INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN ACCOUNTING, FINANCE AND MANAGEMENT SCIENCES

OPEN ACCESS JOURNAL

Vol 14, Issue 3, (2024) E-ISSN: 2225-8329

A Systematic Review on the Impact of Green Management on Construction Firms' Financial Performance

Ying Mingyi[1,2], Tang Sai Hong[1], Eris Elianddy B. Supeni[1], Xia Yingqiao[3], Ying Yujia[4]

[1]Faculty of Engineering, Universiti Putra Malaysia, Serdang Selangor,Malaysia

[2]Jinhua University of Vocational Technology,Jinhua Zhejiang,China

[3]Faculty of Design and Architecture, Universiti Putra Malaysia, Serdang Selangor,Malaysia

[4]Zhejiang Vocational College of Special Education,Hangzhou Zhejiang,China

Email: GS62019@student.upm.edu.my, Yingyj@zcse.edu.cn

Corresponding Author Email: Saihong@upm.edu.my

To Link this Article: http://dx.doi.org/10.6007/IJARAFMS/v14-i3/22465 DOI:10.6007/IJARAFMS/v14-i3/22465

Published Online: 30 August 2024

Abstract

This paper systematically examines the significant impact of green management on the financial performance of construction firms. By conducting a thorough literature review and detailed qualitative analysis, the study aims to offer valuable insights for the construction industry, helping it to pursue sustainable development while maintaining economic viability. The research explores how different green management practices—such as using sustainable materials, implementing energy-efficient construction methods, and obtaining environmental certifications—affect financial performance. The findings indicate that although initial investments in green technologies can be financially challenging, the long-term benefits, including operational cost savings, improved reputation, and greater market competitiveness, far outweigh these initial expenses. The study encourages the integration of green management into the strategic planning of construction firms to achieve both environmental and financial success.

Keywords: Green Management, Construction Firms, Financial Performance, Sustainability.

Introduction

The construction industry stands as a cornerstone of the global economy, yet it concurrently incurs substantial environmental ramifications. As one of the largest consumers of natural resources and a significant contributor to waste and pollution, the sector faces mounting pressure to adopt more sustainable practices. In the contemporary era, an escalating emphasis has been placed on green management within this sector to confront environmental predicaments and amplify corporate social responsibility.Green management refers to the incorporation of environmentally friendly practices and principles into business

operations. This encompasses a broad spectrum of activities, from reducing energy consumption and waste to utilizing sustainable materials and adhering to environmental regulations. The overarching goal is to minimize the negative environmental impact while maintaining economic viability.This systematic review aims to explore how green management affects the financial performance of construction companies. It's crucial for these businesses to understand the potential economic benefits of adopting sustainable practices. As more stakeholders call for sustainability, grasping this connection can help construction firms better position themselves in the market.

Literature Review

Previous research has shown mixed results regarding the relationship between green management practices and financial performance in construction firms. Some studies suggest that environmentally-friendly initiatives can lead to cost savings by improving energy efficiency, reducing waste, and optimizing resource use, which, in turn, positively affects profitability (Abreu et al., 2017). For instance, researchers found that companies investing in pollution prevention measures were able to lower costs and enhance their financial performance significantly (Kalya et al., 2020).

Conversely, other studies have spotlighted that the incipient investment in green technologies and processes might impose a financial encumbrance in the short term. For instance, Canh et al (2019), argued that while the initial costs of implementing environmentally friendly practices can be high, these investments often lead to innovation and efficiency gains that ultimately enhance competitiveness and profitability.

The literature also highlights various mechanisms through which green management practices can influence financial performance. These include operational cost savings, enhanced reputation and brand value, compliance with regulatory requirements, and improved stakeholder relationships. However, the extent of these benefits can vary depending on factors such as the specific practices adopted, the firm's size and resources, and the market context (Yang et al., 2015).

Furthermore, the review uncovers that green management practices can lead to increased market share and customer loyalty. Studies such as those by Shao and Ünal (2019) suggest that firms engaging in sustainable practices tend to attract environmentally conscious consumers, which can enhance revenue streams. Similarly, the work of Martín et al (2016) demonstrates that companies with strong sustainability practices often enjoy better financial performance due to improved risk management and stakeholder engagement.

Moreover, green management can also lead to enhanced employee satisfaction and productivity. According to a study by Davidescu et al (2020), employees in firms that prioritize environmental sustainability often exhibit higher levels of motivation and job satisfaction, which can translate into improved operational performance and financial outcomes.

However, the literature also acknowledges potential challenges and limitations associated with green management. Initial costs, regulatory compliance complexities, and the need for continuous innovation can be substantial. For instance, Seth et al (2018), found that small and

medium-sized enterprises might struggle more with the financial burdens of adopting green practices compared to larger firms.

The following table 1 summarizes the key findings from various studies on the impact of green management on financial performance in construction firms:

Table 1
Summary of Literature on Green Management and Financial Performance

Author(s)	Year	Key Findings	Implications for Financial Performance
Kalya et al	2020	Companies investing in pollution prevention initiatives significantly reduce costs and improve financial performance.	Positive impact on financial performance through cost savings and operational efficiency.
Canh et al	2019	Initial costs of implementing environmentally friendly practices are high, but lead to innovation and efficiency gains.	Long-term financial benefits due to enhanced competitiveness and profitability despite short-term financial encumbrances.
Shao & Ünal	2019	Firms engaging in sustainable practices attract environmentally conscious consumers, enhancing revenue streams.	Positive impact on revenue and market share through increased customer loyalty and attractiveness.
Martín et al	2016	Companies with strong sustainability practices enjoy better financial performance due to improved risk management and stakeholder engagement.	Enhanced financial performance through better risk management, stakeholder relationships, and operational efficiencies.
Davidescu et al	2020	Employees in firms that prioritize environmental sustainability exhibit higher levels of motivation and job satisfaction.	Improved operational performance and financial outcomes due to increased employee productivity and satisfaction.
Seth et al	2018	Medium-sized enterprises may struggle more with the financial burdens of adopting green practices compared to larger firms.	Potential financial challenges for SMEs, highlighting the need for support and resources to facilitate green management adoption.

These findings collectively indicate that while green management practices can pose initial financial challenges, the long-term benefits often outweigh these costs. Construction firms

can achieve operational cost savings, enhanced market positioning, and improved financial performance by strategically integrating sustainable practices into their operations.

Methodology

This systematic review employs a qualitative approach to explore the impact of green management on the financial performance of construction firms. By synthesizing findings from in-depth case studies, interviews with industry experts, and comprehensive reviews of existing literature, the study seeks to uncover insights into how sustainable practices are integrated and their perceived benefits and challenges (Kamble et al., 2018). The review involves systematic keyword searches in several academic databases to identify relevant studies and reports. The selected keywords are designed to capture a broad range of research related to green management and financial performance in the construction industry.Keywords and search strategy are shown in Table 2.

Table 2
Keywords and Search Strategy

Database	Keywords
Google Scholar	[Green management OR Sustainable practices] AND [Construction firms OR Building industry] AND [Financial performance OR Economic impact]
JSTOR	[Green technologies OR Environmental certifications] AND [Financial performance indicators OR Profitability]
Web of Science	[Sustainable materials OR Energy-efficient construction] AND [Cost savings OR Long-term financial benefits]
Scopus	[Corporate social responsibility OR Environmental impact] AND [Construction industry OR Building sector] AND [Financial outcomes OR Business performance]

The methodology involves systematic keyword searches in multiple academic databases, including Google Scholar, Scopus, Web of Science, and JSTOR, ensuring a broad and comprehensive collection of relevant literature. A structured keyword strategy captures various aspects of green management practices and their financial implications, focusing on literature published within the last two decades to reflect recent trends and developments. Inclusion criteria are set to select studies that specifically address the relationship between green management practices and financial performance in construction firms, prioritizing empirical data, case studies, and qualitative insights (Miroshnychenko et al., 2017). The search process applies filters to include only peer-reviewed articles, conference papers, and authoritative reports, excluding those not directly related to the construction industry or lacking substantial financial performance analysis. Relevant data from selected studies are extracted and synthesized to identify common themes, challenges, and benefits associated with green management practices. The findings are analyzed to draw conclusions about the long-term financial impacts of adopting sustainable practices, providing actionable insights for industry stakeholders.

Green Management Practices in Construction

Green management practices in the construction industry are crucial for minimizing environmental impact and promoting sustainability. One fundamental practice is the use of sustainable materials. Construction firms are increasingly prioritizing environmentally friendly

materials, such as recycled steel, bamboo, and low-emission concrete (Robichaud & Anantatmula, 2011). These materials not only help to reduce the carbon footprint of construction projects but also contribute to achieving higher sustainability ratings for buildings (Chen, 2018). By choosing materials that are either recycled or have a lower environmental impact during their production and use, construction firms can significantly lower the ecological footprint of their projects (Sizirici et al., 2021).

Another important aspect of green management in construction is the adoption of energy-efficient construction techniques (Shrestha, 2016). Implementing designs and technologies that enhance energy efficiency is essential for reducing overall energy consumption and operational costs (Chowdhury et al., 2018). For example, integrating solar panels, high-efficiency HVAC systems, and LED lighting into building designs can lead to substantial savings in energy and reduce the environmental impact of the building's operation (Teke & Timur, 2014). These techniques help to create buildings that not only perform better in terms of energy use but also provide long-term financial benefits through reduced utility costs.

Environmental certifications play an important role in green management practices. Obtaining certifications such as LEED (Leadership in Energy and Environmental Design) or BREEAM (Building Research Establishment Environmental Assessment Method) demonstrates a firm's commitment to sustainable building practices (Aykan, 2014). These certifications are recognized standards that evaluate a building's environmental performance across various categories, including energy use, water efficiency, and material selection (Roderick et al., 2009). Achieving such certifications not only enhances a firm's reputation but also increases its marketability by showcasing its dedication to sustainability (Chegut et al., 2011). Additionally, certified buildings often enjoy higher market values and attract environmentally conscious clients and investors (Nelson et al., 2010).

By integrating these green management practices, construction firms can contribute to a more sustainable future while benefiting from the operational and market advantages associated with environmentally responsible building methods (Robichaud & Anantatmula, 2011).

Financial Performance Indicators

To assess the financial impact of green management practices in the construction industry, it is essential to evaluate several key financial performance indicators (Chen et al., 2016). One of the primary indicators is Return on Assets (ROA). ROA measures a firm's profitability relative to its total assets, providing insight into how effectively a company is using its assets to generate earnings (Khan, 2012). Green management practices, such as adopting energy-efficient technologies and sustainable materials, can positively influence ROA (Lui et al., 2021). By reducing operational costs and enhancing asset efficiency, these practices can lead to higher profitability relative to the firm’s asset base (Hu et al., 2022). As a result, firms implementing green management strategies may experience improved ROA, reflecting better utilization of their assets (Wong et al., 2012).

Another important financial performance indicator is Return on Equity (ROE). ROE gauges how well a firm is using its equity to generate profits, offering a view of the firm's profitability from the shareholders' perspective (Damodaran, 2007). Sustainable practices can significantly

impact ROE by increasing overall profitability and attracting investors who are interested in environmentally responsible investments (Cerciello et al., 2023). Firms that excel in green management are often perceived as more innovative and forward-thinking, which can enhance their attractiveness to equity investors (Chen, 2024). Consequently, green management practices can contribute to higher ROE, reflecting a more efficient use of shareholders' equity (Jell & Raha, 2022).

Profit margins are also a critical indicator of financial performance. This metric measures the profitability of a firm's operations by evaluating the percentage of revenue that remains after covering expenses (Ching et al., 2017). Implementing green management practices, such as energy-efficient systems and waste-reduction measures, can lead to substantial cost savings (Nižetić et al., 2019). By lowering operational costs through reduced energy consumption and waste generation, firms can improve their profit margins (Shrivastava, 2018). Enhanced profit margins indicate that a company is not only managing its resources efficiently but also achieving better financial outcomes as a result of its sustainable practices (Cantele & Zardini, 2018).

In general, knowing these these financial performance metrics—profit margins, ROA, and ROE—can give important information about how green management techniques affect a company's bottom line. Construction companies can enhance their financial performance and promote environmental sustainability by utilizing these methods.

Results and Discussion

The results of the analysis indicate that proactive adoption of green management practices by construction companies is typically associated with long-term benefits in financial performance. This finding is consistent with the body of research showing that, through lowering operating costs and boosting competitive advantage, green management strategies can have a favorable impact on financial results.

Impact of Green Management on Financial Performance

Construction firms that prioritize energy-efficient designs and equipment often see reductions in operational costs and improvements in client satisfaction. That is corroborated by research, which shows how energy-efficient solutions can increase project revenues while reducing utility costs (Eon et al., 2020). Energy-efficient systems, such as advanced HVAC units and LED lighting, not only cut down on energy consumption but also attract clients who value sustainability, thereby strengthening the firm's market position (Kim & Yu, 2018).

One significant observation is that firms investing in sustainable materials and technologies tend to enhance their reputation and attract more clients (Varadarajan, 2017). Literature by Pouranian and Shishehbor (2019), confirms that while initial costs for sustainable materials might be higher, these materials often offer benefits such as lower maintenance requirements and longer lifespans. For instance, using recycled steel or low-emission concrete can lead to significant cost savings over time due to reduced upkeep and replacement needs (McGarry et al., 2022). Additionally, companies that adopt sustainable practices benefit from positive publicity and an improved brand image, which can increase client acquisition and allow firms to command higher prices for their services (Charter & Polonsky, 2017).

Interviews with industry experts highlight that the short-term financial implications of green management practices can be mixed. The literature review reflects this sentiment, noting that while the initial outlays for green technologies and processes may result in higher upfront costs, these investments are often offset by long-term savings and a competitive edge (Shrivastava, 2018). For example, research indicates that investments in renewable energy sources and energy-efficient construction methods frequently lead to significant reductions in energy costs and improvements in profit margins over time (Duffy et al., 2015).

Case Studies and Practical Insights

Case studies of successful green management implementations illustrate that while initial investments are substantial, the long-term benefits include operational savings, increased client trust, and a stronger market position (De et al., 2017). For example, a construction firm that achieved LEED certification reported a higher demand for its services and an enhanced reputation among environmentally conscious clients (Bowers et al., 2020). This finding is consistent with the work of Chi et al (2022), who found that LEED-certified buildings often attract premium pricing and a loyal client base due to their sustainability credentials.

In summary, the qualitative findings corroborate the literature, indicating that green management practices, while requiring significant initial investments, tend to yield considerable long-term financial benefits. These benefits include reduced operational costs, improved client satisfaction, and enhanced market positioning. The evidence supports the notion that green management is not only beneficial for the environment but also a viable strategy for enhancing financial performance in the construction industry (O'Donohue & Torugsa, 2016).

Motivation and Contribution of the Study

The motivation for this study arises from the dual challenge faced by construction firms: the need to reduce their environmental impact and to remain financially viable. As one of the largest sectors contributing to resource consumption and environmental degradation, the construction industry is under increasing pressure from stakeholders, including governments, clients, and investors, to adopt sustainable practices. However, there is often a lack of clarity on how such practices affect financial performance, particularly in terms of return on investment and long-term profitability. This study aims to fill this knowledge gap by systematically examining the relationship between green management practices and financial performance in construction firms. By understanding this connection, construction firms can make informed decisions that align with both environmental goals and financial objectives, ensuring their competitiveness and sustainability in an evolving market landscape.

The contribution of this study is significant in several ways. Firstly, it provides a detailed analysis of existing literature on the impact of green management practices, such as the use of sustainable materials, energy-efficient construction methods, and environmental certifications, on the financial outcomes of construction firms. This comprehensive review highlights both the short-term challenges and the long-term financial benefits associated with adopting green practices, offering valuable insights for construction firms considering such investments. Secondly, the study contributes to the field by identifying specific financial performance indicators—such as return on assets (ROA), return on equity (ROE), and profit margins—that are positively influenced by sustainable practices. By focusing on these

indicators, the study demonstrates that green management is not just an ethical choice but a strategic financial decision that can lead to improved profitability, enhanced market positioning, and increased stakeholder trust. Ultimately, this research underscores the importance of integrating green management into the core strategies of construction firms, providing a roadmap for achieving both environmental stewardship and financial success.

Conclusion

The study concludes that green management positively impacts the financial performance of construction firms. Construction companies are encouraged to integrate green practices into their strategic planning to achieve both environmental and economic benefits. The successful implementation of green management requires a committed stance from top management, comprehensive employee training, and continuous monitoring and evaluation of green initiatives' efficacy.

The burgeoning demand for sustainable buildings and infrastructure underscores the importance of green management. Construction firms that fail to adopt sustainable practices may find themselves at a competitive disadvantage in the marketplace. For example, a firm that invests in energy-efficient lighting systems for its construction sites might face significant upfront costs. However, over time, the reduced energy consumption leads to substantial savings on electricity bills, and environmentally conscious clients are more likely to award projects to such firms, further boosting their revenue streams.

In summary, while the journey towards green management in the construction industry may present initial challenges and costs, the long-term financial benefits and enhanced market positioning make it a strategic imperative for the sustained success and viability of construction firms.

Declaration of Interests

We declare that there are no financial or non-financial conflicts of interest associated with this study.

Funding Information

This research was conducted without any funding or support from grant-providing organizations.

References

Abreu, M. F., Alves, A. C., & Moreira, F. (2017). Lean-Green models for eco-efficient and sustainable production. *Energy*, *137*, 846-853.

Aykan, S. (2014). Green vs. sustainable: analyzing and expanding LEED (leadership in energy and environmental design).

Bowers, B., Boyd, N., & McGoun, E. (2020). Greenbacks, green banks, and greenwashing via LEED: Assessing banks' performance in sustainable construction. *Sustainability: The Journal of Record*, *13*(5), 208-217.

Canh, N. T., Liem, N. T., Thu, P. A., & Khuong, N. V. (2019). The impact of innovation on the firm performance and corporate social responsibility of Vietnamese manufacturing firms. *Sustainability*, *11*(13), 3666.

Cantele, S., & Zardini, A. (2018). Is sustainability a competitive advantage for small businesses? An empirical analysis of possible mediators in the sustainability–financial performance relationship. *Journal of cleaner production*, *182*, 166-176.

Cerciello, M., Busato, F., & Taddeo, S. (2023). The effect of sustainable business practices on profitability. Accounting for strategic disclosure. *Corporate Social Responsibility and Environmental Management*, *30*(2), 802-819.

Charter, M., & Polonsky, M. J. (Eds.). (2017). *Greener marketing: a global perspective on greening marketing practice*. Routledge.

Chegut, A., Eichholtz, P., Kok, N., & Quigley, J. M. (2011). The value of green buildings: new evidence from the United Kingdom. *ERES 2010 proceedings*, 1-43.

Chen, P. H., Ong, C. F., & Hsu, S. C. (2016). Understanding the relationships between environmental management practices and financial performances of multinational construction firms. *Journal of cleaner production*, *139*, 750-760.

Chen, Q. (2024). From concept to capital: Investigating the influence of green innovation on equity financing in BRICS economies. *International Review of Financial Analysis*, *93*, 103233.

Chen, Y., Ng, S. T., & Hossain, M. U. (2018). Approach to establish carbon emission benchmarking for construction materials. *Carbon Management*, *9*(6), 587-604.

Chi, C. G., Chi, O. H., Xu, X., & Kennedy, I. (2022). Narrowing the intention-behavior gap: The impact of hotel green certification. *International Journal of Hospitality Management*, *107*, 103305.

Ching, H. Y., Gerab, F., & Toste, T. H. (2017). The quality of sustainability reports and corporate financial performance: Evidence from Brazilian listed companies. *Sage Open*, *7*(2), 2158244017712027.

Chowdhury, J. I., Hu, Y., Haltas, I., Balta-Ozkan, N., & Varga, L. (2018). Reducing industrial energy demand in the UK: A review of energy efficiency technologies and energy saving potential in selected sectors. *Renewable and Sustainable Energy Reviews*, *94*, 1153-1178.

Damodaran, A. (2007). Return on capital (ROC), return on invested capital (ROIC) and return on equity (ROE): Measurement and implications. *Return on Invested Capital (ROIC) and Return on Equity (ROE): Measurement and Implications (July 2007)*.

Davidescu, A. A., Apostu, S. A., Paul, A., & Casuneanu, I. (2020). Work flexibility, job satisfaction, and job performance among Romanian employees—Implications for sustainable human resource management. *Sustainability*, *12*(15), 6086.

de Sousa Jabbour, A. B. L., Vazquez-Brust, D., Jabbour, C. J. C., & Latan, H. (2017). Green supply chain practices and environmental performance in Brazil: Survey, case studies, and implications for B2B. *Industrial Marketing Management*, *66*, 13-28.

Duffy, A., Rogers, M., & Ayompe, L. (2015). *Renewable energy and energy efficiency: assessment of projects and policies*. John Wiley & Sons.

Eon, C., Breadsell, J. K., Byrne, J., & Morrison, G. M. (2020). The discrepancy between as-built and as-designed in energy efficient buildings: a rapid review. *Sustainability*, *12*(16), 6372.

Hu, C., Li, Y., & Zheng, X. (2022). Data assets, information uses, and operational efficiency. *Applied Economics*, *54*(60), 6887-6900.

Jell-Ojobor, M., & Raha, A. (2022). Being good at being good—The mediating role of an environmental management system in value-creating green supply chain management practices. *Business strategy and the environment*, *31*(5), 1964-1984.

Kalyar, M. N., Shoukat, A., & Shafique, I. (2020). Enhancing firms' environmental performance and financial performance through green supply chain management practices and institutional pressures. *Sustainability Accounting, Management and Policy Journal*, *11*(2), 451-476.

Kamble, S. S., Gunasekaran, A., & Gawankar, S. A. (2018). Sustainable Industry 4.0 framework: A systematic literature review identifying the current trends and future perspectives. *Process safety and environmental protection*, *117*, 408-425.

Khan, A. G. (2012). The relationship of capital structure decisions with firm performance: A study of the engineering sector of Pakistan. *International Journal of Accounting and financial reporting*, *2*(1), 245-262.

Kim, J. T., & Yu, C. W. F. (2018). Sustainable development and requirements for energy efficiency in buildings–the Korean perspectives. *Indoor and Built Environment*, *27*(6), 734-751.

Lui, A. K., Lo, C. K., Ngai, E. W., & Yeung, A. C. (2021). Forced to be green? The performance impact of energy-efficient systems under institutional pressures. *International Journal of Production Economics*, *239*, 108213.

Martín-de Castro, G., Amores-Salvadó, J., & Navas-López, J. E. (2016). Environmental management systems and firm performance: Improving firm environmental policy through stakeholder engagement. *Corporate social responsibility and Environmental Management*, *23*(4), 243-256.

McGarry, H., Martin, B., & Winslow, P. (2022). Delivering low carbon concrete for network rail on the routemap to net zero. *Case Studies in Construction Materials*, *17*, e01343.

Miroshnychenko, I., Barontini, R., & Testa, F. (2017). Green practices and financial performance: A global outlook. *Journal of Cleaner Production*, *147*, 340-351.

Nelson, A. J., Rakau, O., & Dörrenberg, P. (2010). Green buildings: a niche becomes mainstream. *Deutsche Bank Research*, 3-22.

Nižetić, S., Djilali, N., Papadopoulos, A., & Rodrigues, J. J. (2019). Smart technologies for promotion of energy efficiency, utilization of sustainable resources and waste management. *Journal of cleaner production*, *231*, 565-591.

O'Donohue, W., & Torugsa, N. (2016). The moderating effect of 'Green'HRM on the association between proactive environmental management and financial performance in small firms. *The international journal of human resource management*, *27*(2), 239-261.

Pouranian, M. R., & Shishehbor, M. (2019). Sustainability assessment of green asphalt mixtures: A review. *Environments*, *6*(6), 73.

Robichaud, L. B., & Anantatmula, V. S. (2011). Greening project management practices for sustainable construction. *Journal of management in engineering*, *27*(1), 48-57.

Robichaud, L. B., & Anantatmula, V. S. (2011). Greening project management practices for sustainable construction. *Journal of management in engineering*, *27*(1), 48-57.

Roderick, Y., McEwan, D., Wheatley, C., & Alonso, C. (2009, July). Comparison of energy performance assessment between LEED, BREEAM and Green Star. In *Building Simulation 2009* (Vol. 11, pp. 1167-1176). IBPSA.

Seth, D., Rehman, M. A. A., & Shrivastava, R. L. (2018). Green manufacturing drivers and their relationships for small and medium (SME) and large industries. *Journal of Cleaner Production*, *198*, 1381-1405.

Shao, J., & Ünal, E. (2019). What do consumers value more in green purchasing? Assessing the sustainability practices from demand side of business. *Journal of Cleaner Production*, *209*, 1473-1483.

Shrestha, S. (2016). *Comparison of energy efficient and green buildings: technological and policy aspects with case studies from Europe, the USA, India and Nepal* (Vol. 49). Universitätsverlag der TU Berlin.

Shrivastava, P. (2018). Environmental technologies and competitive advantage. In *Business Ethics and Strategy, Volumes I and II* (pp. 317-334). Routledge.

Shrivastava, P. (2018). Environmental technologies and competitive advantage. In *Business Ethics and Strategy, Volumes I and II* (pp. 317-334). Routledge.

Sizirici, B., Fseha, Y., Cho, C. S., Yildiz, I., & Byon, Y. J. (2021). A review of carbon footprint reduction in construction industry, from design to operation. *Materials*, *14*(20), 6094.

Teke, A., & Timur, O. (2014). Assessing the energy efficiency improvement potentials of HVAC systems considering economic and environmental aspects at the hospitals. *Renewable and Sustainable Energy Reviews*, *33*, 224-235.

Varadarajan, R. (2017). Innovating for sustainability: A framework for sustainable innovations and a model of sustainable innovations orientation. *Journal of the Academy of Marketing Science*, *45*, 14-36.

Wong, C. W., Lai, K. H., Shang, K. C., Lu, C. S., & Leung, T. K. P. (2012). Green operations and the moderating role of environmental management capability of suppliers on manufacturing firm performance. *International journal of production economics*, *140*(1), 283-294.

Yang, J., Zhang, F., Jiang, X., & Sun, W. (2015). Strategic flexibility, green management, and firm competitiveness in an emerging economy. *Technological Forecasting and Social Change*, *101*, 347-356.