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Blockchain Technology in International Trade: A Catalyst for Efficiency and Revenue Generation

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Abstract

Background and Aim: The advent of blockchain technology has brought about a significant transformation in the realms of finance and international trade, primarily through the implementation of a decentralized ledger system for conducting transactions. The present study aims to assess the efficacy and economic advantages of employing blockchain technology in the context of international trade financing. Specifically, it focuses on the potential decrease in transaction time and cost savings that Chinese domestic banks may experience as a result of adopting this technology.

Materials and Methods: This research employs a quantitative methodology to assess the efficacy of blockchain technology in the context of international trade, with a specific emphasis on banking professionals. The study utilizes a cost-benefit analysis approach to maximize advantages and minimize drawbacks.

Results: The research revealed that the implementation of blockchain technology has the potential to improve operational efficiency and mitigate transaction risks. However, it is important to note that this comes at the expense of increased costs, rendering it unsuitable for widespread adoption due to its unfavorable net benefit.

Conclusion: The findings of the study indicate that the use of blockchain technology leads to enhanced operational efficiency and decreased transactional risks. However, it is important to note that this implementation also entails elevated costs, rendering it impractical for widespread adoption due to its unfavorable net benefit. The report posits that the advantages of operational efficiency offered by blockchain technology are overshadowed by the accompanying expenses, thereby advocating for a prudent approach to its implementation in the realm of international trade. The recommendations encompass many strategies such as the implementation of trial projects, conducting thorough cost-benefit analyses, using hybrid techniques, ensuring ongoing monitoring, and maintaining strict adherence to legal regulations.

Keywords: Blockchain; International Trade; Cost-benefit Analysis; Financial Benefits

Introduction

The concept of blockchain technology was initially presented by an individual using the pseudonym Satoshi Nakamoto in the influential paper titled "Bitcoin: A Peer-to-Peer Electronic Cash System" in 2008 (Nakamoto, 2008). Since then, it has gained significant recognition for its potential to revolutionize the fields of finance and global trade. This groundbreaking technology has established the fundamental basis for cryptocurrencies such as Bitcoin, however, its potential applications transcend the realm of digital money (Cao & Shen, 2022). The distributed ledger technology (DLT) of blockchain can significantly transform how financial transactions and international trade are executed (Chuah, 2023). It presents an ecosystem that is simpler, more secure, and faster, hence giving substantial benefits to businesses, financial institutions, and the global economy at large.

The genesis of blockchain technology can be traced back to the introduction of the initial Bitcoin software in 2009 (Chang, Chen & Wu, 2019). This software established a decentralized and tamper-resistant ledger, which meticulously documents all transactions in a transparent and unchangeable fashion. The technology rapidly garnered attention among technology aficionados; nevertheless, its full capabilities were shown in 2016 when Wave, a financial technology firm, effectively conducted the inaugural trade finance transaction for a letter of credit utilizing blockchain (Ibrahim & Truby, 2022). This significant accomplishment represented a pivotal moment in the trajectory of global commerce, as it substantially diminished the duration of trade transactions from the customary span of 7-10 days to a mere 4 hours (Siddik et al., 2021).

The decrease in the duration of trade transactions was more than just a numerical enhancement; it symbolized a substantial advancement in the effectiveness and safety of global commerce (Yoon et al., 2020). Throughout history, the processes involved in international trade have been characterized by various inefficiencies, delays, and a notable absence of transparency (Thombs & Tillman, 2018). The

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utilization of paper-based paperwork and the engagement of several middlemen sometimes resulted in errors, conflicts, and escalated expenses (Appelbaumn & Nehmerb, 2020). The inherent nature of blockchain technology enables it to effectively tackle these difficulties. The possibilities of blockchain technology in promoting the efficiency of international trade, generating revenue, and improving the overall viability of domestic banks (Orhan, Emikönel & Emikönel, 2021). The primary aim of this research is to evaluate the influence of blockchain technology on global trade procedures, specifically examining its financial advantages and the ramifications it poses for domestic banking institutions (Thammavong, Kenaphoom & Jedaman, 2021). In order to accomplish the stated objective, the study will involve professionals who are actively engaged in domestic trade. The major technique of data collecting will be through the utilisation of structured questionnaires.

The comprehensive analysis of the data about the efficiency improvements and financial benefits of blockchain technology within the realm of global trade (Balci & Surucu-Balci, 2021). These significant insights can enable domestic banks and firms to make well-informed strategic decisions regarding their participation in trade finance solutions based on blockchain technology. Moreover, it is anticipated that the outcomes of this study will have a significant impact on the course of global commerce and financial services, hence molding the operational strategies of enterprises and financial institutions within an ever-expanding globalized and digitized environment (Tian & Sarkis, 2023). The significance of effective and safe international trade processes cannot be overemphasized in light of the ongoing evolution of the global economy. In an era marked by intricate supply chains, varied currencies, and swift digitization, there is an increasing urgency for inventive measures to speed trade transactions and improve financial efficacy (Latorre Salvador, 2021). The utilisation of blockchain technology has emerged as a powerful solution to tackle these aforementioned issues, providing a decentralised, transparent, and secure framework for the facilitation of international commerce processes.

This research study gives an analysis of the possible impact of blockchain technology on international trade, emphasizing its relevance and urgency. This study seeks to provide valuable insights to the academic, business, and policy communities by examining the efficiency gains, financial benefits, and impact on domestic banks associated with international trade and financial services. The findings of this research have the potential to shape the future of these sectors in an increasingly interconnected global landscape.

Research Objective

The present study aims to assess the efficacy and economic advantages of employing blockchain technology in the realm of international trade financing. Specifically, the focus is on examining the potential decrease in transaction time and cost savings that can be realized by Chinese domestic banks.

Literature Review

The Evolution of International Trade: From the Industrial Revolution to the Information Age

International trade, which involves the reciprocal transfer of goods and services across national or regional boundaries, has exerted a significant influence on the formation and development of the worldwide economic framework (Macedo, 2018). This section provides an in-depth analysis of the historical and current dynamics of international trade, focusing on significant milestones and their effects on wealth, living standards, and the characteristics of traded goods. Furthermore, we analyze the profound impacts of the information age on trade methodologies and platforms, along with the rise of intangible items as substantial contributors to global commerce.

The Industrial Revolution that took place in the 19th century represented a significant turning point in the history of international trade. The advent of mechanization and industrialization in Europe and North America led to increased efficiency and cost-effectiveness in production processes (Mokyr, 1998). The aforementioned transition facilitated the proliferation of goods through mass production, resulting in heightened levels of international trade. According to Crafts (2004), the accessibility of inexpensive, mass-produced commodities not only enhanced the quality of life but also engendered

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unparalleled affluence. The latter part of the 20th century was marked by the emergence of globalization, which was defined by the increasing interdependence of economies and the widespread adoption of international trade agreements (Rodrik, 1997). Nations proactively sought to diminish trade impediments and promote international trade by becoming members of entities like the World Trade Organisation (WTO) (Bhagwati, 2004). During this period, there was a notable increase in the levels of international trade, which contributed significantly to the expansion of the economy and propelled the ongoing process of globalization.

The realm of international trade has expanded to encompass more than just physical goods. Feenstra (1998) asserts that intangible goods, such as labor services, production technology, insurance, and financial products, have become increasingly significant in the context of global trade. The integration of expertise, knowledge, and financial instruments has become a crucial aspect of the contemporary global economy, surpassing the constraints associated with tangible items. The emergence of the information age during the 1980s marked the commencement of a distinct period in the realm of global trade. The advancements in communication technology, including electronic data interchange (EDI), automated teller machines (ATM), and telephone voice transfer, brought about a significant transformation in the manner in which information and transactions were carried out (Castells, 1996). The global economy has experienced a growing dependence on digital platforms, which have played a crucial role in enabling expedited and more streamlined trade activities (Leamer, 2007).

In summary, the field of international trade has undergone substantial transformations throughout history, characterized by the emergence of distinct dynamics and complexities in each century. The advent of the Industrial Revolution facilitated the rapid expansion of trade, resulting in heightened economic prosperity and an enhanced quality of life. The phenomenon of globalization has significantly broadened the scope of trade prospects, concurrently elevating the significance of intangible goods as integral elements of international commerce. The advent of the digital age has fundamentally transformed trade practices and platforms, facilitating enhanced efficiency and the real-time exchange of information and transactions. To gain a comprehensive grasp of the intricate nature of international trade in the contemporary interconnected global landscape, it is imperative to acknowledge the significance of appreciating the historical backdrop and the consequential effects of these shifts.

Blockchain Technology and its Implications for International Trade

The basic mechanism supporting the operation of Bitcoin is blockchain technology, which can be traced back to the influential work of Satoshi Nakamoto in his publication "Bitcoin: A Peer-to-Peer Electronic Cash System" (Nakamoto, 2008). The fundamental concept of blockchain involves the use of dispersed nodes to store, verify, and transmit network data. This technology allows participants to securely manage accounts and thoroughly examine transaction records. Blockchain technology can bring about significant transformation in established institutions within the realm of international trade, such as the letter of credit. This is achieved through the introduction of enhanced transparency, security, and efficiency (Swan, 2015). This article explores the utilization of blockchain technology in the context of international trade, specifically examining its impact on payment instruments, trade receivables, and operational efficiency.

The utilization of blockchain technology has the potential to bring about a modernization of the conventional letter of credit system within the realm of international trade. Within a blockchain-enabled ecosystem, exporters, importers, and a range of middlemen are interconnected via a platform that facilitates trade services utilizing blockchain technology. According to Mougayar (2016), transaction contracts function as the foundational framework for the development of smart contracts. These contracts are subsequently validated and employed by the platform for financing and remittances. This innovation optimizes the letter of credit procedure, mitigates the risk of fraudulent activities, and improves the overall efficacy of international trade transactions (Phuakphong & Amonhaemanon, 2023).

Blockchain technology has revolutionized the field of trade receivables and payment instruments by redefining them as negotiable bills that can be effortlessly transferred to various entities,

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such as banks and financial institutions. The utilization of blockchain technology for the direct issuing of payment instruments has the potential to mitigate the occurrence of false invoices and improve the management of accounts receivable (Tapscott & Tapscott, 2016). This invention offers advantages not just to major organizations but also creates avenues for small and medium-sized enterprises (SMEs) to avail enhanced financing alternatives, hence fostering economic growth and increasing financial inclusion.

The optimization of blockchain trade operations encompasses a sequential progression of activities, commencing with the enrollment of participants on the service platform, followed by the creation of electronic wallets, and culminating in the recording of shipping details to be verified by importers. In instances of conflicts, the platform offers a method for arbitration and resolution (Swan, 2015). According to Mougayar (2016), the utilization of smart contracts on the blockchain to represent payment methods and transaction contracts enables sellers to enhance payment certainty, hence minimizing the occurrence of payment inconsistencies and expediting the payment procedure. The implementation of automation systems significantly improves trade efficiency, hence granting a competitive edge in the worldwide marketplace.

In summary, blockchain technology, originally conceived for cryptocurrency, has emerged as a significant catalyst for change in the realm of global commerce. Blockchain technology offers businesses the potential to participate in secure, efficient, and transparent global commerce by reinventing the letter of the credit system, improving trade receivables and payment instruments, and optimizing trade operations. The ongoing evolution and maturation of blockchain technology hold significant potential in terms of its capacity to fundamentally transform the international trade sector.

Conceptual framework

After reviewing the existing literature on the subject, the author formulated a research concept, illustrated in Figure 1.

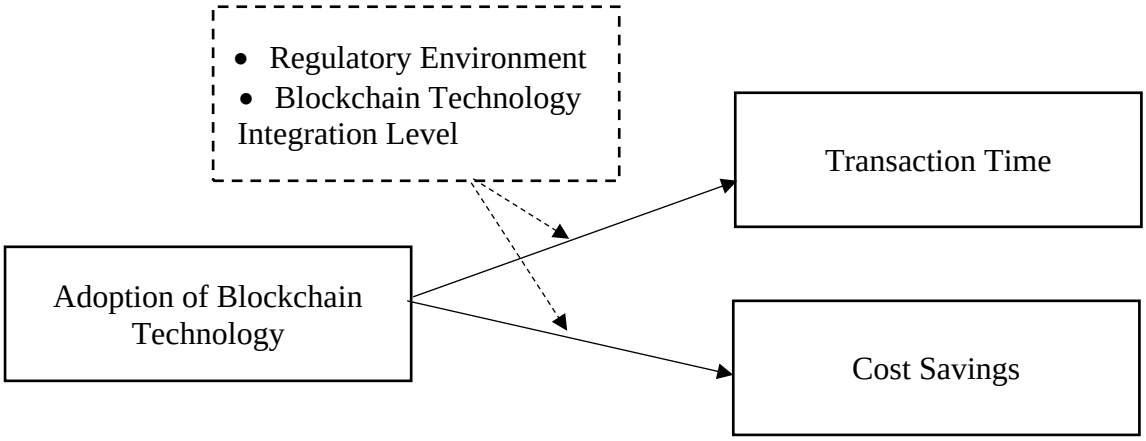

Figure 1 Conceptual framework

Research Methodology

This research study uses a quantitative research methodology to investigate the effectiveness of integrating blockchain technology into the realm of international trade. The evaluation focuses on the cost-effectiveness and overall efficacy of the system to traditional approaches, particularly within the banking sector, targeting professionals in this industry. The study utilizes a cost-benefit analysis approach, which entails the formulation and assessment of various strategies employing technical methodologies to maximize benefits and minimize costs. The subsequent section delineates the precise particulars of the research technique.

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Expert interview

The objective of this study is to examine the comparative performance of a conventional trade model against the utilization of letters of credit and other instruments in the context of blockchain technology integration within the international trade process. The present study utilizes expert interviews as the chosen approach to evaluate the expenses and probable consequences linked to the implementation of this technology in the context of international trade. These individuals offer a wealth of experience and expertise in matters of international trade. The primary aim is to collect relevant data, which will then be subjected to analysis utilizing the cost-benefit analysis approach to provide definitive study results.

An interview can be defined as a mode of interpersonal communication that involves the participation of two or more individuals. During these interviews, the interviewer obtains crucial information from the respondent through verbal interactions or the administration of questionnaire surveys. The questionnaire design employed in this study has been informed by an extensive examination of relevant literature and talks with experts. It effectively divides the analysis of cost indicators into four distinct categories, namely system building, technical training, information security risks, and operational management. Moreover, benefit indicators can be classified into three categories: direct benefits, indirect benefits, and potential benefits.

This study utilizes a systematic methodology that entails the creation and dissemination of surveys to professionals who are actively involved in the banking sector's international trade letter of credit operations. We kindly solicit the experts to delineate the facets of the financial flow that they anticipate would be influenced by the integration of blockchain technology in the realm of global commerce, leveraging their extensive expertise and extensive professional background. Our primary objective is to comprehensively examine the potential improvements in efficiency and advantages that can be achieved via this transformation, while also considering the corresponding expenses and time commitments involved.

The purpose of this systematic interview procedure is to gather pertinent and illuminating data that will allow us to thoroughly evaluate the feasibility of an international commerce process based on blockchain technology. Our primary focus lies in assessing the cost-effectiveness of this approach in comparison to conventional methods like letters of credit. Furthermore, our objective is to assess the comparative effectiveness between the blockchain-based model and the control group, which represents the conventional approach.

Method of Cost-benefit analysis

Cost-benefit analysis is a method employed to determine a particular expenditure objective by presenting multiple strategies to attain the stated objective (Supangatb& Wulandari, 2023). This methodology utilizes precise technological methodologies to compute the expenses and advantages linked to any proposed strategy. Afterward, it utilizes methods of comparison and follows specific principles to choose the most optimal conclusion. Cost-benefit analysis is a widely employed economic approach that involves the application of cost-expense analysis methodologies to inform the planning decisions undertaken by government departments (Osmani et al., 2021). The primary aim of this study is to determine strategies for optimizing benefits while limiting investment expenses. The aforementioned methodology is commonly used in the evaluation of public utility projects that necessitate the measurement of social benefits.

Within the framework of this research, the cost-benefit analysis approach is employed, wherein the conventional international trade procedure is designated as the control group, while the international trade procedure including blockchain technology is identified as the experimental group (Gupta & Jha, 2023). The research mostly centers around these two groups. Furthermore, the scope of the research comprises initiatives that prioritize economic considerations. These projects involve activities such as system construction, technical training, information security risk assessment, and operation management. The indicators that focus on the advantages are classified into three distinct categories: direct benefits, indirect benefits, and potential benefits. Moreover, the results are classified into two categories based on their direct and indirect usefulness. The direct utility is assessed on a numerical scale that spans from -100 to +100 points, whereas the indirect utility score is derived from factual data

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(Boardman et al., 2022). This study aims to ascertain the efficacy and risk reduction potential of the nascent blockchain trade process through an analytical framework.

During the empirical research phase, a comparison study will be conducted on both the control group and the experimental group using cost-benefit indices (Osmani et al., 2021). If the benefit score of the experimental group surpasses that of the control group, while the cost score of the experimental group remains lower than the benefit score, this suggests that the experimental group has promise for future development and implementation. On the other hand, if the benefit score of the experimental group is lower than that of the control group, or if the cost score and quantity of the experimental group exceed the benefit score and quantity, it indicates that the costs linked to the experimental group are excessive or the benefits are inadequate (Arunmozhi et al, 2022). In instances of this nature, it is recommended to refrain from adopting the trading methodology employed by the experimental group.

Experimental design

The present study classifies the results into two distinct categories, namely direct utility and indirect benefit. The quantification of direct utility is established within a numerical range that extends from negative 100 to positive 100, forming the basis for qualitative analysis (Arunmozhi et al., 2022). On the other hand, indirect utility outcomes are denominated in NT dollars, which will subsequently be employed for data analysis (Bruckner et al, 2023).

After the digitalization process of the cost and benefit tables, a comparison analysis is performed to assess the differences between the control group and the experimental group. Within this particular context, the control group is indicative of the conventional trade mode, whereas the experimental group signifies the novel trade mode that integrates blockchain technology. Every individual item within these two groups is subjected to a comprehensive process of cross-comparison and analysis. If the new model's benefit score exceeds that of the traditional model and the cost score of the new model is lower than the benefit score, it suggests that the incorporation of blockchain technology into international trade payment methods has substantial potential for implementation and advancement (Bruckner et al, 2023). Therefore, this study proposes that financial institutions and corporations should contemplate the implementation and allocation of resources toward this strategic business methodology. On the other hand, if the outcomes diverge from the previously indicated situation, it indicates that the technology has not attained a degree of development that is conducive to achieving economic efficiency (Arunmozhi et al., 2022). In instances of this nature, it is recommended to defer the implementation of the blockchain-powered payment system.

Research Result

The research objective entails evaluating the effectiveness and economic benefits associated with the utilization of blockchain technology in the domain of international trade financing. The findings of this study were organized into three distinct sections based on the data analysis: the descriptive statistics of cost indicators, the descriptive statistics of benefit indexes, and the outcomes of the cost-benefit analysis. The research encompasses the following particulars:

Descriptive statistics of cost indicators

The main source of sample data for this study consists of six individuals who are actively involved in full-time international trade positions within Bank C in China. The participants were solicited to furnish data by drawing upon their professional expertise and experience, which was accomplished using questionnaire completion. The provided data forms the basis for the subsequent data analysis carried out in this study.

According to the findings presented in Table 1, it can be observed that throughout the different data sets, there are a total of 16 occurrences when the experimental group exhibits a greater value in comparison to the control group. In a particular instance, the experimental group demonstrates a higher value compared to the control group, yet in another instance, both groups display similar values. The observation reveals that both the conventional payment method and blockchain technology have a positive impact on operational efficiency inside the system. This leads to a more efficient, convenient, and prompt workflow within the specialized trade affairs team.

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Table 1 Cost indicator-the direct utility of the system construction

Items	Hardware		Software		Organization	
Objects	Control	Experiments	Control	Experiments	Control	Experiments
A	85	95	80	80	90	30
B	10	40	-10	50	5	30
C	0	60	20	80	0	50
D	-20	30	-10	40	-10	40
E	20	70	10	80	0	40
F	-10	20	0	30	0	30
Mean	14.17	52.5	15	60	14.17	36.67
Maximum	85	95	80	80	90	50
Minimum	-20	20	-10	30	-10	30
Std. Dev.	37.47	27.88	33.91	22.80	37.47	8.16

***Notes*:** The figures in the table are in 2-digit significance.

According to the findings presented in Table 2, it can be observed that the experimental group demonstrates 13 occurrences where the values surpass those of the control group. Conversely, the control group displays 5 cases characterized by greater values. The data presented in this study indicates that the dominant sentiment among a majority of experts is that the implementation of the experimental group's trade procedure, which relies on blockchain technology, is expected to lead to higher trade-related expenses.

Table 2 Cost indicator-system construction indirect utility aggregation

Items	Hardware		Software		Organization	
Objects	Control	Experiments	Control	Experiments	Control	Experiments
A	100	150	200	100	150	100
B	200	180	300	200	150	100
C	100	400	100	300	300	500
D	180	200	100	300	50	200
E	1	2	5	10	1	2
F	100	180	80	200	40	60
Mean	113.5	185.33	130.83	185	115.17	160.33
Maximum	200	400	300	300	300	500
Minimum	1	2	5	10	1	2
Std. Dev.	70.86	127.45	103.65	113.80	109.11	178.53

***Notes*:** Unit: 10,000 NTD. The figures in the table are in 2-digit significance.

Table 3 provides a strong indication that the overall number of experimental groups exceeds that of the control group. This indicates that there is a positive perception among most individuals regarding the allocation of time, financial resources, and overall resources for trade operations that involve blockchain technology, as compared to existing international trade practices. The impacts of these modifications are subject to favorable assessment in the realm of trade affairs.

Table 3 Cost indicators-the direct utility of technical training aggregation

Items	Personnel costs		Time and resources	
Objects	Control	Experiments	Control	Experiments
A	30	50	20	50
B	10	30	5	30
C	0	80	0	30
D	-30	30	-20	40
E	-10	30	-10	20

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Items	Personnel costs		Time and resources	
Objects	Control	Experiments	Control	Experiments
F	-20	20	-10	30
Mean	-3.33	40	-2.5	33.33
Maximum	30	80	20	50
Minimum	-30	20	-20	20
Std. Dev.	21.6	21.91	14.05	10.33

***Notes*:** The figures in the table are in 2-digit significance.

Table 4 illustrates that within the human expenses category, only two groups demonstrate values in which the experimental group exceeds the control group. This suggests that a significant number of professionals perceive the novel trading method exemplified by the experimental group as more cost-effective in comparison to the use of conventional trade instruments, such as letters of credit. Regarding project time and resources, there exist four data sets whereby the values of the experimental group are greater, suggesting that the incorporation of blockchain technology could potentially result in augmented resource demands within the realm of international trade. The dominant perspective posits that the primary factors contributing to this sentiment are the expenditures associated with training time and other resources.

Table 4 Cost indicator – the indirect utility of technical training

Items	Personnel costs		Time and resources	
Objects	Control	Experiments	Control	Experiments
A	50	30	20	20
B	250	180	100	750
C	150	500	50	100
D	30	400	200	300
E	5	2	2	4
F	300	250	200	150
Mean	130.83	227	95.33	220.67
Maximum	300	500	200	750
Minimum	5	2	2	4
Std. Dev.	123.06	198.31	87.61	280.45

***Notes*:** Unit: 10,000 NTD. The figures in the table are in 2-digit significance.

According to the data presented in Table 5, it can be observed that the experimental group demonstrates 14 occurrences where values surpass those of the control group. Conversely, the control group exhibits 4 occasions where values are greater. As a result, a significant proportion of individuals interviewed for full-time trade affairs positions maintain the perspective that the utilization of blockchain technology in international commerce presents improved operational efficiency when compared to the current conventional international trade procedure.

Table 5 Cost indicators-aggregate results of the direct utility of operations management

Items	Daily operation		Depreciation allowance		Damage repair	
Objects	Control	Experiments	Control	Experiments	Control	Experiments
A	30	60	10	30	5	10
B	5	45	5	20	10	20
C	0	50	50	20	30	10
D	-10	40	-10	20	-20	50
E	10	40	-10	30	-20	40
F	-20	10	10	-10	20	-20
Mean	2.5	40.83	9.17	18.33	4.17	18.33

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Items	Daily operation		Depreciation allowance		Damage repair	
Objects	Control	Experiments	Control	Experiments	Control	Experiments
Maximum	30	60	50	30	30	50
Minimum	-20	10	-10	-10	-20	-20
Std. Dev.	17.25	16.86	22.00	14.72	20.60	24.83

***Notes*:** The figures in the table are in 2-digit significance.

Table 6 presents a comprehensive depiction of the data, suggesting that both the control group and the experimental group demonstrate nine data sets reflecting increased expenses in three distinct categories: daily operations, depreciation allocation, and damage maintenance. This implies that in terms of operational management, although the new trade procedure is effective, it may result in increased expenses in comparison to conventional trading methods, such as the use of letters of credit. Nevertheless, it is important to highlight that, regarding financial outlay, all six participants express the viewpoint that the expenses are very comparable across both methodologies.

Table 6 Cost indicators-aggregate of the indirect utility of operations management

Items	Daily operation		Depreciation allowance		Damage repair	
Objects	Control	Experiments	Control	Experiments	Control	Experiments
A	300	150	50	20	100	60
B	300	210	100	75	150	120
C	200	400	50	100	50	200
D	200	300	100	200	200	300
E	1	2	1	2	2	4
F	200	150	100	50	200	100
Mean	200.17	202	66.83	74.5	117	130.67
Maximum	300	400	100	200	200	300
Minimum	1	2	1	2	2	4
Std. Dev.	109.18	137.32	40.5	71.03	81.08	105.43

***Notes*:** Unit: 10,000 NTD. The figures in the table are in 2-digit significance.

Table 7 presents the variable MG, which denotes the import growth rate data for different nations. The table reveals that there is a rejection of single roots at a statistically significant level of 1%. The experimental group, which employs a revolutionary trading approach centered on blockchain technology, demonstrates superior performance across 10 data groups compared to the control group. It is noteworthy that eight of these data clusters pertain to unforeseen information and instances of unauthorized access by hackers. The intrinsic immutability of blockchain technology, in conjunction with its consensus verification method, engenders a perception of reliability. Moreover, considering one of the distinctive characteristics of blockchain technology, namely its high level of transaction transparency, a significant proportion of professionals hold the view that the novel international trade approach is efficacious in mitigating data breaches, thereby surpassing the long-established conventional trade methods.

Table 7 Cost indicator-the direct utility of information security risk aggregated results

Items	Data leakage		Unexpected information		Hacking	
Objects	Control	Experiments	Control	Experiments	Control	Experiments
A	90	50	-10	40	10	-10
B	20	10	-5	15	5	10
C	40	10	50	50	60	60
D	-30	50	-40	10	-40	30
E	-40	40	-30	30	-20	40
F	90	80	-40	10	30	-30

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Items	Data leakage		Unexpected information		Hacking	
Objects	Control	Experiments	Control	Experiments	Control	Experiments
Mean	28.33	40.00	-12.50	25.83	7.50	16.67
Maximum	90	80	50	50	60	60
Minimum	-40	10	-40	10	-40	-30
Std. Dev.	56.36	26.83	34.02	16.86	35.46	33.27

***Notes*:** The figures in the table are in 2-digit significance.

Table 8 presents an analysis of the effects of adopting blockchain technology within the experimental group. It is worth noting that under the information security risk category, there are a total of eight instances when the experimental group demonstrates greater values in comparison to the control group, which aligns with the classic trade model. Out of the total number of occurrences, six are specifically related to the domains of data leaking and hacking. This result highlights the increased data protection protocols implemented during the conversion of transaction-related documents into digital format and their storage on a partially accessible platform. It is noteworthy that roughly 50% of the participants hold a prudent viewpoint about this matter. However, in terms of managing unforeseen information, only 30% of respondents hold the belief that new trading entities would be required to allocate supplementary resources. This suggests that the majority of professionals in the field express a high level of confidence in the ability of blockchain technology to effectively combat misinformation and bolster data security.

Table 8 Cost indicator-the indirect utility of information security risk aggregated

Items	Data leakage		Unexpected information		Hacking	
Objects	Control	Experiments	Control	Experiments	Control	Experiments
A	50	50	45	30	50	40
B	150	160	250	200	180	210
C	300	300	200	100	100	100
D	100	300	50	100	200	300
E	1	3	1	4	2	3
F	200	100	100	50	40	20
Mean	133.5	152.17	107.67	80.67	95.33	112.17
Maximum	300	300	250	200	200	300
Minimum	1	3	1	4	2	3
Std. Dev.	107.77	125.84	97.44	69.82	79.97	118.85

***Notes*:** Unit: 10,000 NTD. The figures in the table are in 2-digit significance.

Descriptive Statistics of Benefit Index

Table 9 presents significant findings, indicating that among the participants in the experimental group, there are 16 distinct datasets where values exhibit a noteworthy increase in direct advantages. This finding indicates that a majority of the participants, specifically more than 80%, hold a favorable perspective on the integration of blockchain technology in the trading procedure. The aforementioned optimism encompasses a range of facets, encompassing the reduction of operational expenses, the improvement of transactional efficiency, and the mitigation of transactional hazards. In contrast, the control group, which represents the traditional trade model, demonstrates a prevalence of negative figures in about half of the values within these same categories. The aforementioned observation can be understood as an indication of how professionals influence the effectiveness of the conventional trading process within this particular context. Significantly, each element within this particular dimension is subject to increasingly unfavorable evaluations.

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Table 9 Benefits index-the aggregate result of the direct utility of the direct benefit

Items	Operating cost		Transaction efficiency		Transaction risk	
Objects	Control	Experiments	Control	Experiments	Control	Experiments
A	10	30	-10	40	10	50
B	10	40	-5	50	10	30
C	60	0	50	60	0	30
D	-30	20	-10	50	-20	40
E	-10	30	10	30	-10	20
F	30	50	-20	50	-20	30
Mean	11.67	28.33	2.5	46.67	-5	33.33
Maximum	60	50	50	60	10	50
Minimum	-30	0	-20	30	-20	20
Std. Dev.	31.25	17.22	25.25	10.33	13.78	10.33

***Notes*:** The figures in the table are in 2-digit significance.

The findings about direct benefits are presented in Table 10, which includes a total of 10 data sets that demonstrate higher values in the experimental group compared to the control group. On the contrary, the control group demonstrates a total of 8 occurrences where their results surpass those of the experimental group. This finding suggests that individuals being interviewed hold a varied perspective on the effects of blockchain technology on financial results. Roughly 50% of the participants foresee a rise in monetary gains, whereas the other 50% anticipate a decrease in financial outcomes.

Table 10 Benefits index-the aggregate result of the indirect utility of the direct benefit

Items	Operating cost		Transaction efficiency		Transaction risk	
Objects	Control	Experiments	Control	Experiments	Control	Experiments
A	10	20	30	10	25	30
B	200	160	130	70	200	160
C	50	200	300	100	300	100
D	200	300	200	300	100	300
E	1	3	1	3	1	4
F	50	10	100	400	10	100
Mean	85.17	115.5	126.83	147.17	106	115.67
Maximum	200	300	300	400	300	300
Minimum	1	3	1	3	1	4
Std. Dev.	91.19	123.34	110.71	164.35	121.09	106.06

***Notes*:** Unit: 10,000 NTD. The figures in the table are in 2-digit significance.

Table 11 presents a visual representation of the influence of indirect advantages observed in the experimental group. It is important to highlight that the experimental group displays greater values in nine data sets in comparison to the control group. This implies that a significant proportion of experts within the trade business hold a favorable perspective on the implementation of blockchain technology, viewing it as a facilitator of reliable and secure transactions. The authors also recognize the benefits of increased openness and traceability, as they contribute to more efficient oversight. On the other hand, when comparing the new international commerce model that integrates blockchain technology with the old trade method that has been utilized for a considerable duration, it becomes evident that the latter receives unfavorable evaluations in terms of both creditworthiness and the challenges associated with oversight.

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Table 11 Benefits index-the direct utility of the indirect benefits are aggregated results

Items	Overall credit level		Ease of supervision	
Objects	Control	Experiments	Control	Experiments
A	20	10	10	50
B	5	25	20	15
C	10	60	80	60
D	-10	30	-30	40
E	10	30	-10	20
F	-10	20	-10	40
Mean	4.17	29.17	10	37.5
Maximum	20	60	80	60
Minimum	-10	10	-30	15
Std. Dev.	12.01	16.86	38.47	17.25

***Notes*:** The figures in the table are in 2-digit significance.

Upon examination of Table 12, it is apparent that the experimental group consists of 7 data sets exhibiting higher values, whilst the control group comprises 3 data sets. Additionally, 2 data sets are identical in both groups. The findings suggest that, as shown in Table 12 a significant proportion of participants have a favorable perception of the experimental group. Nevertheless, it is important to acknowledge that several experts maintain the viewpoint that the advantages of these procedures do not exceed those of the traditional approaches to international trade that are currently being employed. Furthermore, certain participants express the viewpoint that the advantages produced in this aspect should be equitable for both cohorts.

Table 12 Benefit indicators-indirect benefits indirect utility aggregation results

Items	Overall credit level		Ease of supervision	
Objects	Control	Experiments	Control	Experiments
A	5	5	3	3
B	300	250	200	175
C	50	200	100	50
D	200	300	100	200
E	1	2	1	3
F	100	200	10	40
Mean	109.33	159.5	69	78.5
Maximum	300	300	200	200
Minimum	1	2	1	3
Std. Dev.	119	126.4	79.43	86.91

***Notes*:** Unit: 10,000 NTD. The figures in the table are in 2-digit significance.

To assess the prospective advantages, a comprehensive analysis can be conducted by referring to Table 13. The data presented in the table indicates that the experimental group outperforms the control group in terms of scores. There are five distinct data sets in which respondents, who possess relevant professional expertise and experience, articulate their conviction that blockchain technology will play a significant role in fostering the growth of potential clients.

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Table 13 Benefit indicators-the results of the direct utility integration of potential benefits

Items	Develop potential customers	
Objects	Control	Experiments
A	10	10
B	5	30
C	10	50
D	-20	30
E	20	40
F	-10	30
Mean	2.5	31.67
Maximum	20	50
Minimum	-20	10
Std. Dev.	14.75	13.29

***Notes*:** Unit: 10,000 NTD. The figures in the table are in 2-digit significance.

According to the data presented in Table 14, the forecasts provided by the respondents regarding income numbers demonstrate that just three data sets within the experimental group have the potential to generate revenue. On the contrary, the remaining 50% of the participants maintain the viewpoint that the experimental group, which has made investments in blockchain technology, is expected to generate comparatively lower revenue in comparison to the control group which utilizes conventional trading methods.

Table 14 Benefit indicators-the results of the indirect utility integration of potential benefits

Items	Develop potential customers	
Objects	Control	Experiments
A	2	3
B	100	70
C	100	50
D	100	200
E	1	5
F	100	50
Mean	67.17	63
Maximum	100	200
Minimum	1	3
Std. Dev.	50.87	72.28

***Notes*:** Unit: 10,000 NTD. The figures in the table are in 2-digit significance.

By synthesizing the data presented in the aforementioned summary tables, we can draw judgments about the direct usefulness or practicality. In particular, the experimental group consists of 30 data sets that surpass those observed in the control group, while there are 5 data sets where the experimental group demonstrates lower values compared to the control group. Additionally, there is one data set that exhibits an identical outcome between the two groups. The aggregate findings indicate that the respondents regard blockchain technology as a facilitator for increased efficiency and decreased mistake rates in the context of international trade. Moreover, there is a prevailing belief that it reduces the probability of transaction fraud for 80% of enterprises. On the contrary, the examination of indirect utility reveals that the experimental group outperforms the control group. In contrast, the control group consists of 19 data sets that demonstrate lower values in comparison to the experimental group, which has 15 data sets. Additionally, 2 data sets within the control group exhibit equal values. The findings of this study indicate that participants hold the belief that the newly implemented trade methodology can provide higher returns, especially in projects that encompass more than half of the benefit indicators.

Result of Cost-benefit analysis

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The statistics shown in the summary tables of the initial two subsections were derived from computed values that were anticipated by six practitioners who had the necessary qualifications. Since these predictions are based on individual projections of forthcoming developments, they inevitably have a subjective component, mirroring the diverse perspectives of respondents regarding the effects of blockchain technology on global trade. As a result, there is a significant difference between the maximum and minimum values observed in the summary tables of the first and second parts. To enhance the accuracy of predictions, this study calculates the mean value of all items for each participant, considering it as the anticipated outcome. The anticipated values are then consolidated and contrasted. The conclusive results presented in Table 15 demonstrate that the incorporation of blockchain technology into the novel international trade process by the experimental group yields improved operational efficiency and performance in comparison to conventional international trade approaches, specifically in terms of cost.

Table 15 Cost indicator-the aggregate result of the direct utility average

Items Objects	Controls (A)	Experiments (B)	Differences (B) – (A)	t-statistics
Hardware build	14.17(37.47)	52.50(27.88)	38.33*	0.075
Software build	15.00(33.91)	60.00(22.80)	45.00**	0.025
Organizational establishment	14.17(37.47)	36.67(8.16)	22.50	0.21
Personnel costs	-3.33(21.60)	40.00(21.91)	43.33***	0.0062
Time and resources	-2.50(14.05)	33.33(10.33)	35.83***	0.00071
Daily operation	2.50(17.25)	40.83(16.86)	38.33***	0.0029
Depreciation allowance	9.17(22.00)	18.33(14.72)	9.16	0.42
Damage repair	4.17(20.60)	18.33(24.83)	14.16	0.31
Data leakage	28.33(56.36)	40.00(26.83)	11.67	0.66
Unexpected information	-12.50(34.02)	25.83(34.02)	38.33**	0.042
Hacking	7.50(35.46)	16.67(33.27)	9.17	0.65
Total	76.68(11.10)	382.49(14.13)	305.81	5.928

Notes*:** The figures in the table are in 2-digit significance. The "", "**", and "*" denotes statistical significance at 1%, 5%, and 10% level, respectively.

Concurrently, the data provided in Table 16 allows us to infer that the utilization of this revolutionary technology in international trade results in increased expenses, including monetary, time, and resource investments, in comparison to the existing established trade procedures.

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Table 16 Cost indicator-the aggregate result of the indirect utility average

Items Objects	Controls (A)	Experiments (B)	Differences (B) – (A)	t-statistics
Hardware build	113.50(70.86)	185.33(127.45)	71.83	0.262
Software build	130.83(103.65)	185.00(113.80)	54.17	0.409
Organizational establishment	115.17(109.11)	160.33(178.53)	45.16	0.611
Personnel costs	130.83(123.06)	227.00(198.31)	96.17	0.342
Time and resources	95.33(87.61)	220.67(280.45)	125.34	0.336
Daily operation	200.17(109.18)	202.00(137.32)	1.83	0.98
Depreciation allowance	66.83(40.50)	74.50(71.03)	7.67	0.824
Damage repair	117.00(81.08)	130.67(105.42)	13.67	0.807
Data leakage	133.50(107.77)	152.17(125.84)	18.67	0.788
Unexpected information	107.67(97.44)	80.67(69.82)	- 27.00	0.595
Hacking	95.33(79.97)	112.17(118.85)	16.84	0.78
Total	1,306.16(33.31)	1,730.51(52.85)	424.35*	0.056

Notes*:** Unit: 10,000 NTD. The figures in the table are in 2-digit significance. The "", "**", and "*" denotes statistical significance at 1%, 5%, and 10% level, respectively.

The data reported in Table 17 demonstrates that the experimental group has achieved significantly higher evaluation scores about the efficiency element of the benefit side, as compared to the control group. This suggests that the integration of blockchain technology is expected to strengthen the implementation of global trade processes, leading to improved trade efficiency while reducing transaction risks and regulatory obstacles.

Table 17 Benefit indicator-the aggregate result of the direct utility average

Items Objects	Controls (A)	Experiments (B)	Differences (B) – (A)	t-statistics
Operating cost	11.67(31.25)	28.33(17.22)	16.66	0.286
Transaction efficiency	2.50(25.25)	46.67(10.33)	44.17***	0.0054
Transaction risk	-5.00(13.78)	33.33(10.33)	38.33***	0.0004
Overall credit level	4.17(12.01)	29.17(16.86)	25.00**	0.016

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Items Objects	Controls (A)	Experiments (B)	Differences (B) – (A)	t-statistics
Ease of supervision	10.00(38.47)	37.50(17.25)	27.50	0.154
Develop potential customers	2.50(14.75)	31.67(13.29)	29.17***	0.0049
Total	25.84(5.997)	206.67(6.83)	180.83	1.0273

Notes*:** The figures in the table are in 2-digit significance. The "", "**", and "*" denotes statistical significance at 1%, 5%, and 10% level, respectively.

Furthermore, the revenue forecasts presented in Table 18 indicate that the experimental group is anticipated to generate greater income when compared to the current international trading procedures. Therefore, the integration of blockchain technology into the global trade process has the potential to generate higher profits for enterprises or financial institutions in comparison to the conventional trade framework.

Table 18 Benefit indicator-the aggregate result of the indirect utility average

Items Objects	Controls (A)	Experiments (B)	Differences (B) – (A)	t-statistics
Operating cost	85.17(91.19)	115.50(123.34)	30.33	0.64
Transaction efficiency	126.83(110.71)	147.17(164.35)	20.34	0.807
Transaction risk	106.00(121.09)	115.67(106.06)	9.67	0.886
Overall credit level	109.33(118.99)	159.50(126.40)	50.17	0.495
Ease of supervision	69.00(79.43)	78.50(86.91)	9.50	0.847
Develop potential customers	67.17(50.87)	63.00(72.28)	- 4.17	0.9106
Total	563.50(23.998)	679.34(37.51)	115.84	0.3159

Notes*:** Unit: 10,000 NTD. The figures in the table are in 2-digit significance. The "", "**", and "*" denotes statistical significance at 1%, 5%, and 10% level, respectively.

To evaluate the viability of adopting the experimental group, which entails bringing blockchain technology into the international commerce process, Table 19 has been generated.

Table 19 Cost indicator (recurring cost)-the aggregate result of the direct utility average

Items Objects	Controls (A)	Experiments (B)	Differences (B) – (A)	t-statistics
Personnel costs	-3.33(21.60)	40.00(21.91)	43.33***	0.0062
Time and resources	-2.50(14.05)	33.33(10.33)	35.83***	0.00071

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Items Objects	Controls (A)	Experiments (B)	Differences (B) – (A)	t-statistics
Daily operation	2.50(17.25)	40.83(16.86)	38.33***	0.00299
Depreciation allowance	9.17(22.00)	18.33(14.72)	9.16	0.418
Damage repair	4.17(20.60)	18.33(24.83)	14.16	0.307
Data leakage	28.33(56.36)	40.00(26.83)	11.67	0.661
Unexpected information	-12.50(34.02)	25.83(34.02)	38.33**	0.0423
Hacking	7.50(35.46)	16.67(33.27)	9.17	0.654
Total	33.34(11.96)	233.32(10.63)	199.98***	0.00058

Notes*:** The figures in the table are in 2-digit significance. The "", "**", and "*" denotes statistical significance at 1%, 5%, and 10% level, respectively.

The purpose of these tables is to facilitate comparison, specifically removing one-time charges related to system design, such as hardware, software, and organizational costs. These expenses have already been accounted for in Table 20.

Table 20 Cost indicator (recurring cost)-the aggregate result of the average of indirect utility

Items Objects	Controls (A)	Experiments (B)	Differences (B) – (A)	t-statistics
Personnel costs	130.83(123.06)	227.00(198.31)	96.17	0.342
Time and resources	95.33(87.61)	220.67(280.45)	125.34	0.336
Daily operation	200.17(109.18)	202.00(137.32)	1.83	0.98
Depreciation allowance	66.83(40.50)	74.50(71.03)	7.67	0.824
Damage repair	117.00(81.08)	130.67(105.42)	13.67	0.807
Data leakage	133.50(107.77)	152.17(125.84)	18.67	0.788
Unexpected information	107.67(97.44)	80.67(69.82)	- 27.00	0.595
Hacking	95.33(79.97)	112.17(118.85)	16.84	0.78
Total	946.66(39.48)	1,199.85(60.88)	253.19	0.2409

Notes*:** Unit: 10,000 NTD. The figures in the table are in 2-digit significance. The "", "**", and "*" denotes statistical significance at 1%, 5%, and 10% level, respectively.

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Table 21 displays the definitive results of the cost index and benefits index, which were computed using the direct utility approach. The net benefits observed in the control group and the experimental group are -7.5 and -26.65, respectively. Additionally, the profit-to-cost ratios for the control group and the experimental group are 0.78 and 0.89, respectively. Furthermore, the concept of indirect usefulness is delineated.

Table 21 Consolidation of the final result of direct utility

Indicators Schemes	Cost	Benefit	Net benefit	Benefit-cost ratio
Controls	33.34	25.84	-7.50	0.78
Experiments	233.32	206.67	-26.65	0.89

Notes: The figures in the table are in 2-digit significance.

According to Table 22 in the final findings, the net gain for the control group is recorded as -3.8316 million, accompanied by a profit-to-cost ratio of 0.6. In comparison, the experimental group exhibits a net benefit of -5.2051 million, accompanied by a profit-to-cost ratio of 0.57.

Table 22 Consolidation of the final result of indirect utility

Indicators Schemes	Cost	Benefit	Net benefit	Benefit-cost ratio
Controls	946.66	563.50	-383.16	0.60
Experiments	1,199.85	679.34	-520.51	0.57

Notes: Unit: 10,000 NTD. The figures in the table are in 2-digit significance.

For the experimental group, the net benefits—that is, the direct benefits associated with efficiency in operations and the indirect benefits associated with revenue generation—are not only less than those of the control group, but they also do not balance the total expenses incurred. This suggests that the utilization of blockchain technology in the context of global trade has thus far failed to yield a financial gain. Therefore, as a result of the study given above, it can be concluded that the current investment in the utilization of blockchain technology for the novel trade process is not considered to be cost-effective. Therefore, it can be classified as a financially unviable undertaking in its current state, and it is not recommended for implementation.

Conclusion

The present study examined the effects of blockchain technology on global trade, with a specific emphasis on the integration of the experimental group. The findings indicate that the utilization of blockchain technology leads to improved operational efficiency and performance in comparison to conventional approaches. Nevertheless, this approach results in increased expenses, encompassing financial, temporal, and resource-related commitments. The results of the experiment indicate that the group subjected to the experimental conditions achieved greater levels of efficiency. This finding suggests that the implementation of the proposed intervention has the potential to enhance trade efficiency and reduce transaction risks. The revenue forecasts indicated that the implementation of blockchain technology has the potential to provide greater financial returns compared to conventional methodologies. Nevertheless, the experimental group did not demonstrate a net gain that would justify the profitability of applying blockchain technology to international trade. Consequently, it is not appropriate to implement this technology at present. Hence, the allocation of resources towards blockchain technology is considered to be unremunerative and not recommended for implementation.

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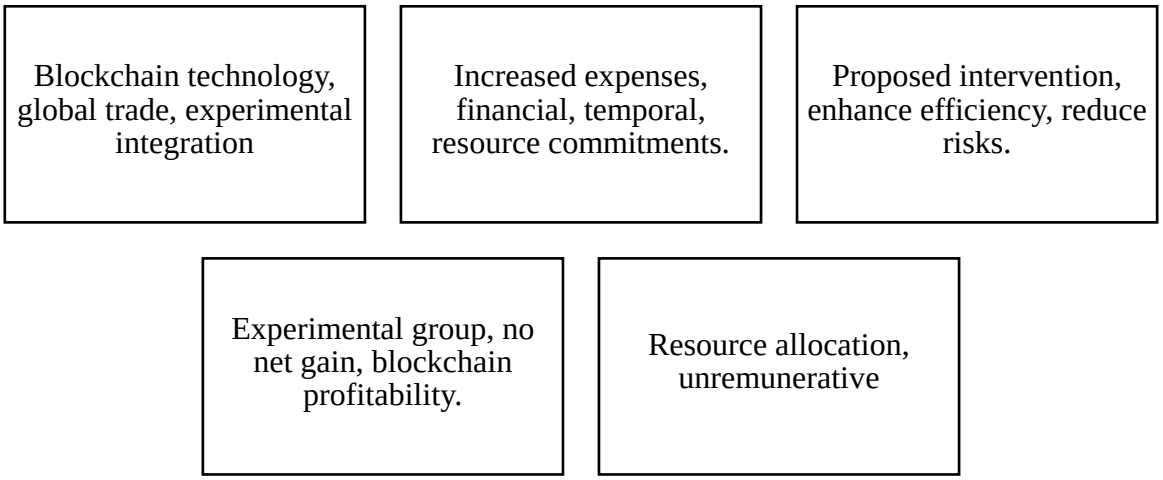

Figure 2 Conclusion of the research result

Discussion

This study aims to empirically evaluate the impact of applying blockchain technology in international trade financing on efficiency, financial outcomes, transaction speeds, and cost reductions for domestic banks. The results suggest that the implementation of blockchain technology improves operational effectiveness and mitigates transactional vulnerabilities; however, it concurrently incurs elevated expenses. Although the experimental group demonstrated a superior efficiency score, it did not result in a financially advantageous net benefit, hence making it unsuitable for implementation.

The research findings shed light on the dynamic nature of electronic commerce (e-commerce), which has experienced substantial advancements, particularly in the realm of online payment security. This article synthesizes previous research efforts that have utilized a wide range of modeling techniques and technology frameworks to investigate the progression of e-commerce transactions and their implications for global trade and financial services. The research conducted covers a range of novel methodologies and technologies, including electronic currency applications, the Bank Payment Commitment (BPO), cross-border electronic transactions, and blockchain technology. Each of these papers presents unique viewpoints regarding the improvement of online payment systems, trade processing, and the efficacy of financial services. In contrast to the existing corpus of research, Ilter (2022) proposed a novel paradigm for electronic cash applications that aimed to cater to the changing demands of online payments. This model functions as a fundamental framework for understanding secure and efficient online payment systems, laying the groundwork for later developments in this domain. Ilter (2022) highlights the importance of modifying payment processes to align with the changing e-commerce environment. Chen et al. (2022) conducted a study that examined the Bank Payment Commitment (BPO) and its implications for firms' attitudes and cooperation with domestic import and export manufacturers in the context of global commerce. This study illuminates the significance of financial intermediaries in conducting secure international trade transactions, underscoring the pivotal function of financial institutions in the global commerce sphere. Kumar et al. (2021) investigated cross-border electronic transactions, with a specific emphasis on the Taiwan-China case study using the Q-trade platform. This study highlights the capacity of technology-driven solutions to address geographical disparities and enhance global trade. The findings obtained from this study offer a glimpse into the prospective landscape of international trade. In addition, Sharma (2023) achieved notable advancements in the utilization of blockchain technology for the development of an

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international trading platform that successfully tackles longstanding obstacles and accelerates trade processing. This seminal research showcases the disruptive capabilities of blockchain technology in revolutionizing worldwide trade practices and addressing challenges about transparency, trustworthiness, and operational effectiveness. In conclusion, Tian & Sarkis (2023) employed a comprehensive methodology, incorporating several models such as the 7S framework, five forces analysis, and PESTEL analysis, to assess the influence of growing blockchain technology on the internal, industrial, and societal aspects of banks. This study highlights the potential of blockchain technology in augmenting financial services and its overall efficacy within the financial industry.

In summary, the comprehensive compilation of research showcased in this article exemplifies the dynamic nature of Internet commerce and the imperative nature of ensuring secure financial transactions. From the examination of fundamental models of electronic currency applications to the exploration of advanced uses of blockchain technology, these studies provide light on the potential of technology to bring about significant transformations in strengthening trade efficiency, mitigating conflicts, and improving financial services. The insights provided here offer vital information for comprehending the changing dynamics of the digital economy, as the e-commerce and banking sectors persistently adjust and introduce new developments.

Recommendation

The present study's findings indicate that the influence of blockchain technology on international trade is characterized by discernible gains in terms of operational efficiency and performance. However, the current benefits are outweighed by the comparatively higher costs involved. Consequently, it is imperative to exercise prudence while considering the implementation of blockchain technology in the realm of international trade.

Implementation recommendations:

1. It is advisable for organizations and businesses engaged in international commerce to contemplate the initiation of pilot projects or proof-of-concept studies to evaluate the feasibility of integrating blockchain technology into their respective operational frameworks. The utilization of a controlled testing environment facilitates the assessment of the technology's viability and cost-efficiency.

2. Before proceeding with the whole implementation, it is imperative to undertake a comprehensive cost-benefit analysis that takes into account the distinct demands and limitations of the organization. The present research aims to evaluate the anticipated benefits of operational efficiency about the corresponding rise in expenses, thereby facilitating decision-makers in making well-informed and sensible decisions.

3. Instead of undertaking a total replacement of old systems, organizations may opt to investigate hybrid options that integrate blockchain technology with conventional procedures. This approach enables the utilization of blockchain's benefits while mitigating the need for substantial upfront capital and potential risks.

4. Organisations that elect to implement blockchain technology ought to build systems to ensure ongoing monitoring and assessment of its effects on trade operations. Systematic evaluations can facilitate the identification of potential cost-saving measures and areas that could benefit from enhancements.

5. In light of the dynamic regulatory framework surrounding blockchain technology in the context of global trade, it is imperative for organizations to prioritize adherence to pertinent legal statutes and regulations. This includes aspects such as the protection of data privacy, ensuring security measures, and adherence to international trade standards.

Future research recommendations:

1. It is recommended that future research endeavors encompass the undertaking of comprehensive and extended cost-benefit studies about the utilization of blockchain technology within the realm of international trade. This may entail monitoring the long-term financial performance of organizations that have implemented blockchain technology. Through the analysis of the correlation between the initial investment and its eventual impact on profitability, as well as the identification of

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distinct aspects that contribute to cost reductions or revenue increases, researchers can offer a more comprehensive comprehension of the financial consequences associated with the technology.

2. Broadening the research scope to include multiple industries within the realm of international trade, including but not limited to manufacturing, finance, logistics, and customs, has the potential to generate significant and valuable insights. Comparative analyses conducted within these industries can illuminate the intricacies and distinct obstacles linked to the implementation of blockchain technology in other fields. This methodology enables a more comprehensive evaluation of the viability and cost-efficiency of the technology within various global trade scenarios.

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