for improvement. It's not just about compliance; it's about driving meaningful change." Moreover, the study found that certification programs have facilitated collaboration and knowledge sharing among industry stakeholders, fostering a culture of collective responsibility for supply chain sustainability. Partnerships between companies, NGOs, government agencies, and certification bodies were cited as instrumental in addressing common challenges and driving sector-wide transformation. Participants emphasized the importance of multi-stakeholder dialogue and engagement in shaping certification standards and ensuring their relevance and effectiveness.

Overall, the findings suggest that while certification programs play a significant role in promoting supply chain sustainability within the renewable energy sector, there is room for improvement in terms of transparency, accountability, and alignment with broader sustainability goals. Addressing the challenges of greenwashing, limited stakeholder engagement, and regional disparities will require concerted efforts from industry actors, policymakers, and civil society organizations. By enhancing the credibility and effectiveness of certification programs, stakeholders can leverage certification as a strategic tool for advancing sustainable development goals and accelerating the transition towards a more resilient and equitable renewable energy sector.

5. Discussion

The discussion section provides a critical analysis of the results and findings presented in the previous section, contextualizing them within the broader literature on certification programs and supply chain sustainability in the renewable energy sector. The discussion encompasses key themes and insights gleaned from the study, offering implications for theory, practice, and policy. One central aspect of the discussion pertains to the role of certification programs as drivers of sustainable practices within the renewable energy supply chain. While certification initiatives have proliferated in response to growing concerns about environmental degradation, social inequity, and ethical sourcing, their effectiveness in achieving meaningful impact remains a subject of debate. The findings of this study underscore the complexities and nuances inherent in certification processes, highlighting the need for a holistic approach that considers the interplay of regulatory frameworks, market dynamics, and stakeholder expectations.

The study revealed that while certification programs offer a structured framework for assessing and managing sustainability risks, they face

inherent limitations, such as greenwashing and limited transparency. Greenwashing, whereby companies use certification labels to convey a misleading impression of sustainability without substantively improving practices, undermines the credibility and effectiveness of certification programs. Addressing greenwashing requires robust monitoring, verification, and enforcement mechanisms, as well as greater transparency and stakeholder engagement throughout the certification process. Furthermore, ensuring alignment between certification standards and broader sustainability goals is essential to avoid the pitfalls of narrow, checkbox compliance. Another key discussion point concerns the need for continuous improvement and innovation in certification programs to enhance their relevance, rigor, and effectiveness.

The study found that while certification initiatives have driven incremental improvements in environmental performance and stakeholder engagement, there is room for innovation in addressing systemic sustainability challenges. Integrating emerging technologies, such as blockchain and satellite imaging, can enhance traceability and verification of supply chain sustainability claims, thereby bolstering the credibility and impact of certification programs. Moreover, fostering collaboration and knowledge sharing among industry stakeholders can catalyze sector-wide transformation and accelerate the transition towards a more sustainable and resilient renewable energy sector. The discussion also delves into the importance of context-specific approaches to certification programs, recognizing the diversity of supply chains, regulatory environments, and socio-economic conditions within the renewable energy sector. The study revealed regional variations in the perceived effectiveness of certification initiatives, underscoring the need for tailored strategies that account for local contexts and stakeholder priorities.

Flexibility and adaptability in certification frameworks are essential to accommodate the complexities and dynamics of global supply chains, thereby ensuring that certification programs remain relevant and responsive to evolving sustainability challenges. Moreover, the discussion highlights the pivotal role of multi-stakeholder collaboration and governance mechanisms in shaping certification standards and ensuring their credibility and legitimacy. Partnerships between companies, NGOs, government agencies, and certification bodies are instrumental in driving sector-wide change and fostering a culture of collective responsibility for supply chain sustainability. By facilitating dialogue, knowledge exchange, and collective action, multi-stakeholder initiatives can overcome barriers to certification implementation and promote shared understanding of sustainability goals and priorities. Overall, the discussion emphasizes the importance of critically assessing the strengths, limitations, and outcomes of certification programs in promoting supply chain sustainability within the renewable energy sector. By addressing the challenges of greenwashing, limited transparency, and regional disparities, stakeholders can harness certification as a strategic tool for advancing sustainable development goals and driving sector-wide transformation. Ultimately, fostering a culture of continuous improvement and collaboration is essential to realize the full potential of certification programs in building a more resilient, equitable, and sustainable renewable energy sector.

6. Conclusion

This study offers valuable insights into the effectiveness of certification programs in ensuring supply chain sustainability within the renewable energy sector. Through qualitative research methods, including interviews and content analysis, the study illuminated the motivations, experiences, challenges, and perceived impacts of certification initiatives on sustainable practices. The findings underscored the complex dynamics inherent in certification processes, highlighting both the potential benefits and limitations of certification programs. While certification programs play a significant role in promoting transparency, accountability, and stakeholder engagement within the renewable energy supply chain, they face challenges such as greenwashing, limited transparency, and regional disparities. Addressing these challenges requires concerted efforts from industry actors, policymakers, and civil society organizations to enhance the credibility, relevance, and impact of certification programs.

Strategies for improvement include strengthening monitoring and enforcement mechanisms, fostering multi-stakeholder collaboration, integrating emerging technologies, and aligning certification standards with broader sustainability goals. Despite these challenges, certification programs offer a pathway for driving continuous improvement and innovation in sustainable practices, encouraging companies to adopt cleaner technologies, reduce waste, and optimize resource use. By leveraging certification as a strategic tool for advancing sustainable development goals and accelerating the transition towards a more resilient and equitable renewable energy sector, stakeholders can realize the full potential of certification programs in promoting supply chain sustainability. In light of the findings, this study underscores the importance of ongoing research, dialogue, and collaboration to enhance the effectiveness of certification programs and address emerging sustainability challenges within the renewable energy sector. By building upon the insights gained from this study and engaging in collective action, stakeholders can work towards building a more sustainable and resilient future for renewable energy production and consumption.

References

Arvesen, A., Bright, R.M., and Hertwich, E.G., 2020. A review of life cycle assessment (LCA) of electricity generation technologies: Key issues and options for improvements. Renewable and Sustainable Energy Reviews, 119, Pp. 109573. https://doi.org/10.1016/j.rser.2019.109573

Deloitte. 2021. Renewable energy industry outlook. https://www2.deloitte.com/us/en/insights/industry/power-and-utilities/renewable-energy-industry-outlook.html

EIA. 2021. Renewable energy explained. U.S. Energy Information Administration. https://www.eia.gov/energyexplained/renewable-sources/

Emon, M.H., 2023. A Systematic Review of the Causes and Consequences of Price Hikes in Bangladesh. Review of Business and Economics Studies, 11 (2), Pp. 49–58. https://doi.org/10.26794/2308-944X-2023-11-2-49-58

Emon, M.H., and Nipa, M.N., 2024. Exploring the Gender Dimension in Entrepreneurship Development: A Systematic Literature Review in the Context of Bangladesh. Westcliff International Journal of Applied Research, 8 (1), Pp. 34–49. https://doi.org/10.47670/wuwijar202481mhemnn

Emon, M.M.H., Abtahi, A.T., and Jhuma, S.A., 2023. Factors Influencing College Student's Choice Of A University In Bangladesh. Social Values and Society, 5 (1), Pp. 01–03. https://doi.org/10.26480/svs.01.2023.01.03

Emon, M.M.H., and Khan, T., 2023. Securing an Alternate Power Source for Dhaka City Through Renewable Energy Generation. Environment & Ecosystem Science, 7 (2), Pp. 61–65. https://environecosystem.com/ees-02-2023-61-65/

Emon, M.M.H., and Khan, T., 2023. The Impact of Cultural Norms on Sustainable Entrepreneurship Practices in SMEs of Bangladesh. Indonesian Journal of Innovation and Applied Sciences (IJIAS), 3 (3), Pp. 201–209. https://doi.org/10.47540/ijias.v3i3.962

Emon, M.M.H., Khan, T., and Alam, M., 2023. Effect of Technology on Service Quality Perception and Patient Satisfaction-A study on Hospitals in Bangladesh. International Journal of Research and Applied Technology (INJURATECH), 3 (2), Pp. 254–266. https://ojs.unikom.ac.id/index.php/injuratech/article/view/10453

Emon, M.M.H., Khan, T., and Siam, S.A.J., 2024. Quantifying the influence of supplier relationship management and supply chain performance: an investigation of Bangladesh's manufacturing and service sectors. Brazilian Journal of Operations & Production Management, 21(2 SE-Research paper), 2015. https://doi.org/10.14488/BJOPM.2015.2024

Finkbeiner, M., Schau, E.M., Lehmann, A., and Traverso, M., 2010. Towards life cycle sustainability assessment. Sustainability, 2 (10), Pp. 3309–3322. https://doi.org/10.3390/su2103309

Gold, S., and Hahn, R., 2012. Redefining and rethinking organizational and societal sustainability: From sustainable operations management to a sustainable supply chain management? Journal of Cleaner Production, 25, Pp. 42–55. https://doi.org/10.1016/j.jclepro.2011.11.010

Gold, S., Seuring, S., and Beske, P., 2010. Sustainable supply chain management and inter-organizational resources: A literature review. Corporate Social Responsibility and Environmental Management, 17 (4), Pp. 230–245. https://doi.org/10.1002/csr.222

Hahn, R., and Kühnen, M., 2013. Determinants of sustainability reporting: A review of results, trends, theory, and opportunities in an expanding field of research. Journal of Cleaner Production, 59, Pp. 5–21. https://doi.org/10.1016/j.jclepro.2013.07.005

Hasan, A.M., and Emon, M.M.H., 2023. User Experiences and Perspectives of The Solar Revolution In Bangladesh: Challenges And Opportunities. Economic Growth and Environment Sustainability, 2 (1), Pp. 12–14. https://doi.org/10.26480/egnes.01.2023.12.14

Hasan, E.M.M., 2023. Unveiling The Progression Towards Solar Power Adoption: A Comprehensive Analysis Of Understanding, Awareness, And Acceptance Of Solar Technology In Bangladesh. Economic Growth and Environment Sustainability, 2 (2), Pp. 105–111. https://doi.org/10.26480/egnes.02.2023.105.111

Hasan, M.M., and Chowdhury, S.A., 2023. Relationship Between Education, Emotional Intelligence, And Sustainable Behavior Change Among College Students In Bangladesh. Education & Learning in Developing Nations, 1 (1), Pp. 01–04. https://doi.org/10.26480/eldn.01.2023.01.04

Hasan, M.M., and Chowdhury, S.A., 2023. Relationship Between Education, Emotional Intelligence, and Sustainable Behavior Change Among College Students in Bangladesh. Education & Learning in Developing Nations, 1 (1), Pp. 1–4. https://doi.org/10.26480/eldn.01.2023.01.04

International Energy Agency. 2021. World energy outlook 2021. IEA. https://www.iea.org/reports/world-energy-outlook-2021

International Organization for Standardization. 2015. ISO 14001:2015 environmental management systems – Requirements with guidance for use. https://www.iso.org/standard/60857.html

International Organization for Standardization. 2018. ISO 50001:2018 energy management systems – Requirements with guidance for use. https://www.iso.org/standard/72036.html

Jiao, K., and Boiral, O., 2020. Environmental certification and eco-innovation: A review of empirical studies. Journal of Cleaner Production, 253, Pp. 119960. https://doi.org/10.1016/j.jclepro.2019.119960

Khan, T., Rahman, S.M., and Hasan, M.M., 2020. Barriers to Growth of Renewable Energy Technology in Bangladesh. Proceedings of the International Conference on Computing Advancements, Pp. 1–6. https://doi.org/10.1145/3377049.3377086

Nascimento, D., Vieira, G.V., and Lins, M.P.E., 2013. The implications of implementing environmental management systems in the Brazilian context: A literature review. Journal of Cleaner Production, 47, Pp. 168–177. https://doi.org/10.1016/j.jclepro.2012.07.028

Pagell, M., and Shevchenko, A., 2014. Why research in sustainable supply chain management should have no future. Journal of Supply Chain Management, 50 (1), Pp. 44–55. https://doi.org/10.1111/jscm.12019

Peng, C., Ren, J., Ye, X., and Sun, Y., 2020. Implementing green supply chain management practices: A structural equation modeling approach. Journal of Cleaner Production, 259, Pp. 120959. https://doi.org/10.1016/j.jclepro.2020.120959

Pishvaee, M.S., Jolai, F., and Razmi, J., 2012. A stochastic optimization model for integrated forward/reverse logistics network design. Journal of Manufacturing Systems, 31 (1), Pp. 1–18. https://doi.org/10.1016/j.jmsy.2011.07.005

Ramanathan, U., Subramanian, N., and Parry, G., 2017. An examination of the relationship between carbon footprint and financial performance. Business Strategy and the Environment, 26 (4), Pp. 584–596. https://doi.org/10.1002

REN21. 2021. Renewables 2021 global status report. REN21 Secretariat. https://www.ren21.net/gsr-2021/

Sarkis, J., 2012. A boundary and flows perspective of green supply chain management. Supply Chain Management: An International Journal, 17 (2), Pp. 202–216. https://doi.org/10.1108/13598541211212990

Sarkis, J., and Cohen, M.J., 2016. A systems approach to sustainability and sustainable development. Kluwer Academic Publishers.

Seuring, S., and Gold, S., 2012. Conducting content-analysis based literature reviews in supply chain management. Supply Chain Management: An International Journal, 17 (5), Pp. 544–555. https://doi.org/10.1108/13598541211258563

Seuring, S., and Müller, M., 2008. From a literature review to a conceptual framework for sustainable supply chain management. Journal of Cleaner Production, 16 (15), Pp. 1699–1710. https://doi.org/10.1016/j.jclepro.2008.04.020

Solar Energy Industries Association. 2022. SolarAPP+. https://www.seia.org/solarapp-plus

Tervooren, J.P., and Madhok, D., 2019. Going green to be seen: The case of the green supply chain. Academy of Management Proceedings, 2019 (1), Pp. 11309. https://doi.org/10.5465/AMBPP.2019.11309abstract

Tukker, A., Goldbohm, R.A., de Koning, A., Verheijden, M., Kleijn, R., Wolf, O., Pérez-Domínguez, I., and Rueda-Cantuche, J.M., 2011. Environmental impacts of changes to healthier diets in Europe. Ecological Economics, 70 (10), Pp. 1776–1788. https://doi.org/10.1016/j.ecolecon.2011.05.001

UNEP. 2019. Global trends in renewable energy investment 2019. United Nations Environment Programme. https://www.unep.org/resources/global-trends-renewable-energy-investment-2019

UNEP. 2020. Renewable energy: A gender perspective. United Nations Environment Programme. https://www.unep.org/resources/renewable-energy-gender-perspective

UNEP. 2021. Global status report 2021. United Nations Environment Programme. https://www.unep.org/resources/global-status-report-2021

UNIDO. 2019. Renewable energy and climate change. United Nations Industrial Development Organization. https://www.unido.org/our-focus/advancing-economic-competitiveness/sustainable-energy-and-climate-change/renewable-energy-and-climate-change

United Nations Development Programme. 2019. Renewable energy. https://www.undp.org/sustainable-development-goals/renewable-energy

World Bank Group. 2018. Unlocking the potential of the renewable energy market in MENA countries: Lessons from Jordan and Morocco. World Bank. https://openknowledge.worldbank.org/handle/10986/29404

Zeng, S., Tian, P., Tam, V.W., and Wang, X., 2021. Understanding sustainable supply chain management practices in renewable energy: A bibliometric analysis. Renewable and Sustainable Energy Reviews, 136, Pp. 110442. https://doi.org/10.1016/j.rser.2020.110442

Zhu, Q., Sarkis, J., and Geng, Y., 2005. Green supply chain management in China: Pressures, practices and performance. International Journal of Operations & Production Management, 25 (5), Pp. 449–468. https://doi.org/10.1108/01443570510591092