Factors Influencing the Adoption of Green Innovation: A Systematic Literature Review

Saranya Devi Nair K.Pavithran[1], Logaiswari Indiran[2*] Jamunahrani Rajagopal[3]

[1,2,3]Faculty of Management, Universiti Teknologi Malaysia, Skudai Johor, Malaysia
*Corresponding Author Email: logaiswari@utm.my

Abstract
Green innovation is increasingly recognised as a strategic approach for reducing environmental impact while enhancing business sustainability and competitiveness. Despite growing scholarly interest, research on the adoption of green innovation remains fragmented, with limited consensus on the key factors influencing its implementation across industries. This study undertakes a systematic literature review to address three main research questions: (i) how green innovation is defined, (ii) what factors drive its adoption, and (iii) which theories are commonly used in its examination. Using PRISMA guidelines, a total of 91 journal articles published between 2010 and 2024 were retrieved from the Scopus database. After applying inclusion and exclusion criteria, 20 high-quality articles were selected for in-depth analysis. The findings indicate that green innovation encompasses technological, procedural, and managerial advancements that collectively promote sustainability. Key drivers of adoption include government regulations and support, technological readiness, organisational culture, and market or customer demands. Theoretical frameworks frequently employed in the literature include the Triple Bottom Line (TBL) theory, the Resource-Based View (RBV), and its extensions such as the Natural Resource-Based View (NRBV) and Resource-Based Theory (RBT). These theories offer structured insights into how firms utilise internal capabilities and external pressures to adopt environmentally friendly practices. Overall, this review highlights the multidimensional and cross-sectoral nature of green innovation adoption. By synthesising current findings, it not only contributes to a more cohesive understanding of the topic but also identifies key research gaps and offers directions for future empirical investigations, particularly in underexplored sectors and developing economies.
Keywords: Sustainability, Green Innovation, Systematic Literature Review, Sustainability Development, Environment

Introduction

Technological advancements have brought countless benefits; nevertheless, they have also led to a tendency among many to neglect environmental preservation. When this happens, environmental concerns may escalate into serious threats that could endanger human survival globally. As was emphasized by Leonidou et al. (2015), the gradual degradation in the quality of the environment is not only a threat to the environment but also has strong consequences for economic development. Changes in patterns of production and consumption have further exacerbated pre-existing challenges, such as climate change, degradation of natural resources, and loss of biological diversity. Facing these increasing challenges, firms in different sectors have begun to include the concept of green innovation as a strategic tool for action. It is not just a sustainable decision, but also makes good business sense when it comes to brand reputation and growth.

In retrospect, green innovation in the 1970s and 1980s was centered mainly around process improvement. Lanjouw and Mody (1996) argue that during that period the focus was on improving industrial processes to be more efficient and environmentally friendly. The concept and content of green innovation have expanded over the years. Today, it focuses on activities that help control the negative outcomes and support responsible and long-lasting practices. These initiatives involve developing and implementing new environmentally friendly technologies, systems, products and services. Commercially, focusing on green innovation is essential, not only to continue operating in a changing world, but also to stay ahead and generate profit. Chen et al. (2006) pointed out that green innovation is a process related to the application of new technology, software and equipment to achieve an eco-efficient performance. Ge et al. (2018) further corroborate this perspective, highlighting that daily operational initiatives such as pollution reduction and resource conservation are essential elements of a company's green innovation strategy.

Although green innovation is gaining populatrity in both academic and business circles, it remains a relatively new field of study. According to Ha et al. (2023), there is increasing interest among scholars to understand what drives green innovation at the corporate level. Nevertheless, despite this growing body of work, empirical and theoretical evidence and support remains limited, especially in terms of identifying the key factors that influence its adoption. To contribute to this evolving field, the present study undertakes a systematic review of relevant literature to examine the major factors that shape the adoption of green innovation. In particular, this review is guided by the following research questions:

i.   Research Question 1: How have previous studies defined green innovation?
ii. Research Question 2: What are the factors that influence the adoption of green innovation across different industries?
iii. Research Question 3: What theories are commonly used in the study of green innovation adoption?

Methods

This study employed a systematic literature review (SLR) approach to examine the factors influencing the adoption of green innovation across industries. The systematic approach was selected to ensure transparency, replicability, and comprehensiveness in identifying and evaluating existing research. By following a structured process, the study aims to minimise bias and provide a balanced overview of current academic contributions on the topic.

Data for this review were retrieved from the Scopus database, which is recognised as one of the most comprehensive and reputable indexing platforms for peer-reviewed literature. Scopus was chosen because it offers wide coverage of high-impact journals across relevant disciplines such as social sciences, business, economics, and decision sciences. The selection of Scopus also helps ensure that the articles included are of a certain academic standard, contributing to the overall quality and reliability of the review.

The search focused on publications from 2010 to 2024 to capture contemporary discussions and developments in the field of green innovation. This time frame was deemed appropriate as it reflects the growing global urgency regarding environmental sustainability over the past decade, marked by the emergence of various climate-related policies, innovations, and corporate commitments.

To refine the search, specific keywords were used: 'factor,' 'green innovation,' and 'adoption.' These terms were selected based on their relevance to the study's objectives. Articles were filtered using the search string: TITLE-ABS-KEY ('factor' AND 'green innovation' AND 'Adoption') AND PUBYEAR BETWEEN 2010 AND 2024 AND (LIMIT-TO(SUBJAREA, 'SOCI') OR LIMIT-TO(SUBJAREA, 'ECON') OR LIMIT-TO(SUBJAREA, 'BUSI') OR LIMIT-TO(SUBJAREA, 'DECI')) AND (LIMIT-TO(EXACTKEYWORD, 'Green Innovation') OR LIMIT-TO(EXACTKEYWORD, 'Determining Factors') OR LIMIT-TO(EXACTKEYWORD, 'Adoption')) AND (LIMIT-TO(DOCTYPE, 'ar')) AND (LIMIT-TO(LANGUAGE, 'English')).

This query ensured that only articles closely aligned with the research topic were retrieved, while subject area filters ensured relevance to social, economic, and business perspectives, fields where innovation adoption is commonly studied. Additionally, limiting the search to English-language journal articles helped maintain consistency and accessibility in analysis, as well as academic rigour.

The initial search resulted in a total of 91 documents. These documents were then screened based on predefined inclusion and exclusion criteria. The inclusion criteria focused on the relevance of the article's title, abstract, keywords, and full text to the topic of green innovation adoption. Articles were also limited to peer-reviewed journals to ensure quality and credibility.

Following this screening, 32 articles were shortlisted for further analysis. These articles were subjected to bibliometric assessment to identify publication trends and thematic focus, alongside a qualitative review to explore the conceptual frameworks, methodologies, and findings. Subsequently, 12 articles were excluded from the review. Six of these did not directly address the factors influencing green innovation adoption, despite including related keywords. Another six were excluded due to the unavailability of full text, which would hinder accurate evaluation and synthesis.

As a result, 20 articles were finalized for the review. These articles provided the empirical and theoretical basis for identifying recurring themes, dominant frameworks, and research gaps in the field of green innovation. By narrowing down to a manageable number of high-relevance articles, the review ensures depth of analysis while maintaining thematic focus.

Table 1
Search String and Inclusion/Exclusion Criteria

CRITERIA	SCOPUS	NUMBER
	91	
Limited to Subject area	Limited to Social Sciences Limited to Business, Management and Accounting Limited to Economics, Econometrics and Finance Limited to Decision Sciences	69
Limited to Document type	Limited to Article	64
Limited to Language	English	64
Limited to Keyword	Limited to Green Innovation Limited to Adoption	32
Total		32
Report for Eligibility (n=32)		
Reports Excluded (n=12) Reason 1= Full Text not available (N=6) Reason2 = Not discussing the factors (N=6) **Reports Included (n=20)**		

Analysis
Research Publication by Year on Green Innovation
Academic research on the factors influencing green innovation was relatively limited in its early phase, with only one publication each in 2010 and 2012, and two in 2014. This reflects the topic's status as an emerging area of interest at the time. However, a notable shift occurred in 2023, when annual publications increased significantly to five, a figure repeated again in 2024, representing a fivefold rise compared to the earlier years. Significantly, 2023 also stood out as the most impactful year, with 496 citations recorded, the highest across the entire review period.

This sharp increase corresponds with the rising global emphasis on sustainability, catalysed by the enforcement of stricter environmental regulations, the growing influence of corporate ESG commitments, and rapid advancements in green technologies. These developments have contributed to the transition of green innovation from a niche research area to a mainstream academic and policy concern. The trend reflects a broader shift in societal and economic priorities, where environmental responsibility is now viewed as essential to long-term resilience. As climate change and sustainable development continue to dominate international discourse, research in this field is likely to expand further, including emerging themes such as digital sustainability, green financing, and the regulatory dimensions of innovation. Overall, the publication trends from 2010 to 2024 not only illustrate the growing maturity of the field but also mirror the increasing integration of environmental concerns into business strategies and policy frameworks worldwide. This trend is further illustrated in the chart below (Figure 1), which shows the yearly number of publications and citations related to green innovation over the selected period.
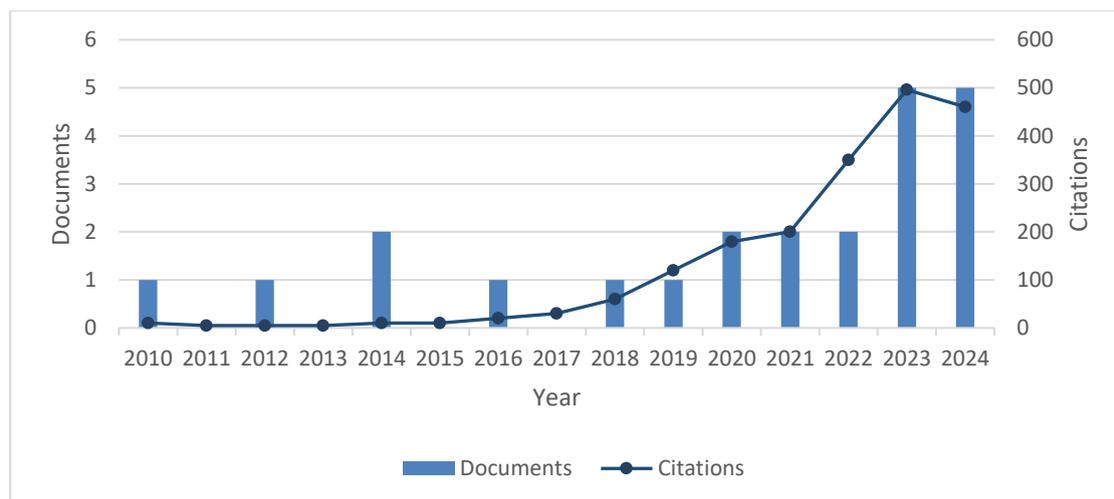
Figure 1 Yearly Trends in the Number of Publications and Citation on Green Innovation

Analysis of Research Question 1: How have previous studies defined green innovation?
Green innovation has been widely discussed as a transformative concept that merges technological advancement with environmental sustainability. It goes beyond the idea of innovation as mere technical progress and instead positions it as a purposeful effort to address growing ecological concerns. According to Sun et al. (2022), green innovation involves technological developments that aim to promote sustainability using clean energy, protection of the environment, and reduction of climate-related risks. This definition reflects the increasingly urgent need to align innovation with environmental priorities.

Da Silva et al. (2023) further support this view, stating that green innovation contributes not only to environmental preservation but also to economic performance. The dual benefit of ecological and economic outcomes highlights why this concept has gained importance in both academic and policy discussions. In fact, with increasing awareness of global pollution and resource depletion, green innovation has become one of the key strategies industries are using to reduce their environmental footprint (Maasoumi et al., 2021).

In order to understand the scope and application of green innovation more clearly, scholars have grouped it into three main categories. Firstly, green products refer to goods that are designed to have minimal environmental impact, for instance, products made from recycled or biodegradable materials. Secondly, green processes focus on sustainable production methods, such as energy-efficient manufacturing and waste minimisation techniques. Thirdly, green management innovations relate to the strategic and organisational changes that companies adopt to embed sustainability into their operations and decision-making processes (Chen, 2011). These classifications demonstrate that green innovation is not limited to product design alone but extends to operational practices and corporate governance.

Building on this, Cao and Chen (2019) describe green innovation as the development and application of new technologies, approaches, and systems that aim to reduce the negative environmental impact typically caused by resource-intensive industries. Their perspective also emphasizes efforts to improve energy efficiency, lower lifecycle costs, and promote sustainable consumption patterns. In this sense, green innovation is not just about making

technical improvements, it signifies a deeper transformation in how businesses function, moving towards models that prioritise both sustainability and long-term profitability.

In addition, the concept of adoption plays a central role in realising the potential of green innovation. Rogers (1995) defines adoption as the decision of individuals or organisations to accept and use a new idea or practice. In the context of green innovation, this involves a conscious shift in behaviour, whether by businesses, policymakers, or consumers, to embrace environmentally friendly alternatives. Such decisions are often influenced by perceived environmental risks, cost considerations, and social expectations.

For the purpose of this study, green innovation is defined as a strategic approach adopted across industries to respond to environmental challenges. It includes not only technological advancements but also procedural and managerial changes that support long-term sustainability. This definition is aligned with literature and reflects the multidimensional nature of green innovation that involves a collective commitment to creating value without compromising ecological integrity.

Analysis of Research Question 2: What factors influence the adoption of green innovation across different industries?
The 20 papers reviewed were systematically categorized according to their respective industries: Agriculture, Manufacturing, Hotel, SME, Construction, HR, and Energy. In the agriculture sector, three studies explored the factors influencing the adoption of green innovations (Lioutas & Charatsari, 2017; Da Silva et al., 2023; McCarthy et al., 2016), each providing valuable insights into how sustainable practices are integrated into farming activities. These studies suggest that the adoption of green innovation in agriculture is often influenced by both external factors, such as environmental policy, and internal factors, such as awareness of sustainability among farmers. This highlights the need for capacity-building and knowledge-sharing efforts to support rural communities in implementing eco-friendly practices.

Similarly, three papers focused on green innovation within the manufacturing industry (Ha et al., 2023; Zhang et al., 2020; Mukhtar et al., 2023). These studies collectively examined the drivers and barriers to innovation in manufacturing processes, emphasising key challenges such as cost constraints, technological capability, and regulatory compliance. Given that manufacturing is often resource-intensive and contributes significantly to emissions, the adoption of green practices in this sector is critical for national and global sustainability goals. Thus, it is not surprising that policy pressure and stakeholder expectations are strong drivers in this context.

In the hotel industry, two papers investigated green innovation adoption. Asadi et al. (2020) and Gu (2022) offered perspectives on how environmental initiatives are implemented in hospitality operations. Their findings suggest that hotels often adopt green practices to enhance their brand image, reduce operational costs, and meet rising consumer demand for sustainable services. The growing trend of eco-conscious tourism further supports the integration of environmental policies within hotel management strategies. In the SME (Small and Medium-sized Enterprises) sector, five studies (Jun et al., 2019; Altassan, 2024; Wasiq et al., 2023; Polas et al., 2023) examined various factors influencing green innovation. This

relatively extensive coverage reflects increasing interest in how smaller firms, which make up a significant portion of many economies, can contribute to sustainable development. Despite having limited financial and human resources, SMEs are often agile and responsive to market shifts. These studies revealed that government incentives, consumer pressure, and the perceived competitive advantage associated with green practices serve as major motivators for adoption.

For the construction industry, only one paper was reviewed (Qi et al., 2010). Nevertheless, it provides a valuable contribution by identifying regulatory frameworks and firm-level leadership as essential drivers for adopting sustainable building practices. As construction projects have long-term environmental impacts, this study suggests that aligning industry standards with green policies is essential for encouraging widespread adoption. The HR and energy sectors were each represented by one study. El-Kassar and Singh (2019) explored green innovation through the lens of human resource management, showing that management commitment and employee engagement are central to sustainable organisational change. Meanwhile, Kapoor et al. (2014) examined consumer acceptance of green innovations in the energy sector, highlighting how customer perceptions, cost, and usability influence adoption. These studies underscore the role of internal culture and external market conditions in driving sustainable innovation.

In addition, four papers did not specify a particular industry and were grouped into a general category. These include studies by Jin et al. (2022), Liu (2023), Qi and Yang (2023), and Zhang (2024), which offer broader theoretical insights and cross-sectoral perspectives. Their findings are valuable in shaping universal frameworks for understanding green innovation beyond industry boundaries. Across all sectors, several key factors were repeatedly identified as influencing the adoption of green innovation. Government support and regulatory enforcement emerged as some of the most common drivers, particularly in manufacturing, construction, and SMEs. This highlights the critical role of national policies and institutional frameworks in shaping organisational behaviour. Regulations not only create compliance requirements but also signal long-term sustainability priorities to industries.

Across all sectors, several key factors were repeatedly identified as influencing the adoption of green innovation. Among these, government support and regulatory enforcement emerged as some of the most common and significant drivers, particularly in the manufacturing, construction, and SME sectors. This finding highlights the critical role of national policies and institutional frameworks in shaping organizational behaviour. Notably, regulations not only compel firms to comply but also serve as signals of long-term environmental priorities, thereby encouraging proactive strategic alignment.

In addition to regulatory factors, technological readiness was another frequently cited enabler of green innovation, especially within the agriculture and SME sectors. The availability, affordability, and practicality of technology significantly influence the ease with which organizations can adopt sustainable practices. Moreover, internal factors, particularly those related to organizational structure and human resources, play a vital role. The presence of a supportive organizational culture, committed leadership, and skilled personnel can create a conducive environment for innovation to take root. These internal capabilities often determine whether green innovation initiatives are implemented successfully or remain

aspirational.

Furthermore, market and customer-related factors featured prominently, particularly in studies focusing on manufacturing and SMEs. Growing consumer awareness, demand for eco-friendly products, and competitive pressures are increasingly pushing firms to innovate in alignment with environmental values. In many cases, the market itself acts as a strong catalyst for change, sometimes even more compelling than regulation. Taken together, these findings suggest that the adoption of green innovation is not driven by a single factor but rather by an interplay of external and internal forces. As summarized in Table 2, these multi-dimensional drivers demonstrate the evolving landscape of sustainable innovation across industries, offering valuable insights for both researchers and practitioners.

Analysis of Research Question 3: What theories are commonly used in the study of green innovation adoption?
Based on the pie chart (Figure 2), the two most frequently cited theories in the reviewed studies are the Triple Bottom Line (TBL) Theory and the Resource-Based View (RBV) Theory, with each appearing in two studies. The TBL Theory, as discussed by Qi and Yang (2023) and Jin et al. (2022), emphasises the importance of achieving a balance between social, environmental, and economic factors in driving green innovation. These three dimensions are not only interrelated but also mutually reinforcing, and their integration is considered vital in shaping sustainable business practices that benefit both current and future generations (Elkington, 1998). The holistic nature of TBL makes it highly relevant in the context of green innovation, where sustainability is no longer a separate initiative but a core strategic concern (Tseng et al., 2015).

On the other hand, the Resource-Based View (RBV) explains how firms can gain a competitive advantage by developing resources and capabilities that are valuable, rare, inimitable, and non-substitutable (Barney, 1991; Barney et al., 2001; Sirmon et al., 2011). In the context of green innovation, this theory justifies firms to invest in unique environmental capabilities, such as eco-friendly technologies or sustainable supply chains, as a means to differentiate themselves in the market. By doing so, RBV highlights how internal resource development, when aligned with sustainability goals, can contribute to both organizational performance and environmental responsibility.
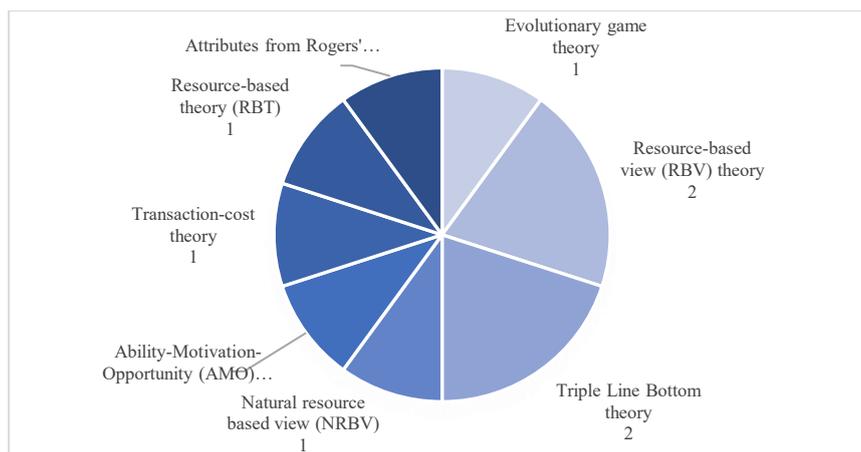
Figure 2 Theories Commonly Used in The Study of Green Innovation Adoption

While the Resource-Based Theory (RBT) has often been applied in green innovation research, scholars have raised concerns regarding its limitations, particularly its lack of emphasis on dynamic environmental changes. This limitation makes it less suitable for addressing evolving ecological challenges that demand flexible and responsive strategies. In response, the Natural Resource-Based View (NRBV) emerged as an extension to RBT, offering a more environmentally attuned perspective. According to Da Silva et al. (2023), NRBV supports the notion that leveraging rare and environmentally responsible resources can enhance both firm competitiveness and ecological performance. This includes efforts such as pollution prevention, sustainable product design, and long-term environmental stewardship.

From the analysis, it is evident that, the increasing use of these theories reflects an important shift in the academic discourse, from viewing sustainability as an external constraint to recognising it as a strategic opportunity for innovation and growth. These frameworks offer researchers and practitioners a structured lens to evaluate how organisations can embed environmental considerations into their core strategies.

Limitation and Future Research

This study has several limitations that must be acknowledged. First, the review was restricted to English-language articles indexed in the Scopus database, which may have excluded valuable research published in other languages or from other reputable databases such as Web of Science or Google Scholar. The exclusive focus on peer-reviewed journal articles also omits insights from industry reports, policy papers, and gray literature that could provide practical perspectives on green innovation adoption. Second, while the review covers multiple industries, the distribution across sectors was uneven. Key sectors such as healthcare, education, transportation, and energy were underrepresented, limiting the generalizability of findings across all industry contexts. Additionally, most of the reviewed studies were concentrated in developed regions, with limited representation from emerging economies, particularly in Africa and Latin America. Third, the heterogeneity in research methodologies and definitions of green innovation across the selected studies poses a challenge in drawing standardized conclusions. The systematic review approach, while methodologically rigorous, is also limited to secondary data and does not capture real-time organizational dynamics.

Future research should address these limitations by broadening the scope to include diverse industrial sectors and geographical regions. Longitudinal and mixed-methods approaches are recommended to better understand the evolving and interactive nature of adoption factors over time. Moreover, emerging technologies such as AI, blockchain, and IoT should be explored in the context of green innovation. Finally, incorporating cultural and institutional contexts into existing frameworks like the Triple Bottom Line (TBL) and Natural Resource-Based View (NRBV) can enhance theoretical robustness and cross-context applicability.

Discussion and Conclusion

The findings from this review highlight that green innovation is a multifaceted concept involving not only technological improvements but also strategic, procedural, and cultural shifts within organizations. Adoption is strongly influenced by both external pressures, such as government policies, stakeholder demands, and market expectations, and internal factors like leadership commitment, organizational culture, and technological readiness. In the Malaysian context, where regulatory enforcement and resources vary across industries, a proactive internal culture and capacity-building become especially critical. Notably, sectors such as manufacturing, SMEs, and agriculture show strong adoption patterns, while industries like healthcare, education, and transportation remain underexplored, indicating potential areas for future research.

Theoretical frameworks such as the Triple Bottom Line (TBL) and Resource-Based View (RBV) remain popular, but their limitations in capturing the dynamic and evolving nature of green innovation are evident. This signals the need to integrate more adaptive theories like the Natural Resource-Based View (NRBV) and dynamic capabilities to reflect real-world complexities. For Malaysia, aligning policy incentives with market-based motivators and grassroots engagement can accelerate adoption. Future research should consider diverse sectors, longitudinal methods, and emerging technologies like AI and IoT to provide a more comprehensive understanding of green innovation adoption in developing economies.

The systematic analysis of 20 core studies in this review offers a comprehensive perspective on the key drivers influencing green innovation adoption across various industries. Four recurring dimensions emerge as critical: (1) government policies and regulatory frameworks, (2) technological capabilities and infrastructure, (3) organisational culture and human resource practices, and (4) market dynamics and consumer demand. These factors are especially prominent in high-impact sectors such as manufacturing, hospitality, SMEs, and agriculture, where achieving sustainability without compromising operational performance is a central concern.

The frequent application of theoretical frameworks like the Triple Bottom Line (TBL) and Resource-Based View (RBV) highlights their value in structuring analysis. However, the growing complexity of sustainability challenges, driven by digital transformation, the circular economy, and climate risks, signals the need for theoretical advancement. Future research should explore the integration of complementary frameworks, such as dynamic capabilities theory or socio-technical systems theory, to better capture the evolving nature of green innovation.

To advance this field, researchers must broaden their scope by including literature beyond Scopus, incorporating regional and sector-specific insights, and engaging with practitioner perspectives. Longitudinal studies and in-depth case analyses are also essential to understand how adoption factors evolve. Moreover, the role of emerging technologies, such as artificial intelligence, blockchain, and IoT, in enabling scalable green solutions warrants focused attention.

Ultimately, green innovation is not just a strategic initiative but a systemic necessity. Realising its full potential requires robust interdisciplinary collaboration, adaptive theoretical models, and context-sensitive empirical research that aligns innovation with sustainability goals. This study contributes meaningfully to both theory and practice. Theoretically, it offers a consolidated view of the multidimensional factors influencing green innovation adoption by synthesising diverse frameworks such as the Triple Bottom Line (TBL), Resource-Based View (RBV), and Natural Resource-Based View (NRBV). By highlighting their strengths and limitations, the review opens up new directions for integrating dynamic and context-sensitive models in future research. Contextually, this study addresses a critical gap by focusing on adoption patterns across various industries, with particular relevance to developing economies like Malaysia. It emphasises the importance of aligning regulatory frameworks with internal organisational readiness and market-driven forces. In doing so, the review not only advances academic understanding but also provides practical guidance for policymakers, industry leaders, and SMEs seeking to embed sustainability more strategically within their operations.

References

Altassan, M. (2024). The moderating mediating model of Green Climate and Green Innovation's effect on environmental performance. *Uncertain Supply Chain Management*, *12*(1), 345–358. https://doi.org/10.5267/j.uscm.2023.9.016

Asadi, S., OmSalameh Pourhashemi, S., Nilashi, M., Abdullah, R., Samad, S., Yadegaridehkordi, E., Aljojo, N., & Razali, N. S. (2020). Investigating influence of Green Innovation on Sustainability Performance: A case on Malaysian Hotel Industry. *Journal of Cleaner Production*, *258*, 120860. https://doi.org/10.1016/j.jclepro.2020.120860

Cao, H., & Chen, Z. (2019). The driving effect of internal and external environment on Green Innovation Strategy-the moderating role of Top Management's environmental awareness. *Nankai Business Review International*, *10*(3), 342–361. https://doi.org/10.1108/nbri-05-2018-0028

Chen, Y. (2011). Green organizational identity: Sources and consequence. *Management Decision*, *49*(3), 384–404. https://doi.org/10.1108/00251741111120761

Chen, Y.-S., Lai, S.-B., & Wen, C.-T. (2006). The influence of Green Innovation performance on corporate advantage in Taiwan. *Journal of Business Ethics*, *67*(4), 331–339. https://doi.org/10.1007/s10551-006-9025-5

Cuerva, M. C., Triguero-Cano, Á., & Córcoles, D. (2014). Drivers of Green and non-green innovation: Empirical evidence in low-tech smes. *Journal of Cleaner Production*, *68*, 104–113. https://doi.org/10.1016/j.jclepro.2013.10.049

Da Silva, A. R., Cirani, C. B., Serra, F. A., Pigola, A., da Costa, P. R., Scafuto, I. C., Ruas, R. L., & Mazieri, M. R. (2023). Determining factors on Green Innovation Adoption: An empirical study in Brazilian agribusiness firms. *Sustainability*, *15*(7), 6266. https://doi.org/10.3390/su15076266

El-Kassar, A.-N., & Singh, S. K. (2019). Green Innovation and organizational performance: The influence of big data and the moderating role of management commitment and HR practices. *Technological Forecasting and Social Change*, *144*, 483–498. https://doi.org/10.1016/j.techfore.2017.12.016

Ge, B., Yang, Y., Jiang, D., Gao, Y., Du, X., & Zhou, T. (2018). An empirical study on Green Innovation Strategy and sustainable competitive advantages: Path and boundary. *Sustainability*, *10*(10), 3631. https://doi.org/10.3390/su10103631

Gu, S. (2022). Green Innovation; a way to enhance economic performance of Chinese Hotels. *International Journal of Innovation Science*, *15*(3), 406–426. https://doi.org/10.1108/ijis-07-2021-0128

Ha, N. M., Nguyen, P. A., Luan, N. V., & Tam, N. M. (2023). Impact of green innovation on environmental performance and financial performance. *Environment, Development and Sustainability*, *26*(7), 17083–17104. https://doi.org/10.1007/s10668-023-03328-4

Jin, C., Shahzad, M., Zafar, A. U., & Suki, N. M. (2022). Socio-economic and environmental drivers of Green Innovation: Evidence from nonlinear ardl. *Economic Research-Ekonomska Istraživanja*, *35*(1), 5336–5356. https://doi.org/10.1080/1331677x.2022.2026241

Jun, W., Ali, W., Bhutto, M. Y., Hussain, H., & Khan, N. A. (2019). Examining the determinants of Green Innovation Adoption in smes: A PLS-SEM approach. *European Journal of Innovation Management*, *24*(1), 67–87. https://doi.org/10.1108/ejim-05-2019-0113

Kapoor, K. K., Dwivedi, Y. K., & Williams, M. D. (2014). Examining consumer acceptance of green innovations using innovation characteristics: A conceptual approach. *International Journal of Technology Management & Sustainable Development*, *13*(2), 135–160. https://doi.org/10.1386/tmsd.13.2.135_1

Lanjouw, J. O., & Mody, A. (1996). Innovation and the international diffusion of Environmentally Responsive Technology. *Research Policy*, *25*(4), 549–571. https://doi.org/10.1016/0048-7333(95)00853-5

Leonidou, L. C., Leonidou, C. N., Fotiadis, T. A., & Aykol, B. (2015). Dynamic capabilities driving an eco-based advantage and performance in Global Hotel Chains: The moderating effect of international strategy. *Tourism Management*, *50*, 268–280. https://doi.org/10.1016/j.tourman.2015.03.005

Lioutas, E. D., & Charatsari, C. (2017). Green innovativeness in farm enterprises: What makes farmers think green? *Sustainable Development*, *26*(4), 337–349. https://doi.org/10.1002/sd.1709

Liu, L. (2023). Green Innovation, firm performance, and risk mitigation: Evidence from the USA. *Environment, Development and Sustainability*, *26*(9), 24009–24030. https://doi.org/10.1007/s10668-023-03632-z

Maasoumi, E., Heshmati, A., & Lee, I. (2020). Green innovations and patenting renewable energy technologies. *Empirical Economics*, *60*(1), 513–538. https://doi.org/10.1007/s00181-020-01986-1

McCarthy, B., Liu, H.-B., & Chen, T. (2016). Innovations in the agro-food system. *British Food Journal*, *118*(6), 1334–1349. https://doi.org/10.1108/bfj-10-2015-0375

Mukhtar, B., Shad, M. K., Woon, L. F., Haider, M., & Waqas, A. (2023). Integrating ESG disclosure into the relationship between CSR and green organizational culture toward Green Innovation. *Social Responsibility Journal*, *20*(2), 288–304. https://doi.org/10.1108/srj-03-2023-0125

Polas, M. R., Kabir, A. I., Jahanshahi, A. A., Sohel-Uz-Zaman, A. S., Karim, R., & Tabash, M. I. (2023). Rural entrepreneurs behaviors towards Green Innovation: Empirical Evidence from Bangladesh. *Journal of Open Innovation: Technology, Market, and Complexity*, *9*(1), 100020. https://doi.org/10.1016/j.joitmc.2023.100020

Qi, G. Y., Shen, L. Y., Zeng, S. X., & Jorge, O. J. (2010). The drivers for contractors' green innovation: An industry perspective. *Journal of Cleaner Production*, *18*(14), 1358–1365. https://doi.org/10.1016/j.jclepro.2010.04.017

Qi, X., & Yang, Z. (2023). Drivers of Green Innovation in BRICS countries: Exploring tripple bottom line theory. *Economic Research-Ekonomska Istraživanja*, *36*(3). https://doi.org/10.1080/1331677x.2022.2150670

Rogers, E. M., Singhal, A., & Quinlan, M. M. (2019). Diffusion of Innovations 1. In *Routledge eBooks* (pp. 415–434). https://doi.org/10.4324/9780203710753-35

Sun, Y., Duru, O. A., Razzaq, A., & Dinca, M. S. (2021). The asymmetric effect eco-innovation and tourism towards Carbon Neutrality Target in Turkey. *Journal of Environmental Management*, *299*, 113653. https://doi.org/10.1016/j.jenvman.2021.113653

Wasiq, M., Kamal, M., & Ali, N. (2023). Factors influencing green innovation adoption and its impact on the sustainability performance of small- and medium-sized enterprises in Saudi Arabia. *Sustainability*, *15*(3), 2447. https://doi.org/10.3390/su15032447

Zhang, S., Yu, Y., Zhu, Q., Qiu, C. M., & Tian, A. (2020). Green innovation mode under Carbon Tax and Innovation Subsidy: An evolutionary game analysis for portfolio policies. *Sustainability*, *12*(4), 1385. https://doi.org/10.3390/su12041385

Zhang, Z. (2024). Green Credit policy, Corporate Social Responsibility and green innovation. *Journal of Business Economics and Management*, *25*(3), 531–552. https://doi.org/10.3846/jbem.2024.21563

Table 2

Factors Influencing Green Innovation Adoption across Different Industries

No	Industry	Article Title	First Author	Factors	Gaps / Limitations	Theory
1	Agriculture	Green Innovativeness in Farm Enterprises: What Makes Farmers Think Green?	Lioutas and Charatsari (2017)	1. Adaptation to the social process of innovation diffusion 2. Environmental concern and Convenience 3. Economic incentives 4. The internal need to pursue change	Future studies are needed to add more factors that can affect farmers' green innovativeness.	Not Specified
2	Agriculture	Determining Factors on Green Innovation Adoption: An Empirical Study in Brazilian Agribusiness Firms	Da Silva et al. (2023)	**1.Technological Factors** • Adoption costs. • Compatibility • Complexity • Relative advantage **2.Organizational Factors.** • Human Resource Quality **Environmental Factors.** • Environmental uncertainty • Government support. • Stakeholder pressure (regulatory bodies, customers, and	Future studies can expand the unit of analysis using larger samples to create complementary quantitative analyses combining quantitative and qualitative techniques.	Natural resource-based view (NRBV) and Resource-based theory (RBT)

				suppliers). • First adopters of green innovation		
3	Agriculture	Innovations in the agro-food system: adoption of certified organic food and green food by Chinese consumers	McCarthy et al. (2016)	1. Demographic factors (gender, presence of children, education, income) 2. Health and environmental reasons	There is a gap in understanding the factors that motivate sustainable consumption specifically in emerging markets like China, as most existing literature has focused on the developed world.	No Specified
4	Manufacturing	Impact of green innovation on environmental performance and financial performance	Ha et al. (2023)	1. Customer pressure 2. Government pressure 3. Government support 4. Market changes	Future research should analyze other factors such as technological or organizational factors, and examine numerous different industries to obtain overall estimations of green innovation.	Not Specified
5	Manufacturing	Green Innovation Mode under Carbon Tax and Innovation Subsidy: An Evolutionary	Zhang et al. (2020)	1. Carbon tax 2. Innovation subsidy 3. Consumer green preference 4. Manufacturers' capabilities of	Future research could extend the model by incorporating government and	Evolutionary game theory

		Game Analysis for Portfolio Policies		absorbing and adopting new technologies	consumer perspectives to construct a three-population evolutionary game model.	
6	Manufacturing	Integrating ESG disclosure into the relationship between CSR and green organizational culture toward green Innovation	Mukhtar et al. (2023)	1. Corporate Social Responsibility 2. Green Organizational Culture	Future empirical studies should consider ESG disclosure as an independent variable with its dimensions to enhance green innovation.	Resource-based view (RBV) theory
7	Hotel Industry	Green innovation: a way to enhance the economic performance of Chinese hotels	Gu (2022)	1. Green organizational culture 2. Green organizational strategies 3. Energy conservations 4. Environmental regulations	Future studies could investigate green practices in SMEs, and add more strategies leading to green innovation.	Transaction-cost theory
8	Hotel Industry	Investigating influence of green innovation on sustainability performance: A case on Malaysian hotel industry	Asadi et al. (2020)	1. Environmental and economic performance	No specific gaps mentioned.	Not Specified
9	SMEs	Examining the determinants of green innovation adoption in SMEs: a PLS-SEM approach	Jun et al. (2019)	1. Organizational and human resource factors 2. Market and customer factors 3. Government support 4. Technological factors	No specific gaps mentioned.	Not Specified

10	SMEs	The moderating mediating model of green climate and green innovation's effect on environmental performance	Altassan (2024)	1.Green HRM	Certain factors hinder sustainable development and organizational performance.	Ability-Motivation-Opportunity (AMO) theory
11	SMEs	Factors Influencing Green Innovation Adoption and Its Impact on the Sustainability Performance of Small- and Medium-Sized Enterprises in Saudi Arabia	Wasiq et al. (2023)	1. Government Support (GS) 2. External Partnership and Cooperation (EPC) 3. Rules and Regulatory Factors (RR) 4. Market and Customer Factors (MC) 5. Organization and Human Factors (OH) 6. Green Innovation Strategy (GIS) 7. Technology Factors (TF)	More research is needed to explore other factors influencing the long-term performance of SMEs.	Not Specified
12	Rural SMEs	Rural entrepreneurs' behaviors towards green innovation: Empirical evidence from Bangladesh	Polas et al. (2023)	1. Environmental concern 2. Perceived ease of use	Further studies should explore how environmental concern affects the link between green innovation strategic behavior and strategic outcomes.	Not Specified
13	Not Specified	Green credit policy, corporate social responsibility and Green innovation	Zhang (2024)	1. Green credit policy (GCP) 2. Corporate social responsibility (CSR)	The relationship between CSR and GI can be further clarified by considering the	Not specified

					institutional and cultural contexts of different countries, which will enhance contributions to sustainable development.	
14	SME in a Low-Tech sector	Drivers of green and non-green innovation: empirical evidence in Low-Tech SMEs	Cuerva et al. (2014)	1. Implementation of Quality Management Systems (QMS) and differentiation	There is a need for a deeper understanding of the factors affecting the adoption of different types of green innovation by SMEs, such as cleaner technologies, environmentally-friendly products, and eco-organizational methods. Future research should focus on developing a more disaggregated database that can explore the specific drivers of various types of eco-innovation.	Not Specified
15	Construction	The drivers for contractors' green	Qi et al. (2010)	1. Government regulations2. Business size	Although existing regulatory	Not Specified

		innovation: an industry perspective			measures are acknowledged, they are not considered stringent enough to be the primary drivers of adopting green construction practices. As a result, both managerial concerns and government regulatory pressures should be utilized as essential and complementary elements to effectively promote and support decision-making related to the adoption of environmental innovation practices.	
16	HR	Green innovation and organizational performance: The influence of big data and the moderating role of management commitment and HR practices	El-Kassar and Singh (2019)	1. Corporate environmental ethics 2. Stakeholders view of green product 3. Demand for green products	The conceptual model did not fully address the breadth of green supply chain management, green human resource management practices, and the social aspects of innovation	Resource-based view (RBV) theory

					and performance. Future research should incorporate both qualitative and quantitative methods to further explore these dimensions within the proposed model. Additionally, a cross-cultural comparative analysis could be conducted to examine variations in these relationships by selecting samples from firms in countries with diverse cultural backgrounds.	
17	Not Specified	Drivers of green innovation in BRICS countries: exploring tripple bottom line theory	Qi and Yang (2023)	1. Social 2. Environmental 3. Economic	Not Specified	Triple Bottom Line Theory (social, environmental, and economic)
18	Not Specified	Green innovation, frm performance, and risk mitigation:evidence from the USA	Liu (2023)	1. CSR-linked compensation 2. CEO Tenure 3. Network Size	Future research should investigate contextual factors that shape green innovation, including	Not Specified

					industry-specifc dynamics and policy frameworks, to gain a more 10 Climate change and environmental degradation are major challenges facing our planet today.	
19	Not Specified	Socio-economic and environmental drivers of green innovation: evidence from nonlinear ARDL	Jin et al. (2022)	1.Environmental, social, and economic factors	Future researchers should explore these relationships in various countries to tailor policies that ensure sustainability. They can also investigate targeted variables in other Asian nations using panel data to broaden the scope of their findings.	Triple Bottom Line (environmental, social, and economic factors)
20	Energy Consumer Behavior	Examining consumer acceptance of green innovations using innovation characteristics: A conceptual approach	Kapoor et al. (2014)	1. Relative Advantage - Rogers (2003)2. Compatibility - Rogers (2003)3. Ease of Use - Davis (1986); Moore and Benbasat (1991)4. Image - Tornatzky and Klein (1982)5. Visibility - Tornatzky and Klein (1982)6. Voluntariness -	The primary limitation of this article is its lack of empirical support. The study largely remains incomplete as it does not provide quantitative evidence from active and potential	Attributes from Rogers' Diffusion of Innovations theory, Tornatzky and Klein's Meta-Analysis, and Moore and Benbasat's Perceived Characteristics of

| | | | | Tornatzky and Klein (1982)7. Result Demonstrability - Moore and Benbasat (1991)8. Social Approval - Tornatzky and Klein (1982)9. Complexity - Rogers (2003)10. Trialability - Rogers (2003)11. Observability - Rogers (2003)12. Cost - Tornatzky and Klein (1982) | consumers of household solar innovations. Future research will focus on applying this conceptual framework to a suitable respondent group to test the proposed propositions and substantiate the arguments with robust statistical findings. | Innovating theory |