



Perceived Innovativeness of Blockchain Technology and the Financial Performance of Manufacturing Firms: The Moderating Role of Organizational Agility

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ABSTRACT

This paper investigated the moderating role of organizational agility on the link amid perceived innovativeness of blockchain technology as well as the financial performance of manufacturing firms. The survey utilized a self-administered questionnaire approach, gathering a total of 262 completed responses for data analysis utilizing Smart PLS-SEM (version 4). The study noted the occurrence of a positively significant relationship amid compatibility as well as financial performance. In addition, the study noted the occurrence of a positively significant relationship amid trialability as well as financial performance. However, there is a positively, insignificant effect amid complexity as well as financial performance. Furthermore, the connection amid relative advantage as well as financial stability is positively insignificant. Moreover, organizational agility has a negatively significant moderation outcome on the relationship amid relative advantage as well as financial performance. Furthermore, organizational agility has a negatively significant moderation outcome on the relationship amid compatibility as well as financial performance. Additionally, organizational agility has a positively significant moderation outcome on the relationship amid complexity as well as financial performance. However, organizational agility has a positively insignificant moderation outcome on the relationship amid trialability as well as financial performance. This investigation provides insights into the value of organizational agility to strengthen the relationship between perceived innovativeness of blockchain technology as well as financial performance in an emerging market thereby highlighting their implications for theory, managers and business success.

Keywords: Relative Advantage, Compatibility, Complexity, Trialability, Blockchain Technology

JEL Classifications: M

1. INTRODUCTION

Blockchain technology, characterized by its decentralization, transparency, and enhanced data security, has emerged as a critical driver of innovation across industries, including manufacturing. Its ability to record transactions securely and immutably has the potential to transform traditional processes, reduce operational inefficiencies, and improve financial performance (Zhang and Ruan, 2024). As manufacturing firms increasingly explore blockchain applications such as supply

chain management, quality assurance, and inventory tracking, the perceived innovativeness of blockchain becomes a crucial determinant of its adoption. Perceived innovativeness refers to the extent to which blockchain is seen as a transformative technology capable of creating new value propositions and revolutionizing traditional business practices (Taherdoost and Madanchian, 2024; Eltahlawy et al., 2024). Despite its immense potential, many firms face significant challenges in realizing blockchain's benefits due to internal barriers and the dynamic nature of their operating environments.

A key factor influencing blockchain's effectiveness in driving financial performance is organizational agility, defined as the capacity of a firm to respond swiftly and effectively to market changes. Agility enables organizations to adapt to evolving technologies and external demands, ensuring they remain competitive in volatile markets (Zhang and Ruan, 2024). Agile firms can integrate disruptive technologies like blockchain more seamlessly, leveraging their potential to create efficiencies, reduce costs, and unlock new revenue streams. For instance, agile firms can capitalize on blockchain's ability to enhance supply chain transparency, minimize delays, and improve supplier relationships, all of which contribute to improved financial outcomes. However, despite the evident link between organizational agility and technological integration, the moderating role of agility in the relationship between blockchain's perceived innovativeness and financial performance remains underexplored.

In manufacturing, operational complexity often poses unique challenges that may hinder blockchain adoption. Manufacturing firms operate in environments characterized by intricate processes, heavy reliance on supply chain coordination, and strict regulatory requirements. These complexities can exacerbate the challenges of adopting blockchain, as firms must align the technology with existing systems and stakeholder expectations (Nayal et al., 2025). Organizational resistance to change, lack of technical expertise, and high implementation costs further complicate blockchain integration, leading to suboptimal outcomes (Zhang and Ruan, 2024). This underscores the importance of understanding how organizational agility can help firms navigate these challenges, enabling them to maximize the financial benefits of blockchain.

Given the rapid pace of technological advancements and increasing market volatility, it is critical to investigate how organizational agility moderates the relationship between perceived blockchain innovativeness and financial performance. Such an exploration is particularly relevant for manufacturing firms, where operational complexity heightens the need for agile strategies. This study seeks to address this gap, contributing to the literature by examining the interplay between perceived blockchain innovativeness and organizational agility in the context of financial performance. Insights from this research can help manufacturing firms optimize blockchain adoption, ensuring that they leverage its transformative potential to achieve financial stability and growth. Furthermore, the findings can inform managerial strategies, guiding firms in fostering agility and aligning blockchain initiatives with organizational goals, ultimately enhancing competitive advantage in the dynamic business environment. Explicitly, the objectives of this investigation are:

- To assess the relationship between perceived innovativeness of blockchain technology and financial performance
- To scrutinize the moderating role of organizational agility on the link amid perceived innovativeness of blockchain technology as well as financial performance.

Subsequent sections of the paper will include literature summaries on eco-friendly marketing practices, as well as financial performance, followed by the presentation of the investigation's methodology. Analysis and results will be provided in subsequent

sections, with the paper concluding by discussing the findings, their theoretical and practical implications.

2. LITERATURE REVIEW

2.1. Theoretical Foundation and Hypotheses

Perceived innovativeness of blockchain technology, financial performance and the moderating role of organizational agility constitute a multifaceted interaction within the field of manufacturing industries. This literature review aims to synthesize existing theoretical frameworks and empirical literature to clarify the relationships between these constructs.

2.2. Innovation Diffusion Theory (IDT)

The relationship between the perceived innovativeness of blockchain technology and financial performance in manufacturing firms can be effectively explained using Innovation Diffusion Theory (IDT), originally proposed by Rogers (2003). IDT provides a robust framework for understanding how innovations are adopted and spread within organizations and across industries. The theory emphasizes five key attributes of innovations—relative advantage, compatibility, complexity, trialability, and observability—which collectively influence the adoption process (Rogers, 2003). Among these, the relative advantage and perceived innovativeness of a technology are critical in determining its acceptance and impact on organizational outcomes, including financial performance.

Perceived innovativeness, as conceptualized in IDT, reflects the extent to which an innovation is seen as new, transformative, and capable of creating value (Duan et al., 2021). Blockchain technology, with its decentralized and transparent architecture, aligns with these attributes, offering substantial advantages over traditional systems in manufacturing. For example, blockchain's ability to enhance supply chain visibility and reduce fraud directly contributes to operational efficiencies and cost savings, thereby positively influencing financial performance (Gupta et al., 2022). IDT explains how these perceived benefits drive the adoption of blockchain in manufacturing firms, as organizations strive to maintain competitive advantage in a rapidly evolving business landscape.

Furthermore, IDT highlights the role of organizational and contextual factors, such as market dynamics, technological infrastructure, and management support, in shaping the diffusion of innovations. In the context of manufacturing firms, operational complexity and regulatory environments may either facilitate or impede the adoption of blockchain technology. These factors underscore the importance of perceived compatibility, where blockchain's alignment with existing systems and processes significantly affects its integration (Zhang et al., 2023). Firms that perceive blockchain as compatible with their strategic goals and operational needs are more likely to adopt it, leveraging its innovativeness to enhance financial outcomes.

IDT also provides insights into how organizational agility influences blockchain adoption. Agile organizations are more receptive to innovations, as they possess the flexibility to adapt to technological disruptions and capitalize on emerging opportunities

(Li and Zhang, 2022). By fostering a culture of experimentation and continuous learning, such firms can accelerate the diffusion of blockchain, enabling them to realize its financial benefits more effectively. This dynamic aligns with IDT's emphasis on the interplay between innovation attributes and organizational readiness in determining adoption success.

IDT offers a comprehensive framework for understanding the relationship between perceived innovativeness of blockchain technology and financial performance in manufacturing firms. By emphasizing the attributes of innovation, organizational factors, and contextual influences, IDT provides valuable insights into how blockchain adoption can be optimized to achieve financial stability and growth.

2.3. Resource-Based View (RBV)

In addition to Innovation Diffusion Theory (IDT), the Resource-Based View (RBV) provides a complementary perspective for understanding the relationship between the perceived innovativeness of blockchain technology and financial performance in manufacturing firms. RBV, a strategic management theory, posits that an organization's competitive advantage stems from its ability to acquire, develop, and deploy valuable, rare, inimitable, and non-substitutable (VRIN) resources (Barney, 1991). Blockchain technology aligns well with these criteria, particularly in manufacturing, where it can serve as a strategic resource to enhance operational efficiency and financial performance (Wamba et al., 2020).

Blockchain's key attributes, such as decentralization, transparency, enhanced security, and reduced transaction costs, make it a valuable resource. From the RBV perspective, these capabilities enable firms to differentiate themselves in the marketplace, streamline supply chain operations, and achieve cost efficiencies, which are critical drivers of financial performance (Luo et al., 2022). For instance, blockchain's ability to create immutable records fosters trust among supply chain partners, reducing disputes and delays, thereby improving cash flow and profitability (Gupta et al., 2022). Furthermore, blockchain's capability to automate processes through smart contracts minimizes administrative overheads, creating additional value.

The RBV emphasizes the importance of how effectively a firm integrates and utilizes its resources. While blockchain offers significant potential, its adoption and impact on financial outcomes depend on an organization's internal competencies and strategic alignment. Firms with robust technological infrastructure and skilled personnel are better positioned to integrate blockchain seamlessly into their operations, leveraging its innovativeness to create value (Zhao et al., 2023). Conversely, firms lacking these capabilities may struggle to fully realize blockchain's benefits, highlighting the critical role of resource management in achieving competitive advantage.

Moreover, RBV underscores the synergistic effect of combining blockchain with other organizational resources, such as organizational agility. Agility enhances a firm's ability to adapt to technological disruptions and extract maximum value from

innovations like blockchain (Li and Zhang, 2022). By fostering a culture of innovation and flexibility, organizations can ensure that blockchain's capabilities are effectively leveraged to address dynamic market conditions and drive superior financial performance.

Integrating the RBV with IDT offers a comprehensive framework for analyzing blockchain adoption. While IDT focuses on the diffusion of blockchain as an innovation, RBV provides insights into how firms can strategically harness its unique attributes to achieve sustainable financial outcomes. Together, these theories highlight the importance of both innovation attributes and organizational resources in shaping the adoption and impact of blockchain technology.

2.4. Dynamic Capabilities Theory (DCT)

For firms operating in dynamic and rapidly changing environments, the Dynamic Capabilities Theory (DCT) offers a compelling framework for understanding how organizations adapt to technological disruptions, such as blockchain adoption, and achieve financial benefits. Originally developed by Teece et al. (1997), DCT focuses on a firm's ability to sense opportunities and threats, seize opportunities, and transform resources to maintain competitive advantage in volatile markets. This theory becomes particularly relevant when examining moderating factors like organizational agility in enhancing the relationship between perceived innovativeness and financial performance (Teece, 2018).

Blockchain technology represents a disruptive innovation with significant potential to transform traditional manufacturing processes by improving transparency, reducing transaction costs, and enhancing supply chain efficiency (Wamba et al., 2020). However, realizing these benefits requires more than the inherent advantages of blockchain; it demands organizational agility—the capability to reconfigure resources and processes rapidly in response to emerging opportunities. DCT emphasizes that firms with strong dynamic capabilities are better equipped to align blockchain's perceived innovativeness with their strategic goals, thus maximizing its financial impact (Li et al., 2021).

Organizational agility, as a dynamic capability, enables firms to integrate blockchain technology effectively by addressing barriers such as operational complexity and resistance to change (Luo et al., 2022). Agility allows organizations to pivot their strategies, experiment with blockchain applications, and implement changes with minimal disruption. For instance, agile firms can quickly adopt blockchain-enabled smart contracts, streamline supplier relationships, and optimize production processes, leading to cost savings and revenue growth. This responsiveness aligns with the transformative potential of blockchain, enhancing its impact on financial performance.

Moreover, DCT highlights the importance of continuous learning and innovation in leveraging disruptive technologies. Firms that invest in developing their dynamic capabilities, such as cultivating an innovative culture, training employees, and upgrading technological infrastructure, are better positioned to harness blockchain's financial benefits (Zhao et al., 2023). These

capabilities enable firms not only to adopt blockchain but also to adapt its features to specific business contexts, creating value beyond initial expectations.

The interplay between perceived innovativeness and dynamic capabilities underscores the importance of organizational readiness in capitalizing on technological advancements. While the perceived innovativeness of blockchain may drive its adoption, dynamic capabilities like agility ensure that its integration delivers tangible financial benefits (Teece, 2020). In this way, DCT provides a nuanced understanding of how firms navigate the complexities of blockchain adoption in dynamic environments, offering insights into the conditions under which blockchain's potential is fully realized.

By integrating DCT with theories like IDT and RBV, researchers and practitioners can gain a holistic understanding of blockchain's impact on financial performance. While IDT focuses on the diffusion of blockchain and RBV emphasizes its strategic value, DCT provides a lens to explore how firms adapt to and capitalize on blockchain's disruptive potential through dynamic capabilities.

2.5. Perceived Innovativeness of Blockchain Technology and Financial Performance

In manufacturing, blockchain's perceived innovativeness lies in its ability to tackle challenges like supply chain inefficiencies, fraud, and data security through decentralization, transparency, and enhanced security (Wamba et al., 2022). Blockchain facilitates real-time supply chain monitoring, automated contract execution, and fraud prevention, enabling improved operational efficiency and financial performance (Gupta et al., 2023; Zhang and Ruan, 2024).

However, adoption faces significant challenges, especially in emerging markets, where high initial costs, technical complexities, and a lack of expertise deter firms (Mensah et al., 2022). Skepticism about its utility and scalability, coupled with concerns over return on investment and regulatory uncertainties, further slow adoption (Agyekum et al., 2023). Resource constraints and the potential misalignment of technology with organizational goals exacerbate these issues.

Perceived innovativeness evolves with technological advancements and ecosystem readiness. Firms in developed economies benefit from supportive infrastructure and policies, enhancing blockchain's perceived value. Conversely, emerging economies face fragmented infrastructure, limited digital literacy, and inconsistent regulatory frameworks, reducing perceived innovativeness (Gupta et al., 2023).

Addressing these disparities requires raising awareness of blockchain's benefits, lowering adoption costs, and fostering institutional support to unlock its transformative potential in manufacturing, especially in emerging economies (Zhang and Ruan, 2024).

Blockchain technology has emerged as a transformative tool in manufacturing, offering significant financial benefits through reduced operational costs, enhanced supply chain efficiency,

and improved transaction transparency (Oriekhoe et al., 2024). Its decentralized ledger enables real-time transaction tracing, minimizing waste, fraud, and inaccuracies in procurement and inventory management, which leads to improved profitability (Wamba et al., 2022). Smart contracts further enhance operational efficiency by automating complex processes and reducing costs (Gupta et al., 2023).

Despite its potential, the adoption of blockchain in emerging economies remains limited. High initial investment costs, technical expertise requirements, and regulatory uncertainties are key barriers (Mensah et al., 2022). Additionally, the lack of success stories and fragmented infrastructure hinder firms' confidence in the technology's financial viability (Agyekum et al., 2023). In such contexts, effective implementation and alignment with organizational objectives are critical to realizing blockchain's financial advantages. Firms that fail to integrate blockchain into their systems or neglect employee training risk missing its potential benefits (Zhang and Ruan, 2024).

Success stories from developed economies demonstrate blockchain's ability to enhance customer trust and reduce transaction costs, improving financial outcomes (Gillpatrick et al., 2022). For emerging economies, addressing adoption barriers through subsidies, capacity building, and regulatory support could enable firms to leapfrog inefficiencies and unlock blockchain's financial potential in manufacturing (Mensah et al., 2022).

Moreover, existing studies emphasize blockchain adoption generally but often overlook how the perception of its innovativeness drives its financial outcomes. There is a need to examine whether manufacturing firms in emerging markets perceive blockchain as innovative and how this perception influences adoption decisions and financial performance (Luo et al., 2022).

Despite theoretical assertions, empirical studies linking blockchain's perceived innovativeness directly to financial performance in manufacturing firms remain scarce. Most research examines either blockchain's technical capabilities or financial metrics without explicitly connecting the two through the lens of perceived innovativeness (Zhao et al., 2023). Consequently, the following hypothesis has been proposed;

- H_1 : There is a statistically significant relationship amid perceived innovativeness of blockchain technology as well as financial performance.
- H_{1a} : There is a statistically significant relationship amid relative advantage as well as financial performance.
- H_{1b} : There is a statistically significant relationship amid compatibility as well as financial performance.
- H_{1c} : There is a statistically significant relationship amid complexity as well as financial performance.
- H_{1d} : There is a statistically significant relationship amid trialability as well as financial performance.

2.6. Moderating Role of Organizational Agility

Organizational agility, defined as a firm's ability to sense, adapt, and respond swiftly to changes in its external environment, is increasingly recognized as a critical enabler of technological

innovation and its successful integration into business processes. Rooted in dynamic capabilities theory, organizational agility reflects a firm's capacity to reconfigure resources and capabilities to address market volatility, technological advancements, and emerging challenges (Teece, 2018). This adaptability becomes particularly relevant in the context of disruptive technologies like blockchain, where alignment between the technology's potential and organizational strategy determines its financial impact.

Research indicates that agile organizations are better positioned to leverage blockchain's innovative capabilities for financial gains. Agility facilitates rapid decision-making, the alignment of blockchain technology with organizational goals, and the overcoming of barriers such as resource constraints and resistance to change (Wamba et al., 2022). By fostering a culture of adaptability and continuous learning, agile firms can effectively implement blockchain to optimize supply chain operations, enhance transparency, and reduce operational costs, which directly improve financial performance (Bathaei, 2024). For instance, agile firms are more likely to exploit blockchain's real-time data capabilities to improve inventory management, minimize waste, and enhance profitability.

In emerging economies, organizational agility holds particular significance due to the dynamic and often volatile business environment. Ghanaian manufacturing firms face challenges such as infrastructural deficits, fluctuating market conditions, and resource constraints, which can hinder the successful adoption and integration of blockchain technology (Agyekum et al., 2023). In this context, agility enables firms to navigate these constraints by rapidly identifying opportunities to align blockchain solutions with operational goals. For example, agile firms in Ghana can leverage blockchain to enhance supply chain traceability, addressing local inefficiencies and building trust with stakeholders (Bai et al., 2022).

Firms that perceive blockchain as a highly innovative solution but lack agility may struggle to integrate it effectively, thereby failing to realize its financial benefits. Conversely, agile organizations can maximize blockchain's potential by aligning its features such as decentralization, transparency, and immutability with their

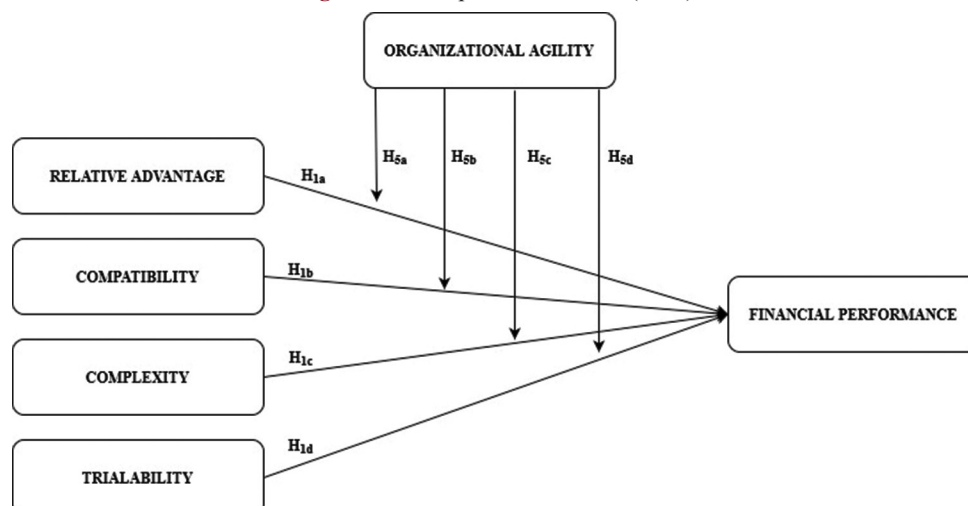
strategic priorities, resulting in enhanced operational efficiency and financial outcomes (Zhang and Ruan, 2024).

Despite its importance, the role of organizational agility in shaping the financial impact of blockchain adoption remains underexplored, particularly in emerging economies. While existing studies have highlighted the positive relationship between agility and technological innovation, the specific moderating effect of agility on the relationship between perceived blockchain innovativeness and financial performance requires further investigation (Abdelwahed et al., 2025). Addressing this research gap can provide critical insights into how manufacturing firms in emerging markets can harness organizational agility to overcome adoption barriers, optimize blockchain's benefits, and enhance financial stability and growth.

Furthermore, few studies have explored factors that mediate or moderate the relationship between perceived innovativeness and financial performance. For instance, organizational agility, market dynamics, and cultural factors may shape how blockchain impacts financial outcomes (Li et al., 2021). The specific role of these variables remains underexplored in the manufacturing sector, particularly in emerging economies. Consequently, the following hypotheses have been suggested (Figure 1);

- H_2 : There is a statistically significant moderation effect of organizational agility on the relationship amid perceived innovativeness of blockchain technology as well as financial performance
- H_{2a} : There is a statistically significant moderation effect of organizational agility on the relationship amid relative advantage as well as financial performance
- H_{2b} : There is a statistically significant moderation effect of organizational agility on the relationship amid compatibility as well as financial performance
- H_{2c} : There is a statistically significant moderation effect of organizational agility on the relationship amid complexity as well as financial performance
- H_{2d} : There is a statistically significant moderation effect of organizational agility on the relationship amid trialability as well as financial performance.

Figure 1: Conceptual framework, (2024)



3. METHODOLOGY

3.1. Survey Instrument

The survey instrument was created by selecting a questionnaire from literature to assess the research model's constituent parts. Using information from a survey sample, the study assessed the validity as well as reliability of the instrument and tested the proposed relations. The question types used to assess perceived innovativeness of blockchain technology have been modified (Davis, 1989; Agarwal and Prasad, 1997; Rogers, 2003). Additionally, the questions used for financial stability were modified (Venkatraman, 1989); the items utilized to assess organizational agility were modified (Teece, 2007; Yousefi and Dooley, 2021). For the investigation, a 5-point Likert scale was used. It is worthy of note, that three academic faculties (marketing, finance and accounting) assessed the content validity of the initial survey.

3.2. Sampling and Data Collection

The cross-sectional survey scheme targeted 800 manufacturing firms registered with the Association of Ghana Industries (AGI) as of 2024 as its population. These firms were categorized based on their respective products. The study relied on the Krejcie and Morgan (1970) formula below to determine the minimum sample size.

$$S = \frac{X^2 NP(1-P)}{d^2 (N-1) + X^2 P(1-P)} \quad (1)$$

Where:

S = The required sample size.

X^2 = The table value of Chi-square for 1 degree of freedom at the desired confidence level (3.841)

N = The population size (800)

P = The population proportion assumed to be 0.5 since this would provide a maximum sample size

d = The degree of accuracy expressed as a proportion (0.05)

$$S = \frac{3.841 \times 800 \times 0.5 \times 0.5}{0.5^2 \times (800-1) + 3.841 \times 0.5 \times 0.5} \quad (2)$$

$$S = \frac{3.841 \times 800 \times 0.25}{0.0025 \times 799 + 3.841 \times 0.25} \quad (3)$$

$$S = \frac{768.2}{2.95775} \quad (4)$$

S = 260.7

Thus, the required minimum sample size is approximately 261.

According to the sample size determination formula by Krejcie and Morgan (1970), with a target population of 800 registered manufacturing firms, the minimum sample size required for this survey at a 95% confidence level and a 0.05 margin of error is 261. To achieve this target, 280 questionnaires were distributed via Google Forms, using simple random sampling

technique. A total of 262 questionnaires were retrieved, yielding a response rate of 93.6%. Each questionnaire was completed by a manager from each of the respective firms. The manufacturing companies included in the study are renowned both nationally and internationally for their prominent role and commitment to sustainable practices. Prior to the survey, participants were provided with a cover letter detailing the study's objectives and their eligibility. Researchers initially inquired informally about the participants' interest in participating in the study. Upon expressing interest, those who wished to complete the questionnaire were invited to do so voluntarily.

3.3. Profile of Respondents

In total, 262 valid responses were collected and used for the statistical analysis. Of these, 64.5% (n = 169) were males, and 35.5% (n = 93) were females, indicating a higher number of male respondents compared to females. The study employed the age classifications recommended by Yarlagadda et al. (2015), namely young adults (<31 years), middle-aged adults (31-50 years), and senior adults (>50 years).

The study reveals that 39% (n = 102) of the respondents were young adults, 53% (n = 139) were middle-aged adults, and 8% (n = 21) were senior adults, indicating that middle-aged managers comprised the majority of respondents. This suggests that the respondents are mature and experienced, making them well-positioned to provide insights into the green marketing communication practices of their firms.

Regarding the positions held by the respondents, 16.7% (n = 44) were Chief Executive Officers (CEOs) or General Managers, 58.7% (n = 154) were senior managers, 12.5% (n = 33) were board members, and 12.1% (n = 32) were middle-level managers. This indicates that senior managers and CEOs together constituted 75.6% (n = 198) of the respondents. These top-level employees, with their extensive experience, are thus capable of providing high-quality responses regarding their green communication practices.

4. DATA ANALYSIS

The statistical analysis was carried out using Smart PLS (version 4.0) software in an attempt to compare the interrelationship between perceived innovativeness of blockchain technology, and financial performance outcomes with organizational agility as a moderator (Ringle et al., 2022). PLS-SEM was used because it is flexible in handling various modelling challenges than the difficult and strict assumptions relating to the use of multivariate statistics (Boonlertvanich, 2019).

Hair et al. (2019) suggested that pointers assessing a concept in the structural model ought to be 0.70 for investigation that utilizes validated concepts in order to guarantee the dependability of the research items. This is due to the indication explaining more than 50% of the variance of the indicator. Because this investigation utilized validated constructs from prior research, a reliability test was conducted utilizing the indicators, employing a minimal reliability criterion of 0.70.

4.1. Evaluation of Measurement Model

We appraised the measurement model utilizing PLS-SEM (version 4). Six modules made up the concept outline of this investigation namely; relative advantage, compatibility, complexity, trialability and financial stability with organizational agility as the moderator (Figure 2).

To assess the measurement model, the construct reliability, convergent validity, and discriminant validity of the six constructs were evaluated (Hair et al., 2019; Hanafiah, 2020). Reliability is established if Cronbach's alpha, composite reliability (ρ_a), and composite reliability (ρ_c) are all above 0.7. Additionally, to establish convergent validity, the average variance extracted (AVE) must exceed 0.5 (Ringle et al., 2022).

Table 1 demonstrates that items, as well as constructs in this investigation, had adequate degrees of convergent validity as well as reliability on each of the six constructs used in this investigation. The study utilized, the heterotrait-monotrait (HTMT) ratio, to evaluate the discriminant validity (Henseler et al., 2015). To substantiate discriminant validity, each concept's HTMT ratio

needs to be <0.9 . (Ringle et al., 2022). The conclusions of HTMT are presented in Table 2, which reveals a satisfactory discriminant validity.

4.2. Evaluation of the Structural Model

The structural model must be appraised to scrutinize the interrelationship amid green brand positioning as well as financial stability with transparency and disclosure as the moderator. Consequently, the hypotheses of the investigation were tested.

4.3. Collinearity Assessment

Collinearity among latent variables is evaluated using the Variance Inflated Factor (VIF). According to Hair et al. (2017), a VIF value of 5 or higher indicates a likely collinearity issue. The findings in Table 3 demonstrate that all VIF values are below 5, indicating no potential collinearity concerns in the model. Consequently, the model is not affected by common method bias (Kock, 2015).

The significance of the path coefficients ought to be appraised, together with the R-square (R^2) as well as Stone-Geisser criterion (Q^2) for perceived innovativeness of blockchain technology and

Figure 2: Measurement model

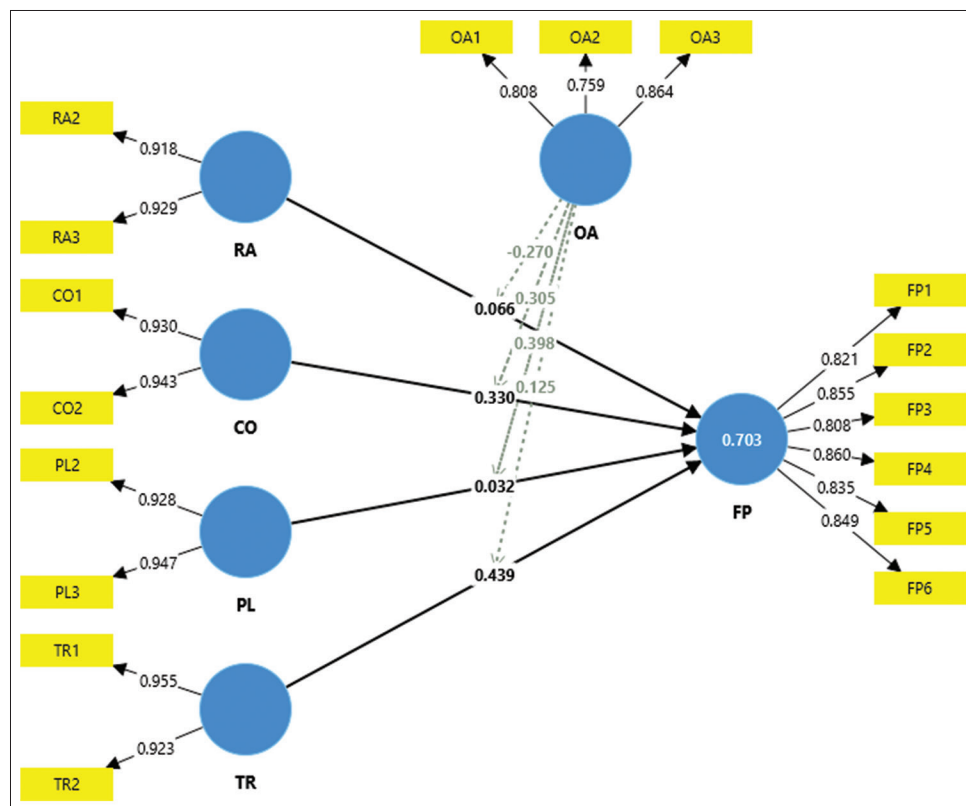


Table 1: Cronbach alpha, composite reliability ρ_a and composite reliability ρ_c

	Cronbach's alpha	Composite reliability (ρ_a)	Composite reliability (ρ_c)	Average variance extracted (AVE)
CO	0.860	0.867	0.934	0.877
FP	0.915	0.918	0.934	0.703
OA	0.739	0.745	0.852	0.658
PL	0.863	0.877	0.935	0.879
RA	0.827	0.830	0.920	0.853
TR	0.869	0.912	0.938	0.882

CO: Compatibility, FP: Financial performance, OA: Organizational agility, PL: Complexity, RA: Relative advantage, TR: Trialability

financial performance in order to appraise the structural model (Hair et al., 2017). The R^2 values of 0.703 for financial performance is regarded as high scores in the behavioral sciences (Ali et al., 2018). This indicates that 70.3% of the predictors are explained by the variance in financial performance. It is worthwhile noting that the variance as explained was above the minimum threshold R^2 assessment of 25% (Hair et al., 2016).

According to Ali et al. (2018), the assessment of Q^2 ought to be greater than zero to show that a structural model is prognostic; in this situation, we observed a Q^2 assessment of 0.675 for financial performance. These numbers demonstrate the model's good predictive capabilities.

All four predictors have a positive effect on financial performance respectively. It is worthy of note that trialability influenced financial performance the most; followed by compatibility, complexity and relative advantage.

4.4. Hypotheses Testing (Direct Effect)

As a conclusion of the direct effect, two of the four hypotheses were supported; compatibility to financial performance ($\beta = 0.330$, $P < 0.01$), trialability to financial performance ($\beta = 0.439$, $P < 0.01$). However, complexity to financial performance is insignificant ($\beta = 0.032$, $P = 0.811$); relative advantage to financial performance ($\beta = -0.066$, $P = 0.591$) is insignificant as can be demonstrated in Table 4.

Table 2: Discriminant validity assessment (HTMT)

	CO	FP	OA	PL	RA
FP	0.837				
OA	0.723	0.660			
PL	0.886	0.795	0.720		
RA	0.870	0.736	0.776	0.892	
TR	0.854	0.856	0.802	0.822	0.843

Table 3: Inner VIF

	VIF
CO → FP	3.228
OA → FP	1.979
PL → FP	4.078
RA → FP	4.397
TR → FP	3.186

Table 4: Hypotheses analysis

	Original sample (O)	f - square	T statistics (O/STDEV)	P-values	Decision
CO → FP	0.330	0.114	4.847	0.000	Supported
PL → FP	0.032	0.001	0.240	0.811	Not supported
RA → FP	0.066	0.003	0.538	0.591	Not supported
TR → FP	0.439	0.204	5.647	0.000	Supported

Table 5: Hypotheses testing (moderation effect)

	Original sample (O)	f-square	T statistics (O/STDEV)	P-values	Decision
OA×RA → FP	-0.270	0.024	2.179	0.029	Supported
OA×CO → FP	-0.305	0.039	3.256	0.001	Supported
OA×PL → FP	0.398	0.045	2.641	0.008	Supported
OA×TR → FP	0.125	0.011	1.677	0.094	Not Supported

The investigation also appraised the effect size (f^2), which is a measure of whether a certain exogenous construct significantly affects an outcome variable. Subject to Cohen's (1988) suggestion, the result of the investigation revealed that compatibility ($f^2 = 0.114$), has a small effect on financial performance. Furthermore, trialability ($f^2 = 0.204$) has a medium effect on financial performance. However, complexity ($f^2 = 0.001$) and relative advantage ($f^2 = 0.003$) has a no effect on financial performance respectively.

4.5. Moderation Effect

One of the current research hypothesis was to appraise the moderation role of transparency and disclosure on the link amid green brand positioning as well as financial stability. Moderation refers to a state in which the connection among two concepts is not continuous, but hinge on the value of a third variable denoted to as a moderator (Hair et al., 2017).

In this regard the appraisal of the moderation effect was applied. It is worthy of note that organizational agility has a negatively significant moderation effect ($\beta = -0.270$, $P < 0.05$) on the relationship amid relative advantage as well as financial performance. Additionally, organizational agility has a negatively significant moderation effect ($\beta = -0.305$, $P < 0.05$) on the relationship amid compatibility as well as financial performance. Furthermore, organizational agility has a negatively significant moderation effect ($\beta = 0.398$, $P < 0.05$) on the relationship amid complexity as well as financial performance. However, organizational agility has a positively insignificant moderating effect on the relationship among trialability ($\beta = 0.125$, $P = 0.094$) as well as financial performance (Table 5).

Subject to Cohen's (1988) suggestion, Table 5 further indicates that the moderation role of organizational agility has small effect on the relationship between relative advantage ($f^2 = 0.024$) and financial performance. Moreover, the moderation role of organizational agility has a small effect on the relationship amid compatibility ($f^2 = 0.039$) and financial performance. Furthermore, the moderation role of organizational agility has a small effect on the relationship amid complexity ($f^2 = 0.045$) and financial performance. However, the moderation role of organizational agility had no effect on the relationship amid trialability ($f^2 = 0.011$), and financial performance.

5. DISCUSSION

Grounded on the innovation diffusion theory, resource-based view, and the dynamic capability theory, the investigation contrasts the moderating role of organizational agility on the relationship among perceived innovativeness of blockchain technology and as well as the financial performance of manufacturing firms. Our results provide actual evidence for the crucial part that organizational agility plays a critical role in moderating the relationship between perceived innovativeness of blockchain technology and the financial performance of manufacturing firms.

Overall, two of the four hypotheses related to the direct effect were supported (Table 4). The study noted the presence of a positively significant relationship amid compatibility and the financial performance of manufacturing firms. Compatibility ensures alignment with existing systems, stakeholder needs, and strategic goals, enabling firms to realize blockchain's financial benefits, such as improved efficiency, cost reduction, and transparency. In resource-constrained settings, compatibility, enhances operational fit, cultural alignment, and regulatory synergy. Firms that perceive blockchain as compatible with their processes and practices face fewer adoption barriers, accelerating value creation. Empirical studies confirm compatibility's significance, linking successful blockchain integration to improved financial performance and sustained growth (Wamba et al., 2022).

In addition, the study noted the presence of a positively significant relationship amid trialability and the financial performance of manufacturing firms. This highlights the importance of experimentation in adopting blockchain technology in emerging markets. Trialability, allowing firms to test blockchain's features on a small scale, mitigates risks, reduces uncertainty, and builds trust in its perceived innovativeness. Blockchain's unique benefits, such as transparency and cost efficiency, are better realized when trialability addresses operational compatibility and stakeholder concerns. Empirical evidence shows that trialing blockchain leads to faster adoption and quicker returns on investment (Wamba et al., 2022; Rogers, 2003). By leveraging trialability, manufacturing firms can align blockchain with market needs and enhance financial performance effectively.

However, the study finds a positively insignificant relationship between complexity and the financial performance in manufacturing firms. This suggests that while complexity may not directly hinder financial outcomes, it can impede the adoption and effective use of innovative technologies like blockchain. In emerging markets, blockchain's perceived complexity can slow adoption and reduce its benefits, despite its perceived innovativeness. To mitigate this, firms need capacity-building strategies, proper planning, and gradual implementation to overcome barriers and fully leverage blockchain's potential for enhancing operational efficiency, transparency, and security, ultimately boosting financial performance.

Furthermore, the study reveals a positively insignificant relationship between relative advantage and the financial performance in manufacturing firms. The study's finding suggests

that while blockchain's perceived benefits, such as improved efficiency and transparency, may influence adoption, they do not always lead to immediate financial gains among manufacturing firms in emerging markets. Factors such as adoption delays, implementation barriers, and external challenges like market volatility and regulatory issues can hinder the realization of blockchain's perceived advantages. As a result, while blockchain offers significant potential, its impact on financial performance may take time to materialize due to these barriers and constraints in emerging market contexts.

The next hypothesis considered the moderation role of organizational agility on the link perceived innovativeness of blockchain technology as well as financial performance (Table 5). The study finds a negatively significant moderation effect of organizational agility on the relationship between relative advantage and the financial performance in manufacturing firms. This suggests that while agility allows firms to quickly adopt blockchain, it may also lead to disruptions if the technology isn't fully integrated with existing operations. In emerging markets, high agility can cause firms to overemphasize novelty, shifting strategies too quickly without aligning blockchain with strategic goals or operational systems. This can hinder financial performance despite blockchain's perceived advantages, as the rapid adoption may not allow sufficient time for optimizing processes and mitigating potential inefficiencies.

The study finds a negatively significant moderation effect of organizational agility on the relationship between compatibility and the financial performance in manufacturing firms. This indicates that there must be a balance of organizational agility with a clear blockchain adoption strategy, ensuring compatibility with existing systems. A phased implementation approach reduces risks, while investing in training programs enhances integration. Cross-functional collaboration is key to seamless blockchain integration across departments. These measures will help maximize blockchain's effectiveness and minimize disruptions, ensuring successful adoption and improved financial performance.

The study finds a positively significant moderation effect of organizational agility on the relationship between complexity and the financial performance in manufacturing firms. The study's finding highlights the importance of agility in adopting blockchain technology. In emerging markets, blockchain's complexity due to integration challenges and resource constraints can hinder adoption. However, organizations with high agility are better equipped to navigate these complexities, adjust strategies, and break down processes. Their flexibility allows for smoother blockchain integration, faster iteration, and continuous learning, leading to improved financial performance. Organizational agility enables firms to capitalize on blockchain's perceived innovativeness and overcome adoption barriers more effectively.

However, the moderation role of organizational agility on the relationship between trialability and the financial performance of manufacturing firms is positively insignificant (Table 5). The study's finding suggests that agility does not significantly enhance

the effectiveness of blockchain trial periods in improving financial outcomes. In emerging markets, the complexity of blockchain technology, regulatory uncertainty, and integration challenges may overshadow the benefits of trialability, even in agile firms. Despite their ability to quickly adopt and experiment, agile firms may still face difficulties in optimizing trial periods, limiting the direct link between trialing blockchain and achieving immediate financial performance improvements.

6. CONCLUSION

The positively significant relationship between compatibility and financial performance reinforces the importance of ensuring alignment between perceived innovativeness and existing practices when adopting blockchain technology. For manufacturing firms in emerging markets, the dual focus on perceived innovativeness and compatibility can unlock blockchain's full potential, fostering sustainable financial growth amidst the challenges of dynamic economic and regulatory environments.

The positive relationship between trialability and financial performance highlights the importance of experimentation in adopting blockchain technology. In emerging markets, where resources are limited, trialability enables firms to test blockchain solutions on a smaller scale, reducing risks and building confidence. This approach helps firms optimize blockchain's application, aligning it with operations and enhancing financial performance, bridging innovation with sustainable financial gains.

While the study finds complexity to have a positively insignificant relationship with financial performance, its influence on adoption and effective use of perceived innovative technologies like blockchain cannot be ignored. In emerging markets, overcoming blockchain's complexity through training, simplification, and phased implementation can enhance its perceived value, ensuring alignment with organizational goals and unlocking its full financial potential. Managers must strategically address complexity to leverage blockchain's innovativeness for long-term financial growth.

The study's finding of a positively insignificant relationship between relative advantage and financial performance suggests that perceived benefits of blockchain do not guarantee immediate financial gains. In emerging markets, firms face challenges such as infrastructure limitations and resource constraints. A strategic, phased approach to blockchain implementation, along with capacity building and long-term planning, is essential for realizing its full financial potential.

The study suggests that organizational agility may negatively moderate the relationship between relative advantage and financial performance in blockchain adoption. In emerging markets, firms must balance innovation speed with operational stability to maximize blockchain's benefits. Strategic alignment, careful planning, and capacity building are essential to enhancing the financial impact of perceived innovative technologies like blockchain.

The study highlights the need for a balance between organizational agility and careful planning when adopting blockchain in manufacturing firms, especially in emerging markets. While agility allows quick adaptation, it is crucial to align blockchain with strategic goals through phased implementations and capacity-building. This approach maximizes blockchain's potential while minimizing risks associated with rapid, disruptive adoption.

The study shows that organizational agility positively moderates the relationship between complexity and financial performance, helping firms manage the complexities of blockchain adoption. In emerging markets, agility is crucial for leveraging blockchain's perceived innovativeness. By fostering agility, investing in training, and adopting a phased approach, managers can overcome challenges and enhance financial performance.

The positively insignificant moderation effect of organizational agility on the relationship between trialability and financial performance underscores the complexity of blockchain adoption in emerging markets. While organizational agility is essential for rapid adaptation, it does not necessarily enhance the financial outcomes of trialing blockchain. Firms should focus on infrastructure development, cautious experimentation, and long-term strategic planning to ensure that trial periods with blockchain technology lead to meaningful financial improvements.

6.1. Theoretical Implications

Our study establishes a critical linkage amid perceived innovativeness of blockchain technology as well as the financial performance of manufacturing firms. Consequently, this study adds to the investigation on perceived innovativeness of blockchain technology as well as financial performance. Moreover, by analyzing the moderation role of organizational agility on the connection amid perceived innovativeness of blockchain technology as well as the financial performance of manufacturing firms, this investigation significantly adds to the body of knowledge.

To make sure that the inquiry is pertinent and legitimate in the particular context of interest, the modified measurement of latent constructs in the study is essential. This can result in a more precise and detailed understanding of the connections between the different constructs and offer insightful information.

Furthermore, the conceptualization of the moderation role of organizational agility on the link amid perceived innovativeness of blockchain technology as well as the financial performance of manufacturing firms offer a new direction for inquiry in order to increase knowledge of financial performance while also empowering manufacturing firms to adopt green blockchain technology strategies in an attempt to be competitive.

Innovation Diffusion Theory (IDT) highlights the role of perceived innovativeness in technology adoption. In emerging markets, firms with higher perceived innovativeness are more likely to adopt blockchain, potentially improving financial performance.

Organizational agility moderates this process, enabling firms to adapt quickly to blockchain's complexities, accelerating adoption, and enhancing financial outcomes.

From a Dynamic Capability Theory perspective, organizational agility enables firms to adapt to changing environments, making it crucial for leveraging blockchain technology. Agility enhances firms' ability to sense opportunities, seize them, and transform resources to integrate blockchain. This adaptability leads to improved financial performance, as agile firms can better respond to market dynamics and technological disruptions, gaining a competitive advantage.

6.2. Managerial Implications

The findings of this analysis have a lot of implications;

Manufacturing firms in emerging markets must address blockchain compatibility challenges by minimizing costs to align with tight budgets, engaging stakeholders to ensure adoption meets the needs of employees, partners, and customers, and investing in training to build workforce capacity. These strategies enhance blockchain integration, optimizing its financial benefits and fostering sustainable growth.

For manufacturing firms in emerging markets, trialability mitigates risks by identifying implementation challenges, showcases tangible benefits like improved supply chain tracking and fraud prevention, and reinforces blockchain's perceived innovativeness. By enabling resource optimization and ensuring effective allocation, trialability fosters adoption and accelerates financial gains, making it a crucial step in leveraging blockchain technology successfully.

Managers can address blockchain complexity by simplifying processes with user-friendly interfaces and clear documentation, investing in employee training to enhance skills, adopting a phased implementation approach to manage transitions effectively, and collaborating with experts to navigate technical challenges. These strategies ensure smoother adoption, optimize resource utilization, and maximize the financial benefits of blockchain technology in manufacturing firms.

Managers should ensure that blockchain's relative advantages align with the firm's goals, fostering strategic alignment for successful adoption. Firms in emerging markets must invest in necessary infrastructure, such as digital systems and workforce training, to support blockchain. Focusing on the long-term benefits, including cost savings, transparency, and customer trust, can lead to sustained financial gains despite initial challenges.

Managers should align organizational agility with a clear blockchain strategy, balancing flexibility with stability in operations. A phased implementation approach, starting with pilot projects, ensures smoother integration. Investing in change management, including training and leadership development, is crucial for managing the complexities of blockchain adoption, especially in emerging markets, to avoid overwhelming resources and ensure successful technology implementation.

Managers should promote organizational agility through flexibility, responsiveness, and continuous improvement to manage blockchain adoption complexities. Investing in training helps employees tackle technical challenges, while a phased implementation allows for gradual adjustments. Cross-functional collaboration between departments like IT, finance, and operations ensures smooth integration, maximizing blockchain's benefits while minimizing its complexities.

Managers should ensure adequate infrastructure and resources for effective blockchain trial periods, as agility alone may not optimize outcomes. They should promote cautious experimentation, investing in pilot projects and expertise. Adopting a long-term perspective on blockchain adoption, rather than focusing on immediate financial gains, is crucial. Cross-departmental collaboration enhances understanding and integration of blockchain across the firm.

6.3. Limitations and Recommendations for Future Research

This study's focus on manufacturing firms in emerging markets may limit its generalizability to developed markets or other industries. Future research should explore blockchain adoption across various sectors, such as services, retail, and agriculture, to gain a broader understanding of how organizational agility influences blockchain's impact on financial performance in different contexts.

The study's reliance on cross-sectional data limits causal inferences. Future research should use a longitudinal design to examine the long-term effects of blockchain adoption on financial performance. This approach would provide deeper insights into how firms adapt and refine blockchain use, focusing on the dynamic interaction between agility and innovation adoption.

The operationalization of organizational agility may vary across firms and industries, especially in diverse cultural contexts. Future research should explore how agility interacts with blockchain adoption in different cultural and institutional settings within emerging markets. Comparing firms across regions could shed light on how cultural factors influence blockchain's perceived innovativeness and financial performance.

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