

Blockchain Based Letter of credit Automation Using Cryptocurrency for Cross-Border Trade

Dr. Shabana.S, Assistant Professor, School of Commerce, Nehru Arts and Science College, Nehru Gardens, Thirumalayampalayam, Coimbatore, Email: nascshabanas@nehrucolleges.com

Subhiksha Venkatakrisnan, Sharukasini E S, Satheesh N,

B. Com PA, Department of Commerce, Nehru Arts and Science College, Nehru Gardens, Thirumalayampalayam, Coimbatore.

ABSTRACT

International trade plays a significant role in the economic development of countries by facilitating the exchange of goods and services across national boundaries. In order to ensure secure financial transactions between exporters and importers, various trade finance instruments are used, among which the Letter of Credit (LC) is one of the most widely adopted mechanisms. A Letter of Credit acts as a guarantee issued by a bank to ensure that the exporter receives payment once the required trade documents are submitted according to the agreed terms. Although this system provides security to both trading parties, the traditional LC process often involves multiple intermediaries, extensive documentation, and lengthy verification procedures. The traditional Letter of Credit system relies heavily on manual processes and paper-based documentation, which often leads to operational inefficiencies and delays in international trade transactions. The involvement of several financial institutions, intermediaries, and regulatory bodies increases the complexity of the process and raises transaction costs. In addition, the lack of transparency and real-time data sharing among participants may result in documentation errors, fraud risks, and disputes between trading partners. These limitations highlight the need for a more efficient and technologically advanced system for managing trade finance operations. In recent years, blockchain technology has emerged as a promising solution to address these challenges in global trade finance. Blockchain is a decentralized digital ledger technology that enables secure, transparent, and tamper-proof recording of transactions. By integrating blockchain with cryptocurrency-based payment systems and smart contracts, it becomes possible to automate the entire Letter of Credit process. Smart contracts can automatically verify transaction conditions and execute payments when predefined requirements are fulfilled, thereby reducing the need for manual intervention and intermediaries. Furthermore, the adoption of blockchain technology in trade finance can significantly enhance transparency and traceability throughout the transaction process. Since blockchain operates on a distributed ledger system, all authorized participants in the network can access and verify transaction records in real time. This feature helps in reducing information asymmetry between trading partners and financial institutions. The immutability of blockchain records also ensures that once a transaction is recorded, it cannot be altered or tampered with, thereby strengthening the security and reliability of financial transactions in cross-border trade.

Keywords: Blockchain, Cryptocurrency, Trade

INTRODUCTION

International trade plays a crucial role in the economic development of nations by enabling the exchange of goods, services, and resources across borders. Through international trade, countries are able to access products and raw materials that may not be available domestically, thereby improving economic efficiency and supporting global economic

growth. In order to facilitate smooth international trade transactions, financial institutions provide various trade finance instruments that help reduce risks associated with cross-border payments. Among these instruments, the Letter of Credit (LC) is one of the most widely used methods to ensure secure and reliable payment between exporters and importers. A Letter of Credit is a financial document issued by a bank on behalf of the importer, guaranteeing payment to the exporter once the specified terms and conditions of the trade agreement are fulfilled. The LC system provides security to both parties involved in the transaction. The exporter is assured that payment will be received once the required documents are submitted, while the importer is assured that payment will only be made after the goods have been shipped according to the agreed terms. Despite its importance in global trade, the traditional Letter of Credit system often involves multiple intermediaries, extensive documentation, and complex verification procedures, which may lead to delays and higher transaction costs.

The traditional LC process is largely dependent on manual documentation and communication between several parties such as issuing banks, advising banks, confirming banks, exporters, importers, and shipping companies. These procedures can make the trade finance system slow and inefficient. Errors in documentation, lack of transparency, and delays in verification can create operational challenges and sometimes lead to disputes between trading partners. Moreover, the involvement of several intermediaries increases administrative costs and processing time, making the traditional LC system less efficient in a rapidly evolving global trade environment. In recent years, technological advancements have introduced new opportunities to improve the efficiency of trade finance systems. One of the most promising innovations is blockchain technology, which provides a decentralized and secure digital ledger for recording transactions. Blockchain technology enables transparent and tamper-proof record keeping, allowing multiple participants to access and verify transaction data in real time. By integrating blockchain technology with smart contracts and cryptocurrency-based payment systems, the entire Letter of Credit process can be automated, reducing processing time, improving transparency, and enhancing trust among international trading partners.

STATEMENT OF THE PROBLEM

International trade transactions involve multiple participants, including importers, exporters, banks, and regulatory authorities. One of the most commonly used instruments to ensure secure payment in cross-border trade is the Letter of Credit (LC). Although the LC system provides financial security to both buyers and sellers, the traditional process is often complex and time-consuming. It involves extensive paperwork, manual verification of documents, and coordination among several intermediaries such as issuing banks, advising banks, and confirming banks. These procedures may lead to delays in payment processing and increase the operational costs associated with international trade transactions. In addition, the traditional LC system faces challenges related to transparency, efficiency, and risk management. Errors in documentation, delays in communication between financial institutions, and the possibility of fraudulent activities can create significant problems for trading partners. As global trade continues to expand, the need for faster, more secure, and transparent financial transaction systems has become increasingly important. Blockchain technology has emerged as a potential solution to these issues by providing a decentralized and automated platform for managing trade finance transactions. Therefore, it becomes essential to examine how blockchain-based systems can address the limitations of traditional Letter of Credit processes and improve the efficiency of cross-border trade operations.

OBJECTIVES OF THE STUDY

The main objectives of the study are:

- To understand the challenges faced by export – import firms in letter of credit processing, documentation, settlement time and transaction costs.
- To evaluate the feasibility of cryptocurrency-based cross border settlement mechanism in trade finance, as perceived by digital payment.
- To examine the role of blockchain technology in automating letter of credit, based on inputs from blockchain consultants and fintech professionals.

RESEARCH METHODOLOGY:

Research methodology refers to the systematic process used to collect, analyze, and interpret data in order to achieve the objectives of a research study. It provides a structured framework that guides the researcher in conducting the study in a scientific and organized manner. The methodology used in this study focuses on understanding the role of blockchain technology in automating the Letter of Credit process and improving efficiency in cross-border trade transactions.

Research Design

The present study adopts a descriptive research design. Descriptive research helps in explaining the concepts related to blockchain technology, cryptocurrency, and the Letter of Credit process in international trade. It also helps in describing the current challenges in traditional trade finance systems and examining how blockchain technology can provide solutions to these issues.

Nature of the Study

The study is analytical in nature as it analyzes the effectiveness of blockchain technology in improving trade finance operations. It evaluates the potential advantages of blockchain-based systems in terms of transparency, efficiency, and security in cross-border trade transactions.

Sources of Data

The study is based on both primary data.

Primary data was collected directly from respondents through a structured questionnaire. The survey was conducted among individuals who have knowledge of banking, finance, international trade, and financial technology. The questionnaire included questions related to awareness of blockchain technology, challenges in the traditional Letter of Credit system, and the potential benefits of blockchain-based trade finance systems.

Sample Size

For the purpose of the study, a sample of 93 respondents was selected. The respondents include finance students, banking professionals, and individuals who have basic knowledge of international trade and financial technology.

Sampling Technique

The study uses a **convenience sampling method** to collect data from respondents who were easily accessible and willing to participate in the survey.

Tools and Techniques for Analysis

The collected data was analyzed using the following statistical and analytical tools:

- Percentage Analysis
- Correlation Analysis

These tools help in interpreting the responses of the participants and understanding their views regarding the adoption of blockchain technology in trade finance.

REVIEW OF LITERATURE:

Several researchers have examined the role of blockchain technology in improving trade finance systems.

Hal Finney (2009) discussed the early development of cryptocurrency systems and highlighted the potential of decentralized digital currencies for secure online transactions.

Marco Iansiti and Kareem Lakhani (2017) explained how blockchain technology can transform business processes by enabling transparent and secure digital transactions without the need for intermediaries.

Dorothy E. Denning (2012) studied digital payment systems and emphasized the importance of cryptographic technologies in improving transaction security.

Reid Hoffman and Michael Harrigan (2012) analyzed the structure of blockchain networks and their potential applications in financial systems.

The existing literature suggests that blockchain technology has significant potential to improve efficiency, transparency, and security in trade finance operations.

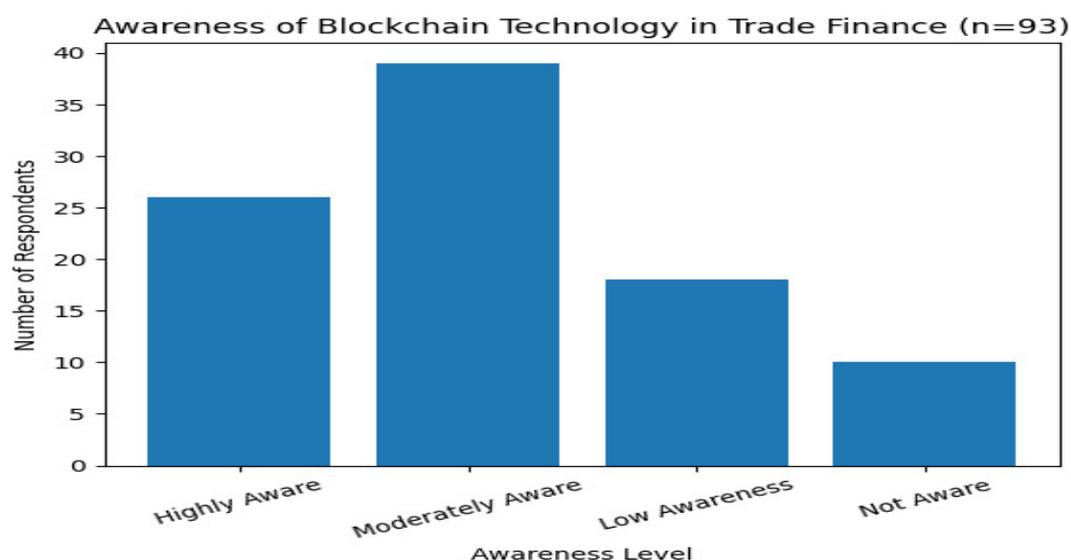
DISCUSSION AND ANALYSIS:

- The traditional Letter of Credit process involves several stages, including issuance, advising, document verification, and payment settlement. Each stage requires communication between banks and trading partners, which may lead to delays and operational inefficiencies.
- Blockchain technology can simplify this process by creating a shared digital ledger that is accessible to all authorized participants in the transaction. Once trade documents are uploaded to the blockchain network, they can be verified automatically through smart contracts.
- Smart contracts are self-executing programs that automatically enforce the terms of an agreement. When predefined conditions are met, the contract triggers the payment process without requiring manual intervention.
- By using blockchain technology, the time required for LC processing can be significantly reduced. Traditional LC transactions may take several days or even weeks to complete, whereas blockchain-based transactions can be executed within a few hours.
- Another major advantage of blockchain technology is improved transparency. Since all participants share the same ledger, it becomes easier to track the progress of transactions and verify the authenticity of documents.
- Overall, blockchain-based LC systems can enhance efficiency, reduce operational costs, and minimize the risk of fraud in international trade transactions.

Awareness of Blockchain Technology in Trade Finance

Awareness Level	Number of Respondents	Percentage (%)
Highly Aware	26	27.96%
Moderately Aware	39	41.94%
Low Awareness	18	19.35%
Not Aware	10	10.75%
Total	93	100%

The above table shows the awareness level of blockchain technology in trade finance among the respondents. It can be observed that 39 respondents (41.94%) are moderately aware of blockchain technology, which represents the majority of the respondents. 26 respondents (27.96%) are highly aware, indicating that a significant number of participants have good knowledge about blockchain applications in financial transactions. Meanwhile, 18 respondents (19.35%) have low awareness, and 10 respondents (10.75%) are not aware of blockchain technology. This indicates that while blockchain technology is gradually gaining recognition, there is still a need to increase awareness and understanding of its role in trade finance and cross-border transactions.



CONCLUSION

Blockchain technology has the potential to transform the global trade finance system by automating the Letter of Credit process. Traditional LC systems are often complex, time-consuming, and costly due to the involvement of multiple intermediaries and manual documentation processes. The integration of blockchain technology and cryptocurrency-based payment systems can significantly improve the efficiency and transparency of international trade transactions. By using distributed ledger technology and smart contracts, financial institutions can automate document verification and payment settlement processes. The study highlights that blockchain-based LC systems can reduce transaction costs, minimize processing delays, and enhance trust among trading partners. As global trade continues to expand, the adoption of blockchain technology in trade finance may play a crucial role in improving the efficiency of cross-border transactions. Therefore, banks, financial institutions, and policymakers should explore the implementation of blockchain-based solutions to modernize trade finance systems and support the growth of international trade.

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