INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 14, Issue 2, (2024) E-ISSN: 2222-6990

Exploring the Dynamics of Business Intelligence for Enhanced Green Innovation

Jie Cheng

Faculty of Management, Azman Hashim International Business School, Universiti Teknologi Malaysia, Johor Bahru, 81310, Malaysia, Suzhi Educational Research Centre, School of International Education, Anhui Xinhua University, Hefei, 230088, China

Corresponding Author Email: chengjie@graduate.utm.my

Harcharanjit Singh Mahinder Singh, Ekene Iwuchukwu

Azman Hashim International Business School, Universiti Teknologi Malaysia, Kuala Lumpur, 54100, Malaysia

Email: harcharanjit@utm.my, ekene@graduate.utm.my

Bo Wang

School of Business, Anhui Xinhua University, Hefei, 230088, China;

Email: wangbo04230423@163.com

To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v14-i2/19107 DOI:10.6007/IJARBSS/v14-i2/19107

Published Date: 10 February 2024

Abstract

Amid the growing focus on sustainability, particularly in the realm of green innovation, this study delves into the correlation between business intelligence and the advancement of green innovation. Specifically, it accentuates the moderating role of green information systems. To explore these dynamics, an online questionnaire survey was conducted among ISO 14001-certified manufacturing firms. A total of 275 responses were meticulously analyzed using structural equation modeling. The outcomes highlight the substantial impact of business intelligence on shaping green innovation, showcasing that the interplay between t business intelligence and green innovation is influenced by the existence of green information systems. This research furnishes Malaysian manufacturing firms with critical insights into the foundational components driving green innovation practices.

Keywords: Business Intelligence, Green Information System, Green Innovation

Introduction

The robust manufacturing sector in Malaysia stands as a significant contributor to its economy, society, and environment (Ngu et al., 2020). Delving into Malaysia's manufacturing industry can offer crucial insights for policymakers and stakeholders (Cheng et al., 2023). It enables the enhancement of regulations, the fostering of innovation, the facilitation of

economic growth, and the promotion of sustainability (Ullah et al., 2022). Indeed, evidence underscores the manufacturing industry's underperformance in green innovation (GI) within Malaysia, despite the substantial RM400 billion earmarked for both new and existing projects in line with the Twelfth Malaysia Plan (Farooq et al., 2022). On a global scale, Malaysia's standing in the Global Innovation Index has declined from 33rd in 2020 to 36th in 2021, with no subsequent improvements. Notably, the country has seen a sharper decline in innovation outputs, plummeting from 34th in 2021 to 46th in 2023 (WIPO, 2022). Locally, the Malaysian government recognizes that the nation's competitive edge relies on infrastructure and talent, not primarily on innovation. Therefore, there exists a critical need to fortify and enhance innovation capacity and skills within Malaysia, especially since heightened innovation could accelerate wealth generation.

Despite the urgent need for green innovation, Malaysia's manufacturing sector faces significant hurdles in embracing business intelligence and green information systems (Asadi et al., 2021). This shortfall is primarily due to the lack of accessible business intelligence tools, inadequate investment in technological infrastructure, and outdated information systems within manufacturing entities (Aishah et al., 2022). Consequently, the ineffective integration of business intelligence (BI) and green information systems (GIS) may hinder the comprehensive collection, processing, and analysis of environmental data, thereby restricting the ability to derive actionable insights for driving green innovation.

Amidst a diverse landscape of challenges and opportunities, this study centers on a pivotal research query: "Can business intelligence and green information systems drive green innovation within Malaysian manufacturing firms?" To probe this inquiry, the research extensively examines the direct influence of business intelligence on fostering green innovation. Essentially, the research seeks to explore how the efficacy of green information systems can either enhance or moderate the link between business intelligence and green innovation. With this pursuit, the study aims to offer valuable insights and actionable recommendations for policymakers, industry leaders, and stakeholders engaged in Malaysia's dynamic manufacturing sector.

Theoretical Foundation and Framework

The research's theoretical framework, depicted in Figure 1, involves three primary constructs: business intelligence, green information system, and green innovation. Selecting an appropriate underpinning theory for this study's exploration of the relationships among these constructs should align with the study's central focus, the nature of the constructs involved, and the specific relationships under investigation. Therefore, the resource-based view (RBV) theory appears suitable, emphasizing resources and capabilities as drivers of competitive advantage (Piwowar-Sulej & Iqbal, 2023). In this context, resource-based view tools represent a resource due to their analytical insights, while the green information system embodies a unique capability in managing environmentally focused data and processes (Yang & Zhang, 2023). Resource-based view is a suitable choice as it aligns with the research's aim of emphasizing how these resources and capabilities can lead to advantages in innovation and sustainability within manufacturing companies. Moreover, the resource-based view suggests that it's not solely the resources themselves but their combination and integration that yield a competitive advantage. Integrating business intelligence tools with a green information system enhances the company's capacity to leverage information for green initiatives, establishing a distinctive capability for driving green innovation (Zameer et al., 2022). Furthermore, the resource-based view posits that resources should be unique and not easily

replicable by competitors (Wernerfelt, 1984). The combination of business ntelligence tools with a specialized green information system forms a unique set of capabilities that may not be easily imitated, thereby contributing to a sustained competitive advantage in green innovation (Abu Al-Rejal et al., 2020). This alignment corresponds well with the study's focus on comprehending the role of technology-related resources and capabilities in the era of digital 4.0.

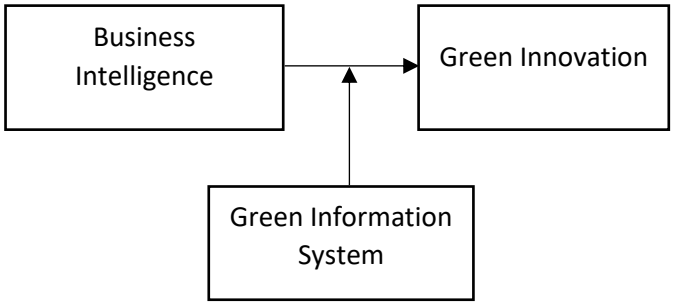


Figure 1: Theoretical framework

Hypotheses Development

Business Intelligence

Business intelligence encompasses technologies, processes, and strategies utilized to gather, analyze, and present data, supporting organizations in making informed business decisions (Cheng et al., 2023). In the context of ISO 14001-certified manufacturing firms in Malaysia, business intelligence can substantially contribute to various facets of green innovation within an organization through several means. Firstly, business intelligence aids in the collection and analysis of consumer behavior and preferences associated with green products (Zameer et al., 2022). This information is instrumental in crafting new eco-friendly products that align with market demands. Analyzing market trends using business intelligence enables companies to pinpoint gaps and opportunities for developing and launching green products that meet customer requirements (Hassani et al., 2023). Secondly, business intelligence tools are instrumental in evaluating current processes, and identifying inefficiencies, energy consumption, or waste generation. Companies can utilize these insights to innovate and optimize processes, thereby reducing their environmental impact. Data-driven analysis fosters a culture of ongoing process improvement, enabling companies to consistently refine and enhance operations toward more eco-friendly practices (Ahmad & Akbar, 2021). Thirdly, business intelligence aids research and development (R&D) endeavors by offering insights into market demands, consumer preferences, and emerging technologies. This support is instrumental in the development of innovative, sustainable technologies. Business intelligence guides decision-making regarding technology adoption, favoring green technologies and advancements that endorse environmental sustainability (Daradkeh, 2022). Furthermore, business intelligence assists in market segmentation and understanding specific groups of environmentally conscious consumers. This capability enables companies to tailor their marketing strategies to resonate with these consumer groups. Business intelligence is pivotal in pinpointing new market opportunities for green products and services, facilitating expansion into previously untapped eco-friendly markets (Eidizadeh et al., 2017). Finally, business intelligence can catalyze a cultural shift within the organization by delivering insights and data that advocate for a more environmentally conscious mindset and practice. Through business intelligence, companies can gather feedback and insights from employees, fostering

a culture of sustainability and utilizing innovative ideas to instill environmental consciousness within the organization (Niwash et al., 2022). Overall, business intelligence stands as a pivotal instrument for comprehending data, market trends, consumer behavior, and process efficiencies, steering decision-making, and fostering innovation across multiple dimensions of green initiatives within an organization (Tamjid Pamchelo et al., 2022). The more deeply manufacturing companies engage in business intelligence activities, the greater their likelihood of experiencing heightened green innovation. Therefore, the initial hypothesis is proposed:

Hypothesis 1: Business intelligence is positively related to green innovation.

Green Information System

The association between business intelligence and green product innovation can be influenced by the existence and effectiveness of a green information system. The green information system acts as an enabling factor that has the potential to bolster and fortify the link between business intelligence and green innovation through diverse mechanisms. For instance, the green information system has the capability to streamline and augment the integration of data pertaining to environmental factors (Trieu et al., 2022). It ensures that data gathered via business intelligence tools precisely aligns with the organization's green initiatives, delivering more precise and pertinent information for driving green product innovation. Secondly, the integration of a green information system with business intelligence tools furnishes specialized analytical capabilities for environmental and sustainability-related data. This integration ensures more precise data analysis, facilitating tailored decision-making for green innovation (Mohammad et al., 2022). Thirdly, a green information system serves as a filter or guide for leveraging business intelligence insights, guaranteeing alignment with green innovation strategies. It directs business intelligence tools towards sustainability and green product development (Chen et al., 2023). Moreover, by moderating the relationship between business intelligence and green innovation, a green information system guides resource allocation specifically towards green product development, enhancing the application of business intelligence insights to support eco-friendly product innovation (Ahmad & Akbar, 2021). Lastly, the green information system ensures that insights from business intelligence tools align with the organization's green innovation goals, steering innovative efforts toward environmental sustainability (Nanath & Pillai, 2017). In essence, the integration of a green information system with business intelligence tools amplifies the efficacy and applicability of data used for green product innovation (Muntean, 2018). The moderating function of the green information system ensures that the insights and analyses derived from business intelligence are directed and fine-tuned to distinctly propel green innovation within the organization. A robust implementation of a green information system is anticipated to fortify the connection between business intelligence and green innovation. Hence, the hypothesis put forward is:

Hypothesis 2: The relationship between business intelligence and green innovation is moderated by green information system.

Methodology

To accomplish its research aims, this study utilized quantitative research methods to meticulously scrutinize data obtained from a cross-section of ISO14001-certified Malaysian

manufacturing companies deeply engaged in green initiatives. Employing a quantitative approach, particularly an online survey questionnaire, enabled robust statistical analyses and hypothesis testing, facilitating the systematic exploration of the research objectives (Vehovar & Manfreda, 2017). Online survey questionnaires provide a practical, cost-effective, and efficient means of collecting data and insights, making them a prevalent choice in contemporary research methodologies. Additionally, online survey questionnaires provided a comprehensive understanding of respondents' perceptions, attitudes, and practices, rendering them an optimal selection for investigating factors interlinked with green innovation (Nardi, 2018).

Choosing owners/managers as respondents ensures that the online survey encompasses insights from individuals wielding authority, possessing extensive knowledge, and playing a pivotal role in steering and executing green innovation strategies within Malaysian manufacturing companies (Jaish et al., 2023). Their insights and perspectives are vital for comprehending organizational strategies, policies, and innovation implementation. Owners/managers are instrumental in providing a high-level perspective on green innovation initiatives, setting innovation targets, and guiding the overall strategic direction of the organization.

The practical method of leveraging items from pre-existing studies to construct a survey questionnaire offers efficiency, credibility, and a solid groundwork for gathering data in new research undertakings (Fife-Schaw, 1995). Incorporating established items from prior studies enhances the consistency and quality of the collected data, particularly valuable in cross-cultural and comparative studies, as it provides standardized and validated measures across diverse settings or study samples. In this research, the assessment of business intelligence utilized a five-item scale (Niwash et al., 2022) while the evaluation of the green information system employed a six-item scale (Liu et al., 2018). Furthermore, a five-item scale was utilized to gauge green innovation (Zhou et al., 2020).

Results

Out of the distributed surveys, 275 responses were considered for analysis, reflecting a noteworthy effective response rate of 56.35%. The majority of respondents were affiliated with the food and beverage sector, with a preference for privately owned businesses. The study highlighted that a considerable percentage of participating companies had a significant operational history, existing for over 21 years, employing over 200 individuals, and generating an annual turnover exceeding 15 million ringgits.

Measurement Model

The measurement model went through a comprehensive assessment, including the appraisals of construct validity and reliability, as well as a discriminant validity analysis, carried out using SmartPLS V.4. As shown in the illustration (Figure 2) and described within the associated table (Table 2), all constructs revealed strong item loadings, surpassing the threshold of 0.7. Moreover, these constructs displayed favorable internal consistency by exceeding Cronbach's alpha values of 0.7. Further affirming the robustness, the composite reliability scores were over 0.8, reflecting high reliability, while the average variance extracted values surpassed 0.5, denoting robust discriminant validity.

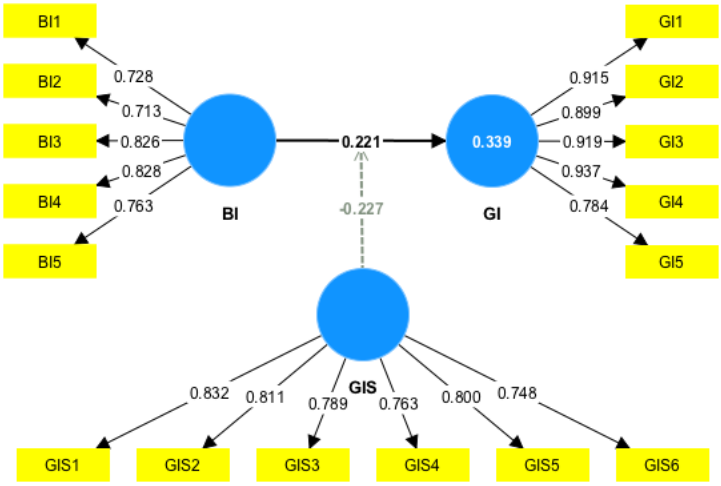


Table 2
Construct validity and reliability

Construct	Item Code	Item Loading	Cronbach Alpha (α)	CR	AVE
BI	BI1	0.728	0.838	0.881	0.598
	BI2	0.713			
	BI3	0.826			
	BI4	0.828			
	BI5	0.763			
GI	GI1	0.915	0.935	0.951	0.796
	GI2	0.899			
	GI3	0.919			
	GI4	0.937			
	GI5	0.784			
	GI6	0.915			
GIS	GIS1	0.832	0884	0.909	0.626
	GIS2	0.811			
	GIS3	0.789			
	GIS4	0.763			
	GIS5	0.800			

The findings depicted in Table 3 reveal that all item loadings for the constructs were above the cross-loading values, signifying no problem related to cross-loading. Additionally, Table 4 highlights that the square root of the average variance extracted (AVE) for each variable surpassed the correlation with others, confirming no issues related to the Fornell–Larcker criterion. Moreover, the ratios of heterotrait-monotrait correlations in Table 5 were above 0.85 for all variables. Consequently, these three tests collectively indicated no concerns about discriminant validity.

Table 3
Cross loadings

	BI	GI	GIS	GIS x BI
BI1	0.728	0.19	0.383	-0.133
BI2	0.713	0.212	0.301	-0.069
BI3	0.826	0.306	0.441	-0.117
BI4	0.828	0.421	0.578	-0.325
BI5	0.763	0.359	0.369	-0.028
GI1	0.377	0.915	0.444	-0.382
GI2	0.334	0.899	0.461	-0.426
GI3	0.369	0.919	0.424	-0.44
GI4	0.423	0.937	0.479	-0.434
GI5	0.331	0.784	0.444	-0.269
GIS1	0.326	0.34	0.832	-0.445
GIS2	0.318	0.313	0.811	-0.398
GIS3	0.327	0.32	0.789	-0.332
GIS4	0.382	0.319	0.763	-0.403
GIS5	0.619	0.54	0.8	-0.382
GIS6	0.512	0.447	0.748	-0.327
GIS x BI	-0.191	-0.439	-0.48	1

Table 4
Fornell–Larcker criterion

Construct	BI	GI	GIS
BI	0.773		
GI	0.413	0.892	
GIS	0.556	0.505	0.791

Table 5
Heterotrait-monotrait ratio of correlations

Construct	BI	GI	GIS	GIS x BI
BI				
GI	0.431			
GIS	0.578	0.525		
GIS x BI	0.189	0.453	0.51	

Structural Model

Upon evaluating the measurement model using Smart PLS V.4, bootstrapping was conducted to test all three research hypotheses. The result of path coefficients was presented in Figure 1, while Table 7 illustrated the t-statistics and p-value. In the structural model of this research, H1 displayed a path coefficient of 0.221, a t-value of 3.717, and a p-value of 0.000. With the p-value being less than 0.05, H1 was affirmed. As per the outcomes of the

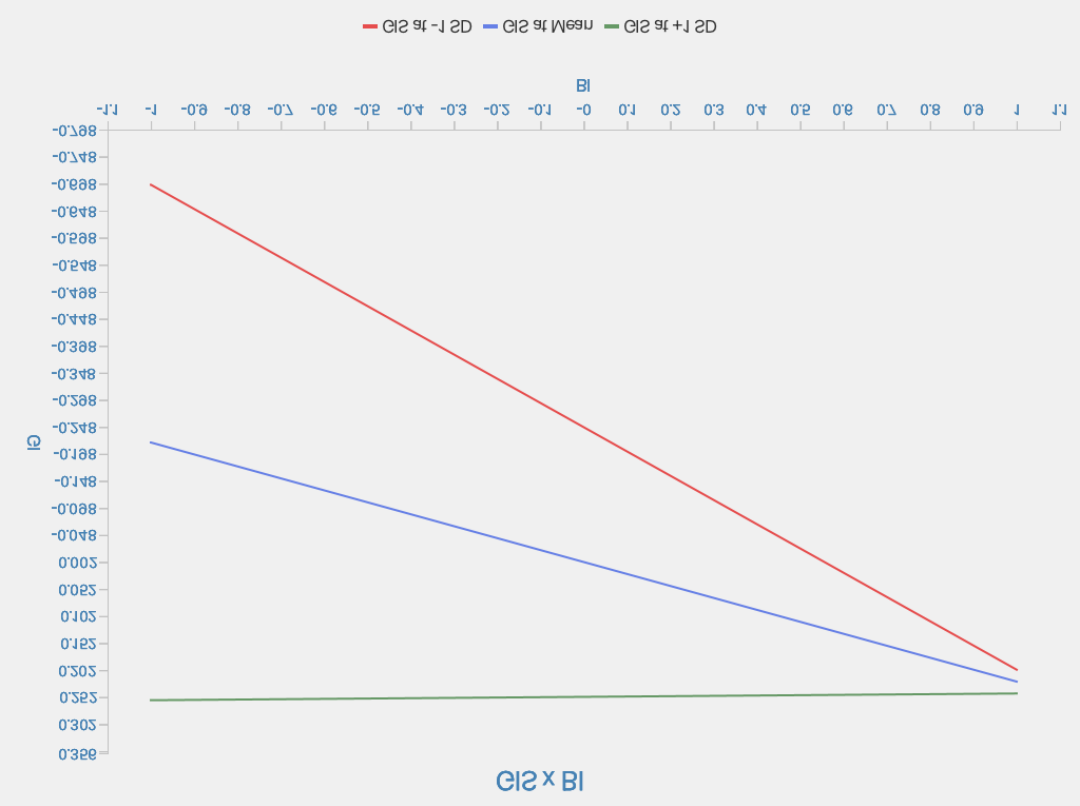
moderation analysis, H2 demonstrated a path coefficient of 0.227, a t-value of 4.074, and a p-value of 0.000. With the p-value being under 0.05, H2 was confirmed.

Table 7
Direct effect and moderating effect

H	Relationship	Standard Deviation (STDEV)	*t*-Statistics	*p*-Value	Decision
H1	BI → GI	0.06	3.717	0	supported
H2	GIS → GI	0.071	3.508	0	supported
H3	GIS x BI → GI	0.056	4.074	0	supported

The coefficient of determination (R^2) demonstrates that the proposed research model holds a moderate level of explanatory power concerning green innovation. Specifically, the model's predictive capability accounts for approximately 33.9% of the variance in green innovation. Nonetheless, it's crucial to acknowledge that 66.1% of the variation in green innovation is due to other unidentified factors, highlighting the influence of other variables on this result. Figure 2 visually demonstrates the role of the green information system in shaping the connection between business intelligence and green innovation. It illustrates a strengthened interaction wherein both the independent and moderating variables mutually influencing the dependent variable, resulting in an effect greater than mere additive impact. This infers that when the green information system is at higher levels, the connection between business intelligence and green innovation gets stronger. At lower levels of the green information system, on the contrary, the influence of business intelligence on green innovation decreases.

Figure 2
Interaction plot of GIS x BI



Discussion

H1 hypothesized a positive link between business intelligence and green innovation, which is consistent with earlier research (Hassani et al., 2023). This emphasizes the importance of investing in business intelligence practices, especially in fostering green innovation. According to the research findings indicating a positive link between business intelligence and green innovation, it is recommended for Malaysian manufacturers to consider investing in business intelligence. Such an investment holds the potential to enhance and promote green innovation practices. Prior to making any investment in business intelligence, a comprehensive analysis of the company's individual context is crucial. This includes an assessment of the company's current sustainability initiatives, available resources, existing business intelligence infrastructure, and the potential costs and benefits associated with adopting or extending business intelligence capabilities. This thorough analysis will ensure the decision aligns with the company's overall sustainability strategy and objectives. Moreover, it's crucial that the implementation of business intelligence is in harmony with the company's broader sustainability strategy and objectives. Aligning the data collected and insights obtained through business intelligence with the organization's sustainability goals is essential. This cohesion ensures that the derived data and analytics effectively support and strengthen the company's sustainability initiatives.

H2 proposed that the green information system moderates the connection between business intelligence and green innovation, a discovery consistent with an earlier study (Trieu et al., 2022). The findings substantially affirm the green information system's role as a moderator in the connection between business intelligence and green innovation. This emphasizes the need for Malaysian manufacturing companies to improve the effectiveness of their green information systems, ultimately benefiting their green innovation endeavors. Yet, aligning the choice to invest in a green information system with the distinct requirements

of each manufacturing company in Malaysia and ensuring a well-structured execution is vital. A strategic and well-executed implementation plan optimizes the system's effectiveness in supporting sustainability and green innovation initiatives. This encompasses aspects such as training, data integration, and adaptability to the company's operations. Additionally, integrating the green information system with business intelligence tools is a pivotal component of the comprehensive assessment and implementation strategy, ensuring alignment and effectiveness in supporting sustainability initiatives. This approach maximizes the system's effectiveness in backing sustainability and green innovation initiatives, ensuring it meets the company's distinct objectives and challenges.

Conclusion, Limitations, and Future Directions

The outcomes of this research reveal a nuanced connection between business intelligence and the facilitation of green innovation, underscoring the crucial role played by green information systems as a moderator in this association. The employment of business intelligence tools, particularly when guided and bolstered by a strategically integrated green information system, demonstrates a favorable impact on the initiation and advancement of environmentally conscious and innovative practices within Malaysia's manufacturing sector. The study suggests that the strategic adoption of business intelligence, moderated by the specialized functionality of green information systems, can significantly influence the development and implementation of green innovation initiatives. The analytical and data-driven capabilities of business intelligence, when complemented by the eco-focused infrastructure and support of green information system, demonstrate the potential to drive sustainable strategies, product innovation, process efficiency, technology development, and market positioning geared towards sustainability.

The research significantly contributes to practical application and theoretical frameworks by empirically examining and validating the relationship between business intelligence, green information systems, and green innovation within the specific context of the Malaysian manufacturing industry. Moreover, the incorporation of green information system as a moderator enriches the understanding of how technology, particularly eco-focused systems, moderates the relationship between data-driven insights and the emergence of sustainable innovations. Furthermore, practical insights derived from the study can offer essential guidance for implementing business intelligence and green information systems within manufacturing settings. These insights can provide strategies to optimize these technologies, promoting the development of sustainable innovations. Implementing the research's recommendations could potentially grant companies a competitive edge by merging data-driven decision-making with environmentally focused technologies, fostering green innovation. Additionally, the study contributes to the practical implementation of sustainability principles within industrial environments, enabling companies to bolster their environmental responsibility through informed strategies and innovations.

Finally, it's important to acknowledge the limitations of this research. Relying on survey-based data collection can introduce response biases, and the reliability of self-reported measures might have limitations. Incorporating different data collection approaches, such as interviews or observations, could provide supplementary and potentially more robust insights. Likewise, this research is confined to a specific timeframe, and advancements in technology or alterations in sustainability practices could have transpired since the data collection, potentially impacting the applicability of the findings. Additionally, external variables not considered in the study, like economic fluctuations, global market changes, or

unforeseen environmental factors, might exert an influence on the observed relationships. Future studies in the Malaysian manufacturing sector could explore the influence of green digital learning orientation on green innovation, focusing on potential moderators between business intelligence and green innovation. Further investigation could delve into specific types of Green Innovation influenced by the application of business intelligence and green information systems, such as eco-design, the adoption of renewable energy, waste reduction strategies, or practices for sustainable supply chains.

Author Contributions: Conceptualization, investigation, and writing, J.C.; Data collection, H.S.M.S. and S.S. L.; Funding, M.J.W.
Funding: University-Industry collaborative education project, No.220903711211614; Science and technology innovation project, No. S202212216163, S202212216174.
Conflicts of Interest: The authors declare no conflict of interest.

References

Abu Al-Rejal, H. M. E., Udin, Z. M., Hassan, M. G., Sharif, K. I. M., Al-Rahmi, W. M., & Al-kumaim, N. H. (2020). Green Information Technology Adoption Antecedence: A Conceptual Framework. In F. Saeed, F. Mohammed, & N. Gazem (Eds.), *Emerging Trends in Intelligent Computing and Informatics,* 1073, 1098–1108). Springer International Publishing.

Ahmad, T., & Akbar, A. (2021). Role of Information System Strategies, Business Intelligence and Analytics used to Enhance Firm Performance: Mediating role of Innovation Ambidexterity. *Journal of Digitovation and Information System*, *1*(2), Article 2.

Aishah, R. S., Chew, B. C., & Saptari, A. (2022). A PROCESS OF ADOPTING GREEN INFORMATION TECHNOLOGY IN MALAYSIA. *Suranaree Journal of Science & Technology*, *29*(4).

Asadi, S., Nilashi, M., Samad, S., Rupani, P. F., Kamyab, H., & Abdullah, R. (2021). A proposed adoption model for green IT in manufacturing industries. *Journal of Cleaner Production*, *297*, 126629.

Bany Mohammad, A., Al-Okaily, M., Al-Majali, M., & Masa'deh, R. (2022). Business Intelligence and Analytics (BIA) Usage in the Banking Industry Sector: An Application of the TOE Framework. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(4), 189.

Chen, Z., Zhao, J., & Jin, C. (2023). Business intelligence for Industry 4.0: Predictive models for retail and distribution. *International Journal of Retail & Distribution Management*.

Cheng, J., Singh, H. S. M., Zhang, Y.-C., & Wang, S.-Y. (2023). The impact of business intelligence, big data analytics capability, and green knowledge management on sustainability performance. *Journal of Cleaner Production*, 139410.

Daradkeh, M. (2022). Innovation in Business Intelligence Systems: The Relationship Between Innovation Crowdsourcing Mechanisms and Innovation Performance. *International Journal of Information Systems in the Service Sector (IJISSS)*, *14*(1), 1–25.

Eidizadeh, R., Salehzadeh, R., & Chitsaz Esfahani, A. (2017). Analysing the role of business intelligence, knowledge sharing and organisational innovation on gaining competitive advantage. *Journal of Workplace Learning*, *29*(4), 250–267.

Farooq, M., Cheng, J., Khan, N. U., Saufi, R. A., Kanwal, N., & Bazkiaei, H. A. (2022). Sustainable Waste Management Companies with Innovative Smart Solutions: A Systematic Review and Conceptual Model. *Sustainability*, *14*(20), 13146.

Fife-Schaw, C. (1995). Questionnaire design. *Research Methods in Psychology*, 174–193.

Hassani, A., Halbusi, H. A., Hassani, A., & Halbusi, H. A. (2023). *Business Intelligence: An Important Tool to Develop Dynamic Capabilities and Sustainable Innovation in the Digital Age*. IntechOpen.

Jaish, A. A., Murdipi, R., Razak, D. A., & Alwi, N. Mohd. (2023). The Impact of Digitalization Towards the Sustainability of Malaysian SMEs: The Dynamic Capabilities Perspective. In A. Hamdan, A. Harraf, A. Buallay, P. Arora, & H. Alsabatin (Eds.), *From Industry 4.0 to Industry 5.0* (Vol. 470, pp. 3–12). Springer Nature Switzerland.

Liu, Z., Wang, H., & Li, P. (2018). The antecedents of green information system and impact on environmental performance. *International Journal of Services, Economics and Management*, *9*(2), 111.

Muntean, M. (2018). Business intelligence issues for sustainability projects. *Sustainability*, *10*(2), 335.

Nanath, K., & Pillai, R. R. (2017). The Influence of Green IS Practices on Competitive Advantage: Mediation Role of Green Innovation Performance. *Information Systems Management*, *34*(1), 3–19.

Nardi, P. M. (2018). *Doing survey research: A guide to quantitative methods*. Routledge.

Ngu, H. J., Lee, M. D., & Osman, M. S. B. (2020). Review on current challenges and future opportunities in Malaysia sustainable manufacturing: Remanufacturing industries. *Journal of Cleaner Production*, *273*, 123071.

Niwash, M. N. K., Cek, K., & Eyupoglu, S. Z. (2022). Intellectual Capital and Competitive Advantage and the Mediation Effect of Innovation Quality and Speed, and Business Intelligence. *Sustainability*, *14*(6), 1–21.

Paulino, E. P. (2022). Amplifying organizational performance from business intelligence: Business analytics implementation in the retail industry. *Journal of Entrepreneurship, Management and Innovation*, *18*(2), 69–104.

Piwowar-Sulej, K., & Iqbal, Q. (2023). Leadership styles and sustainable performance: A systematic literature review. *Journal of Cleaner Production*, *382*, 134600.

Tamjid Pamchelo, A. R., Khakpour, M., & Kiani, K. (2022). Analyzing the Impact of Business Intelligence Capacity, Network Learning, and Innovation on the Performance of Startups. *Journal of Executive Management*, *14*(27), 257–275.

Trieu, V. H., Burton-Jones, A., Green, P., & Cockcroft, S. (2022). Applying and Extending the Theory of Effective Use in a Business Intelligence Context. *MIS Quarterly: Management Information Systems*, *46*(1), Article 1.

Ullah, S., Khan, F. U., & Ahmad, N. (2022). Promoting sustainability through green innovation adoption: A case of manufacturing industry. *Environmental Science and Pollution Research*, 1–21.

Vehovar, V., & Manfreda, K. L. (2017). Overview: Online surveys. *The SAGE Handbook of Online Research Methods*, 143–161.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, *5*(2), 171–180.

WIPO. (2022). *Global Innovation Index 15th Edition*.

Yang, H., & Zhang, L. (2023). Research on the evaluation of green innovation ability of resource-based enterprises based on digital technology. *Optik*, *273*, 170406.

Zameer, H., Wang, Y., Yasmeen, H., & Mubarak, S. (2022). Green innovation as a mediator in the impact of business analytics and environmental orientation on green competitive advantage. *Management Decision*, *60*(2), 488–507.

Zhou, M., Govindan, K., & Xie, X. (2020). How fairness perceptions, embeddedness, and knowledge sharing drive green innovation in sustainable supply chains: An equity theory and network perspective to achieve sustainable development goals. *Journal of Cleaner Production*, *260*, 120950.