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Resource Commitments for Technology-Deployments to Boost Corporate Sustainability

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Abstract

The manufacturing industry is infamous for its detrimental environmental effects resulting from the extensive utilization of natural resources as well as the emission of hazardous chemicals. Considering the growing concern of both governmental bodies and customers regarding environmental sustainability, it is imperative for organizations to address these concerns and improve their bottom-line performance by implementing Green Supply Chain Practices (GSCP) coupled with novel technological advancements such as blockchain technology (BCT). However, the successful integration of innovative technologies and the adoption of green practices necessitate the backing of resource management to ensure the efficient execution of operations. Therefore, this research aims to identify the direct influence of resource management on the successful implementation of block chain technology (BCT) for green SC operations and firms bottom line performance. A total of 127 Malaysian Electrical and Electronics firms were surveyed using a close-ended questionnaire to gather data. This study utilizes partial least squares-based structural equation modeling (PLS-SEM) to analyze the relationships. In doing so, the test results demonstrate the positive relationship between resource commitment, blockchain technology (BCT), Green SCP and Corporate sustainability. The research findings indicate the positive impact of resource commitments in implementing blockchain technology for green SC practices and corporate sustainability. Furthermore, the findings also support the mediating effect of green SC practices in association between BCT and corporate sustainability.

Keywords: technological innovation; blockchain technology; corporate sustainability; green practices; resource commitment.

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1 Introduction

The organizational efforts in the context of green manufacturing required proof for consumers to witness the true value addition of sustainability. In this regard, technology plays a vital role in providing the required proof (Rehman-Khan et al., 2021). By implementing new technology, such as blockchain technology, the identification and classification of different parties engaged transactions is recorded and each stage of the supply chain is tracked, including the procurement of primary materials, manufacturing, transporting, and the final deliveries (Hader et al., 2022) which in turn improve the effectiveness of performance indicators within the supply chain (Hastig & Sodhi, 2020). Blockchain technology can contribute to the development of a secure and green supply chain through the integration and traceability of products via a transparent audit trail (Rehman-Khan et al., 2021). Traceability employed in the supply chain sector is the ability to identify prior and current storage locations and records of product retention. This includes tracking products as they move through complex processes, from raw materials to distributors and customers, after passing through many geographic zones (Hader et al., 2022; Ahmed & MacCarthy, 2023). Thus, we aim to analyze the influence of blockchain technology on the green supply chain practices.

Green supply chain practices are likely to influence the sustainability practices of the company as it could influence the effective utilization of the resources, energy consumption, and saving on many other fronts. Excessive pollution can be caused by inefficient logistics management, which can lead to more energy, waste, and greenhouse gas emissions. Moreover, green logistics management strategies improve societal safety and satisfy environmental expectations for stakeholders, thus, their incorporation is important for the purpose of this research (Demir et al. 2015). Existing literature has provided evidence related to green supply chain and sustainability; however, they have provided mixed evidence related to this which requires providing further evidence about it (Hejazi, Al Batati, and Bahurmuz 2023). Hejazi et al. (2023) provide valuable insights into the influence of GSCM on sustainable performance but focus primarily on specific dimensions of this relationship, leaving important gaps related to other potential influencing factors. In response to this limitation, as well as the call for more comprehensive evidence, this research seeks to expand on prior studies by exploring not only the direct relationship between GSCM practices and sustainability performance but also the driver and moderating factors that may affect this relationship. By doing so, we aim to provide a more holistic understanding of how green supply chain initiatives can drive corporate sustainability. Thus, the second objective of this research is to understand the influence of green supply chain practices on the sustainable performance of firms.

The impact of extended supply chains on the environment is observed as the global ecosystem is confronted with an extensive range of sustainability challenges (Arora & Mishra, 2019; Khan et al., 2023b). It is not feasible to depend just on a certain domain or industry for the resolution of this matter. Alignment is required in all domains, encompassing resource commitment for the adoption of block chain technology. Resources commitment ensures that organizational assets are at the disposal for the successful completion of a project (Sahoo et al., 2022). Resource commitment facilities efficient availability, allocation and disbursement of IT resources (Mao et al., 2016) which is required for the purpose of adoption of technologies effectively. Thus, this research aims to examine the influence of resource commitment on the adoption of block chain technology for green supply chain management which ultimately translates to sustainable performance of the firms.

This research focused on the context of a Malaysian electric manufacturing sector which is recognized as an essential sector to contribute in terms of economic development of the country. Malaysian electric and electronic sector is a key hub in the global electronics supply network where demand for clear evidence of sustainable practices is increasingly critical. This necessity stems from the sector's substantial role in supplying electronic goods and components worldwide, coupled with a rising global consciousness regarding environmental issues. Blockchain technology offers a promising solution for Malaysian manufacturers to credibly demonstrate their commitment to reducing environmental impacts across various stages, including procurement, production, and logistics. Specifically, blockchain's capability for detailed tracking facilitates the authentication

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of sustainably sourced raw materials (Kamble et al., 2020), the verification of reduced energy consumption and waste in production processes (Hastig & Sodhi, 2020), and the assurance of fair labor practices providing Malaysian companies with the means to validate their green initiatives to international partners. Moreover, the traceability enabled by blockchain ensures accountability, offering a mechanism to address any environmental or social concerns that arise (Thompson & Rust, 2023), thus maintaining Malaysia's esteemed position in the global market. By embracing blockchain to authenticate sustainability efforts, the Malaysian electric and electronics industry can build trust and credibility, enhancing its position in the burgeoning market for environmentally friendly electronic products (Mubarik et al., 2021). Blockchain's role in ensuring transparency and traceability is instrumental in advancing Malaysia's competitive stance in sustainable practices within the international electronics supply chain. Nevertheless, the implementation of Blockchain is limited in the industry and the existing literature lacks a comprehensive and systematic assessment of critical factors such as resources management and the role of top management in the implications of blockchain technology for green supply chain management (GSCM) (Khan et al., 2021; Mubarik et al., 2021).

This research makes three important contributions to the literature on green supply chain management practices. Firstly, it provides valuable insights regarding the influence of resource commitments for the adoption of emerging technologies which are essential in transitioning to sustainable practices. Secondly, this research provides additional evidence related to the influence of adoption of block chain technologies on different practices of green supply chain management. Thirdly, this research delineates the mechanism and elucidates the mediating influence of the green supply chain practices on the relationship between block chain technology and corporate sustainability. Moreover, this research provides important evidence in the context of Malaysian electric and electricity sector which is quite important in terms of its contribution to economic growth and contribution to environmental goals.

The remainder of the chapter is organized as follows: in the next section conceptual background of the study is presented followed by hypothesis development. It is followed by a discussion on methodology and then data analysis and findings are shared. Finally, a discussion on the findings is presented followed by concluding thoughts.

2 Literature Review

2.1 Theoretical Foundations and Research Framework

This research employs contingency theory to evaluate the management role in technology adoption and the impact of GSCMP on corporate sustainability. The contingency theory developed by Lawrence and Lorsch (1967) suggests that organizational effectiveness results from or contingent upon some critical factors (such as management decision to implement technology). The contingency is defined as a variable that moderates the effect of an organization’s characteristics on organizational performance (Donaldson, 2001; Ifinedo, 2006). In applying contingency theory, we emphasize that resource commitment functions as a key contingent factor, where its effectiveness in driving corporate sustainability is highly dependent on the level of top management support. Specifically, the allocation of resources towards sustainable initiatives is not uniformly beneficial; rather, it is contingent upon the strategic priorities set by top leadership.

In the context of this research, the role of the management in implementing Blockchain technology for effective green SCP and the resulting impact on firms social, environmental, and economic performance is investigated. Blockchain technology is gaining widespread application due to its potential for enhancing supply chain visibility, digitization, security, reducing cost

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of SC management and information sharing (Bag et al., 2020). In a Deloitte survey, 53% of respondents already view Blockchain technology as a critical for their organizations (Deloitte, 2019). Blockchain technology has a potential to improve, revise and restructure the processes and working relationships between supply chain partners (Queiroz & Fosso Wamba, 2019). Therefore, facilitating the implementing of green practices in the supply chain.

Similar to any other change-related initiatives, the implementation and success of this new technology are contingent upon the role and support of management (Nah & Delgado, 2006). Rauniar et al, (2023) suggest that resources commitment is one of the most important critical factors in information technology implementation. Furthermore, literature review suggests the importance of management support through information technology-related initiatives (Mabert et al., 2003). The availability and involvement of management ensures that resources are available for the successful implementation of new technologies such as Blockchain technology (Ali & Miller, 2017). Once implemented, the Blockchain plays an effective role in propagating green supply chain initiatives and implementation of sustainable practices between supply chain partners across the supply chain (Mubarik et al., 2021). GSCM benefits from Blockchain through integration of entities and processes in a secure, reliable and trusted way. This in turn impacts productivity due to enhanced real-time information sharing, security and improved processes (Mubarik et al., 2021) resulting in improved social, environmental and economic performance.

2.2 Hypotheses Development

2.2.1 Resources Commitment and Blockchain Technology

Resource Commitment refers to how management assigns an organization's assets, both intangible and tangible, to ensure optimal operation and profitability while sustaining a viable business model for particular market segments (Sahoo et al., 2022). Barney (1991) defines organizational resources (OR) as the assets and resources managed or employed by an organization to set and execute plans that enhance efficacy and effectiveness. Therefore, the company must provide essential support and re-sources for the successful adoption of advanced technology. Consequently, the management of SC poses several challenges and requires the constant supervision of managers to closely monitor multitude of aspects to ensure transparency and accessibility among all tiers in supply chain (Chang et al., 2022).

Kulkarni & Patil (2020) proposed support from top management, learning culture, cost, market dynamics, consumer readiness, competitive environment, and regulatory framework shapes determine the adoption of BCT. Malik et al, (2021) contextualized the above-mentioned factors in Technological, Organizational and Environmental forces shaping the BCT adoption in various industries. Research on BCT adoption in Wine Industry, reveals that adoption of this technology is helpful in brand management and ensures customer's trust (Agostinelli and Gilli, 2022). While Silvestri et al. (2023) see adoption and execution of BCT as unique resource helping firms in formation of unique capabilities leading to competitive advantage. However, BCT adoption and execution needs serious resource commitment from the firm, Guan et al., (2023) suggest that supply chain alignment enhance BCT adoption, however, resource constrained firms do not have the capacity to work on alignment, but they try to integrate BCT into their existing system.

At the organizational level, organizational readiness both in-terms of financial and technological dispositions are important considerations while thinking of BCT adoption. In case of financial readiness, an important decision that top management takes are the allocation of resources among the various priority endeavors. Research reveals inconclusive results related to Top management's willingness to move towards the adoption of the new technology will make it one of the priorities while committing resources. Along with the attitude of the firm towards innovation and change

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also determines willingness to BCT adoption, higher the firm innovativeness, greater would-be transformation leading to adoption of BCT (Malik et al., 2021). BCT is an expensive endeavor, the upfront cost in the form of hardware and software infrastructure needs investment also the lack of trained human capital can also act as barrier (Choi et al., 2020).

As long as enablers of the BCT are concerned, studies using TOE framework have come up with a list of variables enabling or hindering the BCT adoption by firms. In the Technological domain the availability of BCT infrastructure, reduction of information asymmetry, perceived benefits, disintermediation and several other factors are being studied. At the organizational level, firm readiness or factors related to organizational resourcefulness are being considered. As discussed above, for an organization to adopt new technology into their process and procedures they need both monetary and non-monetary resources. It is not only about the availability of resources but the mind-set of the top management and availability of trained labor force that will determine the destiny of the organization. At the macro/environmental level the wider socio-economic landscape, governmental regulations and policies have been looked at and research yields some mixed findings (Malik et al., 2021).

Hence, for an organization to adopt and implement BCT, it must be resource sufficient and willing to invest the resources towards the implementation of this technology. Fosso and Guthrie (2020) suggest that adopting BCT necessitates that firm commit resources to all business activities and functional areas. BCT is a capability and firm needs resources (tangible and intangible) to build this capability (Bag et al., 2022). If organizations do not adapt to the changing environment, they will be left behind. For an organization to stay current in the business landscape top management must divert and commit resources for technology adoption and execution. In this research we have considered the resource commitment as lens to investigate the organizations allocate their resources for BCT adoption and execution.

Nevertheless, the management decisions acts as a critical link between the purchaser and retailer with the intention of improving the overall SC's efficiency and plays an essential role in implementing novel technologies for sustainable operations (Lu et al., 2022). According to Dubey et al. (2017), the active involvement and dedication of management are critical factors in the effective implementation of technology. In doing so, prior research has demonstrated that the utilization of blockchain technology (BCT) plays a pivotal part in enabling collaboration among supply chain partners by enabling transparency, accountability, immutability (Hastig & Sodhi, 2020) and promotes collaboration by offering real-time information resulting in improved reliability and trustworthiness of the system. Not only adoption of BCT but the implementation of is also contingent upon the resource commitment of the firm, the dynamic capability of the entrepreneur enables him to absorb and integrate the external knowledge with internal resources that facilitates the adoption and implementation of BCT (Sabbagh et al., 2024). Thus, the success of sustainable strategies, promoting sustainability is determined by management initiatives adequate and effective support, engagement, and willingness (Orji & Liu, 2020). Hence, the previous discussion suggests the development of the first hypotheses.

$\mathcal{H}_1$: Resource commitments influence the adoption of BCT.

2.2.2 Blockchain Technology (BCT) and Green SC Practices

Acceptance of the Blockchain technology (BCT) is a noticeable technological innovation (Saberi et al., 2019) that has radically transformed business operations and supply chain performance (Mubarik et al., 2021; Nazir et al., 2023). Therefore, Ivanov at al., (2018) suggest, for competitive advantage in the wake of disruptive technologies, originations should re-evaluate their supply chain strategies and make use of blockchain-based digital supply chain-networks (DSNs) that synchronize

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the fluxes of physical products, information, talent, and finances. Realizing the benefits, several firms have started adapting this technology. The use of BCT results in seamless integration by offering improved visibility into the status of items and tracking their location. Also, BCT aids as a decentralized-database that mitigates the risk of a single-point-of-failure (SPOF) and the need for a central authority to handle data. Each node within the blockchain network holds a complete copy of the ledger (Mubarik et al., 2021). Each alteration is documented as a new immutable record making the blockchain a data structure unalterable (Jabbar et al., 2020). However, in the field of SC, such technological progressions have encouraged researchers to reconsider its effects on environment friendly practices, as the adoption of these advanced technologies and its impact on environmental sustainability is uncertain (Zhang et al., 2023). Therefore, sustainability experts keep attending to the manufacturing industry, which is a major source of greenhouse-gas emissions. In doing so, Khan et al. (2021) proposes that BCT has the ability to reduce emissions in manufacturing at all critical stages. Furthermore, previous research proposes that BCT could add to the sustainability SC by encouraging carbon-efficient product design, manufacturing, and distribution (Nazir et al., 2023; Ali et al., 2023) and it has evolved as a notable solution for manufacturing industry (Junaid et al., 2023) serving as a tool to significantly reduce emissions in all critical phases of the manufacturing process. Therefore, we propose the second hypotheses as:

$\mathcal{H}_2$: Block chain technology is positively linked with GSCP.

2.2.3 Green SC Practices and Corporate Sustainability

Environmental concerns have become increasingly intertwined with global trade and market dynamics. Consumers worldwide are recognizing the significance of nature and the environment, leading to a growing demand for eco-friendly products (Tariq et al. 2017)In doing so, the concept of GSCM involves implementing procedures, methods, and regulations to lessen the damaging effects of SC process by the adopting aforementioned green practices i.e., green purchasing (GPR), ecological design (ECD), green manufacturing (GMG), green packaging, green distribution (GDN) and reverse logistics (RLG) accordingly (Mubarik et al., 2019). The manufacturing industry plays a crucial role in a country's economic growth, prompting professionals and scholars to investigate the strategies that contribute to organizational economic progress (Rehman-Khan et al., 2021) as well as ensuring sustainability through development of the social & ecological concerns (Seuring et al., 2008). Consequently, green SC practices can enhance corporate sustainability by providing cost advantages (Saberi et al., 2019) boosting competitiveness through improved capabilities (Scur & Barbosa, 2017) enhancing production efficiency while reducing environmental impact, improving the quality of both products and processes while decreasing wastes (Wijethilake, 2017; Matarneh et al., 2024). Thus, this discussion contributes to the formulation of third hypotheses.

$\mathcal{H}_3$: GSCP are positively linked with corporate sustainability.

2.2.4 Mediating Effect of GSCP in association between BCT and Corporate Sustainability

In order to meet consumer demand and remain competitive, firms are urged to implement environmentally friendly practices including utilizing renewable energy sources and minimizing waste (Ahmed et al., 2020). Therefore, firms should not only focus on creating monetary value but also maintain both social and environmental values (Balon, 2020). In doing so, GSCM is a prominent concept that emphasizes environmental-friendly practices throughout the SC, aiming to decrease the environmental impact by implementing sustainable practices comprising all partner in SC (Assumpção et al., 2022). Resultantly, by integrating the element of sustainability across their SC operations companies may recued their negative footprint on the environment, save money,

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build repute and shape suitable future (Islam et al., 2024). The GSCM is seen as an extension of old-style SC (Ahlstrand, 2018). The contemporary SC is a merger of environmental concerns with SCM leading to environmental innovation. Bag et al., (2020) see blockchain-based green SC as an appropriate solution for connecting companies in environmentally friendly business practices. Furthermore, implementation of blockchain technology can be seen as a critical component for sustainable development (Mukherjee et al., 2021). Thus, monitoring and disseminating data on environmental and social factors can impact environmental, social, and safety risks, highlighting a significant implication of BCT (Adams et al., 2018). Therefore, the prior discussion contributes to the formulation of fourth hypotheses.

$\mathcal{H}_4$: GSCP mediates the link between BCT and corporate sustainability.

Research framework explaining the interlinkages between resource commitment, blockchain technology, green supply chain management practices, and corporate sustainability are provided in figure 1.

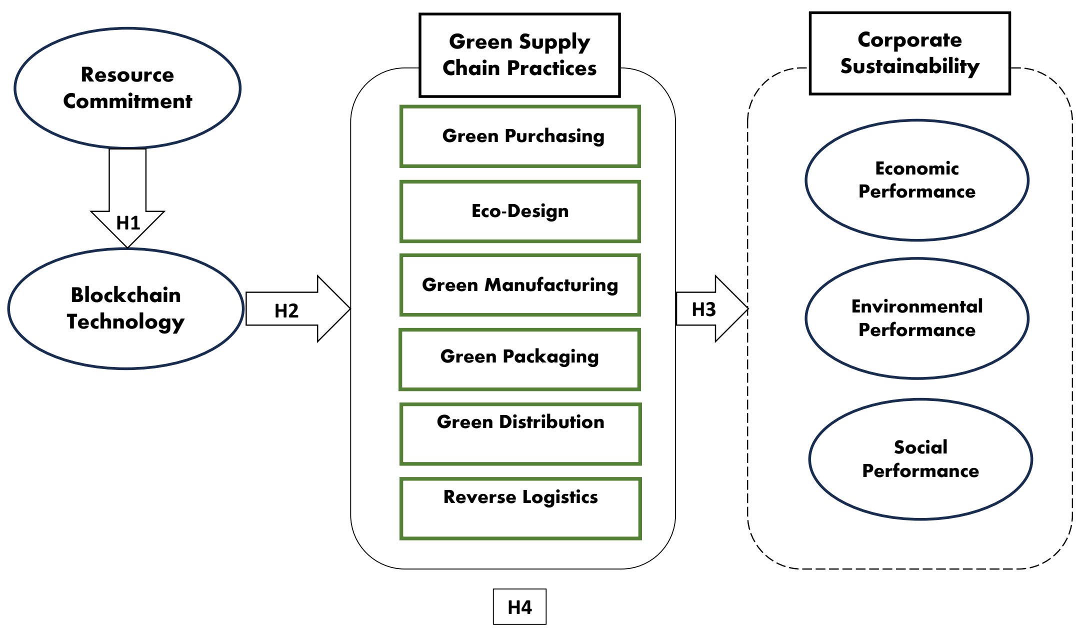

Figure 1. Research Framework (**not** in the end)

3 Research Methodology

3.1 Sample and data collection

This study targeted Malaysia's Electrical and Electronics sector, a key component of the nation's manufacturing GDP and exports. The study aimed to assess how blockchain technology affects green supply chain practices, considering resource commitment as an antecedent and corporate sustainability as the outcome variable. To begin, the researchers conducted an initial screening to select companies that were either using or beginning to use blockchain in their supply chain management. This preliminary screening revealed that about 70% of companies in the sector had adopted blockchain at various levels, from pilot stages to full integration. Furthermore, following refinements to the survey instrument based on insights from a panel of academic and

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industry experts, the research team distributed the questionnaire to 225 manufacturing companies confirmed to be employing blockchain technology. These firms were specifically chosen for their substantial economic impact and their readiness to integrate blockchain into their supply chain operations.

The survey was particularly aimed at managers overseeing operations and sustainability initiatives. The survey assured anonymity and confidentiality, emphasizing that responses would be used exclusively for scholarly research. Efforts to increase response rates included sending reminders, resulting in 127 fully completed surveys, translating to a 56.4% response rate. The responses represent a diverse mix in terms of size, age, job function, positions. The demographic characteristics are presented in Table 2. The adequacy of the sample size, confirmed by G*Power software analysis, stood at 79. The collection of data was carried out from Sept 2022 to Dec 2022, with a strong emphasis on confidentiality and academic intent to encourage participation and reduce nonresponse bias (Badar et al., 2025).

Table 1. Constructs Definitions (**not** in the end).

Construct	Definitions
Resource Commitment	*"Resource management involves organizing, combining, and utilizing a company's resources to generate value for consumers and gain competitive advantages"* (Sirmon et al., 2007).
Blockchain	*"A decentralized digital technology that offers transparency, accountability, and security"* (Saberi et al., 2019).
Green Purchasing	*"The term "green purchasing" refers to an approach to product sourcing and development that emphasizes minimal impact on the environment, as well as collaboration with suppliers"* (Khan & Qianli, 2017).
Ecological Design	*"Green design promotes waste reduction through recycling, remanufacturing, as well as green purchasing, reverse logistics, and manufacturing"* (Khan & Qianli, 2017).
Green Manufacturing	*"Green manufacturing entails reducing hazardous waste in the entire manufacturing process and emphasizes strategic planning and reduction of resources such as energy, water, and materials"* (Khan & Qianli, 2017).
Green Packaging	*"Green packaging strategies consist of using biodegradable materials, reducing superfluous packaging, utilizing paper wrappings, minimizing polystyrene, facilitating disassembly, and employing simpler packaging materials"* (Kung et al., 2012).
Green Distribution	*"Green distribution involves the use of environmentally friendly packaging and transportation, which includes factors like package qualities, size, form, materials, and transportation characteristics that impact distribution"* (Gavronski et al., 2011).
Reverse Logistics	*"Reverse logistics refers to the products that are nearing the end of their useful life, have expired, or are contaminated and can be removed from the market. It can be classified into four categories: end-of-use, commercial return, reusable packaging, and cargo unitization"* (Fleischmann et al., 2001).

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Construct	Definitions
Corporate Sustainability	*"Corporate sustainability refers to the development that satisfies the current demands without endangering the ability of next generations to fulfill their requirements in terms of social, economic and environment"* (Asiaei et al., 2021).
Environmental Performance	*"Environmental Performance refers to the ability to reduce the usage of hazardous waste in the supply chain and the ability of cultivating plants to reduce emissions"* (Green et al., 2012).
Economic Performance	*"Economic Performance refers to a willingness to minimize costs in the manufacturing process, such as material and component procurement, energy and water usage, and waste disposal"* (Green et al., 2012).
Social Performance	*"Social Performance refers to firms' social practices including social projects, the well-being of all stakeholders, and educational opportunities for all people"* (Yildiz Çankaya & Sezen, 2019).

Table 2. Demographic Survey (**not** in the end)

Electrical & Electronic Sector		Numbers	Percentages
(Owned)	International	69	0.5433
	Local (Malaysian)	58	0.4567
Firm Age	1 to 5	17	0.1339
	6 to 10	19	0.1496
	11 to 15	27	0.2126
	16 to 20	21	0.1654
	Over 20 Years	43	0.3386
Job Function	Supply Chain Professionals	33	0.2598
	Production Operations	23	0.1811
	Procurement	22	0.1732
	Logistics Manager	31	0.2441
	Others	18	0.1417
Experience in Organization	4-7 Years	27	0.2126
	8-11 Years	33	0.2598
	12 - 15 Years	42	0.3307
	More than 15 years	25	0.1969
Management position	Low level	27	0.2126
	Middle level	39	0.3071
	Top	61	0.4803
Size (Number of employees)	250-499	41	0.3228
	500-999	52	0.4094
	1000-1499	21	0.1653
	1500-1999	9	0.0708
	More than 2000	4	0.0315

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3.2 Method Bias

To address common method bias (CMB) in this study, we combined upfront survey design strategies with later statistical tests (Faiz et al. 2024). We developed and randomized the survey questions and assured respondents' anonymity to reduce bias. For the statistical analysis, we utilized the marker variable method (Rönkkö and Ylitalo, 2011), selecting a social desirability scale as the marker variable. The minimal difference in R2 values with and without this marker suggested that CMB was not a significant issue. The careful survey design and the marker variable analysis provide strong evidence that CMB does not undermine the study's findings, showing that we effectively managed and controlled CMB (Faiz et al., 2024; Zia et al., 2024).

3.3 Instrument Development

For this study, the survey's constructs and measurements were carefully chosen from established research to ensure their relevance and dependability for this investigation (see Table 3). The survey included a 9-item section on blockchain technology adapted from Kamble et al. (2023) and Queiroz & Fosso Wamba (2019), and a detailed 21-item section on green supply chain practices, broken down into green purchasing, green manufacturing, green distribution (Scur & Barbosa, 2017; Yildiz Çankaya & Sezen, 2019), Eco-Desing (Vanalle et al., 2017), green packaging (Yildiz Çankaya & Sezen, 2019; Mishra et al., 2017) and reverse logistics based on Ghadge et al. (2022). The questionnaire also featured a 10-item section on corporate sustainability, incorporating ideas from Yildiz Çankaya & Sezen, (2019), and Asiaei et al. (2021). Finally, a 4-item scale of resource commitment adapted from Runiar et al. (2023). Responses were obtained on a 5-point Likert scale, ranging from strongly disagree to strongly agree.

Table 3. Constructs and Sources (**not** in the end)

Constructs	Sub - Construct	Items/ Measure	Source
Resource Commitment	Nil	4	Rauniar et al. (2023)
Blockchain Technology (BCT)	Nil	9	Kamble et al. (2023), Queiroz & Fosso Wamba (2019)
Green Supply Chain Practices	6	21	Jabbour et al. (2017), Scur & Barbosa, (2017), Vanalle et al. (2017), Mishra et al. (2017), Yildiz Çankaya & Sezen, (2019), Ghadge et al. (2022), Yang et al. (2024)
Corporate Sustainability	3	10	Yildiz Çankaya & Sezen, (2019), Asiaei et al. (2021)

4 Results and Analysis (**not** in the end)

The analysis was conducted using Partial Least Squares (PLS), a method often employed in quantitative studies for its variance-based approach. The PLS analysis is a two-phase process: initially, it involves validating the measurement model by examining the indicators' validity and reliability for each construct. Subsequently, the structural model is evaluated to verify the proposed theoretical relationships. The evaluation of validity involves analyzing factor and cross-loadings, whereas reliability is determined through composite reliability, the average variance extracted (AVE), and Cronbach's alpha. The assessment confirmed the measurement model's reliability,

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with each variable surpassing the recommended criteria for Cronbach's alpha, composite reliability, and average variance extracted (AVE). Specifically, the values for Cronbach's alpha and composite reliability were each above 0.7, and the AVE for each construct was over 0.5, illustrating the indicators' effectiveness in accurately measuring their corresponding variables. Table 4 presents construct reliability and validity. Furthermore, the model successfully passed tests for discriminant validity using the methods proposed by Fornell and Larcker in 1981. To satisfy Fornell and Larcker's criteria, the square root of each construct's average variance extracted (AVE) needs to be greater than its highest correlation with any other construct. The findings in Table 5 indicate that discriminant validity has been established through the use of Fornell-Larcker (FL) criteria. Consequently, the measurement model adhered to all the predefined standards for reliability and validity, thereby endorsing the continuation of hypothesis testing within the conceptualized structural model.

Table 4. Construct Reliability and Validity (**not** in the end)

Construct	Items	Outer Loadings	CR	Cronbach Alpha	AVE
Resource Commitment	RC1	0.716	0.819	0.776	0.532
	RC2	0.772			
	RC 3	0.723			
	RC 4	0.704			
Blockchain Technology	BC1	0.793	0.929	0.897	0.592
	BC2	0.811			
	BC3	0.775			
	BC4	0.718			
	BC5	0.729			
	BC6	0.707			
	BC7	0.812			
	BC8	0.805			
	BC9	0.763			
Green Purchasing	GP 1	0.772	0.85	0.822	0.587
	GP 2	0.715			
	GP 3	0.793			
	GP 4	0.781			
Ecological-Design	ECD 1	0.754	0.848	0.811	0.583
	ECD 2	0.822			
	ECD 3	0.771			
	ECD 4	0.702			
Green Manufacturing	GM 1	0.824	0.853	0.826	0.592
	GM 2	0.724			
	GM 3	0.733			
	GM 4	0.792			
Green Packaging	GPP 1	0.728	0.789	0.756	0.555
	GPP 2	0.787			
	GPP 3	0.719			
Green Distribution	GD1	0.772	0.777	0.736	0.537

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Construct	Items	Outer Loadings	CR	Cronbach Alpha	AVE
	GD2	0.723			
	GD3	0.702			
Reverse Logistics	RL1	0.821	0.834	0.803	0.626
	RL2	0.788			
	RL3	0.763			
Economic Performance	ECP1	0.811	0.883	0.852	0.654
	ECP2	0.824			
	ECP3	0.777			
	ECP4	0.822			
Environment Performance	EVP1	0.722	0.789	0.761	0.555
	EVP2	0.773			
	EVP3	0.739			
Social Performance	SP1	0.723	0.792	0.768	0.56
	SP2	0.789			
	SP3	0.731			

Table 5. Discriminant Validity (**not** in the end)

	RC	GP	ECD	BC	GD	EVP	RL	GM	ECP	SP	GPP
RC	0.73										
GP	-0.017	0.766									
ECD	0.241	0.562	0.764								
BC	0.352	0.278	0.193	0.769							
GD	0.06	0.378	0.291	0.192	0.733						
EVP	0.233	0.443	0.551	0.318	0.152	0.745					
RL	0.297	0.283	0.229	0.096	0.395	0.23	0.791				
GM	0.12	0.477	0.572	0.283	0.551	0.288	0.382	0.769			
ECP	0.432	0.136	0.294	0.121	0.221	0.388	0.278	0.283	0.809		
SP	-0.063	-0.033	0.113	0.085	0.093	0.471	-0.058	0.011	0.379	0.748	
GPP	0.055	0.264	0.379	0.011	0.582	0.431	0.403	0.362	0.106	0.089	0.745

4.1 Structural Model Results (**not** in the end)

Table 6 presents the structural model results. The assessment of the structural model revealed strong empirical evidence for many of the theorized links. Initially, a significant and positive linkage was observed between resource commitment and Blockchain technology ($\beta = 0.173$), affirming the first hypothesis (H1). Moreover, blockchain technology were also seen to have a positive effect on green supply chain practices ($\beta = 0.294$), thus corroborating hypotheses H2, Additionally, it was found that GSCP has a significant and positive direct impact on corporate sustainability ($\beta = 0.348$) based on economic, environment and social performance, thus confirming H3. The post hoc indirect effect was also observed and found that green supply chain practices mediate the relationship between BCT and corporate sustainability ($\beta = 0.102$). To sum up, this analysis validated the predicted interrelations among resource commitment, blockchain technology, green supply chain practices, and corporate sustainability. The study reveals that

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blockchain technology itself doesn't have a direct effect on sustainable performance; rather, it acts as a catalyst for sustainable results by encouraging the adoption of green supply chain initiatives. Blockchain's contribution lies in offering the transparency and traceability needed for sustainability assurance, but the real benefits in performance emerge from the integration of green practices throughout the supply chain management. While blockchain provides essential insights for sustainability, the responsibility falls on organizations to apply this knowledge in enhancing their supplier choices, transportation strategies, manufacturing methods, product designs, and other areas. The pronounced impact of adopting green practices within the supply chain on sustainable outcomes underscores the crucial intermediary role these practices play in harnessing the potential of blockchain for real environmental and social improvements. In this way, blockchain technology indirectly yet significantly affects sustainable performance by underpinning the adoption of comprehensive green practices that lead to a transformative overhaul of supply chain operations. These empirical results lend support to the theoretical proposition that views blockchain as a foundational element, enabling organizations to implement broad-based green initiatives that collectively overhaul and improve supply chain sustainability.

Beyond path coefficient analysis, Hair et al. (2019) emphasize SmartPLS's predictive power as a key feature. Our study thus evaluated the predictive relevance (Q2) and determination coefficients (R2). Results in Table 6 show R2 values indicating how much variance in corporate sustainability and other variables is explained by factors like RC, BC and GSCP. For instance, in the case of corporate sustainability, 52.6% variance is explained by these factors. Additionally, Q2 values, obtained via blindfolding, were all above zero (e.g., 0.248 for CS), confirming the model's strong predictive relevance as per Hair et al. (2017)'s criteria.

Table 6. Test Results (**not** in the end)

Hypotheses	Path Model	Beta	t-value	p-value	Decision
H1	Resource commitment → Blockchain technology	0.173*	1.989	0.048	Supported
H2	Blockchain technology → Green supply chain practices	0.294**	3.736	0	Supported
H3	Green supply chain practices → corporate sustainability	0.348***	4.561	0	Supported
H4	Blockchain technology → Green supply chain practices → corporate sustainability	0.102*	2.021	0.045	Supported

* $p < 0.01$, ** $p < 0.05$

R2 → BC = 0.127; GSCP = 0.391; CS = 0.526

Q2 → BC = 0.102; GSCP = 0.276; CS = 0.423

Beyond path coefficient analysis, Hair et al. (2019) emphasize SmartPLS's predictive power as a key feature. The R^2 values for the model show that it explains 52.6% of the variability in Corporate Sustainability, indicating robust predictive strength. However, it's important to remember that while R^2 values are helpful for understanding the model's in-sample explanatory power, assessing its out-of-sample predictive relevance is also essential. In line with Danks and Ray's (2018) guidance, we employed the PLS predict method to address this aspect. As depicted in Table 7, all Q^2 values for the endogenous constructs are positive, confirming that the model possesses satisfactory predictive relevance. Furthermore, we compared the Root Mean

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Square Error (RMSE) values obtained from Partial Least Squares Structural Equation Modeling (PLS-SEM) to those from a benchmark Linear Model (LM), which is crucial given the symmetric distribution of prediction errors in our model. The data presented in Table 5 indicate that many of the RMSE_PLS scores are lower than the RMSE_LM scores at the indicator level. Drawing on insights from Hair et al. (2019), we conclude that the model achieves moderate to high predictive accuracy, especially concerning its primary focus on corporate sustainability performance.

Table 7. PLS Predict Results (**not** in the end)

Items	Q^2 predict	PLS-SEM_RMSE	LM_RMSE	Difference
BC1	0.263	1.038	1.085	-0.047
BC2	0.365	1.078	1.155	-0.077
BC3	0.29	0.922	0.961	-0.039
BC4	0.263	1.236	1.128	0.108
BC5	0.368	1.068	1.107	-0.039
BC6	0.227	1.196	1.207	-0.011
BC7	0.278	1.186	1.171	0.015
BC8	0.387	0.931	0.917	0.014
BC9	0.263	0.938	0.949	-0.011
LVS_ECP	0.357	0.866	0.885	-0.019
LVS_EVP	0.405	0.883	0.926	-0.043
LVS_SP	0.467	0.867	0.871	-0.004
LVS_GDD	0.345	0.738	0.776	-0.038
LVS_GMM	0.317	0.771	0.779	-0.008
LVS_GP	0.381	0.648	0.644	0.004
LVS_IEM	0.496	0.633	0.652	-0.019
LVS_RLL	0.365	0.726	0.752	-0.026
LVS_SCC	0.371	0.731	0.754	-0.023

5 Discussion

The significance of strategic initiatives and their impact on the organization's sustainable performance can be demonstrated and communicated through the allocation of resources for the implementation of digital technology (Sirmon et al., 2011; Nazir et al., 2024). According to Cyert & March (1963), to successfully integrate and accommodate a new digital technology, it is essential for the organization to make the necessary assistance and resources accessible to the organization. In doing so, the first hypothesis of this research proposes that the resources commitment have significant impact on the implementation of BCT with ($\beta = 0.173$, $p = 0.048$). Consequently, our findings indicate that the resources commitment plays a significant role in the implementation of BCT. Furthermore, the results also consistent with the previous study such as according to Mao et al. (2016) resource commitment is a measure of an organization's level of compliance with information technology and demonstrates the firm's supportive attitude toward IT resources. Investing in new technology implementation programs demonstrates an organization's readiness to prioritize strategic activities (Sirmon et al., 2007; Rauniar et al., 2023). Nonetheless, management decisions are essential for determining whether or not to execute

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sustainable environment initiatives, including BCT and green SCP. Consequently, the achievement of these initiatives is significantly based on the support extended by upper management. According to Mubarik et al. (2020), organizations are progressively concentrating on environmentally friendly sustainable supply chains, utilizing modern technology such as blockchain, to gain a competitive edge and ensure long-term survival Thus, our research examined and identified a positive impact of BCT on green SC practices with ($\beta = 0.294$, $p = 0.000$). Furthermore, these findings are aligned with those of other studies including (Saberi et al., 2019; Mubarik et al., 2020; Kamble et al., 2020) demonstrated that the implementation of BCT has positively affected the green SCP. In addition, BCT prevents unnecessary additional manufacturing, which in turn helps businesses to accurately forecast the demand and supply in real time. Third hypothesis current research suggesting a positive relationship of green SCP and corporate sustainability with ($\beta = 0.348$, p = 0.000) is in accordance with the previous research, as Habib et al. (2020) highlighted the significance of green SCP in reducing waste production, averting environmental incidents, and preserving energy. Consequently, companies employ green operations to enhance their sustainable performance, driven by emergent pressure from buyers (Karmaker et al., 2023). Geng et al. (2017) validate that green SCP assists in eco-design, resultantly generates economic performance. Also, Umer et al., (2022) have highlighted the twofold impact of green SCP on social and environmental performance by decreasing waste during processing activities and improving profitability. This entails using green purchasing, ecological design (ECD), green manufacturing (GMG), green packaging, green distribution (GDN), and reverse logistics (RLG) to produce environmentally friendly products, contributing to corporate sustainability.

Additionally, our findings propose a positive mediating impact of green SCP in association between BCT and corporate sustainability with ($\beta = 0.102$, p = 0.045) exhibiting the need to integrate green SCP for realizing the benefits of BCT on corporate sustainability. Furthermore, the positive mediating impacts of green SCP are consistent with prior research studies such as De Giovanni & Cariola (2021) proven the association between Industry-4.0 technologies and green SCP. In addition, Karmaker et al. (2023) demonstrated the positive mediating effect of green SCP in association between IR4.0 technologies including blockchain technology (BCT) and firms' sustainable performance. As a result, firms may implement green SCP, such as reduction in use of natural resources and lower emissions of harmful pollutants or gases, with the goal of building an environmentally friendly organization.

6 Managerial Implications and Limitations

The present work offers several suggestions and implications that can be incorporated into practice for firms' sustainability. The study reveals that professionals in the electrical & electronics sector believe that BCT-enabled green SCP improves corporate sustainability by leveraging the resources commitment as a key driver of BCT implementation. Based on our research findings, it suggests when organizations commit resources, it encourages people to work toward common goals and boosts their motivation to successfully integrate new technology. In addition, our results also support the literature that presents how important it is to devote resources to successfully integrate new technology. Early resource commitment can indicate management's intention on the priority and necessity of implementing technologies. Consequently, policymakers and managers, particularly those in the electrical & electronics sector, should consider integrating Industry-4.0 technologies, such as blockchain technology, due to the numerous advantages it offers. Firstly, the use of BCT enhanced demand and supply planning, reducing excess production, and facilitating just-in-time production, leading to cost savings (Mubarik et al., 2020). Second it enables companies to

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perform business transactions with improved efficiency. Additionally, the use of BCT makes it possible for managers to monitor and audit the transactions that take place within their supply chains. By utilizing autonomous smart contracts and shared, secure, decentralized ledgers, the blockchain-enabled supply chain eliminates the need for intermediaries in its networks, thereby enhancing the safety and reliability of the supply chain (Kamble et al., 2023). This results in a significant decrease in associated expenses.

Furthermore, BCT amplifies the micro-supply chain inefficiencies, enabling managers to implement stronger, more sustainable, and cleaner business processes and promotes the green SCP that further enhances corporate sustainability. However, green SC operations require enhanced visibility, transparency, traceability, trustworthiness, and reliability of data. In doing so, BCT's features makes it easy to integrate with green supply chain initiatives, fostering trust and collaboration. Thus, top-level managers should understand the significance of BCT's role in environmentally friendly and sustainable operations. Therefore, the study results are extremely advantageous for practitioners who are in the process of incorporating BCT into their businesses. Our research results will motivate professionals in the electrical & electronics industry sector around the globe to consider investing in BCT to improve their corporate sustainability.

While our study offers some valuable contributions, it is important to acknowledge its limitations as well. This study utilized a cross-sectional strategy, relying on data gathered at a single time point. This enhances the likelihood of biased outcomes. In the future, researchers may employ different methodologies, for example longitudinal and experimental studies, to address this constraint and validate our findings. Another methodological contribution can be understanding the enablers of technology adoption patterns and its consequences (both positive and negative) from the top management using an interpretive approach, this will help to dig deep and learn about the contextual intricacies during the adoption and execution process.

Lastly, since our samples are from Malaysian electric and electronics sector, therefore we can only draw limited conclusions about the results' generalizability. Future research should investigate adaptability and compare and contrast data from different countries. The varying institutional framework conditions across the countries result in varying experiences of adoption and implementation. In the presence of institutional voids, the process of BCT adoption and execution can be an interesting avenue to explore.

7 Conclusion

In this study, the role of resource commitment in implementing advanced technologies such as blockchain and its influence in incorporating GSCP is investigated. Further, it also analyses the impact of GSCP on corporate sustainability i.e. social, economic, and environmental performance. It is found that resource commitments effectively influence the implementation of Blockchain initiatives by ensuring the availability of resources and support. By incorporating blockchain in their operations, an improved integration and collaboration among different supply chain entities is observed. This in turn assists in developing and spreading green supply chain practices. The study presents a positive correlation between resource commitment and BCT and the positive influence of blockchain on green SCP. It is also found that green SCP has a significant and positive impact on corporate sustainability. Moreover, it is found that green SCP mediates the relationship between blockchain technology and corporate sustainability. Additionally, it is observed that BCT acts as a catalyst for sustainable results by encouraging the adoption of green supply chain initiatives.

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9 Appendix

Construct / Dimensions	Measurement Items / Scale
Resource Commitment	**Rauniar et al. (2023)**
	Financial resources are committed
	Skilled workers are committed
	Managerial talents are committed
	Organizational time is provided
Blockchain	**Kamble et al. (2023), Queiroz & Fosso Wamba (2019)**
	Smart contracts for automatically implementing multiparty agreements.
	Order validation and approval
	Invoice processing and final payment settlement
	Verification of conflict-free raw material
	Validating the manufacturing parameters.
	Leveraging the scale of big data availability
	Standardized quality documentation.
	Integrating the manufacturing practices
	Logistics asset management (such as machines, transport vehicles, warehouses, material handling equipment's etc.)
Green Purchasing	**(Scur & Barbosa, 2017; Umar et al., 2021; Yildiz Çankaya & Sezen, 2019)**
	Providing design specification to suppliers that include environmental requirements for purchased item
	Cooperation with suppliers for environmental objectives
	Suppliers' ISO14000 certification
	Environmental audit for suppliers' internal management
Ecological Design	**(Vanalle et al., 2017)**
	Design of products for reduced consumption of material/energy
	Design of products for reuse, recycle, recovery of material and component parts
	Design of products to avoid or reduce use of hazardous of products
	Design of processes for minimization of waste

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Construct / Dimensions	Measurement Items / Scale
Green Manufacturing	**(Scur & Barbosa, 2017; Umar et al., 2021; Yildiz Çankaya & Sezen, 2019)**
	The manufacturing process will reduce the noise pollution to the minimum
	Substitution of polluting and hazardous materials/parts
	Production planning and control focused on reducing waste and optimizing materials exploitation
	Process design focused on reducing energy and natural resources consumption in operations
Green Packaging	**(Yildiz Çankaya & Sezen, 2019; Mishra et al., 2017)**
	Decreases material use in packaging
	Recyclable or reusable materials for primary packaging
	Prevents or lessens the use of harmful packaging materials
Green Distribution	**(Scur & Barbosa, 2017; Umar et al., 2021; Yildiz Çankaya & Sezen, 2019)**
	Selection of cleaner transportation methods
	Effective shipment consolidation and full vehicle loading
	Routing systems to minimize travel distances
Reverse Logistics	**Ghadge et al. (2022)**
	Product returns from customers is acceptable
	Mends, reconditions and reproduces the parts from the returned, faulty or damaged products
	Disassembles returned products that could not be used to recover renewable and reusable materials
Economic Performance	**Yildiz Çankaya & Sezen, (2019), Asiaei et al. (2021)**
	Decrease in cost of materials purchased
	Decrease in cost of energy consumption and waste discharge
	Improvement in earnings per share
	Improvement in return on investment
Environmental Performance	**Yildiz Çankaya & Sezen, (2019), Asiaei et al. (2021)**
	Improvement of an enterprise's environmental situation
	Decrease of consumption for hazardous/harmful/toxic materials
	Decrease of frequency for environmental accidents
Social Performance	**Yildiz Çankaya & Sezen, (2019), Asiaei et al. (2021)**
	Improvement in customer satisfaction
	Improvement in investments on social projects (education, culture, sports)
	Improvement in relations with community stakeholders, e.g., nongovernmental organizations (NGOs) and community activists

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