Journal of Information Systems Engineering and Management
2024, 9(3), 24653
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Exploring Smart Contracts and Trade Credit in Modern Supply Chain Finance: Assessing Risk Appetite and Operational Efficiency with Data Imaging and Interaction Systems

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Citation: Zuo, G. (2024). Exploring Smart Contracts and Trade Credit in Modern Supply Chain Finance: Assessing Risk Appetite and Operational Efficiency with Data Imaging and Interaction Systems. *Journal of Information Systems Engineering and Management*, *9*(3), 24653. https://doi.org/10.55267/iadt.07.14867

ARTICLE INFO

Received: 06 Nov 2023
Accepted: 31 Jan 2024

ABSTRACT

Trade credit terms and the use of smart contracts have become essential tools in the age of digital transformation, helping to shape contemporary company practices. Businesses are using technology and financial tactics more and more to improve operational effectiveness and manage risk. The way these methods play out is influenced by the complimentary roles that data imaging, information systems, and interaction systems play. The aim of this study was to thoroughly examine the complex interactions that exist between the use of smart contracts, trade credit terms, data imaging, information systems, interaction systems, operational effectiveness, and risk tolerance. The study aimed to offer a cohesive viewpoint on the ways in which these elements interact in modern corporate environments by taking mediation and moderation effects into consideration. A sample size of 438 organizations was chosen at random to facilitate quantitative analysis. The data was gathered using an online questionnaire. SPSS and Process were used for data analysis. Implementations of smart contracts and both operational efficiency and risk appetite were found to have strong and favorable connections. Operational effectiveness and risk tolerance were positively impacted by favorable trade credit conditions. In these relationships, data imaging became a mediator, while information systems and interaction systems functioned as moderators, affecting the type and strength of the links. This research contributes a holistic understanding of how smart contract implementations and trade credit terms impact operational efficiency and risk appetite. The mediation and moderation effects reveal the nuanced dynamics, enhancing knowledge for both academia and industry practitioners.

Keywords: Smart Contract Implementation, Trade Credit Terms, Data Imaging, Risk Appetite, Interaction System.

INTRODUCTION

Risk appetite and operational efficiency are two paramount facets that underpin the success and sustainability of modern organizations. A key factor in determining strategic decision-making is risk appetite, or an organization's willingness to take measured risks in the pursuit of its goals (Dong, Wu, Zhou, & Chen, 2022). It acts as a compass, assisting companies in spotting opportunities and navigating the choppy waters of unpredictability. Having the right amount of risk appetite enables businesses to balance innovation and caution, which promotes resilience and adaptation in fast-paced marketplaces (He, H. Gao, Li, L. Guo, Lei, & Cao, 2023). Operational efficiency, on the other hand, provides the foundation for an organization's long-term growth. It

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means that an organization is able to develop its processes and deliver products or services with minimal waste and high efficiency (Sandra Marcelline et al., 2022). efficient operations decrease costs, boost productivity, and guarantee that resources are used wisely. This improves now not only a company's monetary line but also its agility and capability to respond quickly to market developments (Vidar Gudmundsson, 2023). The operational dynamics of organizations are shaped by the complex interplay between the execution of smart contracts and trade credit terms, which have an impact on operational efficiency and risk appetite. Blockchain technology enhances financial processes through functions such as secure and transparent transaction recording, automated contract execution via smart contracts, and real-time auditability, which collectively improve operational efficiency (Alsalim & Ucan, 2023). Smart contracts provide transparency, optimize workflows, cut down on errors, and speed up processing by automating procedures. Operational efficiency is enhanced by these economic benefits. Moreover, risk appetite may be impacted by the predictability and transparency that smart contracts provide (Hassani et al., 2021). Organizations are more inclined to take a risk-tolerant stance when they can see contractual consequences more clearly and are less unsure, particularly in situations where the predictability of smart contracts improves reliability.

By allowing for financial flexibility, trade credit terms are essential to operational effectiveness. Advantageous trade credit conditions enable businesses to minimize financial constraints, maximize working capital management, and deploy resources effectively. enhanced operational efficiency can be achieved by businesses through effective resource allocation (Beloglazov, Abawajy, & Buyya, 2012). Trade credit terms serve as a safety net for businesses, enabling them to postpone payments and free up cash flow, which promotes a higher risk tolerance. Companies that maintain good trade credit terms and have a track record of upholding them can establish a reputation for creditworthiness, which opens up further opportunities and gives them the courage to take measured risks (J. Wang, K. Wang, Li, & Zhao, 2022). Within this complex web of relationships, the deployment of smart contracts and trade credit conditions work together to affect operational efficiency and risk appetite, which in turn affects how businesses manage the constantly changing business operations landscape.

Previous studies have examined how different aspects of financial technology, trade credit conditions, and smart contract implementations affect financial decision-making and business operations. Research has examined the benefits of using smart contracts in terms of efficiency (Praitheeshan, Pan, Zheng, Jolfaei, & Doss, 2021), the impact of trade credit terms on working capital management (S. A. Yang & Birge, 2018), and the contribution of financial systems and data visualization to improving operational effectiveness (Anderson et al., 2019). Furthermore, Tan and Wang's (2023) studies have looked at the moderating influence of information systems and interaction systems on technology-related strategies and the mediating role of data imaging in financial and operational contexts. Previous research frequently concentrates on discrete components or provides a narrow view of the complex interrelationships between various variables. The lack of a comprehensive analysis that takes into account both mediation and moderation effects, offering a thorough grasp of how these components interrelate within the dynamic environment of contemporary corporate operations, represents a research gap.

The purpose of this research is to thoroughly examine, in the context of modern corporate operations, the effects of trade credit terms and smart contract implementations on operational efficiency and risk appetite. With an emphasis on the moderating effects of information systems and interaction systems as well as the mediating role of data imaging, this research aims to provide a comprehensive understanding of the interplay between these aspects. The objectives of the study are as follows.

1. To examine the influence of smart contract implementations on operational efficiency and risk appetite in modern organizations.

2. To assess the impact of trade credit terms on operational efficiency and risk appetite within the context of business operations.

3. To investigate the mediating role of data imaging between smart contract implementations, risk appetite and operational efficiency.

4. To Investigate the mediating role of data imaging in the connections between trade credit terms, risk appetite and operational efficacy.

5. To investigate the moderating roles of information and interaction systems between smart contract implementations, trade credit terms, risk appetite and operational efficiency.

This study offers a fresh perspective on the relationships between smart contract implementations, trade credit terms, data imaging, information systems, interaction systems, operational efficiency, and risk appetite. It stands out by thoroughly examining the increasingly critical elements of mediation and moderation in trendy business globally. The study's findings are relevant as businesses navigate the digital age when technological and financial strategies are vital. The findings of this study aid both academics and industry professionals in making more informed judgments, increasing operational efficiency, and refining risk management strategies. The research is significant and timely because it aims to aid businesses in thriving in a business environment that is becoming increasingly complex and data-driven.

LITERATURE REVIEW

Theoretical Background

The Technology Acceptance Model is a well-known theory that examines how people and organizations embrace and use new technology. This theory can help comprehend the variables that influence the acceptance and utilization of interaction systems, smart contracts, and information systems inside businesses in the context of this study. TAM can provide important insights into how perceived utility and usability affect technology adoption and the way adoption affects chance appetite and operational effectiveness (Zhou & Lund, 2023). TAM may help lead this research project to find out what factors affect the adoption of smart contracts, interaction systems, and information systems (J. Zhang & Luximon, 2021). Understanding why and how firms embrace or reject innovative technology is crucial because it affects operational effectiveness and risk tolerance (Chung et al., 2023). Furthermore, when examining trade credit conditions, the Technology Acceptance Model (TAM) can shed light on the variables driving the adoption of trade credit practices. These variables include perceived ease of use and perceived usefulness, which are critical for increasing organizational operational efficiency and enhancing risk management. By understanding these factors, organizations can better implement and optimize trade credit systems, ultimately leading to improved financial stability and performance.

Smart Contract Implementations and Operational Efficiency

Smart contracts are automated, self-executing programs that can optimize and streamline a number of operational procedures. The following research demonstrates that their application can have significant advantages. A thorough examination of the implications of smart contracts in supply chain management was carried out by Jiang, Chen, Wen, and Zheng (2022). They discovered that smart contracts' automation and transparency greatly shortened the time needed to verify and carry out agreements, improving overall operational efficiency (Ferreira, 2021). Additionally, smart contracts can reduce human error in guide processes, improving supply chain accuracy (Ciotta, Mariniello, Asprone, Botta, & Manfredi, 2021). Smart contracts' ability to automate financial transactions and eliminate the need for middlemen has been shown to improve operational efficiency in the financial sector. I. A. Omar, Hasan, Jayaraman, Salah, and M. Omar (2021) described how smart contracts expedited trade agreement processing and accelerated transaction settlement, resulting in efficiency advantages in trade finance. According to Aquilina, Casino, Vella, Ellul, and Patsakis (2021), there were notable cost reductions and quicker processing times as a result of the removal of middlemen and reduced paperwork. Furthermore, the use of smart contracts in the insurance industry has shown a significant influence on operational efficiency. Smart contracts facilitated real-time claims processing, decreasing the administrative overhead associated with insurance claims, according to Manoj, Makkithaya, and Narendra (2023). Automation in claims processing not only sped up the payment process but also reduced the possibility of errors and fraud, enhancing overall insurance operations efficiency.

H1: Smart contract implementations have a significant and positive impact on operational efficiency.

Smart Contract Implementations and Risk Appetite

Sood et al. (2023) examined financial industry smart contract adoption concerns. They discovered that smart contracts, because of their self-executing nature and transparency, reduce counterparty risk and boost participant trust. As a result, companies may be more inclined to engage in riskier transactions, resulting in an increase in risk appetite (P. L. Lee, Lye, & C. Lee, 2022). Natanelov, Cao, Foth, and Dulleck (2022) investigated the effect of smart contracts on risk mitigation in the context of supply chain management. A smart contract can be designed to automatically initiate specific operations in response to predetermined circumstances, which lowers the possibility of supply chain interruptions. Given the improved control and responsiveness that smart contracts provide, a business may be more willing to take on risk as a result of the better predictability and mitigation of supply chain hazards (Eskandari, Sadegheih, Zare, & Lotfi, 2022). Furthermore, Kaafarani, Ismail, and Zahwe (2023) evaluated the impact of smart contracts on risk appetite in the insurance setting. Smart contracts provide real-time data collection and claim processing, helping insurers identify and manage risks. As insurers gain confidence in their risk assessment and management capabilities, this may lead to a higher risk appetite.

H2: Smart contract implementations have a significant and positive impact on risk appetite.

Trade Credit Terms and Operational Efficiency

According to the research of Ding, Jiang, Wu, and Zhou (2021), liberal trade credit terms can boost operational efficiency by minimizing the requirement for short-term external financing. Businesses can lower the cost of external financing by extending payment terms to suppliers, managing cash flow better, and making more intelligent resource allocations to boost operational effectiveness (H. Yang, Zhuo, Shao, & Talluri, 2021). Pattnaik and Baker (2023) investigated the impact of trade credit on firms' working capital management capacities. Based on their findings, businesses may be able to lower operating expenses and increase productivity by providing their customers with more advantageous trade credit terms. These conditions, according to Guan, Mou, and Sun (2022), could help organizations maximize their cash conversion cycles and negotiate better rates with suppliers, resulting in more efficient working capital management.

H3: Trade credit terms have a significant and positive impact on operational efficiency.

Trade Credit Terms and Risk Appetite

In the context of financial management and risk assessment, the impact of trade credit terms on a company's risk appetite has been researched. The terms and conditions under which a company extends and receives trade credit from its customers and suppliers can have a significant impact on its willingness to engage in risky operations. James (2023) explored the relationship between trade credit conditions and corporate risk-taking behavior. More permissive trade credit conditions provided to customers can lead to increased sales, possibly contributing to a higher risk appetite as firms vie for market share. This, however, comes with the potential of a higher customer default rate, which increases a firm's overall risk exposure (D. P. Stowell & P. Stowell, 2024). Trade credit circumstances affect an organization's financial adaptability and risk-taking (Shakib, Sohag, Hassan, & Vasilyeva, 2023). extended payment terms from suppliers could be a source of short-term funding. However, too favorable terms for supplier financing may reduce liquidity and increase financial risk, which may cause a business to be more cautious when taking on new ventures.

H4: Trade credit terms has a significant and positive impact on risk appetite.

Data Imaging as a Mediator

Data imaging involves creating a visual or graphical representation of data for humans to understand or analyze. Data visualization can include charts, graphs, infographics, maps, and other visuals (Panavas et al., 2022). In data analysis and presentation, data imaging helps explain complex facts, patterns, and relationships. Data imaging can help to mediate the relationship between smart contract implementations and operational efficiency. Large volumes of transaction data are generated by smart contracts (Jamil et al., 2022). Data imaging tools, such as data visualization and analysis, can analyze and show this data in a way that is understandable and useful. Data imaging can optimize resource allocation, streamline workflow, and enable data-driven decision-making by offering real-time insights into operational processes, thereby improving operational efficiency (Niecikowski et al., 2022). Smart contract deployment affects an organization's risk appetite through data imaging. Raj, Jauhar, Ramkumar, and Pratap (2022) found that transparent and auditable smart contracts generate a lot of transaction data. Risk exposure and mitigation measures may be made more transparent with data imaging technology. Data imaging improves risk assessment and monitoring, changing organizations' risk appetite (ezerins, Ludwig, O'Neil, Foreman, & Açıkgöz, 2022). This technology increases their willingness to take on more risk in areas where they have greater control and visibility. For instance, businesses can take more calculated risks in credit risk assessment by better evaluating customer creditworthiness, in investment decisions by thoroughly analyzing opportunities, and in supply chain management by predicting and mitigating disruptions. Additionally, data imaging enhances fraud detection, operational efficiency, market expansion strategies, and product development decisions, allowing for more confident and informed risk-taking in these critical areas. Data imaging can act as a mediator in the interaction between trade credit conditions and operational efficiency by providing real-time tracking and control over accounts receivable. To demonstrate how trade credit terms affect cash flow, S. Liu, Wang, and Li (2023) conducted research. Data imaging lets businesses see how trade credit terms affect working capital and liquidity. Better cash flow management is made possible by this enhanced visibility and real-time data analysis, which may boost operational effectiveness (C. C. Lee, 2023). Data imaging can mediate trade credit circumstances and risk appetite by supplying financial information about the firm. According to study by Natanelov et al. (2022) and W. Liu et al., (2023), companies with more flexible trade credit terms may be better equipped to handle cash flow and minimize financial risk. By employing data imaging to analyze financial data and provide real-time risk assessment, organizations can adjust their risk appetite in response to changes in the market and their financial circumstances. This could lead to more intelligent risk-taking decisions depending on the organization's financial capacity.

H5a: Data imaging mediates the relationship between Smart contract implementation and operational efficiency.

H5b: Data imaging mediates the relationship between Smart contract implementation and risk appetite.

H5c: Data imaging mediates the relationship between Trade credit terms and operational efficiency.

H5d: Data imaging mediates the relationship between Trade credit terms and risk appetite.

Information System as a Moderator

A network of hardware, software, data, processes, and people gathers, processes, stores, and distributes data and information inside an organization. It improves decision-making, automation, and business processes, boosting efficiency and effectiveness (Stvilia, Wu, & Lee, 2019). According to Zhao et al. (2020), an advanced information system can operate as a moderator in the link between smart contract implementations and operational efficiency. An excellent information system capable of integrating smart contracts can improve their overall efficacy. It improves the transparency and efficiency of operational operations by streamlining data gathering, processing, and analysis Smart contract adoption can yield substantial advantages in operational efficiency, particularly for organizations equipped with advanced information systems (Zhou & Lund, 2023). These advantages include streamlined and automated contract execution processes, enhanced transparency and auditability of transactions, reduced administrative overhead, and improved accuracy in record-keeping. Furthermore, integration with advanced information systems enables seamless communication and data exchange, facilitating smoother execution and enforcement of smart contracts. The relationship between smart contract implementations and risk appetite can be moderated by an information system. The quality and capabilities of an organization's information system, as revealed by Deebak and AL-Turjman (2021), might influence its perception of the dangers associated with smart contract adoption. A robust information system with real-time monitoring and security measures can boost smart contract confidence. As a result, firms with advanced information systems may be more likely to use smart contracts and, as a result, have a larger risk appetite in areas where the information system provides strong support (Sadu, Jindal, Lipari, Ponci, & Monti, 2021). An information system can mitigate the effect of trade credit terms on operational efficiency. According to research by Al-Otaibi (2022), the connection may be greatly impacted by an information system's capacity to automate trade credit management. By streamlining the administration and monitoring of trade credit terms, an advanced information system can lessen the workload. Automation may improve working capital management, increasing operational efficiency. Trade credit policies may have a more noticeable impact on an organization's operational efficiency if it has such information systems (Laali, Nourzad, & Faghihi, 2022). The capabilities of an information system play a crucial role in assessing the impact of trade credit terms on the financial health of a firm (Z H. Wang, Qi, Zhang, & Liu, 2021). Specific capabilities include robust data analytics functionalities for analyzing trade credit data, real-time monitoring capabilities to track credit performance, integration with financial models for risk assessment, and predictive modeling capabilities to forecast the implications of varying credit terms. Additionally, advanced reporting and visualization tools enable stakeholders to gain insights into the relationship between trade credit practices and financial outcomes, aiding in strategic decision-making and risk management efforts. As a result, depending on the quality of its information system, the organization's risk appetite may be more finely adjusted to its financial position and market conditions.

H6a: Information system moderates the relationship between Smart contract implementation and operational efficiency.

H6b: Information system moderates the relationship between Smart contract implementation and risk appetite.

H6c: Information system moderates the relationship between Trade credit terms and operational efficiency.

H6d: Information system moderates the relationship between Trade credit terms and risk appetite.

Interaction System as a Moderator

A social media platform, a chatbot, or a video conferencing system are examples of interaction systems. The term "interaction system" is often used to refer to the technology or tools that enable interactions and communication (Ren et al., 2022). It makes interaction between persons or between individuals and computer systems easier, hence fostering communication and cooperation and facilitating participation (Y. Cao & AlKubaisy, 2022). According to research by Papadouli and Papakonstantinou (2023), the relationship between smart contract implementations and operational efficiency may be moderated by the quality and capabilities of an interaction system. Stakeholders engaged in smart contract-based processes can collaborate and communicate more easily with each other when there is an effective interaction mechanism in place. It can facilitate decision-making, problem-solving, and feedback in real-time, all of which improve operational efficiency. As demonstrated by Fleming, Safaeinili, Knox, Hernandez, and Brewster (2023), an organization's ability to communicate and work together to manage the risks connected with smart contracts can be influenced by the capabilities and quality of its interaction system. Improved communication and risk-reduction techniques can be fostered by an improved interaction system (Ren et al., 2022). According to M. Li, Zhao, Zhang, Liu, and Fu (2022), organizations that possess sophisticated interaction systems may see a greater impact on operational efficiency because of their capacity to facilitate seamless communication and cooperation between suppliers and customers, hence enhancing trade credit management and operational procedures. The association between trade credit conditions and risk appetite can potentially be moderated by an interactive system. Deng, Fu, Xu, and Zhu's (2021) research demonstrates how an organization's interaction system might impact its ability to collaborate and communicate with suppliers and consumers. The effectiveness and transparency of managing trade credit conditions can be impacted by the caliber of this interaction mechanism. The quality of the company's interaction system may affect its risk assessment and appetite, which affects how the business approaches trading credit risk.

H7a: Interaction system moderates the relationship between smart contract implementation and operational efficiency.

H7b: Interaction system moderates the relationship between smart contract implementation and risk appetite.

H7c: Interaction system moderates the relationship between trade credit terms and operational efficiency.

H7d: Interaction system moderates the relationship between trade credit terms and risk appetite.

Based on the above discussion and literature we developed the following conceptual framework as shown in **Figure 1**.

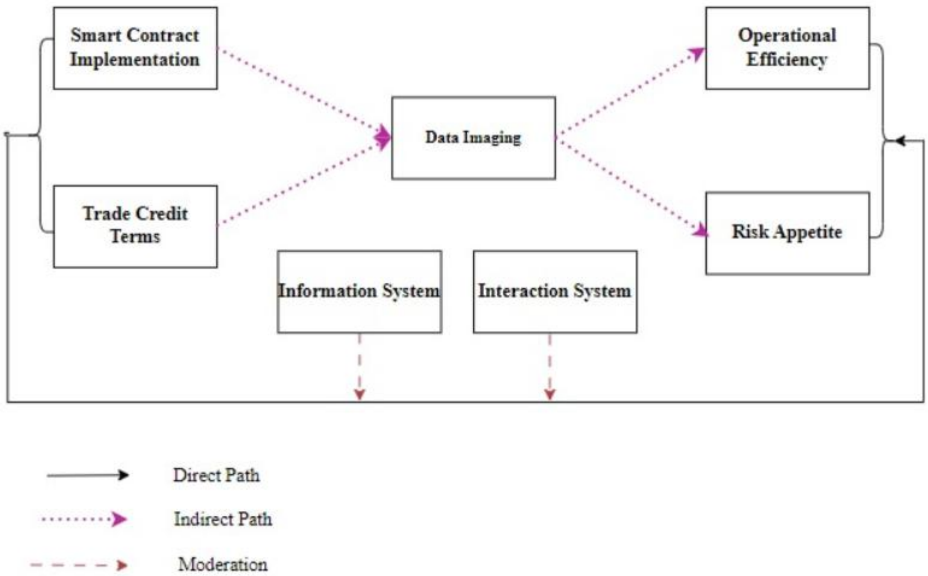

Figure 1. Conceptual Framework

METHODOLOGY

Research Design

The study employed a quantitative research design to investigate the relationships and interactions between variables related to smart contract implementations, trade credit terms, data imaging, information systems, interaction systems, operational efficiency, and risk appetite. Quantitative research was chosen to allow for structured data collection and statistical analysis, enabling the assessment of hypotheses and relationships (J. W. Creswell & J. D. Creswell, 2017).

Population

The population for this study included businesses and organizations across various sectors that had integrated smart contract implementations and engaged in trade credit transactions. The study focused on organizations that utilized online systems for operational and financial activities.

Sample Size Determination Technique

The sample size for the study was established by utilizing a rule of thumb, specifically a sample size of 438 people. The intricacy of the research variables and the possibility of subgroup analysis led to the conclusion that this size was adequate to provide statistical power and representativeness.

Sampling Technique

A random sampling technique was used to select participants from the population. Random sampling ensured that every eligible organization in the population had an equal chance of being included in the sample, reducing the risk of selection bias (Cuevas-Vargas, Camarena, & Velázquez-Espinoza, 2022).

Data Collection Technique

An online questionnaire was used to collect data. The purpose of the questionnaire was to gather data about the use of smart contracts, words used in trade credit, data imaging, information systems, interaction systems, operational effectiveness, and risk tolerance. It was distributed to participants electronically, ensuring efficiency and reach (Canet-Juric et al., 2021).

Data Analysis Technique

Statistical software was utilized to conduct a thorough examination of the gathered data. Basic analyses, descriptive statistics, and preliminary data cleaning were all done using SPSS (Statistical Package for the Social Sciences) (El Ayoubi & Radmehr, 2023). The software program Origin was used for more complex statistical studies, such as structural equation modeling (SeM) to investigate the correlations between variables. SeM made it possible to investigate the suggested mediation and moderation effects, which led to a thorough comprehension of the study constructs and how they relate to one another.

RESULTS

Demographics of the Study

The majority of the sample, 23.50%, falls within the 25–34 age range. This shows that the study has a large number of mid-to late-20s and early-30s participants. 18.49% of the sample is 45–54 years old, showing a large middle-aged population. The other age groups make up 10-15% of the sample evenly. The sample is virtually evenly split between males and females, with each gender contributing 49.77% of the participants. This gender balance is essential to avoid gender-related bias in the study's outcomes. The majority of participants (35.89%) have a Bachelor's Degree. A Ph.D. or similar degree is held by 32.19% of participants, indicating a high level of education. High school and master's degree holders are 7.99% and 23.97 per cent. With 44.30% of the sample, middle-income people dominate. High-income participants are 23.74% and low-income 17.58%. Like many survey respondents, 14.38% choose not to divulge their salary. The most common industry is technology/IT, with 23.06% of the sample. The second-largest sector is healthcare (16.44%). Finance/Banking contributes 13.01%, Manufacturing 11.19%. education, Retail, and "Other" make up 36.3%, showing participant employment diversity. Participants with 20+ years of experience make up 30.82% of the sample, indicating a considerable number of experienced experts. 26.48% have 10-19 years of experience, while 18.03% have 0-4 years. The group includes 24.66% with 5-9 years of experience. Participants' technology literacy is strong, with 46.12% "Proficient" or higher. "Somewhat proficient" is 22.60% while "Very proficient" is 17.81%. This sample is tech-savvy. Participants' smart contract familiarity is high, with 34.48% "Very familiar" and 22.16% "Moderately familiar". "Slightly familiar" holds 12.57% and "extremely familiar" 30.82%, indicating that a large fraction of the sample understands smart contracts and blockchain technology. **Table 1** shows the demographic profile of respondents.

Table 1. Demographic Profile of Respondents

Demographic Variable	Categories	Frequency (n)	Percentage (%)
Age	18-24 years	47	10.73%
	25-34 years	103	23.50%
	35-44 years	68	15.53%
	45-54 years	81	18.49%
	55-64 years	59	13.47%
	65 years and above	80	18.26%

Demographic Variable	Categories	Frequency (n)	Percentage (%)
Gender	Male	219	49.77%
	Female	219	49.77%
Education Level	High School	35	7.99%
	Bachelor's Degree	157	35.89%
	Master's Degree	105	23.97%
	Ph.D. or equivalent	141	32.19%
Income Level	Low income	77	17.58%
	Middle income	194	44.30%
	High income	104	23.74%
	Prefer not to say	63	14.38%
Industry or Sector	Finance/Banking	57	13.01%
	Technology/IT	101	23.06%
	Healthcare	72	16.44%
	Manufacturing	49	11.19%
	Retail	43	9.82%
	Education	45	10.27%
	Other (please specify)	61	13.93%
Years of Experience	0-4 years	79	18.03%
	5-9 years	108	24.66%
	10-19 years	116	26.48%
	20+ years	135	30.82%
Technology Literacy	Somewhat proficient	99	22.60%
	Proficient	202	46.12%
	Very proficient	78	17.81%
Familiarity with Smart Contracts	Slightly familiar	55	12.57%
	Moderately familiar	97	22.16%
	Very familiar	151	34.48%
	Extremely familiar	135	30.82%

Descriptive Statistics

The primary characteristics of a dataset are summed up and described using numerical or graphical methods known as descriptive statistics (Hafiza AReesha Javed, Nawaz, & Hafiza Arooba Javed, 2023). These statistics give us a snapshot of the data, allowing us to better grasp its central tendency, variability, and dispersion. Descriptive statistics are commonly used to describe data, and they contain metrics such as mean, minimum, maximum, and standard deviation (Javed et al., 2023). Descriptive data for seven variables are presented in **Table 2** and **Figure 2**: SCI (Smart Contract Implementation), TCT (Trade Credit Terms), DI (Data Imaging), OE (Operational Efficiency), RA (Risk Appetite), INFS (Information System), and INTS (Interaction System). The variable SCI includes 438 observations ranging from 1 to 5, with a mean score of 3.75 and a standard deviation of 1.162. This implies a moderate level of diversity in Smart Contract Implementation throughout the sample. Variables like TCT, DI, and RA have moderate variability as well, with means of 3.90, 3.84, and 3.93, respectively. As an illustration of how the data points for operational efficiency are comparatively clustered around the mean, OE displays a higher mean of 4.10 and a lower standard deviation of 0.871. The distribution of INFS is narrow, with a mean of 4.02 and a standard deviation of 0.961, whereas the distribution of INTS is moderate, with a mean of 3.95 and a standard deviation of 0.988. In order to improve comprehension of the features and variability of the data, these statistics offer a useful summary of the primary tendencies and spreads within each variable.

Table 2. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
SCI	438	1	5	3.75	1.162
TCT	438	1	5	3.90	1.018
DI	438	1	5	3.84	1.016
OE	438	1	5	4.10	.871
RA	438	1	5	3.93	1.027
INFS	438	1	5	4.02	.961
INTS	438	1	5	3.95	.988

Note: SCI = Smart Contract Implementation, TCT = Trade Credit Terms, DI = Data Imaging, OE =

Operational Efficiency, RA = Risk Appetite, INFS = Information System, INTS = Interaction System.

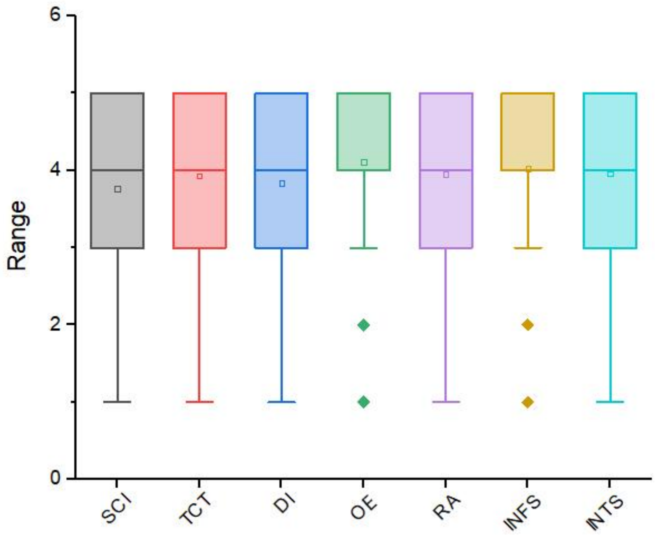

Figure 2. Descriptive Statistics

KMO and Bartlett's Test

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity are two important statistical tests in data analysis, especially in the context of factor analysis and dimensionality reduction (Iofrida, Soni, & Yukongdi, 2022). The adequacy of the dataset for factor analysis is assessed using the KMO test; a higher KMO score denotes stronger inter-variable correlations (N. Zhang et al., 2023). **Table 3** shows a rather high KMO Measure of Sampling Adequacy of 0.910, which is close to the maximum value of 1. The aforementioned discovery, illustrated in **Table 3**, highlights the remarkable appropriateness of the dataset for component analysis. It implies that the variables within the dataset exhibit strong correlations and are appropriately organized to facilitate the extraction of underlying factors. A requirement for a successful factor analysis is the presence of substantial correlations between variables, which is evaluated by Bartlett's Test of Sphericity, which is also depicted in **Table 3**. The approximate chi-square value is 13308.191, and the significance level (Sig.) is a very low 0.0001. These results, which support the applicability of factor analysis, firmly refute the hypothesis that the variables are uncorrelated and confirm that the variables in the dataset show significant correlations. Therefore, **Table 3** emphasizes the dataset's excellent eligibility for component analysis due to the considerable interrelationships among its variables and the clear presence of correlations required for comprehending underlying factors.

Table 3. KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.910
Bartlett's Test of Sphericity	Approx. Chi-Square	13308.191
	df	595
	Sig.	.0001

Constructs Reliability and Validity

The degree to which a measurement tool reliably measures the desired construct or notion across a number of items or questions is referred to as construct reliability (Yu, Abbas, Álvarez-Otero, & Cherian., 2022). It is critical to make sure the instrument is dependable, which means it gives consistent results when used regularly. Cronbach's alpha (α) and Composite Reliability (CR) are two popular methods for gauging construct dependability. These statistics evaluate a scale's internal consistency, with higher values suggesting greater dependability (Duong, T. B. N. Nguyen, & T. K. C. Nguyen, 2021). The items on the scale are likely to assess the same underlying construct if the internal consistency of the scale is strong. Construct validity refers to how well a measurement instrument assesses the desired construct or concept (Javed et al., 2023). It guarantees that the measurement being made by the instrument is what it is supposed to measure. Construct validity is essential for drawing meaningful conclusions from data. Values nearer 1 indicate stronger correlations between individual items and the underlying construct, which is measured by factor loading (Imtiyaz, Soni, & Yukongdi, 2022). The proportion of variance in the observable variables explained by the underlying construct is calculated using AVe. A higher AVe value is indicative of improved concept validity (Javed et al., 2023).

The smart contract implementation construct has five items (SCI1-SCI5) with factor loadings ranging from 0.635 to 0.826, indicating strong associations. The trade credit terms construct also has five items (TCT1-TCT5) with factor loadings ranging from 0.678 to 0.779, indicating strong connections. The data imaging construct has five items (DI1-DI5) with factor loadings ranging from 0.636 to 0.830, again indicating strong associations. The operational efficiency construct has five items (OE1-OE5) with factor loadings ranging from 0.665 to 0.838, indicating reliability and robustness. The risk appetite construct has five items (RA1-RA5) with factor loadings ranging from 0.629 to 0.884, showing strong relationships. The information system construct has five items (INFS1-INS5) with factor loadings ranging from 0.879 to 0.909, indicating strong connections. Lastly, the interaction system construct has five items (INTS1-INTS5) with factor loadings ranging from 0.643 to 0.910, emphasizing strong relationships. Overall, all the constructs have reliable and robust indicators based on the factor loadings of their respective items.

Table 4 displays each variable's remarkable internal consistency, as seen by all Cronbach's alpha (α) values surpassing the widely acknowledged criterion of 0.7. In particular, α is attained by the Smart Contract Implementation (SCI) variable at 0.846, Trade Credit Terms (TCT) at 0.808, Risk Appetite (RA) at 0.826, and Operational Efficiency (OE) at a high of 0.830. The Information System (INFS) outperforms all others with an impressive α value of 0.915, while the Interaction System (INTS) achieves an α value of 0.848. The value of imaging data is 0.713. The high alpha values confirm the strong internal consistency and reliability of the items within each variable, indicating that the questionnaire or scale provides a reliable assessment of the desired constructs in a consistent manner.

All of the Composite Reliability (CR) values in **Table 4** are higher than the generally recognized cutoff of 0.7, indicating strong internal consistency in each variable. Smart Contract Implementation (CR = 0.848), Trade Credit Terms (CR = 0.835), Risk Appetite (CR = 0.843), Operational Efficiency (CR = 0.848), and Interaction System (CR = 0.901) all have CR values well above 0.7, indicating strong internal consistency among the items measuring these constructs. With a remarkably high CR of 0.946, the Information System variable stands out and emphasizes the great degree of internal consistency among its elements. These CR values collectively validate the reliability of the items within each variable, guaranteeing that the questionnaire or scale delivers a consistent assessment of the targeted structures (Javed et al., 2023). The values of the Average Variance Extracted (AVE) for every variable in **Table 4** provide information about the construct validity. Smart Contract Implementation AVE = 0.530), Trade Credit Terms (AVE = 0.504), Risk Appetite (AVE = 0.525), Operational efficiency (AVE = 0.531), information system (AVE= 0.787) and Interaction System (AVE = 0.649) all have AVE values well above 0.5.

Table 4. Construct Reliability and Validity

Variables	Items	Factor Loading	A	CR	AVE
Smart Contract Implementation	SCI1	0.650	0.846	0.848	0.530
	SCI2	0.704			
	SCI3	0.826			
	SCI4	0.806			
	SCI5	0.635			
Trade Credit Terms	TCT1	0.701	0.808	0.835	0.504
	TCT2	0.779			
	TCT3	0.678			
	TCT4	0.684			
	TCT5	0.705			
Data Imaging	DI1	0.723	0.713	0.846	0.525
	DI2	0.830			
	DI3	0.636			
	DI4	0.725			
	DI5	0.697			
Operational Efficiency	OE1	0.668	0.830	0.848	0.531
	OE2	0.667			
	OE3	0.787			
	OE4	0.838			
	OE5	0.665			

Variables	Items	Factor Loading	A	CR	AVE
Risk Appetite	RA1	0.762	0.826	0.843	0.523
	RA2	0.884			
	RA3	0.629			
	RA4	0.648			
	RA5	0.663			
Information System	INFS1	0.880	0.915	0.946	0.787
	INFS2	0.909			
	INFS3	0.883			
	INFS4	0.886			
	INFS5	0.879			
Interaction System	INTS1	0.910	0.848	0.901	0.649
	INTS2	0.890			
	INTS3	0.809			
	INTS4	0.746			
	INTS5	0.643			

Correlation Analysis

The degree to which two or more variables are related or correlated with each other is quantified by correlation. It facilitates the understanding of correlations between changes in one variable and changes in another by analysts and researchers (Maureen, van der Meij, & de Jong, 2022). The correlation matrix, shown in **Table 5** and **Figure 3**, demonstrates the correlations between the variables under consideration. Notably, Smart Contract Implementation (SCI) has a modest positive association with Trade Credit Terms (TCT), indicating that as one variable rises, so does the other. Significant positive correlations between the Data Imaging (DI) measure and both SCI and TCT are shown, suggesting that gains in DI are correlated with gains in these variables. SCI, TCT, DI, and Risk Appetite (RA) are all positively connected with Operational Efficiency (OE), implying that if operational efficiency improves, so will these other factors. The variable that shows the strongest positive relationships with all variables is Risk Appetite (RA), with OE showing the highest association. Similarly, both the Information System (INFS) and the Interaction System (INTS) had significant positive correlations with all variables, with the INFS having the largest link with OE. The interrelatedness of these factors is clarified by these findings, which can be helpful in comprehending the intricate relationships that exist within the study's environment.

Table 5. Correlation Matrix

	SCI	TCT	DI	OE	RA	INFS	INTS
SCI	1						
TCT	.610**	1					
DI	.526**	.481**	1				
OE	.353**	.360**	.530**	1			
RA	.527**	.504**	.446**	.642**	1		
INFS	.498**	.598**	.472**	.774**	.676**	1	
INTS	.373**	.409**	.555**	.737**	.664**	.639**	1

** Correlation is significant at the 0.01 level (2-tailed).

Note: SCI = Smart Contract Implementation, TCT = Trade Credit Terms, DI = Data Imaging, OE = Operational Efficiency, RA = Risk Appetite, INFS = Information System, INTS = Interaction System.

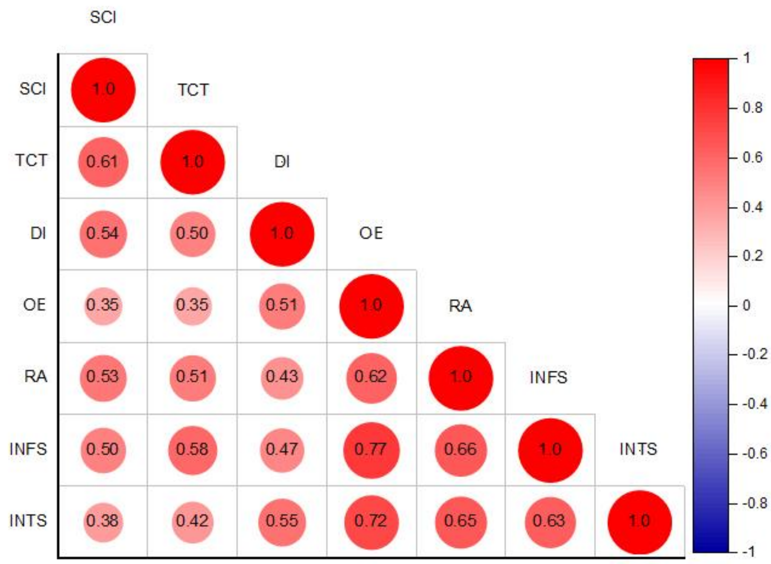

Figure 3. Correlation Matrix

Regression Analysis

Regression analysis is a statistical approach used to investigate and model the relationship between one or more independent variables and a dependent variable (Grigoroudis, Noel, Galariotis, & Zopounidis, 2021). Understanding the relationship between changes in the independent variables and changes in the dependent variable is its main objective. This technique is very useful for predictive modeling, hypothesis testing, and comprehending cause-and-effect linkages (Freire, Ferradás, Núñez, Valle, & Vallejo, 2019). The findings of four regression models, each connected to a distinct hypothesis, are shown in **Table 6**. Hypothesis H1 of the study stated that Smart Contract Implementation (SCI) has a significant and positive impact on Operational Efficiency (OE). According to the B coefficient of 0.264, there is a corresponding 0.264 change in OE for every unit change in SCI. The 0.0001 p-value indicates a highly significant link, implying that changes in Smart Contract Implementation have a considerable impact on Operational Efficiency. This model accounts for about 35.3% of the variation in operational efficiency, according to the R-squared (R2) value of 0.353. Hence H1 is accepted. Hypothesis H2 of the study stated that Smart Contract Implementation (SCI) has a significant and positive impact on Risk Appetite (RA). A change of one unit in SCI is thought to cause a corresponding change of 0.465 in RA, according to the B coefficient of 0.465. The extraordinarily low p-value (0.0001) highlights the importance of this association. The model explains roughly 52.7% of the variance in risk appetite, according to the R-squared value of 0.527, demonstrating the robust explanatory power of smart contract implementation on risk appetite. Hence H2 is accepted.

Hypothesis H3 of the study stated that Trade Credit Terms (TCT) has a significant and positive impact on Operational Efficiency (OE). According to the B coefficient of 0.308, a change in TCT of one unit is equivalent to a change in OE of 0.308. The p-value of 0.0001 emphasizes the importance of this association. The model explains approximately 36.0% of the variance in operational efficiency, as indicated by the R-squared (R2) value of 0.360, indicating a significant impact of trade credit terms on operational efficiency. As a result, H3 has been accepted. Hypothesis H4 of the study stated that Trade Credit Terms (TCT) has a significant and positive impact on Risk Appetite (RA). A one-unit change in TCT corresponds to a 0.508 change in RA, according to the B coefficient of 0.508. The extraordinarily low p-value (0.0001) highlights the importance of this association. The significant impact of Trade Credit Terms on Risk Appetite is demonstrated by the R-squared value of 0.504, which indicates that the model explains around 50.4% of the variance in Risk Appetite. As a result, H4 is accepted.

Table 6. Regression Analysis

		B	Std. Error	t	Sig.	R2
H1	SCI-> OE	0.264	0.034	7.870	0.0001	0.353
H2	SCI-> RA	0.465	0.036	12.932	0.0001	0.527
H3	TCT -> OE	0.308	0.038	8.046	0.0001	0.360
H4	TCT -> RA	0.508	0.042	12.175	0.0001	0.504

Mediation Analysis

As indicated in **Table 7**, the mediation study was carried out using the SPSS Process, a popular tool developed by Andrew Hayes for assessing mediation, moderation, and conditional process effects in statistical models (Qin et al., 2022). examining how a mediator, or intermediary variable, mediates the relationship between an independent and dependent variable is one use for this particular method (W. Liu et al., 2023). Data Imaging acted as a bridge between Smart Contract Implementation (SCI) and Operational Efficiency (OE). Data Imaging has a function in mediating the link between SCI and OE, according to the study's results, which showed a statistically significant positive indirect impact (B = 0.188, p = 0.032). As a result, H5a has been accepted. In addition to this, Data Imaging played a crucial role in connecting Smart Contract Implementation (SCI) with Risk Appetite (RA). A robust and statistically significant indirect impact was seen in the results (B = 0.465, p = 0.0001), indicating that Data Imaging is an efficient mediator of the association between SCI and RA. Hence H5b is accepted.

The study discovered that Data Imaging acts as a mediator between Trade Credit Terms (TCT) and Operational Efficiency (OE). A positive and statistically significant indirect impact was found in the analysis (B = 0.264, p = 0.0001), indicating that Data Imaging has a mediating function in the link between TCT and OE. Hence H5c is accepted. Similarly, Data Imaging acted as an intermediary in the association between Trade Credit Terms (TCT) and Risk Appetite (RA), similar to H5b. The study revealed a favorable and very significant indirect effect (B = 0.191, p = 0.0001), highlighting Data Imaging's role as a mediator in how TCT influences RA. Hence H5d is accepted.

Table 7. Mediation Analysis

		B	Std. Error	t	Sig.
H5a	SCI-> DI -> OE	0.188	0.036	2.143	0.032
H5b	SCI-> DI -> RA	0.465	0.038	12.932	0.0001
H5c	TCT -> DI -> OE	0.264	0.034	7.870	0.0001
H5d	TCT -> DI -> RA	0.191	0.039	8.046	0.0001

Moderation Analysis

Table 8 shows Andrew Hayes' SPSS Process moderation analysis. This technique is commonly used to analyze moderation effects in statistical models and helps researchers understand how a third variable might moderate the effect of an independent variable on a dependent variable (Kim & Park, 2023). Moderation analysis helps researchers determine when or for whom variables are stronger or weaker. **Table 8** presents a series of hypotheses (H6a, H6b, H6c, H6d, H7a, H7b, H7c, H7d) on how Information System (INFS) and Interaction System (INTS) moderate the relationships between Smart Contract Implementation (SCI) and Trade Credit Terms (TCT) with Operational Efficiency (OE) and Risk Appetite (RA). This analysis shows that Information System (INFS) moderates the association between Smart Contract Implementation (SCI) and Operational Efficiency (OE). The B coefficient of 0.081 implies that INFS and SCI interaction significantly influences OE (p = 0.0001). The Information System affects the strength and direction of the SCI-OE interaction. Hence H6a is accepted. Information System (INFS) moderates the link between Smart Contract Implementation (SCI) and Risk Appetite (RA). The B coefficient of 0.054 shows that INFS and SCI interact to affect RA (p = 0.043). This demonstrates that the Information System can influence the intensity and direction of the SCI-RA relationship. Hence H6b is accepted. According to this analysis, Trade Credit Terms (TCT) and Operational Efficiency (OE) are mediated by the Information System (INFS). The Information System influences TCT and OP, as evidenced by the B coefficient of 0.123, which demonstrates a significant interaction effect (p = 0.0001). Hence H6c is accepted. Additionally, the relationship between Risk Appetite (RA) and Trade Credit Terms (TCT) is moderated by the Information System (INFS). The INFS has an effect on RA and TCT, as indicated by the B coefficient of 0.116, which shows a significant interaction effect (p = 0.0001). Hence H6d is accepted.

Between the Smart Contract Implementation (SCI) and Operational Efficiency (OE), the Interaction System (INTS) acts as a moderator. The interaction system has an effect on SCI and OP, as the B coefficient of 0.096 indicates a significant interaction effect (p = 0.0001). Hence H7a is accepted. Risk appetite (RA) and Smart Contract Implementation (SCI) interact in a way that is moderated by the Interaction System (INTS). The B coefficient of 0.078 reveals that the interaction system has a significant interaction effect (p = 0.006), demonstrating that the interaction system influences SCI and RA. Hence H7b is accepted. The relationship between Operational Efficiency (OE) and Trade Credit Terms (TCT) is moderated by the Interaction System (INTS). The INTS has an effect on OE and TCT, as indicated by the B coefficient of 0.084, which shows a significant interaction effect (p = 0.038). Hence H7c is accepted. Finally, INTS moderates the link between TCT and RA. B coefficient of 0.092 shows a significant interaction effect (p = 0.004), indicating that the INTS affects TCT and RA. Hence H7d is accepted.

Table 8. Moderation Analysis

		B	Std. Error	t	Sig.
H6a	INFS*SCI -> OE	0.081	0.020	4.039	0.0001
H6b	INFS*SCI-> RA	0.054	0.027	2.034	0.043
H6c	INFS*TCT -> OE	0.123	0.091	9.571	0.0001
H6d	INFS* TCT -> RA	0.116	0.034	5.069	0.0001
H7a	INTS*SCI -> OE	0.096	0.087	5.520	0.0001
H7b	INTS*SCI-> RA	0.078	0.028	2.768	0.006
H7c	INTS*TCT -> OE	0.084	0.026	2.077	0.038
H7d	INTS* TCT -> RA	0.092	0.031	2.931	0.004

DISCUSSION

The purpose of this study is to examine how smart contract implementations and trade credit terms affect organizational operational efficiency and risk appetite. The mediating role of data imaging and the moderating impacts of information and interaction systems are investigated. The study aims to deliver insights that help firms make educated decisions and optimize their financial and technology strategies, promoting operational excellence and risk management. The first hypothesis asserts that operational efficiency is significantly and favorably impacted by smart contract implementations. Working within blockchain technology, smart contracts have a great deal of potential to improve operational efficiency (Aquilina et al., 2021). Their main function is the automation of different processes, which reduces the need for manual interventions which are labor-intensive and prone to error and saves time. Process automation, as demonstrated by research by Ilinykh, Yurkova, and Aksenov (2021), increases productivity by optimizing work, lowering operational bottlenecks, and streamlining operations. Additionally, smart contracts, supported via blockchain generation's immutability, foster self belief and transparency in transactions. This guarantee that contracts will be carried out as planned lessens the need for dispute resolution and permits in-the-moment process monitoring. According to Korpysa and Halicki (2022), this considerably influences operational performance. Hypothesis 2 suggests that smart settlement implementations definitely have an effect on an employer's threat appetite. Smart contracts, embedded in blockchain technology, constitute a risk management paradigm shift. They are known for their ability to automate contracts, execute them in a self-enforcing way, and maintain transparency throughout the contract execution process (Hunhevicz, Motie, & Hall, 2022). This transparency significantly reduces uncertainties and improves the predictability of contractual results. Thus, smart contracts make a business more open to measured risks (Onjewu, Walton, & Koliousis, 2023). Furthermore, Manoj et al. (2023) noted that smart contracts' automation and efficiency strengthen the risk management process resilience and encourage businesses to take on risk. According to Hypothesis 3, trade credit terms significantly and favorably affect operational efficiency. This hypothesis's underlying logic stems from the realization that advantageous trade credit terms have the ability to improve operational efficiency and streamline corporate processes (Ding et al., 2021). Giving businesses the freedom to handle their payables and receivables well improves cash flow management, eases financial strain, and makes more efficient use of resources possible. Consequently, it is anticipated that this improvement will lead to more effective procedures, which will raise operational efficiency (Carroll & Neumann, 2022). Alsalim and Ucan's (2023) study has shown that skilled trade credit terms management improves working capital management and operational efficiency. When trade credit conditions are designed favorably, they provide a useful resource that contributes to process optimization, supporting Hypothesis 3. According to Hypothesis 4, an organization's risk appetite is significantly and favorably impacted by trade credit arrangements. According to D. P. Stowell and P. Stowell's (2024) research, flexible trade credit conditions provide firms with increased financial flexibility. This can result in lower financial risks and more effective resource allocation. As a result, firms are more prone to take measured risks, particularly in areas where attractive lending terms provide some financial protection. This study supports Hypothesis 4's assumption that trade credit terms have a major influence on risk appetite.

Data imaging is proposed as a mediator in the relationship between the deployment of smart contracts and operational efficiency in Hypothesis 5a. They have discovered that data imaging, or the viewing and analysis of data produced by smart contracts, promotes process optimization and better decision-making. Consequently, there is an increase in operational efficiency (Retico et al., 2021). Hypothesis H5b states that facts imaging mediates how clever agreement implementations have an impact on an enterprise business enterprise's threat tolerance. Studies have indicated the impact of data imaging on risk perception and management in the context of smart contract deployments (Critten, Messer, & Sheehy, 2019). Data imaging can help organizations increase their risk visibility and awareness, which improves risk appetite by allowing them to make more educated and self-assured risk-taking decisions (D. Cao, 2023). According to Hypothesis 5c, data imaging mediates the relationship between trade credit terms and operational efficiency. According to Ding et al. (2021), data imaging is crucial for realizing the benefits of trade credit terms on operational efficiency. Offering businesses, the financial flexibility they need to invest in data imaging technologies can improve operational performance and process efficiency. This is made possible by favorable trade credit terms. Data imaging may act as a mediator in the relationship between trade credit conditions and risk appetite, according to hypothesis 5d. Data imaging can have an effect on an agency's danger belief and urge for food for risk (Guan et al., 2022). Companies that invest in data imaging on advantageous trade credit terms have improved risk visibility, which empowers them to make more educated and frequently risk-tolerant decisions.

The relationship between smart contract implementation and operational efficiency is moderated by information systems, according to Hypothesis 6a. This means that the quality and sophistication of an organization's information systems influence the strength and type of the relationship between smart contract deployment and operational efficiency (Zhao et al., 2020). Organizations with modern information systems are better positioned to fully realize the potential of smart contracts, resulting in more noticeable benefits in operational efficiency. The relationship between the use of smart contracts and risk appetite is proposed to be moderated by information systems in Hypothesis 6b. Depending on information system performance, smart contract adoption may alter an organization's risk appetite. An organization's information system quality impacts smart contract risk management (Kalashnikov & Sakrutina, 2019). The more robust risk management capabilities that sophisticated information systems can provide may have an impact on the organization's risk appetite. Information systems influence the relationship between trade credit terms and operational efficiency, according to hypothesis 6c. The complexity of an organization's information systems, according to (Hueros-Barrios, Rodríguez Sánchez, Martín, Jiménez, & Fernández, 2022), determines the influence of trade credit circumstances on operational efficiency. Advanced information systems enable firms to manage and capitalize on the benefits of advantageous trade credit terms in an effective manner, resulting in increased operational efficiency (Taylor et al., 2022). The relationship between trade credit conditions and risk appetite is mediated by information systems, according to hypothesis 6d. Research has shown that an organization's capacity to manage and evaluate the risks related to trade credit conditions can be strongly impacted by the caliber of its information systems (X. Li, Lepour, Heymann, & Maréchal, 2023). Businesses possessing cutting-edge information systems, such as SAP Risk Management, Oracle Risk Management Cloud, IBM OpenPages, Microsoft Dynamics 365, and SAS Risk Management, are better equipped to assess and control the risks related to trade credit terms, which in turn influences their risk tolerance.

Research has shown that the effectiveness of an organization's interaction systems can have a significant impact on the ability of smart contract implementations to enhance operational efficiency (Papadouli & Papakonstantinou, 2023). Organizations with advanced interaction systems can facilitate better communication and collaboration, which in turn improves operational efficiency. Hypothesis 7a suggests that interaction systems moderate the relationship between smart contract implementation and operational efficiency. This suggests that the influence of smart contract implementation on operational efficiency varies depending on the effectiveness of an organization's interaction systems (Deebak & AL-Turjman, 2021). The relationship between smart contract implementation and risk appetite is moderated, according to hypothesis 7b, which implies that an organization's interaction systems have an impact on how strong the relationship is between smart contract implementation and risk appetite. Research indicates that the quality of an organization's interaction systems influences how effective smart contract implementation is at impacting risk appetite (Karajizadeh et al., 2023). Advanced interaction systems can promote better risk communication and understanding, leading to more confident and informed risk-taking decisions. According to hypothesis 7c, there is a moderating effect of interaction systems on the link between terms of trade credit and operational efficiency. The significance of interaction systems in optimizing the effects of trade loan conditions on operational efficiency has been highlighted in this domain's research (Caporale, A. D. Sova, & R. Sova, 2022). Optimizing trade credit conditions and improving operational efficiency require smooth communication and teamwork, which are made possible by efficient interaction systems. The relationship between trade credit conditions and risk appetite may be moderated, according to hypothesis 7d, by interaction systems. Research has shown that an organization's risk appetite can be greatly impacted by the quality of its interaction systems when it comes to trade credit conditions (Vega, 2021). Advanced interaction systems enable organizations to discuss and assess trade credit terms risks more effectively, which influences their overall risk appetite.

CONCLUSION

Intricate linkages between smart contract implementations, trade credit conditions, data imaging, information systems, interaction systems, operational efficiency, and risk appetite were investigated in this study. The research verified the noteworthy and favorable effects of smart contract implementations on operational efficiency and risk appetite through rigorous quantitative analysis. Positive effects on risk appetite and operational efficiency have been demonstrated by favorable trade credit conditions. Furthermore, the quality of the information and the interaction systems were important moderators in these interactions, and data imaging emerged as a key mediator. The results highlight the complex interactions that modern digital firms must contend with, highlighting how technology and financial tactics influence enterprises' propensity for risk-taking and operational efficiency. These revelations deepen our comprehension of the dynamic nature of modern corporate operations and have applications for businesses looking to maximize productivity and risk mitigation in an ever-digitizing environment.

IMPLICATIONS

Theoretical Implications

The study provides a more thorough theoretical knowledge of the complex interactions between smart contract implementations, trade credit terms, data imaging, information systems, operational efficiency, interaction systems, and risk appetite. It emphasizes the need to consider these aspects holistically rather than separately. The study also explores the complex dynamics of moderation and mediation, which contribute to the theoretical underpinnings of these ideas and their use in organizational settings. Moreover, the findings' cross-sector applicability emphasizes how crucial technology and financial strategies are to contemporary business operations. As a final step, the research advances the theoretical foundations of this discipline by providing options for future inquiries into particular industry contexts and the changing environment of technology and finance.

Practical Implications

This study's practical ramifications are multifaceted and have substantial relevance for firms attempting to negotiate the intricacies of today's business market. To begin, the data indicate opportunities for improving operational efficiency, which is a fundamental goal for every firm. Businesses can streamline their processes, save costs, and allocate resources more efficiently by strategically deploying smart contracts and optimizing trade credit conditions. Second, the insights provide a guidepost for educated risk management. Smart contracts' inherent openness and predictability enable firms to make informed risk-taking decisions, enabling more effective risk management methods. Finally, the study emphasizes the strategic significance of data imaging, emphasizing the role of data visualization tools in improving decision-making and overall data-driven strategies. Finally, recognizing the moderating effects of information and interaction systems on smart contract implementations and trade credit terms encourages organizations to invest in and maximize the potential of these systems, resulting in better financial and technological strategy management.

LIMITATIONS

First, cross-sectional data makes it hard to determine causality or track changes over time. A deeper comprehension of the changing connections between trade credit terms, data imaging, smart contract implementations, and related variables may be possible through longitudinal research. Furthermore, the study uses self-reported data, which raises the possibility of measurement mistakes and response bias. Despite efforts to guarantee data accuracy, self-reporting's inherent limitations still exist. Moreover, the study design is quantitative in nature, which provides a wide view but could miss the depth of qualitative insights that come from qualitative approaches. Lastly, despite careful consideration, the study's sample size is not all-inclusive, and differences may occur among various industries and geographical areas.

FUTURE DIRECTIONS

Given the study's shortcomings, several intriguing future research directions appear. Longitudinal studies can provide insights into changing relationships as well as the impact of technical advances on smart contract implementations, trade credit conditions, and their impact on operational efficiency and risk appetite. Interviews and case studies, for example, can provide a more in-depth understanding of the experiences and issues that firms confront when adopting smart contracts and managing trade credit conditions. exploring unique industry contexts and geographical variances may also provide a more personalized perspective. The study lays the groundwork for future research into the role of developing technology and financial strategies in altering corporate operations, allowing researchers to deepen and refine our understanding of this dynamic terrain.

CONFLICT OF INTEREST

No potential conflict of interest was reported by the author.

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