



**IMPROVEMENT OF BANKING  
INTERNATIONAL TRADE TRANSACTION  
(LETTER OF CREDIT) BY SMART  
CONTRACTS AND BLOCKCHAIN  
TECHNOLOGY**

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MASTER THESIS  
FINANCE AND PARTICIPATION BANKING**

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## **THESIS APPROVAL PAGE**

I certify that in my opinion the thesis submitted by Akram TARIQ titled “IMPROVEMENT OF BANKING INTERNATIONAL TRADE TRANSACTION (LETTER OF CREDIT) BY SMART CONTRACTS AND BLOCKCHAIN TECHNOLOGY” is fully adequate in scope and in quality as a thesis for the degree of Master of Science.

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This thesis is accepted by the examining committee with a unanimous vote in the Department of Finance and Participation Banking as a Master Thesis Exam. November 22,2023

<b><u>Examining Committee Members (Institutions)</u></b>	<b><u>Signature</u></b>
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## **DECLARATION**

I hereby declare that this thesis is the result of my own work and all information included has been obtained and expounded in accordance with the academic rules and ethical policy specified by the institute. Besides, I declare that all the statements, results, materials, not original to this thesis have been cited and referenced literally.

Without being bound by a particular time, I accept all moral and legal consequences of any detection contrary to the aforementioned statement.

**Name Surname:** Akram TARIQ

**Signature** :

## **FOREWORD**

Alhamdulillah, all thanks be unto the Almighty Allah for all the blessing You had given me. The courage, endurance, and patience You put inside me, strengthening me in completing my Master Degree and thesis

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## **ABSTRACT**

This study proposes a new model of smart contracts to address the shortcomings of business transactions in international trade. This study explores and explains the distinguishing features of smart contracts. These functionalities enable Letters of Credit (LC) and the benefits their application brings to the parties involved in the process, making the banking system part of the new mechanism model. Thus, this study used a qualitative approach, described as intentional discussions or dynamic collaborations involving at least three (3) individuals, resulting in co-constructed, context-oriented outcomes. Organized meetings typically involve carefully crafted questions that are asked to participants verbatim in a predetermined order. These meetings often review instruments or gather information from various experts. The results revealed that there are challenges that will be faced by the blockchain smart contract technology if implemented in the banking international trade or system. These challenges include regulatory and legal issues, adapting business models according to the new smart contract and blockchain technology, and developing new workforce planning strategies. The study compared the interview results with the literature review to determine the impact of smart contracts and blockchain on LC in the banking industry, banking jobs, and international trade. The study discovered that there are similar ideas. This study also critically analyzed the advantages of using smart contracts and blockchain technology in the stages of an LC. The analysis was based on interviews conducted by the researcher and a review of relevant literature.

**Keywords:** Banking International Trade, Blockchain Technology, Smart Contract, Letter of Credit.

## ÖZ

Bu çalışma, uluslararası ticarete ticari işlemlerdeki eksiklikleri gidermek için Akıllı Sözleşmelerin yeni bir mekanizma modelini önermektedir. Ayrıca bu çalışma, akıllı sözleşmelerin ayırt edici özelliklerini, akreditifi mümkün kılacak işlevselliklerini ve uygulanmasının sürecin taraflarına getireceği faydaları araştırıp açıklayacak ve bankacılık sistemini yeni mekanizmanın bir parçası haline getirecektir. model. Bu nedenle, kullanılan Niteliksel yaklaşım, en az üç (3) kişi arasında ortak yapılandırılmış, bağlam odaklı sonuçlara yol açan kasıtlı tartışmalar veya dinamik işbirlikleri olarak tasvir edilmiştir. Organize toplantılar, kural olarak, üyelere önceden belirlenmiş bir istekle kelimesi kelimesine sorulan, özenle hazırlanmış sorulardan oluşur. Bu toplantılar birçok durumda inceleme araçlarıyla ilgili olarak veya çeşitli uzmanlıklardan bilgi istendiğinde kullanılır. Sonuçlar, bankacılık uluslararası ticaretinde veya sisteminde uygulandığında, düzenleyici ve yasal zorluklar olarak, iş modellerini yeni akıllı sözleşme ve blockchain teknolojisine ve yeni iş gücü planlama stratejileri zorluklarına göre uyarlamak gibi, blockchain akıllı sözleşme teknolojisinin karşılaşılabilecek zorluklar olduğunu ortaya koydu. Çalışma, Akreditiflerde yer alan akıllı sözleşme ve blok zincirinin bankacılık sektörü ve bankacılık işleri ile Uluslararası Ticaret üzerindeki etkisini belirlemek için röportaj sonuçlarını literatür taramasıyla karşılaştırmış ve benzer fikirlerin olduğunu tespit etmiştir. Bu çalışmada ayrıca araştırmacının yapmış olduğu röportaj ve literatür taramasına dayanarak akreditif aşamalarında akıllı sözleşmeler ve blockchain kullanımının faydasına yönelik eleştirel analizler yapılmıştır

**Anahtar Kelimeler :** Bankacılık Uluslararası ticaret, Blockchain teknolojisi akıllı sözleşme, akreditif.

## ARCHIVE RECORD INFORMATION

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## ARŞİV KAYIT BİLGİLERİ

<b>Tezin Adı</b>	Bankacılık Uluslararası Ticaret İşlemlerinin (Kredi Mektubu) Akıllı Sözleşmeler ve Blockchain Teknolojisi ile Geliştirilmesi
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## **ABBREVIATIONS**

<b>LC</b>	:Letters of Credit
<b>DC</b>	:Documentary Collections
<b>SC</b>	:Supply Chains
<b>IoT</b>	:Internet of Things
<b>P2P</b>	:Peer-to-Peer
<b>SCM</b>	:Supply Chain Management
<b>ICC</b>	:International Chamber of Commerce
<b>UCP</b>	:Uniform Customs & Practice for Documentary Credits
<b>KYC</b>	:Know your customer
<b>BL</b>	:Bill of Lading
<b>CPU</b>	:Central Processing Unit
<b>WTO</b>	:World Trade Organization
<b>BPMN</b>	:Business Process Model and Notation
<b>UTAUT</b>	:Unified Theory of Acceptance and Use of Technology
<b>TAM</b>	:Technology Acceptance Model
<b>PLS-SEM</b>	:Partial Least Squares Structural Equation Modeling
<b>FATF</b>	:Financial Action Task Force
<b>LIS</b>	:Library and Information Science
<b>Eucp</b>	:e-Uniform Customs and Practice

## **SUBJECT OF THE RESEARCH**

This study proposes a new model of smart contracts to address the shortcomings of business transactions in international trade. This study explores and explains the distinguishing features of smart contracts. These functionalities enable Letters of Credit (LC) and the benefits their application brings to the parties involved in the process, making the banking system part of the new mechanism model. This study used a qualitative approach, described as intentional discussions or dynamic collaborations involving at least three (3) individuals, resulting in co-constructed, context-oriented outcomes. These meetings often review instruments or gather information from various experts. The results revealed that there are challenges that will be faced by the blockchain smart contract technology if implemented in the banking international trade or system.

## **PURPOSE AND IMPORTANCE OF THE RESEARCH**

This study proposes a new mechanism model of Smart Contracts to address the shortcomings of business transactions in international trade. Furthermore, this study will explore and explain the distinguishing features of smart contracts. These functionalities will enable LC and the benefits their application will bring to the parties of the process and make the banking system part of the new mechanism model.

## **METHOD OF THE RESEARCH**

This study used a qualitative approach, which has been depicted as intentional discussions or dynamic co-operations between at least three (3). the members of this have been selected depending on their field of specialization in the banking sector (trade finance departments or treasury departments). The study used organized meets that were sequential processes for evaluating a research problem to gain further understanding of the impact of improving banking international trade transactions (LC) by smart contracts and blockchain technology.

## **HYPOTHESIS OF THE RESEARCH / RESEARCH PROBLEM**

Third parties in finance add complexity and hinder trade processes. Blockchain can address these issues, especially in trade finance like LCs. Researchers explore blockchain's potential in trade finance, including performance improvements, feasibility studies, and trust-building with smart contracts. Blockchain technology shows promise in international trade. It also influences supply chains (SCs), banking, logistics, documents, and funding in international trade.

## **POPULATION AND SAMPLE (IF AVAILABLE)**

The study population consists of (3) managers in international trade and treasury departments in the banking sector from different banks worldwide.

## **SCOPE AND LIMITATIONS / DIFFICULTIES**

The scope of the study includes identifying the international trade banking system and international trade worldwide. The study followed an organized sampling of managers in international trade and treasury departments in the banking sector from different banks worldwide. Besides, this study focuses on some of the blockchain technology selected characteristics that are important elements for affecting the international trade banking system and international trade.

# 1. INTRODUCTION

This chapter aims to discuss the introduction of the study as a general overview of the study. Therefore, it begins with a discussion of the background of the research by reviewing some of the researchers' efforts in this field, which are related to international trade, Letters of Credit (LC), and blockchain. This chapter also includes the statement of the problem, its objectives, the rationale for the study, and the importance of studying. In addition, the outline of the study is presented at the end of the chapter.

## 1.1. Background

In international trade, LC is regarded as the primary instrument (Ali Mahmoud Abdallah Alrabei, 2017). It is generally regarded as an international contract (Al Amaren & Indriyani, 2019). The fact that LC is the most reliable method of ensuring payment in a global trade transaction highlights its utmost significance in safeguarding the interests of all parties involved in international trade (Hao & Xiao, 2013). The spread of international trade and the movement of goods between parties in different nations over the past century have been fundamental aspects of current trade. When the LC method is used in international trade, the customer or applicant (buyer) will have a guarantee that the price of the cargo will not be paid. This is unless the seller demonstrates that they fulfill the responsibilities stipulated in their supporting sales contract. In addition, the seller will receive their money, and the bank will receive a commission for acting as a mediator in this transaction (Marwan Al Ebrahim & Hashem Al Jaza'ar, 2007). However, there are numerous issues with LC in practice, such as the lack of trust between the parties involved. The complex nature of global trade, involving multiple buying and selling partners from various countries operating under different legal guidelines and regulations, creates financing challenges (Kowalski et al., 2021). Several factors contribute to this, including the novelty of the LC itself and the absence of laws governing it. Examining the risk in order to find a legal remedy for it in an LC transaction is a novel method of raising legal awareness worldwide (Al-Amaren, Ismail & Nor, 2020). Even though the LC contract has many advantages, it has numerous risks for all parties involved when it is implemented. Additionally, the fact that LCs are subject to international regulations and provisions



makes this risk even more difficult to mitigate. Moreover, the situation is worsened by the fact that many nations have not incorporated LC into their own legal framework. For example, in Jordan and Malaysia, there is an absence of judicial decisions addressing the risks in LC, as well as a lack of sources, legal texts, and research. This raises doubts about the ability of blockchain and smart contracts to transform the framework of documentary credit operations from a risky process into a safer, faster, and more efficient process for parties involved in LC. Can an LC transaction be risk-free using blockchain technology and smart contracts? In other words, can blockchain and smart contracts eliminate the risks and problems in LC transactions?

### **1.1.1. Letters of Credit**

LC is a typical system that addresses the inclusive design and sound judgment of common business corporate transactions (Mooney & Blodgett, 1995). It has been used extensively to work with installments, commonly in overall deals (Dand, 2011). LC provides a solid foundation for managing business transactions with another trading partner (Mooney & Blodgett, 1995). An LC is a financial instrument that guarantees the dealer's payment for goods or services provided to a client. In LCs, banks commonly act as impartial intermediaries, releasing the funds (the buyer's payment) only when certain conditions are met. Although there are generally two significant occasions in such exchanges, there is a need for various occasions in the process to provide tools, assistance, confidence, and judgment in case of a dispute. The use of official documents and procedures, the involvement of a trustworthy referee, typically a bank, and the protection of both the buyer and the seller are all advantages of LC and other similar transaction mechanisms and facilitators. However, there are several consequences due to the nature of these transactions and the involvement of third parties. This includes additional paperwork, inefficiency, lack of transparency, a prolonged process, a permanent reliance on at least one-third of the party, and information leakage. The major inefficiencies of the process are widely regarded as these. As Niepmann and Schmidt-Eisenlohr (2017) have mentioned, banks are geographically specific, and the structure of LC is highly competitive. Therefore, shocks to individual banks can significantly impact trading patterns. Over the long haul, this approach can impact the quality and efficiency of sales, especially on a large

scale. Furthermore, an LC, in the same way as other trading instruments, is susceptible to fraud and requires transparency. Che Hashim and Mahdzan (2014) have highlighted the common procedure fraudsters use in LC exchanges. Moreover, the use of LC makes buyers and sellers dependent on banks, which delays the transaction process and increases the likelihood of manipulation and fraud.

According to another perspective, the cycle associated with the LC system is characterized by the high cost of issuing LC, such as the considerable investment costs that discourage banks from providing LC. These problems no longer occur only in LC transactions but also in other types of transactions, including Documentary Collections (DC), open accounts, and escrow accounts. It is worth mentioning that most other business transaction mechanisms are no longer as secure as LC. For example, they may consider DC when the customer and the vendor have reached sufficient confidence (assuming that other factors, such as financial and political issues, remain stable). This technique also provides a certain level of security, though not as robust as the LC. However, it is enough to safeguard the seller in case of default (Dand, 2011). DC does not contain price guarantees. Instead, the seller's financial institution forwards the archives to the buyer's bank (Niepmann & Schmidt-Eisenlohr, 2017). In contrast to LC, the benefits of DC are that the expenses are lower, and the vendor receives the price faster (Dand, 2011). Other transaction mechanisms encompass open accounts, cash-in-advance, and escrow.

### **1.1.2. Blockchain Technology**

Blockchain has gained significant popularity (Vincent, Skjellum & Medury, 2020) and is considered "one of the most remarkable technological innovations of the 21st century" (Kimani, Adams, Attah-Boakye, Ullah, Frecknall-Hughes & Kim, 2020). This is due to its unique properties that ensure privacy, security, and integrity of network-based transactions (Kotamraju, Arepalli, Vejendla & Kanumalli, 2021), which allows it to act as "the solution for the current issues in different industries and Supply Chains (SCs)" (Ali, Chung, Kumar & Tan, 2021). Due to the dynamic hashing and cryptography used at each stage of the transaction, the term "blockchain" refers to a chain of interconnected records that are highly secure. Blockchain innovation prevents the possibility of hacking or breaching exchanges through intentional or unplanned

efforts (Kotamraju et al., 2021). There have been ongoing efforts to differentiate cryptocurrencies from blockchains ever since the creation of Bitcoin. For instance, Tapscott and Tapscott (2016) argued that the new digital ledger of blockchain, which has the ability to record anything of value, has applications that extend beyond financial services. Deeds and ownership titles, intellectual property rights, educational degrees, financial accounts, the location of portable assets, charitable donations tied to specific outcomes, employment contracts, and others are all examples. Huang and colleagues (2019) provided an overview of the process of creating chains in a blockchain.

1. “A block is created to represent the transaction.
2. The information about this block (or the transaction) is transmitted to every node in the network.
3. All nodes in the network must approve and validate the transaction. (This step can be automated using an algorithm).
4. If approved, the block is added to the chain, which completes the transaction action and provides a permanent transaction record.”

According to Huang et al. (2019), a database is composed of data entries from various transactions. The database is referred to as a “ledger” since blockchain technology was introduced into the financial industry. A “ledger” is the term used to refer to the computer file or main book used in accounting to calculate and record financial transactions. There is no centralized database since every node in the system keeps all of its data (Huang et al., 2019). Blockchain technology utilizes a linked block structure for data storage and verification. It employs a trusted consensus mechanism to synchronize data changes, creating a secure digital platform for data storage and sharing. The Internet of Things (IoT), identity management, and SC systems are just a few examples of Internet interactive systems where blockchain technology is thought to be useful (Feng, Khan & Kumar, 2019).

### **1.1.3. Blockchain Roles and Capabilities**

A few blockchain technology jobs and capabilities can be used to develop the interaction of LC further. Above all, blockchain technology brings about close, constant notices, representation of the progression of reports, agreements, and terms,

ongoing verification of archives, and immutable and sealed records of reports, terms, and conditions. This has enabled digital proof of ownership, streamlining administrative processes, collaborative verification of transactions and ownership transfer, and granting participants access to transaction records (Ali et al., 2021; Belu, 2019; Chang et al., 2019; Sun et al., 2019; Tapscott & Tapscott, 2016; Vincent et al., 2020).

The hybrid nature of blockchain technology includes the source of its characteristics. Group action technologies, such as distributed ledgers, asymmetric encryption, smart contracts, and Peer-to-Peer (P2P) networks, are typically considered the most prominent (Lu, 2019). Transparency is one of the most significant advantages of adopting blockchain technology (Morgan, Richey & Ellinger, 2018), resulting from its distinctive and powerful capabilities. Every node (participant) in the blockchain must maintain a data backup (Lu, 2019), and all transactions are shared with all other nodes in the network to ensure the dissemination of useful information. This maintains affordable system transparency while still ensuring that all network actors are promptly informed of all data (Queiroz & Fosso Wamba, 2019). Note that blockchain offers decentralized information storage, while old systems store it in a single database. In traditional, centralized data set frameworks and transactions are inherently reliable or supported through trusted intermediaries that ensure authenticity. This incurs additional costs, making the presentation challenging when using central servers. Blockchain is immutable and secure, which means it is a distributed ledger technology that ensures confidence in the integrity of recorded information (e.g., transaction data) by preventing intentional or unintentional modifications (Beck, Müller-Bloch & Ruler, 2018). A block of data is unable to be altered or removed from a blockchain once it is added. In addition, research indicates that blockchain can reduce insecurity, uncertainty, and ambiguity in transactions by producing a single truth for all network participants and providing complete transnational disclosure (Ali et al., 2020). Blockchain can send real-time notifications and verifications and supports smart contracts, digital signatures, and multi-signatures. The performance of essential transaction processes and outcomes can be authentically and effectively measured, thanks to blockchain. Costs can be reduced, and efficiency can be increased by minimizing the involvement of third parties, such as banks, as inspectors and observers.

According to Koetsier (2019), individual suppliers can conduct their checks and balances in near real-time. According to Ali et al. (2020), blockchain is regarded as a significant technical innovation in the digitalization of physical and digital asset ownership. Blockchain has been described as a programmable multi-purpose platform for managing asset ownership and contracts in addition to providing a secure audit trail that is unable to be corrupted (Lindman et al., 2017; Mattila, 2016). Many new applications become possible when an asset is solely digital, and a public ledger can securely track ownership of assets (Athey, Parashkevov, Sarukkai & Xia, 2016).

#### **1.1.4. Smart Contract**

The concept of smart contracts is a crucial element in blockchain's endeavor to enhance P2P business transactions (Roriz & Pereira, 2019). According to Enmaa-Dimitrieva and Schmidt-Kessen (2019), smart contracts, which are agreements written in code and automatically executed in a blockchain environment, are a subject of intense debate. According to Szabo (2018), a contract is a set of promises made in a "meeting of the minds," the traditional method for formalizing a relationship. Contracts are primarily utilized in business relationships, although they can also be employed for other types of agreements and relationships. As a result, he defined a smart contract as a collection of promises written in digital form, accompanied by protocols that outline how the parties can fulfill those promises. The author believes these contracts are intelligent as they are far more practical than their paper-based, lifeless predecessors. Smart contracts are described by Szabo (1997) as "protocols within which the parties perform." As a result, when a transaction or event occurs, rules dictate how the data should be processed to achieve the desired outcome. This can be achieved by converting smart contracts into computer code, with clauses and agreements embedded as lines of program code. Decentralized autonomous organizations, decentralized applications, smart tokens, and smart property were all made possible by the introduction of smart contracts. These contracts paved the way for the development of automated financial applications based on cryptocurrency (Di Francesco Maesa & Mori, 2020). Smart contracts, in general, are computer protocols designed to digitally verify, facilitate, or enforce the terms of a predefined contract's negotiation or performance. They were first proposed more than two decades ago.

However, the recent development of blockchain-based technologies and Bitcoin has rekindled interest in their potential among technologists and the business community (Werbach & Cornell, 2017). With the assistance of smart contracts, legitimate transactions can be conducted without the need for a third party. These transactions cannot be reversed and can be tracked. According to De Graaf (2019), defining blockchain-based smart contracts is more challenging. According to Roriz and Pereira (2019), these programs were created to automate transactions and enable parties to agree on the outcomes of a specific event without relying on a centralized authority. According to Brennan and Lunn (2016), the goal of a smart contract is to utilize the trustless and immutable nature of blockchain to facilitate P2P agreements that are automatically enforced by computer codes.

P2P business transactions can be enhanced by smart contracts due to their unique characteristics, which distinguish them from traditional contracts. It also makes them powerful tools for creating value and developing innovative business models.

- i. Smart contracts can be stored and executed without a middleman on a network of interconnected computers owned by different individuals or organizations using P2P connections.
- ii. Smart contracts independently execute “if-then” commands, ensuring contractual promises are conducted.
- iii. Consensus-based transactions take place.
- iv. Data is inaccessible and stored on a public ledger.

A secure public ledger with a single source of truth that guarantees transparency is commonly referred to as a “blockchain” (de Graaf, 2019). According to Enmaa-Dimitrieva and Schmidt-Kessen (2019), “no-trust contracting environments” can also promote trust in smart contracts. A smart contract is a key component of the proposed framework in this study. These encoded parameters also play a significant role in the speed and transparency of this system.

## **1.2. Research Problem**

Typically, this prompts third parties, such as financial institutions, to be involved. Note that these third parties fulfill some requirements, where they also

introduce additional complications that make the transaction process more challenging (Crosby, Pattanayak, Verma & Kalyanaraman, 2016). Common obstacles include reliance on third parties, the lengthening and complexity of processes, the possibility of information leakage, the high costs of intermediary services, monopoly power, low efficiency, and a lack of transparency (Toorajipour, Oghazi, Sohrabpour, Patel & Mostaghel, 2022). Paper-based processes are essential for the transmission of information, payments, messages, ownership transfers, and other functions in trade finance, specifically LC (Chang et al., 2020). Due to its multifaceted capabilities and advantages, blockchain technology is well-suited to address these issues. Researchers and scholars have discussed how blockchain technology could enhance trade finance and LC. Samy, Tammam, Fahmy, and Hasan (2021) addressed the performance of the consensus algorithm in blockchain technology to enhance reliability in different business scenarios. The Istanbul Byzantine Fault Tolerance voting-based algorithm has been proposed for alteration. Chang et al. (2019) investigated whether blockchain can be used in international trade. To enhance the proposed mode's overall trade performance and identify and validate the prospects related to process flow, the authors conducted a feasibility study and a comparative analysis. Agibalova et al. (2019) conducted a comparative analysis of the LC in international transactions. They gained valuable experience by implementing the LC on a blockchain technology platform in the context of Russian trade. Authors also made use of smart contracts. The authors concluded that legislators in Russia and other countries were still in the early stages of developing public relations, based on their analysis of legislative practices in other nations.

Jain and Sedamkar (2020) recognized safety and trust issues in the global change system. As a provider of alternative financing solutions, they proposed a blockchain technology-based solution for LC. In addition, they recommended utilizing blockchain technology and smart contracts to enhance assurance protection and build trust in the alternative ecosystem. Belu (2019) conducted a literature review to demonstrate the potential benefits of blockchain technology in global trade. Kowalski and colleagues (2021) conducted in-depth interviews with professionals in the field to examine how blockchain technology influences the trust relationships among buying and selling partners in international trade. Other studies have also examined the impact of blockchain technology on various aspects of global business processes, such as

Supply Chain Management (SCM), banking, logistics, documentation, and finance (Babich & Hilary, 2018; Guo & Liang, 2016; Sangeetha et al., 2020; Sun et al., 2019).

### **1.3. Research Questions**

Based on the problem statement that has been identified, the present study seeks to answer the following questions;

1. How do smart contracts and blockchain technology affect international trade through LC ?
2. How does building an international banking trade system that deals with LC using smart contracts and blockchain technology affect the banking industry and banking jobs ?
3. What are the benefits and shortcomings of using blockchain and smart contracts in LC ?

### **1.4. Research Objectives**

This study aims to meet the following objectives:

1. To determine the effect of the smart contract and blockchain technology on international trade through LC.
2. To identify the effect of building an international banking trade system that deals with LC using smart contracts and blockchain technology on the banking industry and banking jobs.
3. To identify the benefits and shortcomings of using blockchain and smart contracts in LC.

### **1.5. Research Significance**

This study proposes a new mechanism model of smart contracts to address the shortcomings of business transactions in international trade. Furthermore, this study explored and explained the distinguishing features of smart contracts. These functionalities will enable LC and the benefits their application will bring to the parties of the process and make the banking system part of the new mechanism model.



## **1.6. Research Scope**

The scope of the study is that digital and conventional banks have been selected primarily since these banks play a significant role in the development of the finance industry in the nations in general (Ozili, 2018). The present study focuses on some of the characteristics of blockchain technology that are important elements that affect the international trade banking system and international trade worldwide. These characteristics should be considered to improve financial transactions and make them compatible with financial institutions' regulations.

## **1.7. Outline of the Study**

The purpose of this study is to propose a new mechanism model of smart contracts to address the shortcomings of business transactions in international trade. To meet this objective, this research is organized into five chapters. Chapter One sets the foundation of the research by justifying why the present study needs to be conducted. In particular, it identifies research questions that were developed and research objectives were formulated. This chapter also discusses the significance of the present study to theory and practice. In this chapter, a brief overview of the LC, blockchain roles and capabilities, and smart contracts were presented to set the context of the study. A more detailed contextualization of the research setting was offered in Chapter Two. Here, the discussion is made by banking international trade, literature review, and hypotheses. Next, Chapter Three discusses the methodology used in the study. Chapter Four discusses the empirical findings of the study, and Chapter Five summarizes the thesis contributions, recommendations, implications, discussion, and conclusion.

## **2. LITERATURE REVIEW**

In this chapter, the concept of the Letter of Credit (LC), its features and types, the documents required to apply for LC, the LC process, and the relationship between the LC and international trade were explained. Consequently, blockchain technology, the concepts of smart contracts, and the relationship with international trade were explained. Moreover, this chapter presented previous studies. It covered LC, international trade, blockchain technology, and smart contracts.

### **2.1. Letter of Credit Concepts**

LC is a credit facility that is extensively used by organizations involved in international trade. It serves as a payment guarantee provided by banks to exporters (Paul, 2015). LC is a financial instrument in which banks provide financial assurance to companies involved in import and export businesses in case of payment delays or defaults (Chang, Chen & Wu, 2019). Companies operating overseas often deal with unfamiliar suppliers and providers; hence, they need proof of confirmation payment before proceeding with the transaction. Deal. Thus, an LC acts as a financial instrument that provides payment assurance to suppliers or exporters involved in the trade and purchase of goods and services (Koirala, 2010). An LC is issued by the bank to the buyer in order to ensure that the buyer makes a timely payment to the seller. It acts as a guarantee on behalf of the buyer that they will pay the full amount to the seller within the defined timeline or on time. If the buyer is unable to repay the amount to the seller on time, the bank will pay on the buyer's behalf to the seller (Koirala, 2010). LC has many features, such as:

- LCs are issued against collateral/security, which may include the buyer's fixed deposits and bank deposits (Sarker, 2006).
- Certain fees are charged by the bank depending on the type of LC (Rajashekaragouda & Dakshayini, 2020).
- Guidelines are issued by the International Chamber of Commerce (ICC) for any form of LC (Ahmed, Kurniullah, Ramirez-Asis, Al-Awawdeh, Al-Shamayleh, bin Abdulaziz & Julca-Guerrero, 2021).

- Correctness of LC: Only documents are exchanged, and no goods or services are involved in this process. Therefore, all the details mentioned in the letter should be correct, including the name of the seller, date, amount, product name, and quantity (Grath, 2011).
- Banks will deny the payment if they find even the slightest mistake in the buyer’s name, product name, or shipping date (El-Gamal, 2000).
- Since all parties involved deal with documents rather than goods and services, the payment will not be contingent upon any defects in goods and services, if there are any.

### 2.1.1. Types of Letters of Credit

Table 1 below contains the LC types and their descriptions.

**Table 1: LC Types and Description**

L/C Type	Description
Commercial LC	These types of LCs come with a direct payment method where the issuing bank releases the payment to the beneficiary or exporters (Alavi, 2016).
Export/Import LC	Whether it is an import or export bank credit letter depends on who uses it. Simply put, if the exporter uses a bank credit letter, it will be known as an export documentary credit and vice-versa (Hugo, 2017).
Transferable Bank Credit Letter	As the name suggests, this is a type of LC where the beneficiary can transfer his/her right to third parties. It means these payment guarantee letters are transferable to the next beneficiary in the chain and involve a middleman. The original beneficiary requests the bank to transfer either the entire payment or part thereof to the second beneficiary. Here, the first beneficiary acts as a middleman (Islam, 2019).
Non-transferable Bank Credit Letter	Contrary to the transferable LC, these bank credit letters cannot be transferred to another beneficiary, and the payments can be prevented from being received by any second beneficiary (Stoufflet, 1982).

Revocable Payment Guarantee Letters	A revocable LC can be amended or canceled by the issuing bank without giving any prior notice to the beneficiaries. This is why these payment guarantee letters are not used frequently (Hasyim, 2016).
Irrevocable Payment Guarantee Letters	On the other hand, an irrevocable LC is one where the terms and conditions cannot be changed or amended by the bank without the prior consent of the sellers. These are more secure than revocable LCs (Puneri, 2021).
Standby LC	Standby LC is similar to the bank guarantee, where the exporters are entitled to get the payment from the bank if the buyer fails to perform the contract's terms and conditions. In short, it ensures the exporter that the buyer will perform their part of the contract (Meral, 2020).
Confirmed LC -	A documentary credit can be a confirmed LC when it involves a bank other than the issuing bank to guarantee the documentary credit. This second bank is the confirming bank (seller's bank). The confirming bank ensures on-time payment to the seller in case the buyer or issuing bank defaults. In simple words, where a confirming bank adds its own confirmation to the credit, it is known as a confirmed LC. Here, the beneficiary's bank submits the documents to the confirming bank (Agibalova, Ilovaysky, Kayl & Usanova, 2019).
Unconfirmed LC	On the contrary, an Unconfirmed LC is only assured by the issuing bank and does not involve any second bank's confirmation. To put it simply, only the issuing bank is liable to make the payment to the seller in case the buyer defaults (Butakova, 2020).
Revolving Bank Credit Letter	This type of LC can be used to make plenty of drawings within a particular limit during a particular period. Global traders use it in shipments involving diverse goods to be traded within a specific period (Humaira, 2020).
Back-to-Back LC	A Back-to-Back LC is issued when the exporter requests his bank to issue an LC in favor of the supplier to secure raw material. It means there is a second LC issued with another LC as security. It can be understood by taking the example of a middleman buying goods from one party and selling them to another. The bank issues a Back-to-Back LC backed by the export LC (Debnath, 2021).
Red Clause Bank Credit Letter	A Red Clause bank credit letter is where the buyer's issuing bank provides a partial payment to the seller before the

	shipment of goods or the availability of services. This secures a certain supplier to accelerate the shipping process. It means there is a partial payment before the goods are shipped to the buyer (Biswas, 2021).
Traveler's LC	These are issued to travelers going abroad with a guarantee that the drafts made at foreign banks will be honored by the issuing bank (Kim, 2021).
Credit on Sight/Sight Credit	In this type of LC, the entrepreneur or businessman can get the payment by presenting the correct documents (like bills of exchange) to the lender with a sight letter. These LCs allow you to take the funds instantly by presenting a sight credit (Clarke, 2018).
Time Credit/Acceptance Credit	Bills of exchanges that are drawn and paid after a certain period between the lender and the borrower are known as time credit. In these LCs, these bills are accepted upon presentation and honored on their respective due dates (Schmidt,2019).

These are some of the main types of LC. To obtain an LC, the consumer needs to provide a certain document to the issuing bank, depending on the type. Before applying for a bank credit letter, both importers and exporters should be aware of all the types of bank credit letters to pick one as per their business requirements.

### **2.1.2. Documents Required to Apply for a Letter of Credit**

According to the UCP 600 (Uniform Customs & Practice for Documentary Credits), which is the official publication issued by ICC. It is a set of 39 articles on the issuance and use of LC, which applies to 175 countries worldwide. Every LC should obtain these documents:

- Duly filled application form with passport-sized photographs
- Know your customer (KYC) of the applicant, co-applicants, partners, and directors (Passport, Vote ID card, Aadhar Card, and Driving License, amongst others).
- Bill of Exchange
- Commercial Invoice
- Certificate of Origin

- Health and insurance certificates – Original
- Buyer’s Financial Documents
- Packing, Shipping, and Transportation Documents
- Landing airway bills and cargo receipts
- Related commercial documents: Certificate of Inception
- Official documents required by the buyer’s/seller’s country
- Any other documents required by the lender

### **2.1.3. Process of Letter of Credit (according to the UCP 600)**

Step 1: The applicant or buyer approaches the desired bank to request the issuance of an LC. This bank is known as an opening or issuing bank.

Step 2: An advising bank (usually an international bank) will be involved to assist the beneficiary or seller in receiving the LC issued by the buyer’s issuing bank. The advising bank will verify the authenticity of the LC by examining the name, product details, and other relevant information.

Step 3: Advising banks will share the LC with the seller, providing reassurance that the money will be received, as banks are now involved in this process.

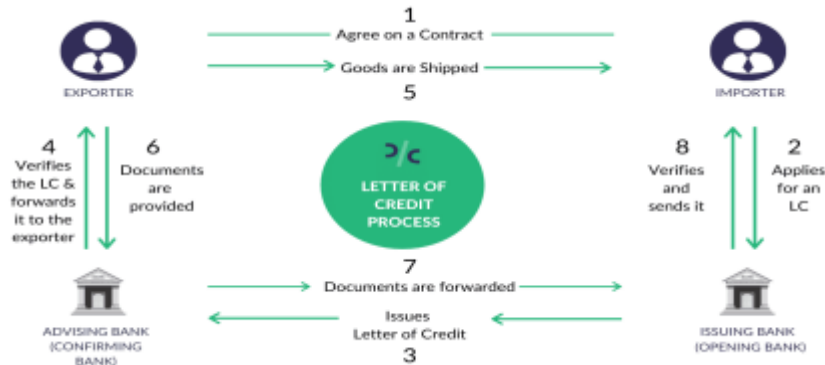
Step 4: After seller assurance, the goods will be shipped according to the details provided by the buyer or applicant. The seller will now receive the Bill of Lading (B/L) since the goods have already been exported.

Step 5: The buyer shall now present the B/L to the nominated or negotiating bank (international bank), where the bank will verify all the shipping documents and ensure that all goods were shipped according to the instructions. Finally, the nominating bank will make the payment to the seller or exporter.

Step 6: The nominating bank will share the shipping documents with the issuing bank and request payment.

Step 7: The issuing bank will then share the documents with the buyer, seeking approval on their accuracy and verifying whether all the products have been shipped based on the buyer’s information.

Step 8: The buyer now makes the payment to the issuing bank, which then sends the payment to the nominated or negotiating bank.



**Figure 1: L/C Processes**

**Sources:** (Parekh, 2022)

## 2.2. LC and International Trade

Exchange finance has had a critical impact on international trade. As per varying levels of risk, merchants may choose different payment terms to address different key concerns (Malaket, 2020). For the most part, LC (otherwise known as documentary credit) represents a documentary proof of trust and is the preferred payment method by exporters due to its lower risk level (Ahmed et al., 2021). Sellers (exporters), buyers (importers), shippers (logistics carriers), and banks that manage credit operations typically make up the majority of trade participants (Chang et al., 2019). Three primary flows comprise trade: cash, logistics, and document flow. In most cases, a sales contract between a seller and a buyer initiates international trade (Alfaro, Calani & Varela, 2021). Various payment methods, including payment by delivery, telegraphic transfer, open account, and LC, are introduced and adopted in different contexts to mitigate potential trading uncertainties and reduce risks between trading parties. The LC method is considered one of the most secure payment options in terms of trade financing (Kowalski et al., 2021). Banks in the seller and buyer countries facilitate most transactions, which involve the exchange of cash and tangible goods (Hadad & Bratianu, 2019). The buyer asks their bank to provide a line of credit to the seller's bank, and the seller is instructed to verify the received line of credit

before proceeding with the exchange of goods. The seller is responsible for delivering the goods to the buyer, while the shipper provides the necessary shipping documents, such as a B/L, to the seller. The B/L serves as a physical warranty to claim ownership of the goods and is sent to the seller's bank, then to the buyer's bank, and finally, the payment is made to the seller's bank (Chang et al., 2019). At last, the purchaser pays his bank as compensation for the LC, which he presents to the transporter to ensure the goods upon delivery. As a form of documentary credit, the conventional LC is relatively secure compared to other payment methods, but its processing is complex and time-consuming. Communication and coordination issues may arise when multiple participants engage in cross-border business with unfamiliar counterparts, resulting in high costs and negative user experiences.

### **2.3. Blockchain Technology Concepts**

The term “blockchain” refers to a decentralized, immutable digital ledger secured by advanced cryptography, distributed among peer nodes in a network, and using a consensus mechanism to determine the transaction protocol. Control, on the other hand, is decentralized. The paper highlights the key concepts of blockchain, including the permanent, distributed, digital ledger, cryptography, shared network, agreement component, and decentralization, to emphasize its importance (Puthal, Malik, Mohanty, Kougianos & Das, 2018).

A ledger is where all an entity's transactions are recorded and stored in accounting. A computer file, a database, or even a distributed database like the blockchain, where transactions are recorded electronically, are all examples of digital ledgers (Faccia & Petratos, 2021). Since the blockchain transaction ledger differs from others, it cannot be computationally changed as long as the network's honest nodes control most of the central processing unit (CPU) power. This feature makes it immutable (Niranjanamurthy, Nithya & Jagannatha, 2019). The ledger was invented in Mesopotamia over 5,000 years ago. Single-entry accounting, which records transactions in a list to track the addition or removal of assets, is the earliest and simplest method of recording transactions. Since single-entry accountings are prone to errors and difficult to trace when recorded fraudulently, single-entry accountings should be managed by owners or family members (Garbutt, 1984). Double-entry



accounting added a clear strategy for identifying and eliminating errors by recording two entries for each transaction, ensuring that the ledger is always balanced. In 2005, Grigg proposed triple-entry accounting, an alternative to traditional double-entry accounting that utilizes cryptography to secure transactions and make them resistant to alteration. Using public-key cryptography, the blockchain implementation ensures that the sender has the authority to conduct non-reversible transactions, following the concept of triple-entry accounting (Perera, Nanayakkara, Rodrigo, Senaratne & Weinand, 2020). Techniques for secure communication to safeguard confidential information in the presence of adversaries are known as cryptography (Kaur, Singh, & Gill, 2021). Cryptographic hash functions and concepts from public key cryptosystems are utilized in blockchain to authenticate the user's authorization for conducting transactions and achieving consensus among network nodes on blockchain data. Diffie and Hellman proposed the use of public key cryptosystems to provide digital signatures. Digital signatures, regardless of whether they are based on public key cryptosystems, conventional encryption functions, probabilistic computations, or other methods, share several important properties. These include a convenient method for the recipient to verify the sender of the message and a simpler way for the sender to generate their own digital signature. However, it must be impossible for others to generate another person's digital signature (Diffie & Hellman, 1988).

There are two keys in public key cryptography: the public key and the private key. Additionally, a function or cipher algorithm utilizes the private encryption key to convert the original text into a ciphertext. The sender or owner creates the public-private key pair, and the private key serves as the confidential key for encrypting information. Anyone can use the public key to verify that the original owner has digitally signed the information (Bhardwaj, Subrahmanyam, Avasthi & Sastry, 2016). When coins or tokens are transferred, the blockchain uses a public key cryptography technique to verify ownership. The cryptographic hash function is a one-way algorithm that converts a series of characters of varying lengths into a fixed-size bit string, known as a hash. This function is an essential component of blockchain technology, as it ensures the integrity of its data. The three most important properties of an algorithm required for blockchain hash capabilities are that it should consistently generate the same resulting hash from the same input. This is so that no algorithm should be able to generate the original input given the hash and that even minor changes to the input will

result in a completely different hash. For hashing its block information, Bitcoin utilizes the SHA-256 algorithm, Ethereum utilizes Ethash, and Litecoin utilizes Scrypt (Kiktenko, Pozhar, Anufriev, Trushechkin, Yunusov, Kurochkin & Fedorov, 2018). The most common consensus algorithms, proof-of-work and proof-of-stake, are used in every blockchain to ensure data accuracy. Nodes in a P2P network store the replicated data of the blockchain. Messages are broadcasted with the best effort, and the longest proof-of-work chain is accepted as evidence of what occurred when nodes were offline (Yao, Ye, Murimi & Wang, 2021).

Hubs in the organization gather new transaction exchanges and structure a tree-like information design of hashed exchanges into a block. They then compete with each other to solve a challenging hash-based proof-of-work. The answer to the proof-of-work is broadcasted by the first node, which then adds the block to their existing blockchain for others to verify. The block is only accepted by nodes if all transactions are valid and have not been spent already. Acceptance is expressed by working on the next block with the accepted block's hash as the previous hash. As a reward for contributing their computing resources to solving the challenging proof-of-work, the block miner receives newly minted coins (Yao, Ye, Murimi, & Wang, 2021). The algorithm in proof-of-stake selects individuals, known as validators, to generate blocks based on specified criteria. The rules characterize how validators are selected to cast a ballot and produce blocks in view of their financial stake in the organization, subsequently remunerating clients who are rationing the long-haul worth of the blockchain. The more coins a person carries in their wallet, the more likely they will be selected as validators. However, the proof-of-stake systems also employ randomization or coin age-based methods to ensure that stakeholders will not always receive priority. The value of a coin is calculated by dividing the number of days it has been in the wallet by its value. Simply put, the value of a coin divided by its holding period is its age (King & Nadal, 2012).

### **2.3.1. Blockchain Types**

Blockchains can be categorized into two main types, namely permission-less blockchains and permission blockchains (Bhushan, Sinha, Sagayam & Andrew, 2021). Permissionless blockchains allow nodes to operate without imposing any restrictions.

In accordance with the particular blockchain's consensus protocol, anyone can openly read, inspect, and participate in data validation and writing. Many cryptocurrencies, such as Bitcoin and Ethereum, operate on permission-less blockchains. These blockchains are considered completely decentralized and are protected by cutting-edge cryptography. Users who work to preserve the network's integrity receive financial rewards. Transactions on permission-less blockchains are designed to be completely irreversible, meaning they cannot be undone once their nodes confirm. A permission-less blockchain's transaction throughput is significantly lower than that of a permission blockchain due to strict restrictions and security considerations. Blockchains without permission are completely transparent and decentralized (Bhushan et al., 2021). In permission blockchains, a consensus mechanism is used to verify the writing of data among its privileged participants. Permission blockchains restrict writing access to a select group of participants. Depending on the permissions required by the permission blockchain, read access could be granted to anyone or restricted to the general public. As an alternative to the initial permission-less blockchains, this type of blockchain has developed to address the need to run blockchain technology among a set of known and identifiable participants who must be explicitly responsible for the blockchain network. Thus, participants need not completely trust each other (Vukolić, 2017). Business and social applications are the primary uses for permission blockchains, which necessitate blockchain distributed ledger technology. However, it does not require an incentive cryptocurrency. Permissioned blockchains are further subdivided into open and closed types based on read access: open permission blockchains are partially decentralized, and anyone can read their data. Meanwhile, closed permission blockchains are fully centralized, and data is only visible to participants (Bhushan et al., 2021).

### **2.3.2. Smart Contracts**

In the form of smart contracts, self-executing contractual clauses can be embedded in hardware and software, making contract breaches costly for the breacher (Szabo, 1997). Despite the fact that the idea has been examined since the late 1990s, the introduction of blockchain platforms has enabled the execution of smart contracts without the involvement of third parties. Through decentralized currencies, parties that

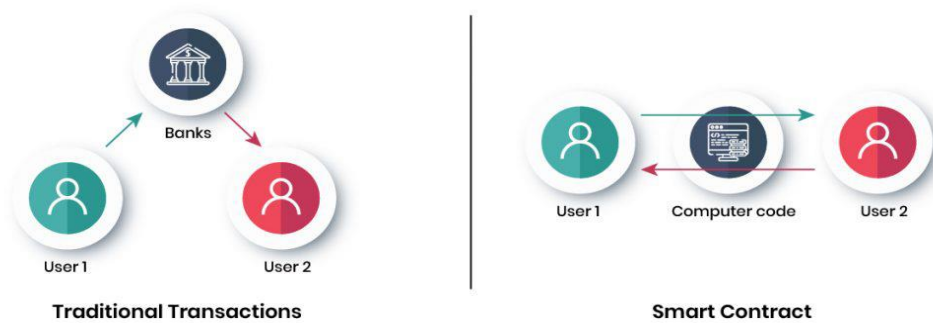
distrust each other can execute transactions using smart contract systems. Smart contracts are settled through the blockchain, ensuring legitimate parties receive appropriate compensation (Kosba, Miller, Shi, Wen & Papamanthou, 2016). When the participants' terms have been met, the blockchain provides a decentralized, tamper-proof, open platform for running self-executing smart contracts (Kirli, Couraud, Robu, Salgado-Bravo, Norbu, Andoni & Kiprakis, 2022). At the point when conditions are met, a smart contract is written as a small program and executed on the blockchain without the involvement of a third party. After the contractual terms are negotiated and revised, participants typically transfer units of money into a smart contract (Zheng, Xie, Dai, Chen, Chen, Weng & Imran, 2020). At a specific moment, in accordance with the terms, the smart contract is automatically validated and executed on the blockchain. The funds in the agreement will then be returned to the initial users if the conditions are not met or delivered to the relevant party or parties if the conditions are met (Zheng et al., 2020). Blockchain not only provides a platform for running smart contracts but also provides a way for anonymous participants to perform dependable, irreversible transactions without involving a centralized third party (Xu, Weber, Staples, Zhu, Bosch, Bass & Rimba, 2017). Blockchain-based smart contracts are remarkable for their unchanging nature, self-execution, cost-effectiveness, accuracy, auditability, and trustlessness. Although the Bitcoin blockchain has minimal programmable support for smart contracts, both Ethereum and Bitcoin offer the ability to execute smart contracts (Xu et al., 2017). According to Xu et al. (2017), the Bitcoin blockchain's scripting lacks Turing completeness, state awareness, value awareness, and blockchain awareness, making writing smart contracts extremely challenging. The first blockchain platform, Ethereum, was built with decentralized applications and smart contracts in mind. Users can create any framework, including colored coins, smart property, name-coin, and many others, by simply writing the logic in a few lines of code. The Ethereum platform provides a fully-fledged Turing-complete programming language capable of creating "contracts" that can be used to encode complex state transition capabilities. The Ethereum platform offers much-needed programmable support for smart contracts, though the number of transactions that can be processed per second is currently limited (Buterin, 2014). Zilliqa is a blockchain platform that proposes a specific-purpose smart contract language and execution environment that utilizes the underlying architecture to provide a large-scale and

highly efficient computation. It is also designed to scale transaction rates (Meneghetti, Parise, Sala & Taufer, 2019). Electro-Optical System (EOS) is yet another effective platform for smart contracts. It offers a decentralized version of an operating system that can manage millions of transactions per second (One, 2018). Some of the blockchain platforms optimized for writing and executing smart contracts on the blockchain include Zilliqa, EOS, and Ethereum. Decentralized applications that can run on the Internet without being controlled by a centralized entity can be built by developers using a combination of written smart contracts (Meneghetti et al., 2019; One, 2018).

#### **2.4. Smart Contract and International Trade**

In recent years, smart contracts that can be used for various automated electronic transactions have emerged in international trade digital contracting (Chang et al., 2019). There are now a number of internet platforms, like Ethereum, that let you create smart contracts and use them for more than just these kinds of transactions (Hu, Liu, Chen, Zhang, Huang, Niu & Liu, 2021). The significance of regulating these new digital contracts is heightened by the fact that this expansion is bound to influence the manner in which trade is currently performed. In addition, the upkeep and enforcement costs of smart contracts are significantly lower (Chang et al., 2019). This is made possible by smart contracts' online monitoring of the parties' agreement execution, allowing for simultaneous control over execution and compliance with the agreement's requirements in a split second (Hewa, Ylianttila & Liyanage, 2021). As a result, the implementation of smart contracts in international trade results in significant cost savings throughout the agreement: the completion of the understanding, the parties' compliance with the conditions, and its enforcement (Özkan, Azizi & Haass, 2021). There is no need to rely on contractual agents or other middlemen, which ensures transparency and accountability and cuts down on paperwork (Bhat, Nor, Amiruzzaman & Islam, 2021).

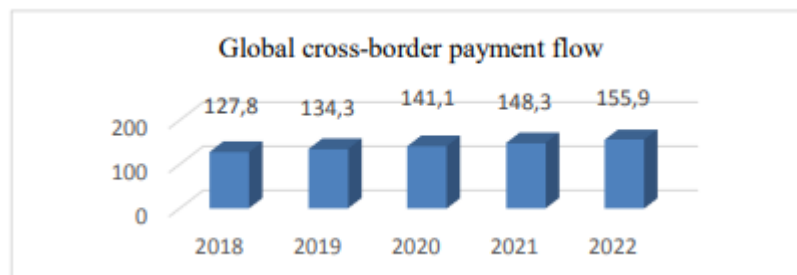
## How Smart Contracts Work?



**Figure 2:** Smart contracts

**Source:** [www.mantralabsglobal.com](http://www.mantralabsglobal.com)

The graph below (Figure 3) indicates that international trade transaction flow jumped from \$127.8 trillion to \$155.9 trillion. This significant growth results from the simplification of payment processes after digitization (the adoption of blockchain technology) and the transition from the traditional method to the digital method in various cross-border transaction steps. Figure 3 indicates the development of global cross-border payment flow.



**Figure 3:** The development of international trade payment flow

**Source:** (India Business & Trade, 2022).

## **2.5. Previous studies**

### **2.5.1. International Trade and Blockchain Technology**

Al-Amaren, Ismail, and Nor (2020) concentrated on the fuse of trend-setting innovation into the installment strategy in worldwide exchange, as would be considered normal to prompt a solitary, straightforward, and quickly executed start-to-finish exchange between the purchaser, dealer, and their separate financial accomplices. Their investigation discovered that blockchain will save exertion, cost, time, and the quantity of report streams between various organizations.

Bhat, Nor, Amiruzzaman, and Islam (2021) examined the various applications requiring reliable registration to utilize blockchain. One of these areas that would enormously profit from a decentralized conditional model is exchange finance. Accepire-BT, a product stage intended for the cooperative Exchange Money, is the subject of this starter assessment. The proposed arrangement is implemented by smart contracts written in Robustness, the Ethereum blockchain's hidden programming language. Using MetaMask and Remix, they assessed the Rinkeby test organization's presentation. The primer preliminary exhibits that smart contracts complete cycles in under one moment. Moreover, they discuss the expenses of utilizing the public Ethereum Rinkeby organization.

Ganne (2018) discussed in his research that the development of new technologies has always had an impact on trade. Blockchain, a brand-new technology, has recently been hailed as the next big game-changer by many. Can international trade be transformed by blockchain technology? By providing a fundamental explanation of the technology, this publication aims to deconstruct the Blockchain phenomenon. Examining how this technology is currently used or can be used in the various areas covered by World Trade Organization (WTO) rules examines its relevance to international trade. Doing so sheds light on how this technology might affect intellectual property rights and cross-border trade in goods and services. It discusses the opportunities Blockchain presents for small-scale producers and businesses and its potential to lower trade costs and increase Supply Chain (SC) transparency. In conclusion, it examines a number of obstacles that must be overcome before technology can be implemented broadly and significantly impact international trade.

Belu (2019), in his paper, means to feature the likely advantages of using blockchain innovation in international trade. One of the most troublesome advancements existing apart from everything else, blockchain, will fundamentally modify the system for explicit unfamiliar exchange activities. The blockchain innovation, its hidden standards, and the fields where it can be utilized are undeniably examined in this paper. The study distinguished blockchain-based applications in the operations and monetary extent of international trade and featured the possible advantages of this innovation, referring to scholastic writing and different web-based sources.

Chang et al. (2019) proposed in this paper to research the materialism of blockchain innovation to LC installment processes in worldwide exchange. Plan, procedure, and approach: To receive the rewards of dispersed records and circulated business work process amortization, a blockchain-based re-designing interaction is developed using the blockchain and its savvy contract innovation. The proposed blockchain-based global exchange process model's possibilities for facilitating process stream and further developing, generally speaking, exchange execution were affirmed through similar investigation and a practicality study. Practical implications: Conventional exchange processes dislike mediators, data idleness, and trust, which make the cycle less proficient by and large. By reforming business processes across big business borders in various enterprises, the arising blockchain innovation might possibly alleviate these issues. Inventiveness and worth: This study provides a useful case in business process re-designing and adds to the calculated plan of a blockchain and savvy contract-based process. To work on the proficiency of business process tasks, it is suggested that extra endeavors be made in different areas committed to blockchain exploration and application.

Jain and Sedamkar (2020) discussed the nature of blockchain technology in their research. Blockchain's prominent features, including smart contracts and distributed ledger technology, make it a promising option for decentralized and distributed cross-border trade. The paper aims to identify problems with the global trade system in terms of trust and security and propose a blockchain-based solution that considers LC as a means of trade financing. In order to guarantee the safety and trustworthiness of the trade ecosystem, we propose a blockchain-enabled smart contract strategy.



Agibalova et al. (2019) examined one kind of non-cash exchange as an LC installment intended to address the worries of both the payer and the beneficiary of assets. These commitments take into account fast installments and confirmations regarding the exchange of products, administrations, or development. The potential gains of this kind of trade can similarly be used in the execution of blockchain development and splendid arrangements. Regardless, it requires acceptable, genuine rules. The reason for this distribution is to consider the opportunities for the standardization and improvement of Russian lawful standards in regard to the guidelines of the letter of acknowledgment exchange structure as well as the use of data and Web advances. The subject piece and content of the “exemplary” LC in worldwide exchanges, the underlying Russian involvement in the execution of an LC on the blockchain stage, and the utilization of brilliant agreements were the subject of a similar examination in the review. The end is that global-local area and Russian lawmakers are simply starting to grasp this sort of advertising, which depends on this procedure. This additionally considers the laws of different countries. In such a manner, it is vital to foster peaceful accords that depend on worldwide principles of public regulation and are settled upon by states in this space.

Dutta et al. (2020) talked about the decentralized construction, dispersed notes and capacity component, agreement calculation, smart contracting, and awry encryption of blockchain to guarantee network security, straightforwardness, and perceivability. Blockchain is an innovation with a particular mix of these highlights. SC capabilities, including SC provenance, business process reengineering, and security improvement, can possibly be changed by blockchain. Lately, an increasing number of studies have analyzed the utilization of blockchain in SCs. In this paper, they take a gander at all of the important explorations on the utilization of blockchain coordination in SC tasks and consider 178 unique articles. Alongside significant patterns and difficulties, they feature the related amazing open doors, likely cultural impacts, and state-of-the-art advances. They take a gander at various ventures, including delivering, producing, auto, flight, finance, innovation, energy, medical care, horticulture and food, online business, schooling, and others, that can be effectively changed by utilizing blockchain-based advances to develop perceivability further and oversee business processes. The strong starting point for additional examinations on this critical arising research region is set down as a future exploration plan.

Güler, Salihoglu, Ozturk, and Pala (2023) stated that the motivation behind their review is to examine the benefits that blockchain innovation can provide to customs freedom systems and the capability of blockchain innovation to digitize records utilized in exchange processes. Note that there are two sections to the work. Through three particular digitalization situations utilizing blockchain innovation, the creators analyzed the record stream between parties in customs leeway processes in the primary stage. They have presumed that it is favorable to rapidly adjust to advancements in the field of record executives in global exchange customs leeway processes that depend on blockchain innovation. They utilized the Neuro Analytical Hierarchy Process (NAHP) technique to examine the levelheaded dynamic cycle's needs in the subsequent stage. The essential moves defying the advancement to new development are to prepare staff for new systems, make and work on new inside cycles, the time appreciated concurring with trading accessories, the change time span, and the game plan of mechanical enhancements with guidelines.

### **2.5.2. LC and Smart Contract**

Toorajipour, Oghazi, Sohrabpour, Patel, and Mostaghel (2022) proposed another device to address the weaknesses of outsider ward exchanges with regard to global exchange in light of Business Process Model and Notation (BPMN) 2.0 norms and rules. The discoveries give LC that consolidate the advantages of blockchain and smart contracts.

Rajashekaragouda and Dakshayini (2020) examined on an overall scale that Supply Chain Management (SCM) is an association of comforts that goes through different cycles. This includes the acquisition of raw parts, storage and improvement of these materials, and exchange of them into things overtotally for the transport of possible results to clients. Albeit all of this appears to be direct in principle, really overseeing such a framework is troublesome. Different advances are being used to determine and conquer these shortcomings and set aside the association cash. Blockchain is one of these, and it is investigating better approaches to change the game all in all. A progressive production network framework in light of blockchain is proposed in this work to address the weaknesses of the current framework. Utilizing a disseminated, unchanging, profoundly solid record idea that records the historical

backdrop of items from their start to their purchaser without requiring an outsider to confide in a party, the proposed blockchain framework accomplishes straightforward record keeping and provenance following at a lower cost. The adequacy of the proposed framework is demonstrated by this work, which is completed with the assistance of hyper-ledger texture.

Singh and Singh (2016) proposed that the decentralized ledger, known as a blockchain, is utilized to trade computerized cash and make arrangements and exchanges safely. To check another exchange, each organization part approaches the latest scrambled ledger duplicate. A blockchain ledger is an assortment of all past Bitcoin exchanges. It fundamentally comprises a circulated data set with a carefully designed information structure block that continues to develop and holds bunches of individual exchanges. The finished blocks are added sequentially and directly. A timestamp and data connected to a past block are remembered for each block. Since Bitcoin is a permission-less distributed network, any client can interface with the organization and send new exchanges to confirm existing blocks and make new ones. In a 2008 examination paper presented on the cryptography reserivist, Satoshi Nakamoto depicted the plan of Bitcoin, the computerized cash. The cryptographers' well-established issue has been settled by Nakamoto's idea, laying the foundation for advanced money. The thoughts, attributes, and necessities of blockchain, as well as how Bitcoin works, are talked about in this paper. It plans to accentuate the job that Blockchain will play in forming the fate of banking, monetary foundations, and Internet of Things (IoT) reception.

Benson (2018) examined the Catch 22 that "modern technology" should be safer yet is hard for individuals to trust and cannot actually be kept away from. Individuals accept that the blockchain is a panacea for the splendid eventual fate of LC. The traditional strategy for LC is a paper-based framework that requires parties in various nations to share and approve reports. This makes the LC instrument slow, wasteful, and exorbitant. This present circumstance will prompt a solitary framework, straightforward, start-to-finish exchange executed rapidly between purchaser, dealer, and their particular financial accomplices. This investigation discovered that blockchain would save exertion, cost, time, and the number of archive streams between different elements. Moreover, it includes trend-setting innovation in

installment technique in worldwide exchange while fantasizing that LC does not need such complex worldwide paper-pursue.

Ahmadisheykhsarmast et al. (2020) examined the idea by introducing a decentralized application for maintenance installment on the blockchain stage in their book section, discussing the benefits of smart contracts for contracting the board. The proposed smart contracts application computerized the installment of maintenance promptly following the client's endorsement of incomplete fruition of the works, consequently completing the maintenance provisions of a common undertaking contract. Furthermore, the application makes it conceivable to store maintenance installment and task-finishing information on the blockchain. To test the proposed framework and demonstrate its possible advantages, a genuine development project contextual investigation was examined. The application's security evaluation is incorporated, just like the application's plan decisions. By exhibiting a protected, reliable, unchanging, straightforward, effective, and dependable stage for mechanized execution of agreement statements, the spearheading utilization of smart contracts to contract the board suggested that shrewd agreements present a critical potential for improving the agreement of the executive's cycle.

Queiroz and Wamba (2019) examined the new relationship models being used throughout the whole inventory network due to the peculiarity of digitalization. As per this viewpoint, blockchain is a state-of-the-art innovation that is, as of now, reshaping the connections between all framework members in the coordinated operations and production network. Notwithstanding, regardless of how examination on the blockchain has advanced at a general rate as of late, the collection of writing regarding the matter needs adequate contextual investigations of individual blockchain reception conduct. Consequently, this study makes up for this shortfall, especially by aiding the perception of individual blockchain reception conduct in the coordinated operations and store network fields in India and the US. They have created a model that depends on a marginally changed variant of the conventional Unified Theory of Acceptance and Use of Technology (UTAUT). This model draws on the arising writing on the blockchain, inventory network, and organization hypothesis, as well as Technology Acceptance Models (TAMs). The model being made was then evaluated using the incomplete least squares primary condition display Partial Least Squares Structural Equation Modeling (PLS-SEM). The model was ultimately upheld, and the outcomes

suggested that experts in India and the United States behave differently in reception. In equal, the discoveries have all the earmarks of being a valuable expansion to the writing on information technology reception, SCM, and blockchain, as well as an indication of progress.

Larson, D. A. (2018) discussed how the LC remains a crucial trade finance mechanism, particularly for international transactions involving parties lacking mutual trust. Due to the independence and strict compliance principles, the bank cannot examine the nature of the goods in the underlying sales contract. As a result, the obligation to pay is solely contingent on pieces of paper rather than the actual shipping status of the goods. Real-time data means that the LC is no longer just a stand-alone mechanism. Rather, it can effectuate the underlying sales contract without violating the independence or strict compliance principles. This means there is no reason why the buyer and seller cannot make informed decisions to ensure that the goods get from Point A to Point B. Therefore, in order to bring LC into line with SC procedures, the financial sector ought to adopt these technologies. The letter-of-credit process, from creation to payment, is made more efficient by blockchain, smart contracts, and the IoT, all of which are examined in this Comment.

Ruslan (2022) highlighted the provisions of global exchange, in which blockchain LC is a state-of-the-art innovation. It opens up a ton of chances to fix the issues with the ongoing LC viewpoints. The examination intends to decide if this moment is the best opportunity to execute blockchain-based LC and how blockchain innovation disturbs the LC work process. The technique for story audit was utilized in this review. Out of 226 articles recovered from ScienceDirect, IEEE Xplore, Springer Open, Emerald Understanding, Exploration Door, and Google Researcher, 26 were viewed as relevant to addressing the examination questions. Blockchain LC and brilliant agreements disturb the LC work process to make it more proficient, secure from misrepresentation and modifications, lower costs, and provide better perceivability, as per critical discoveries from the exploration. The cost to take on makes another finding: embracing the development fundamentally given has become sensible, and many banks and associations have embraced the blockchain LC. Hence, the reception cycle should be progressive.

Furkan Uysal1, Salar Ahmadiheykhsarmast, and Rifat Sonmez (2022) examined the development obtainment; the utilization of LC is normal, particularly in global exchanges. LC is a bank responsibility that decreases value-based gambles for purchasers and providers. In global exchanges, both the purchaser and the provider require the contribution of an outsider to guarantee that obtainment strategies run as expected. Outsider inclusion, then again, makes exchanging more convoluted, adds charges, and needs actual command to exceed expectations for merchandise like hardware or materials. Moreover, the credit furthest reaches of individual gatherings might adversely affect the whole cycle. A structure in view of shrewd agreements, where legally binding understanding is made in a decentralized blockchain with brilliant agreements, is proposed in this paper as an option in contrast to the normal utilization of LC. It is more solid, less expensive, and quicker. Actual command over the conveyed thing is conceivable with IoT gadgets, simplifying entire deal obtainment and being more affordable as well as solid than standard LC practices.

Zamanian and Vatani (2022) examined LC, where the purchaser opens an LC with a trustworthy monetary establishment like a bank, guaranteeing the merchant is one of the best answers for enormous and worldwide business players in the field of expanding security and diminishing exchange risk. That aggregate was guaranteed and provided. Notwithstanding the many benefits of electronic frameworks, this paper-based process actually requires a critical venture of time and cash. Subsequently, accreditation effectiveness improves with any work to reduce expenses or time. Utilizing the expressive examination technique to organize and assess the means in the two systems, the reason for this article is to make sense of the chance of moving LC methodology from past strategies to the blockchain stage and making smart contracts as model propositions. This study demonstrates that utilizing a profoundly solid framework with smart contracts (self-execution) to conduct an LC on a blockchain stage increments exchange security and the probability of holding provided reports, requiring the contribution of Human resources (HR). Moreover, the interaction from start to finish credit makes reports more limited, quicker, and more affordable. Since the use of LC on the blockchain stage is additionally founded on savvy resources, it does not need to adhere to Swift or Financial Action Task Force (FATF) guidelines, similar to how banks in various nations do not have a direct line.

### **3. METHODOLOGY**

This chapter provided explanations of research methodology, research design, data analysis, data collection, interview process, how the participants were selected and from where, research tools, and explained the interview steps and how participants answered interview questions.

#### **3.1. Research Design**

This research design aims to provide a comprehensive understanding of the impact of blockchain and smart contracts on the Letter of Credit (LC) process in global trade. Moreover, it aims to identify the effect of building an international banking trade system that deals with LC using smart contracts and blockchain technology on the banking industry and banking jobs. In addition, to identify the benefits and shortcomings of using blockchain and smart contracts in LC by employing a semi-structured interview (phone and email). The integration of qualitative data will enhance the validity and reliability of the study's findings. Ethical considerations and participant engagement are prioritized throughout the research process.

Research strategy: Utilize a qualitative research design that combines semi-structured interviews (phone and email) and data collection.

Participant selection: The study used purposive sampling as a sampling technique for selected participants from the trade finance and treasury departments of various banks, selected based on their experience and knowledge of global financial transactions and the LC process.

Research Instruments:

Semi-Structured Interviews: Conducted with three participants from trade finance and treasury departments.

Email Interviews: Used as an additional method to accommodate participants' preferences and overcome geographic limitations.

Interview Design:

Structure: Semi-structured interviews are used for validation and exploration.

Content: Interview questions developed based on the study's objectives, incorporating main and sub-questions.

Flexibility: Semi-structured interviews allowed for probing deeper into emerging themes.

Qualitative Data Analysis: Thematic analysis for an in-depth understanding of interview responses.

Ethical Considerations:

Informed Consent: Participants were provided with information letters, consent forms, and contact details.

Confidentiality: Assured participants to encourage open and honest responses.

Feedback: Participants are given an opportunity to review and provide feedback on their interview responses.

Timeline:

Data Collection: Conduct interviews and administer questionnaires over a specified period.

Data Analysis: Perform qualitative analysis concurrently.

Reporting: Develop and finalize research findings, conclusions, and recommendations.

### **3.2. Sampling in the Qualitative Study**

In this study, a purposive examining strategy is employed to choose respondents for a review that utilizes subjective examination (Teddlie & Tashakkori, 2009). This procedure is applied by choosing the individuals from exchange money and depository divisions. The size for the subjective review was a sum of three individuals, and these respondents were chosen in view of their experience and essential information on worldwide financial exchanges and the LC process and its application in the financial area.



### **3.3. Research Instruments**

This study gathered information from essential information (the interview protocol) to recognize the advantages and weaknesses of utilizing blockchain and smart contracts in LC. Moreover, it aims to identify how skilled blockchain and smart contracts are in disposing of the gamble, the issues in LC exchanges, and how the outsider behaves like a reviewer and onlooker to reestablish a problem with worldwide exchange. Corresponding to this study's meeting, the inquiry questions were figured out by the analyst and sent to specialists for approval. Furthermore, the variation of the things in the instrument was directed by the hypothetical system of the review, and the instrument requested for data was connected with the impact of the blockchain, smart contracts, and LC. A qualitative study is an insightful interaction pointed toward understanding a social peculiarity or human issue according to various viewpoints, which can likewise be alluded to as a diverse cycle. The quantitative and qualitative methodologies have shared characteristics, particularly in investigating certain peculiarities. The two methodologies manage information that generally intrudes on the progression of occasions in the social world and specifically center around issues like mentalities, articulations, activities, capabilities, or ways of behaving of individual respondents. In addition, "the two methodologies at the same time carry various characteristics to the exploration cycle" (Cupchik, 2001). The constructivist point of view recommended a few things that can upgrade the theoretical way to deal with subjective information assortment (Onwuegbuzie & Johnson, 2006). Since the cycle is at last interpretive, it is required exclusively for the cognizance of the examination, and that ought to be sufficient to legitimize the realness of the groundwork of the subjective setting in any exploration study (Creswell & Garrett, 2008). For this study, the subsequent instrument is top-to-bottom meeting meetings directed by three individuals from the trade finance and treasury departments. This cycle is a deliberate connection, where one individual gets information from the respondents in view of the writing surveys and the exhortation from specialists. Through interviews, scientists can get significant information they cannot get with a poll alone (Gay & Airasian, 2003). Qualitative interviews have been depicted as intentional discussions or dynamic cooperation between at least two individuals, leading to co-constructed, context-oriented results (Denzin & Lincoln, 2003). Merriam (2001) referenced that involving interviews as an information assortment technique is ideal while examining conduct,

sentiments, or how individuals decipher their general surroundings when they cannot be promptly noticed. The meeting strategy is likewise valuable when interest in previous occasions cannot be rehased. Moreover, meetings can be described as organized, semi-organized, or unstructured. Organized meets, as a rule, contain painstakingly phrased questions that are asked to members word for word in a foreordained request. In many cases, these meetings are utilized related to review instruments or when information is required from various scientists (Fisher, 2011). A semi-structured or directed interview is used to get data from all respondents. Merriam (2001) made sense that these gatherings are coordinated by an overview of requests or subjects to be researched, but neither the particular stating nor the solicitation are still hanging out there early. This plan allows the investigator to address what is happening, discover the respondent's emerging viewpoint, and gain momentous contemplation in regard to forthright. Additionally, this association considers further demands considering the way that the individuals' responses are quick (Lindlof & Taylor, 2002). Semi-structured interviewing is the most versatile of the gathering methodologies. Hitchcock and Hughes (1995) saw that this sort of interview allows the researcher to endlessly foster the respondent's reactions by changing courses of action to beat the standard inclination of respondents to anticipate questions. This game plan is versatile and allows the expert to test the limitations of the respondent's data (Cohen, Manion & Morrison, 2000). The point of involving the interview strategy in the ongoing review is to explore the factors of blockchain smart contracts in LC and distinguish the utilizing, how able blockchain and smart contracts are to exclude the gamble and the issues in LC exchanges, and how the outsider behaves like a controller and eyewitness, to reestablish a problem with worldwide exchange. The inquiry questions contained seven Semi-structured interviewing questions coordinated with three individuals from the trade finance and treasury departments. Significant inquiries were posed that were considered significant during the meeting. Table 2 below presents the interview questions.

**Table 2: Interview Questions**

1.	What are the problems and risks that face the bank management and bank clients in the traditional system of letters of credit?
2.	Can blockchain and smart contracts eliminate the risks and the problems in the letter of credit transactions, and how can the third party act as an inspector and observer to restore a hassle with global trade?
3.	How can the banks use smart contracts and blockchain technology in their letter of credit preparations and process?
4.	What is your opinion about the IBM-Maersks, TradeLens, and we.trade platforms that adopted smart contracts and blockchain technology in their international trade transactions through letters of credit?
5.	How can we build an international banking trade system that deals with letters of credit using smart contracts and blockchain technology?
6.	Is it possible that the implementation of smart contracts and blockchain technology in the letter of credit process could lead to some changes in the banking industry and the disappearance of existing bank jobs?

### **3.4. Data Collection Method**

This study's data comprises qualitative data, which shall be collected through the procedures discussed in the following subsections.

#### **3.4.1. Data Collection for the Qualitative Study**

The current section explains more about the qualitative data that was collected using the mixed mode of interview approach (semi-structured interview method and e-mail interviewing method).

#### **3.4.2. Semi-Structured Interview**

The methodology utilized in this exploration to gather optional information was to direct meetings, as referenced previously. As per Sekaran (2003), one more technique for information assortment is to shape a gathering to be evaluated to get data from the respondents about the subject of interest. Collis and Hussey (2009) characterized a meeting as a technique for information assortment in which members are asked to determine what they do, think, or feel. Nonetheless, as indicated by Saunders et al. (2007), there are three classes of meetings: specifically organized,

semi-organized, and unstructured meetings. Structured interviews are utilized in descriptive research to get quantitative information, and the scientist utilizes polls in view of a foreordained and normalized or indistinguishable arrangement of inquiries. The scientist can choose to read out each inquiry and afterward record the reaction on a normalized plan, generally with pre-coded replies. The second classification of the interview is the semi-structured interview. It is non-normalized and utilized in logical examinations by which the specialist has a rundown of subjects and inquiries to be covered. Consequently, these meetings might fluctuate, starting with one meeting and then onto the next. The last classification of an interview is the unstructured meetings or top-to-bottom meetings, normally utilized in exploratory examinations to investigate a general or potentially new region in which the scientist is intrigued. As a rule, the utilization of the meeting as an information assortment strategy enjoys a few benefits. In the first place, the utilization of meetings increments conviction. The immediate contact between the specialist and the interviewee permits the questioner to make sense of all the more uninhibitedly the primary motivation behind the review. This is with the goal that the scientist can explain any uncertainty and try not to misconstrue the ideas or the inquiries posed (Oppenheim, 1998). Secondly, it permits the questioner to pose more perplexing inquiries and follow-up questions that would not be imaginable with the poll technique for information assortment. Likewise, the analyst can consider nonverbal correspondence, like the sentiments, conduct, mentalities, and looks of the interviewee. Subsequently, reactions can provide a more elevated level of certainty, in contrast with survey reactions (Collis & Hussey, 2009). The choice to involve a specific kind of interview as an information assortment strategy relies upon the exploration targets (Leedy & Ormrod, 2001). In this review, semi-organized interviews were utilized to approve the aftereffects of the quantitative review. Semi-organized meetings can uncover components that need further examination and make sense of topics arising from the quantitative information assortment. Furthermore, semi-organized interviews are utilized not exclusively to uncover and comprehend the “what” and “how” of a peculiarity but also to investigate the “why” all the more completely (Saunders et al., 2007). In the current study, semi-structured interviews have the most extensive level of adaptability among the other subjective strategies since this kind of interview can arrive at the suggested level of directors more than the review approach (Leedy & Ormrod, 2001). Likewise, semi-structured interviews are

mostly suggested for approving outcomes utilizing a poll (Wass & Wells, 1994). In the financial area, it is suggested that the specialist utilize the semi-structured interview procedure for the purpose of information assortment, notwithstanding an assortment of genuine information to lead business and executives-related research. Such a procedure has been very fruitful in the financial area, as individuals from the exchange money and depository divisions like to talk as opposed to finishing up a survey. Hence, in this review, the semi-structured interview was utilized as a corroborative report to affirm and approve the consequences of the quantitative analysis.

### **3.4.3. E-Mail Interviewing**

Over the most recent twenty years, a few Library and Information Science (LIS) examinations that utilize subjective exploration techniques have arisen (Meho, 2006). This approach has prompted a huge shift toward concentrates that depend on perception and addressing rather than surveys or organized interviews. Investigating the worth of email interviews in subjective exploration can be an exceptionally successful and helpful strategy that could be utilized at LIS. This technique could be valuable for people who favor an internet-based interview over an up-close and personal meeting. It would likewise be helpful for people who are not open effectively. As per Denscombe (2003), the nature of reactions obtained through web-based research is far superior to the nature of similar reactions created through customary techniques. Accordingly, a few examinations in the writing survey (e.g., Curasi, 2001; Meho & Tibbo, 2003; Murray, 2004; Murray & Harrison, 2004) often depend on email and up close and personal meeting strategies. In these investigations, it was discovered that members who communicate through email were more centered around the inquiry questions since they had a higher intelligence thickness than members who were evaluated face to face. It is not necessarily the case that the nature of eye-to-eye interviews is lower, yet rather features the upsides of the email interview for both the specialist and the respondent concerning the variables of time and correspondence. This is particularly true when a potential respondent has restricted time or when there are geographic obstructions and limits that block directing an up close and personal meeting (Karchmer, 2001; Murray, 2004; Youthful et al., 1998). The utilization of email to gather subjective information will grow as admittance to the web increments,

making this technique for information assortment more pervasive. There are not many observational investigations that have taken a gander at the strategies in question. Likewise, there is a need to investigate further investigations that can utilize a few procedures for managing email-based interviews when contrasted with phone and up close and personal meetings. Subsequently, in this review, notwithstanding a semi-organized interview, the strategy of email interview was likewise utilized for information assortment to affirm and approve the consequences of the quantitative examination. Such an email information assortment method has been very effective in the financial area, as individuals from the exchange money and depository divisions will probably not be accessible for eye-to-eye interviews. This is particularly evident when time and monetary requirements hold up the traffic of directing a meeting.

#### **3.4.4. Interview Design**

The mixed-method interview (semi-structured and email interviews) is viewed as one of the main examination procedures. However, it has not been remembered for most past bookkeeping studies. Semi-organized interviews permit the questioner to pose extra inquiries that emerge from the exchange between the specialist and the interviewee (Di Cicco-Sprout, Crabtree & Meho, 2006). After conferences and conversations with Islamic money researchers and bookkeeping experts, the plan of the interview questions was fundamentally moved along. Furthermore, the researchers and professionals added to the improvement of the interview questions plan. The interview questions covered the vast majority of the issues connected with global financial exchanges (Letter of Credits). They also demonstrated how smart contracts and blockchain technology can be utilized to address these issues. The center inquiries questions were then enhanced with a few sub-inquiries to observe every point profoundly during the screening (Zikmund, 1997).

#### **3.4.5. Interview Process**

Three individuals from the trade finance and treasury departments of three distinct confidential banks consented to partake in semi-structured interviews led by phone and three individuals by email interview. If one of the individuals from the

exchange money and depository divisions could not take an interest, one more establishment from a similar area was reached. A duplicate of the data letter, interview assent structure, contact data structure, and key interview questions was sent to all individuals from the trade finance and treasury departments who consented to partake. In the data letter, the target of the meeting made exhaustive sense for the individuals from the trade finance and treasury departments. The letter likewise incorporated an explanation ensuring the privacy of the members. The leaders were then reached again to plan the meeting. Each interview was affirmed and directed by phone one day before the arrangement. Individuals from the trade finance and treasury departments were selected for interviews on the grounds that their experience was considered adequate to mirror the full scope of issues analyzed for this review (Cooper & Schindler, Sun, 1998). Comparable semi-organized questions were utilized for all meetings to guarantee case similarity. All meetings were recorded with the assent of the members. The length of each interview was somewhere in the range of 30 and 40 minutes. Subsequent to presenting themselves, the analyst started with the primary inquiry, which was connected with the accompanying: Can blockchain and smart contracts eliminate the risks and problems in the LC transactions, and how can the third party act as an auditor and observer to fix global trade? Then, at that point, other primary inquiries and sub-questions were posed. Every respondent was urged to pose extra inquiries that had not been tended to in this review. All interviewee questions were responded to during the meeting. Toward the end of each meeting, members were approached to provide criticism, alter records, or erase data they did not wish to use in ensuing distributions. The interaction went flawlessly, as there was no data to erase during this cycle. Nonetheless, just data connected with the review questions was considered.

### **3.5. Data Analysis Techniques**

The current study has employed an analysis of the qualitative data using thematic analysis techniques.

### **3.6. Qualitative Data Analysis**

Dissimilar to quantitative data, there are no normalized techniques for examination intended for qualitative data due to their tendency (Saunders, 2003). Bryman (2006) brought up that unmistakable principles for leading the investigation of subjective information have not advanced. Consequently, there are a few qualitative examination customs and approaches and various methodologies for summing up the information gathered (Saunders, 2003). Although the various methodologies are not fundamentally unrelated, they can be joined. Therefore, it tends to contend that the thematic analysis approach is the best one to use in this review. The interest or focal point of topical investigation is on the substance of the discourse and what is expressed instead of how things are said (Riessman, 2004). Following that, the investigation of the subjective information started after the quantitative information assortment was finished. The information acquired from the meetings was handled and dissected in a few stages. To begin with, the accounts were painstakingly paid attention to, and afterward, the substance was deciphered and recorded as a hard copy. Every member's reactions were recorded on a different piece of paper. The handling and examination of meetings normally consume a large chunk of the day on the grounds that the accounts should be paid attention to painstakingly before they are deciphered, recorded as a hard copy, and read over and over afterward (Drever, 1995). In this manner, the translated information was painstakingly perused to precisely recognize the point region connected with the motivation behind the review. Reactions to each address were summed up on various sheets and translated with the goal that all reactions to a specific inquiry were gathered together. Reactions to each address were assembled into classes, and significant information was recorded under every classification. Reactions were then depicted according to the subjects or classes and represented with statements. To guarantee this, a rundown of interview points was provided to the respondents in this concentrate before directing the meeting. This method is expected to advance legitimacy and dependability by permitting respondents to address the mentioned data with the goal that respondents can accumulate supporting hierarchical documentation from their records (Saunders, 2003). Concerning the subjective information, manual subjective information investigation was utilized to break down the information gathered from respondents during the mixed-method interviews (semi-structured and email interviews).



## **4. RESULTS**

This chapter reports the data analysis of the study. The themes method was used to analyze the data collected from primary data. Data patterns, themes, and meanings can be identified and analyzed using the themes method. This qualitative research strategy includes efficiently inspecting and coding information for repeating examples and topics and, afterward, coordinating these subjects into a cognizant construction. The technique is ordinarily utilized in sociology research, especially in fields like brain science, humanism, and humanities, yet can likewise be applied in different examination areas. The subject technique provides a thorough and efficient way to examine subjective information and can produce significant experiences into complex social peculiarities.

### **4.1. Qualitative Findings Based on Interviews**

A mixed- interview was utilized to overview members. An agenda of inquiries was utilized to guarantee that points key to the inquiry were tended to in the meetings (DiCicco-Sprout & Crabtre, 2006). The motivation behind the semi-organized interviews was to acquire assessment viewpoints, reflections, and remarks from people who have specific information, aptitude, and data and come from particular callings connected with the financial business. Semi-organized interviews are more versatile than other examination techniques, for example, organized meetings or studies, although the inquiries posed to observe every subject arose during the screening (Louise Barriball & While, 1994). The utilization of inquiries without a right or wrong answer permitted respondents to communicate their perspectives on subjects that the questioner did not guarantee to anticipate. It also provided an open door to address factors that respondents felt were significant. The interviews were conducted in English. A thematic analysis discussed the points considered (Mundy, 2010). This study was conducted with blended technique interviews with individuals from the financial area, utilizing different semi-structured questions that covered various parts of worldwide exchange in the financial area, especially in Letters of Credit (LC), blockchain, and smart contract innovation. Trade Finance Manager expansion, this study led an overview with the delegate deputy treasury manager to expand the viewpoint of input on the above subjects and to catch the profundity of his experience.

The scientist laid out a continuous expert connection with the interviewee to work on the nature of the inquiries and, consequently, the interview and to give follow-up questions and explanations on a case-by-case basis. Interviews were initiated with predetermined questions that paved the way for in-depth discourse on the topic. The interviews included four phases. In the first phase, interviewees were asked to share their views. It pertains to the problems and risks faced by bank management and the bank customer in the traditional LC system and their views on how blockchain and smart contracts can eliminate the risks and problems in LC transactions. It also concerns how the third party can act as an auditor and observer to restore order to global trade. In the second phase, respondents were asked to identify the ability to use smart contracts and blockchain technology in LC preparations and processes and to express their opinions about the platforms IBM -Maersks, TradeLens, and we.trade. Note that these platforms use smart contracts and blockchain technology in their international trade transactions through LC. The third phase examined the relationship between implementing smart contracts and blockchain technology in the LC process and eliminating existing banking jobs. The final phase focused on how we can build an international trading system for banks to process LC using smart contracts and blockchain technology. A sum of three respondents was moved through all media (up close and personal (online): three individuals, three respondents by email, and one respondent by telephone effectively finished the meeting). Respondents who effectively finished the meeting had the option to exhaustively make sense of their perspectives and examine possibly delicate subjects on a private premise. The following segment presents the nitty-gritty aftereffects of the meetings.

Table 3 summarizes the direct effects of the determinants on legitimacy.

**Table 3:** Direct effect Relationship

<b>Interviewees (P1, P2, P3)</b>	<b>Letter of credit</b>	<b>International trade</b>	<b>Blockchain smart contract technology</b>
<b>P1</b>	✓	✓	✓
<b>P2</b>	✓	✓	✓
<b>P3</b>	×	✓	-

X: No effect, ✓: Effect, -: No answer

## 4.2. Thematic Analysis

In various fields, including social science, psychology, education, and healthcare, thematic analysis is a prevalent qualitative method for data analysis. This is to gain a deeper comprehension of the phenomenon being studied, which entails locating patterns, themes, and meanings in qualitative data (Kiger & Varpio, 2020). This topic will explore thematic analysis in detail, including its definition, types, steps, strengths, limitations, and examples of its application.

### Definition of Thematic Analysis:

The process of finding, analyzing, and reporting on patterns (themes) in qualitative data is known as thematic analysis. It is a data analysis strategy that can be used to investigate a wide range of research questions and is adaptable and flexible. The goal of thematic analysis is to determine and describe patterns in the data. Often, inductive reasoning is used to develop new insights (Kiger & Varpio, 2020).

Types of Thematic Analysis: Topical examination can be comprehensively characterized into two kinds: both inductive and deductive. Deductive thematic analysis is a top-down method that guides data analysis using pre-existing theoretical or conceptual frameworks. It begins with a set of predefined codes or categories that are utilized for data organization and analysis. When researchers clearly understand the research question and the relevant literature, deductive thematic analysis is useful (Bouncken, Qiu, Sinkovics & Kürsten, 2021). Inductive topical investigation, then again, is a granular perspective that includes distinguishing examples and subjects inside the information without utilizing any prior systems or classes. This more exploratory method enables researchers to discover novel and unanticipated themes they may not have previously considered (Terry, Hayfield, Clarke & Braun, 2017).

### Steps in Thematic Analysis:

The process of thematic analysis involves several steps that researchers can follow to ensure a systematic and rigorous approach to analyzing qualitative data (Castleberry & Nolen, 2018). These steps include:

- Acquaintance with the information: In order to familiarize themselves with the data's content and context, researchers should read it multiple times.

- Making the initial codes: Using either a deductive or an inductive method, researchers should identify the data's initial themes or patterns and code them.
- Trying to find themes: Specialists should look for more extensive subjects inside the underlying codes, gathering comparative codes and marking them with an enlightening name.
- Examining the themes: The themes should be looked over by researchers to make sure they are meaningful, consistent, and accurately reflect the data.
- Naming and defining themes: Each theme should be defined and provided with a name by researchers, ensuring the name accurately reflects the theme's content.
- The final report's preparation: The themes should be described in detail in the final report, supported by quotes from the data and an explanation of their significance.

#### Strengths of Thematic Analysis:

Thematic analysis has several strengths that make it a popular method for qualitative research (Swain, 2018):

- Flexibility: Thematic analysis is an adaptable technique that can be adjusted to various exploration questions and settings.
- Rigor: A methodical and thorough method for analyzing qualitative data is thematic analysis.
- Accessibility: Thematic analysis is a method that does not require specialized software or statistical expertise and is relatively straightforward.
- Interpretive: Researchers are able to interpret the data in a meaningful and nuanced manner through the use of thematic analysis, resulting in the discovery of novel and unexpected themes.
- Transparency: Researchers can report and document their findings in a transparent and replicable manner using thematic analysis.

#### Limitations of Thematic Analysis:

The thematic analysis also has several limitations that researchers should be aware of (Kiger & Varpio, 2020):

- **Subjectivity:** Thematic analysis is an emotional strategy that depends on the scientist's translation of the information.
- **Time-consuming:** When dealing with large datasets, thematic analysis can take much time.
- **Sample size:** Thematic analysis may not be appropriate for analyzing large datasets as it is best suited to smaller or medium-sized datasets.
- **Reliability:** When the themes are generated inductively, thematic analysis can be difficult to replicate.

This study will explain the results depending on the research questions.

#### **4.2.1. What Are The Problems And Risks That Face The Bank Management And Bank Clients In The Traditional System Of Letters Of Credit?**

The answer from P1

- Many challenges restrict and limit trade finance transactions, such as Exchange rates, Compliance issues, Imposed economic sanctions, political issues, and more.

- One of the challenges of a letter of credit is the delay in forwarding and receiving the LC documents. The cycle that LC documents take to be delivered from the beneficiary to advising/ second /third advising /confirming banks to the issuing bank can be time-consuming. The traditional way is to forward the LC documents through courier services, which takes time and may cause loss to the applicant in case the goods arrive before the documents. This scenario can lead the applicant to take extra actions, such as (issuing a letter of indemnity) which will eventually cost extra fees and expose the applicant to more risk. Another scenario is the risk of late presentation of documents in the expiry place (the place where the LC expires). This risk is considered a breach of the LC terms (the most common discrepancy).

Other than that, there is the risk of losing the documents while forwarding them between different banks through courier services.

The answer from P2

The traditional system of LC involves several risks and challenges for both banks and their clients. Some of these problems and risks include:

- Delay in payment: The traditional LC system involves a lot of paperwork and manual processes, which can cause delays in the payment process. This delay can impact the cash flow of the bank's clients and affect their ability to conduct business.
- High transaction costs: The process of issuing, verifying, and paying out LCs can be expensive, involving fees and charges for both the bank and its clients. These costs can be a significant burden, especially for small and medium-sized businesses.
- Fraud and errors: The manual nature of LC processing increases the risk of fraud and errors. Fraudsters can take advantage of the complex and paper-based process to manipulate information, forge documents, or even create fictitious companies. Furthermore, simple errors in documentation or delays in processing can cause financial losses and create disputes between the parties involved.
- Dependence on correspondent banks: LCs often require multiple banks to be involved, including correspondent banks that facilitate transactions between the issuing and the beneficiary banks. This can lead to delays, communication issues, and additional costs, increasing the risk of errors and fraud.
- Inflexibility: The traditional LC system can be rigid, with little room for customization to meet the specific needs of clients. This can limit the range of financial products and services banks offer their clients, resulting in dissatisfaction and reduced business.

Overall, the traditional system of LCs involves various risks and challenges for banks and their clients, such as delays in payment, high transaction costs, fraud, errors, dependence on correspondent banks, and inflexibility. These issues highlight the need for more efficient, transparent, and secure digital systems to manage trade finance transactions

The answer from P3

1. Country risk or political risk.
2. Fraud risk.

3. Applicants are non-delivery, goods received with inferior quality,
4. Issuing bank's bankruptcy risk.
5. Exchange rate risk.

#### **4.2.2. Can Blockchain And Smart Contracts Eliminate The Risks And The Problems in The Letter Of Credit Transactions, And How Does The Third Party Act As An Inspector And Observer To Restore A Hassle With Global Trade?**

The answer from P1

Using blockchain technology can mitigate the risk created by delays in receiving/forwarding the LC documents at the expiry place premises. It will illuminate the risk of goods arriving at the port of loading before the documents and the loss of documents in courier companies as well.

The answer from P2

Blockchain technology and smart contracts have the potential to address many of the challenges associated with traditional LC transactions. Here is how:

1. Efficiency and Transparency: Blockchain-based LCs can streamline the process by providing a single platform for all parties to access, validate and authenticate data in real-time. This can reduce delays and errors as well as increase transparency.
2. Security and Fraud Prevention: The decentralized nature of blockchain provides an immutable and tamper-proof record of all transactions, thereby reducing the risks of fraud and errors. It also eliminates the need for manual inspection and auditing, thereby reducing operational costs.
3. Automated and Customized Smart Contracts: Smart contracts can automate the entire LC process, including the issuance, validation, and payment processes. They can also be customized to meet the specific needs of each transaction, thereby increasing flexibility and reducing the risk of errors.
4. Eliminating Third-Party Intermediaries: Blockchain-based LCs eliminate the

need for intermediaries such as correspondent banks, thereby reducing transaction costs and improving the efficiency of the process.

Overall, blockchain and smart contracts can help to streamline the LC process and increase efficiency, transparency, and security while reducing costs, errors, and fraud. Furthermore, third-party observers and inspectors can still provide additional assurance and oversight to the parties involved. By leveraging blockchain and smart contracts, global trade can become less hassle and more streamlined, transparent, and secure.

#### **4.2.3. How Can Banks Use Smart Contracts And Blockchain Technology in Their Letter Of Credit Preparations And Processes?**

The answer from P1

Banks can use smart contracts and blockchain technology to streamline their LC preparations and processes by creating a decentralized, secure, and transparent system. Here are some ways that banks can implement smart contracts and blockchain technology for LC processes:

1. **Automation:** Smart contracts can automate the process of creating, verifying, and executing LC. This eliminates the need for intermediaries and reduces the possibility of errors and fraud.
2. **Real-time monitoring:** Blockchain technology allows for real-time monitoring of the entire LC process, from initiation to completion. This provides better visibility and transparency for all parties involved, which can help to prevent disputes.
3. **Secure documentation:** Blockchain technology provides secure storage and sharing of documents related to the LC process, such as invoices and bills of lading. This reduces the risk of document tampering or loss.
4. **Faster processing times:** Smart contracts can automate the approval process, reducing the time for an LC to be processed and approved.
5. **Overall,** implementing smart contracts and blockchain technology in LC processes can improve efficiency, reduce costs, and increase security and transparency.



The answer from P2

Banks can leverage smart contracts and blockchain technology to streamline and automate the LC process, making it faster, more secure, and more efficient. Here are some ways in which they can do this:

1. Automating the LC process: Smart contracts can automate the entire process of issuing, verifying, and settling LCs. Banks can use smart contracts to encode the terms and conditions of the LC into the blockchain and automate the verification and settlement process, eliminating the need for manual intervention.
2. Enhancing security and reducing fraud: Blockchain technology can provide a secure and transparent platform for banks to issue and verify LCs. The decentralized and immutable nature of the blockchain can make it difficult for fraudsters to tamper with or manipulate LCs.
3. Reducing costs and improving efficiency: By automating the LC process, banks can reduce the costs associated with the manual verification and processing of LCs. Smart contracts can also reduce the time and effort required to settle disputes and reconcile transactions, improving the efficiency of the process.
4. Improving transparency: Blockchain technology can provide an auditable and transparent record of all LC transactions, enabling banks to track the progress of transactions and verify the authenticity of documents.
5. Enabling cross-border transactions: Smart contracts and blockchain technology can facilitate cross-border transactions by enabling faster and more efficient processing of LC. This can help reduce the time and cost associated with international trade, making it easier for businesses to engage in global commerce.

Overall, using smart contracts and blockchain technology can provide significant benefits to banks in preparing and processing LCs by improving security, reducing costs, improving efficiency, and enabling cross-border transactions.

#### **4.2.4. What Is Your Opinion About The IBM-Maersks, Tradelens, And We.Trade Platforms That Adopted Smart Contracts And Blockchain Technology In Their International Trade Transactions Through Letters Of Credit?**

The answer from P1

From the researcher's point of view, this is brilliant and saves too much time, improves efficiency, reduces costs, and increases security and transparency.

The answer from P2

The IBM-Maersks TradeLens and we.trade platforms are innovative examples of how smart contracts and blockchain technology can be applied in international trade. By leveraging the security and transparency of blockchain technology, these platforms have the potential to streamline trade processes, reduce costs, and improve efficiency. Smart contracts enable the automation of trade processes, reducing the need for manual intervention and the potential for errors or fraud. This can help to reduce the time and cost associated with international trade, making it easier for businesses to engage in global commerce. Furthermore, the use of blockchain technology can provide a secure and auditable record of all trade transactions, enabling transparency and traceability throughout the trade process. This can help to reduce the risk of disputes and improve trust between trading partners.

Overall, adopting smart contracts and blockchain technology in international trade transactions through LC is a positive development for the industry. It has the potential to revolutionize the way trade is conducted by improving security, reducing costs, and increasing efficiency.

#### **4.2.5. How Can We Build An International Banking Trade System That Deals With Letters Of Credit Using Smart Contracts And Blockchain Technology?**

The answer from P1

A banking international trade system that deals with LC using smart contracts and blockchain technology can be developed in several steps:

Understanding the existing process: The first step is to understand the existing process of international trade and LC in banking. This includes understanding the roles of various parties involved, the documentation process, and the legal framework. Identifying the pain points: Once the existing process is understood, the next step is to identify the pain points and inefficiencies in the process. This could include delays, errors, fraud, and high costs. Designing a smart contract solution: Based on the pain points identified, a smart contract solution can be designed. This involves creating a blockchain-based system that automates the LC process using smart contracts. The smart contracts can be programmed to execute the terms of the LC automatically once certain conditions are met, such as the delivery of goods. Developing the blockchain network: Once the smart contract solution is designed, the blockchain network needs to be developed. This involves choosing the appropriate blockchain platform, setting up the network, and integrating it with the banking system. Testing and deployment: After the blockchain network is developed, it must be thoroughly tested to ensure it works as intended. Once it is tested and validated, the system can be deployed for use in international trade. Monitoring and maintenance: The final step is to monitor the system and perform regular maintenance to ensure it continues functioning smoothly. Overall, building an international banking trade system that deals with LC using smart contracts and blockchain technology requires a thorough understanding of the existing process. It also necessitates carefully identifying pain points and a well-designed smart contract solution integrated with the appropriate blockchain platform.

The answer from P2

Building an international banking trade system that deals with LC using smart contracts and blockchain technology requires careful planning, design, and implementation. Here are some steps that could be considered:

1. Define the requirements: Start by defining the requirements of the banking international trade system. Identify the key features and functions the system needs to have to support the issuance, verification, and settlement of LC using smart contracts and blockchain technology.
2. Choose the appropriate blockchain platform: Select a suitable blockchain platform for the banking international trade system. Consider factors such as scalability, security, interoperability, and regulatory compliance.

3. Develop smart contracts: Develop smart contracts that can automate the entire process of issuing, verifying, and settling LC. Ensure that the smart contracts are designed to be tamper-proof and secure and can handle complex trade transactions.
4. Integrate with existing banking systems: Integrate the blockchain-based banking international trade system with existing banking systems to ensure that it can seamlessly interact with other systems and processes.
5. Ensure regulatory compliance: Ensure that the system complies with all relevant regulations and standards for international trade and banking.
6. Test and deploy: Test the system thoroughly to ensure that it is functioning as intended and deploy it in a controlled manner to minimize the risk of disruption.
7. Provide training and support: Provide training and support to system users to ensure that they can use it effectively and efficiently.

By following these steps, it is possible to build an international banking trade system that uses smart contracts and blockchain technology. The result is a more efficient, secure, and transparent system for international trade that can benefit businesses, banks, and other stakeholders.

#### **4.2.6. Is It Possible That The Implementation Of Smart Contracts And Blockchain Technology In The Letter Of Credit Process Could Lead To Some Changes In The Banking Industry And The Disappearance Of Existing Bank Jobs?**

The answer from P1

This technology will only cut off the time that banks spend in sending and receiving the LC documents, which will mainly affect the courier services companies. This is due to the fact that even though the documents will be authenticated and forwarded through blockchain technology, they will still be checked to make sure they comply with all the LC terms and conditions. This requires the full team's efforts to double-check the system's efficiency, especially in the development and testing stages. Once the system is running, it can step up and take the risk of deciding whether the presented documents comply with the LC terms or not. Based on the above, we can

conclude that existing bank jobs will be downsized and replaced with system developers.

The answer from P2

The implementation of smart contracts and blockchain technology in the LC process could disrupt the banking industry and lead to changes in how banks operate and the roles that people play within them. Here are some potential impacts:

1. Automation of processes: Smart contracts and blockchain technology can automate many of the processes involved in the LC process, reducing the need for manual intervention. This could lead to some job displacement within banks, particularly for those involved in manual verification and processing of documents.
2. Efficiency gains: The use of smart contracts and blockchain technology can make the LC process more efficient, reducing the time and cost associated with the process. This could lead to banks streamlining their operations, which could result in some job losses.
3. New roles and skills: Adopting smart contracts and blockchain technology in the banking industry could create new roles and require new skills. For example, banks may need to hire developers, blockchain experts, and smart contract specialists to design, develop, and maintain the systems.
4. Increased competition: The use of smart contracts and blockchain technology could lead to increased competition in the banking industry as new players enter the market and existing players adopt new technologies. This could lead to some consolidation within the industry, which could result in job losses.

Overall, implementing smart contracts and blockchain technology in the LC process could lead to changes in the banking industry, including job displacement and the need for new skills and roles. However, it is essential to note that technological change has historically created new jobs and opportunities, and the same may be true in this case. Additionally, as banks adopt new technologies, they may be able to offer new and innovative services to customers, which could create new job opportunities.

## **DISCUSSION AND CONCLUSION**

In this chapter, the study delves into a comprehensive discussion and analysis of the influence of smart contracts and blockchain technology on this crucial aspect of global commerce through Letters of Credit (LC). The integration of smart contracts and blockchain technology has the potential to revolutionize the way trade transactions are conducted, offering numerous benefits such as increased efficiency, enhanced security, and reduced costs. However, it is essential to critically evaluate these advancements to understand their implications and limitations fully. This chapter explores the advantages of utilizing smart contracts and blockchain technology in LC and critically analyzes these benefits. Furthermore, we will provide recommendations and draw conclusions based on our findings.

### **Discussion**

In this section, the study explains in detail the impact of smart contracts and blockchain technology on international trade through LC. It also discusses the impact of building an international banking trade system that deals with LC using smart contracts and blockchain technology on the banking industry and banking jobs. This is through the feedback that the researcher received from the interviewees, and their feedback was compared with the literature review.

### **Impact of building a banking international trade system that deals with letters of credit using smart contracts and blockchain technology on banking industry and banking jobs**

Building a global financial exchange framework that uses shrewd agreements and blockchain innovation to deal with LC can essentially affect the financial business and banking position. Brilliant agreements and blockchain innovation offer a few benefits with regard to global exchange (Chang, Chen & Wu, 2019). They can smooth out and computerize the most common way of giving and overseeing LC, diminishing the requirement for manual intercession and desk work. This can prompt expanded proficiency, quicker exchange times, and lower costs for banks and organizations engaged with global exchange (Clark, 2014). The reception of shrewd agreements and blockchain innovation in the financial business may likewise have suggestions for

banking positions. As specific errands and cycles become mechanized, there might be a change in the ranges of abilities expected by banking experts (Chang, Baudier, Zhang, Xu, Zhang & Arami, 2020). Occupations that include manual handling and confirmation of LC might be affected, while new jobs connected with overseeing and managing brilliant agreement-based frameworks might arise. It is essential to take note that the particular effect on financial positions will rely upon different variables. This includes the degree of reception of savvy contracts and blockchain innovation, the speed of mechanical headways, and the capacity of banking experts to adjust to these changes (Alsalmim & Ucan, 2023). Based on the interview results of this study, one of the interviewees (P1) was noted as saying, "... This technology will only cut off the time that banks spend in sending and receiving the LC documents, which is mainly will affect the courier services companies. This is attributed to the fact that even though the documents will be authenticated and forwarded through blockchain technology, they will still be checked to make sure they comply with all the LC terms and conditions, and this requires the full team efforts to double-check the system efficiency, especially in the development and testing stage, once the system is running then it can step up and take the risk of deciding whether the presented documents comply with the LC terms or not. Based on the findings above, we can conclude that existing bank jobs will be downsized and replaced with system developers."

One interviewee (P2) said "...The implementation of smart contracts and blockchain technology in the LC process has the potential to disrupt the banking industry and could lead to some changes in the way banks operate and the roles that people play within them. Here are some potential impacts:

1. Automation of processes: Smart contracts and blockchain technology can automate many of the processes involved in the LC process, reducing the need for manual intervention. This could lead to some job displacement within banks, particularly for those involved in manual verification and processing of documents.
2. Efficiency gains: The use of smart contracts and blockchain technology can make the LC process more efficient, reducing the time and cost associated with the process. This could lead to banks streamlining their operations, which could result in some job losses.

3. New roles and skills: The adoption of smart contracts and blockchain technology in the banking industry could create new roles and require new skills. For example, banks may need to hire developers, blockchain experts, and smart contract specialists to design, develop, and maintain the systems.
4. Increased competition: The use of smart contracts and blockchain technology could lead to increased competition in the banking industry as new players enter the market and existing players adopt new technologies. This could lead to some consolidation within the industry, which could result in job losses. Overall, implementing smart contracts and blockchain technology in the LC process could lead to changes in the banking industry, including job displacement and the need for new skills and roles. However, it is essential to note that technological change has historically created new jobs and opportunities, which may be true in this case. Additionally, as banks adopt new technologies, they may be able to offer new and innovative services to customers, which could create new job opportunities.”

Comparing the feedback from (P1) and (P2) with the findings from Ozdemir et al.’s (2021) research on the role of blockchain in reducing barriers to humanitarian Supply Chain Management (SCM), the findings can identify both similarities and differences in their perspectives. Let us examine these similarities and differences in relation to the impact of blockchain technology on SCM and the banking industry:

#### Similarities:

1. Automation of Processes and Efficiency Gains: Both (P1)’s feedback and (P2)’s feedback acknowledge the potential for automation and increased efficiency through the use of blockchain technology. They recognize that smart contracts and blockchain can automate processes involved in the LC process, reducing the need for manual intervention and leading to efficiency gains.
2. New Roles and Skills: Both feedback acknowledge the potential for new roles and skills in the banking industry due to the adoption of blockchain technology. They mention the need for developers, blockchain experts, and smart contract specialists to design, develop, and maintain blockchain systems.

#### Differences:



1. Job Displacement: (P1)'s feedback focuses on the downsizing of existing bank jobs and their replacement with system developers due to the implementation of blockchain technology. In contrast, (P2)'s feedback mentions job displacement within banks, particularly for those involved in manual verification and processing of documents, but also highlights the potential for new job opportunities as banks adopt new technologies.
2. Increased Competition: (P2)'s feedback highlights the potential for increased competition in the banking industry due to the use of smart contracts and blockchain technology. They mention the entry of new players and the adoption of new technologies, which could lead to industry consolidation and job losses. (P1)'s feedback does not explicitly mention increased competition as a result of blockchain implementation.

The similarities between the feedback and the findings include recognizing the potential for automation, efficiency gains, and the need for new roles and skills in the banking industry. However, there are differences in the emphasis on job displacement, the potential for increased competition, and the overall outlook on job opportunities and industry changes. Comparing the findings from Belu's (2019) research on blockchain application in international trade with the feedback from (P1) and (P2), we can identify both similarities and differences in their perspectives. Let us examine these similarities and differences in relation to the impact of blockchain technology on the banking industry and international trade:

#### Similarities:

1. Automation of Processes and Efficiency Gains: Both (P1)'s feedback and (P2)'s feedback acknowledge the potential for automation and increased efficiency through the use of smart contracts and blockchain technology. They recognize that these technologies can automate processes involved in the LC process, reducing the need for manual intervention and streamlining operations.
2. Potential Job Displacement: Both feedbacks mention the potential for job displacement within banks due to smart contracts and the adoption of blockchain technology. (P1)'s feedback suggests that existing bank jobs may be downsized and replaced with system developers. (P2)'s feedback highlights the possibility

of job losses, particularly for roles involved in manual verification and processing of documents.

Differences:

1. **Scope of Impact:** (P1)'s feedback focuses primarily on the impact on banks and courier services companies, specifically in relation to the time spent on sending and receiving LC documents. In contrast, (P2)'s feedback takes a broader perspective, discussing the potential disruption of the banking industry as a whole and changes in the roles played by individuals within banks.
2. **New Roles and Skills:** (P2)'s feedback explicitly mentions the need for new roles and skills, such as developers, blockchain experts, and smart contract specialists, to design, develop, and maintain the systems. (P1)'s feedback does not explicitly address the creation of new roles and skills resulting from the adoption of blockchain technology.
3. **Increased Competition:** (P2)'s feedback highlights the potential for increased competition in the banking industry as new players enter the market and existing players adopt new technologies. This aspect is not mentioned in (P1)'s feedback.

Comparing the findings from Martino's (2019) research on the impact of blockchain and technological innovations in the banking industry to the feedback from (P1) and (P2), there are some similarities and differences in their perspectives. Let us examine these similarities and differences in relation to the impact of blockchain technology on the banking industry:

Similarities:

1. **Automation of Processes and Efficiency Gains:** Both (P1)'s feedback and (P2)'s feedback recognize the potential for automation and increased efficiency through the use of smart contracts and blockchain technology. They acknowledge that these technologies can automate processes involved in the LC process, reducing the need for manual intervention and streamlining operations.
2. **Potential Job Displacement:** Both feedbacks mention the potential for job displacement within banks due to the adoption of smart contracts and blockchain technology. (P1)'s feedback suggests that existing bank jobs may be downsized and replaced with system developers. Meanwhile, (P2)'s feedback highlights the

possibility of job losses, particularly for roles involved in manual verification and processing of documents.

Differences:

1. **Scope of Impact:** (P1)'s feedback focuses primarily on the impact on banks and courier services companies, specifically in relation to the time spent on sending and receiving LC documents. In contrast, (P2)'s feedback takes a broader perspective, discussing the potential disruption of the banking industry as a whole and changes in the roles played by individuals within banks.
2. **New Roles and Skills:** (P2)'s feedback explicitly mentions the need for new roles and skills, such as developers, blockchain experts, and smart contract specialists, to design, develop, and maintain the systems. However, (P1)'s feedback does not explicitly address the creation of new roles and skills resulting from the adoption of blockchain technology.
3. **Increased Competition:** (P2)'s feedback highlights the potential for increased competition in the banking industry as new players enter the market and existing players adopt new technologies. This aspect is not mentioned in (P1)'s feedback.

The similarities between the feedback and the findings include recognizing the potential for automation, efficiency gains, and potential job displacement resulting from the implementation of blockchain technology in the banking industry. However, there are differences in the scope of impact, consideration of new roles and skills, and the mention of increased competition. It is crucial to consider the specific findings and recommendations presented in Martino's (2019) research to understand the impact of blockchain and technological innovations in the banking industry. Additionally, analyzing the similarities and differences between the research and the feedback allows for a broader perspective on the potential changes and opportunities blockchain technology brings.

### **Impact of Smart Contract and Blockchain Technologies on International Trade Through Letters of Credit**

Smart Contracts and Blockchain Innovation have arisen as progressive instruments with monstrous potential to change different enterprises, including

international trade (Ganne, 2018). The mix of smart contracts and blockchain innovation has prompted a critical development in exchange finance (Chang, Luo & Chen, 2019). These progressions can possibly altogether affect international trade through LC. The execution of blockchain innovation diminishes duties and expenses, wipes out the point of interaction of middle people, and guarantees greater security and straightforwardness (Mishra & Kaushik, 2021). This, thus, prompts decreased exchange hindrances and a speed increase in worldwide exchange all over the planet. The use of blockchain innovation in supporting and installment methods in worldwide exchange likewise decreases funding and installment costs, further improving the productivity of exchange processes (Slatvinska, Demchenko, Tretiak, Hnatyuk & Yarema, 2022).

The Effect of Smart Contracts and Blockchain Innovation on LC can possibly change LC in worldwide exchange. This is on the grounds that the ongoing system of import and product exchange vigorously depends on the bank's LC settlement framework, which requires both import and commodity sides (Alsalim & Ucan, 2023). Based on the interview results of this study, one of the interviewees respondent (P1) said, "...Using blockchain technology can mitigate the risk that is created by delays in receiving/forwarding the LC documents at the expiry place premises and will illuminate the risk of goods arriving to port of loading before the documents and the loss of documents in courier companies as well."

One interviewee (P2) said "...The adoption of smart contracts and blockchain technology in international trade transactions through LC is a positive development for the industry. It has the potential to revolutionize the way trade is conducted by improving security, reducing costs, and increasing efficiency." Comparing the feedback from (P1) and (P2) with the findings from Al-Amaren, Ismail, and Nor's (2020) research titled "The blockchain revolution: A game-changing in LC", we can identify several similarities in their perspectives. Let us examine these similarities in relation to the benefits and implications of using blockchain technology and smart contracts in LC transactions:

1. Mitigating Risks and Enhancing Security: (P1)'s feedback highlights the risk of delays and loss of documents in traditional LC processes. Similarly, the research findings of Al-Amaren et al. suggest that blockchain technology can mitigate

these risks by ensuring the secure and timely exchange of LC documents. The use of blockchain technology provides a transparent and immutable ledger, reducing the chances of document loss and enhancing security in the process.

2. Improving Efficiency and Reducing Costs: (P2)'s feedback emphasizes the potential revolution of trade by adopting smart contracts and blockchain technology in LC transactions. This aligns with the research findings, which propose that blockchain technology can streamline and automate various processes, leading to increased efficiency and reduced costs. Smart contracts, facilitated by blockchain, enable self-executing agreements, eliminating the need for intermediaries and reducing administrative burdens.

Comparing the feedback from (P1) and (P2) with the findings from Agibalova, Ilovaysky, Kayl, and Usanova's (2019) research titled "Use of letter of credit form of payment in the implementation of smart contracts and blockchain technology", we can identify several similarities in their perspectives. Let us examine these similarities in relation to the utilization of smart contracts, blockchain technology, and the potential benefits in international trade transactions:

1. Mitigating Risks and Enhancing Security: (P1)'s feedback emphasizes the use of blockchain technology to mitigate risks associated with delays, loss of documents, and the arrival of goods before the necessary documents. Similarly, the research by Agibalova et al (2019) explores the integration of smart contracts and blockchain technology in the LC process. Utilizing blockchain's transparent and secure nature can significantly reduce the risks associated with document delays, loss, and tampering, thereby enhancing security and trust in trade transactions.
2. Improving Efficiency and Reducing Costs: (P2)'s feedback highlights the positive impact of adopting smart contracts and blockchain technology in international trade transactions, improving security, reducing costs, and increasing efficiency. Agibalova et al (2019) research aligns with this perspective, suggesting that integrating smart contracts and blockchain technology in LC payments can streamline processes, automate manual tasks, and reduce the need for intermediaries. These efficiencies can ultimately result in cost savings and enhanced operational efficiency.

It is important to consider the specific findings and recommendations presented in Agibalova et al (2019). research to comprehensively understand their conclusions regarding the utilization of smart contracts and blockchain technology in the LC process. Additionally, any contrasting viewpoints or nuances presented in the research and feedback are worth noting to form a well-rounded perspective on the potential benefits and challenges of incorporating smart contracts and blockchain technology in international trade transactions.

One interviewee (P2) said, “...Blockchain and smart contracts can help to streamline the LC process and increase efficiency, transparency, and security while reducing costs, errors, and fraud. Furthermore, third-party observers and inspectors can still have a role in providing additional assurance and oversight to the parties involved. By leveraging blockchain and smart contracts, global trade can become less hassle and more streamlined, transparent, and secure.” Comparing the feedback from (P2) with the findings from Zamanian and Vatani’s (2022) research titled “Increase the efficiency of LC with private blockchain technology and smart contracts and comparative assessment of compliance with the rules”, we can identify several similarities in their perspectives. Let us examine these similarities in relation to the use of private blockchain technology and smart contracts in increasing the efficiency of LC and their impact on trade processes:

#### 1.Streamlining Processes and Increasing Efficiency:

(P2)’s feedback emphasizes that blockchain and smart contracts can streamline the LC process, increasing global trade efficiency. Similarly, Zamanian and Vatani’s (2022) research explores the utilization of private blockchain technology and smart contracts to enhance the efficiency of LCs. By automating manual tasks, reducing paperwork, and streamlining the exchange of information, blockchain, and smart contracts can significantly improve the speed and effectiveness of trade transactions.

#### 2.Enhancing Transparency and Security:

(P2)’s feedback highlights that blockchain and smart contracts can increase transparency and security in the LC process. This aligns with Zamanian and Vatani’s (2022) research findings, which suggest that blockchain technology provides a transparent and immutable ledger, ensuring that all parties have real-time access to the

same information. Additionally, smart contracts enforce predetermined conditions and rules, reducing the potential for errors and fraud.

### 3. Role of Third-Party Observers:

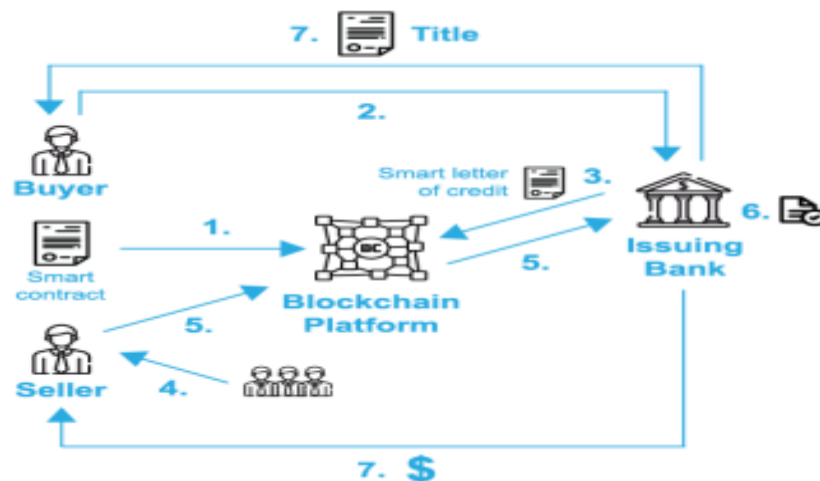
(P2)'s feedback mentions the continued role of third-party observers and inspectors in the LC process to provide additional assurance and oversight. While not explicitly addressed in the given research title, it is common for third-party observers to be involved in trade transactions. Their involvement can still be maintained even with the implementation of blockchain technology and smart contracts, as these technologies can facilitate the secure sharing of relevant information. These similarities indicate a shared understanding of the potential benefits of using private blockchain technology and smart contracts in the context of LCs. However, it is essential to note that a comprehensive analysis would require a deeper exploration of the specific findings and recommendations presented in Zamanian and Vatani's (2022) research. Additionally, it is valuable to consider any contrasting viewpoints or nuances presented in the research and feedback to form a well-rounded perspective on the topic.

### **The Benefit of Using Smart Contracts and Blockchain Technology in Letter of Credit**

The following are five reasons why the use of Smart Contracts and Blockchain Technology in LC will prove beneficial:

1. Smart Contracts and Blockchain will assist with lightening the gamble of narrative extortion and will decrease the expense of the exchange (Nezih Akbas, 2019).
2. Smart Contracts and Blockchain can possibly make the installment strategies in banking international trade more compelling, trusted, and simpler for all gatherings in LC exchanges and increment the great standing of LC among global exchanges (Lata Varghese & Rashi Goyal, 2017).
3. Smart Contracts and Blockchain eliminate the need for correspondent banks in LC transactions (Chatterjee, Singla & Lam, 2020).

4. Payment method automation on blockchain guarantees quicker guaranteed installments by forestalling debates emerging from contract ambiguities, which diminishes installment deferments through the early revelation of inconsistencies. It diminishes the cost and trouble of making corrections due to disparities (Ahmad Sheikh Sarmast, Sönmez & Sönmez,2020).
5. Smart Contracts and Blockchain innovation eliminate the need for an actual show of documents, making the system quicker and simpler for LC parties. Applying blockchain can assist with finishing all the LC exchanges in the span of one day. It additionally ensures that all gatherings have perceivability into the cycle and can check the documents introduced by the merchant (Lata Varghese & Rashi Goyal, 2017).



**Figure 4:** Letter of Credit Process based on Blockchain

**Source:** Adopted by the researcher from the findings

The seven steps of the LC under blockchain technology are as follows :

1. The seller and buyer enter into a contract of sale (smart contract) on a platform using Blockchain technology.
2. The buyer creates a Smart LC for the issuing bank.
3. The bank will review the smart LC issue and confirm it on the Blockchain.
4. The different parties involved in the transaction (Shipping Companies, Customs, Port Authorities, Insurance Companies) will issue the different documents



required, such as the Bill of Lading (B/L), insurance documents, certificates of quality and quantity, and certificates of origins, to name a few).

5. The seller presents those documents to the bank electronically (using Blockchain).
6. The checking is done automatically to confirm the documents' compliance with the LC's conditions and highlight any discrepancies.
7. If everything is compliant and correct, the bank will sign off everything. Thus, the asset title is automatically transferred to the buyer, and payment is made simultaneously to the seller.

### **Critical Analysis for the Benefit of Using Smart Contracts and Blockchain Technology in Letter of Credit**

In this part, this study will provide the real situation about using blockchain in an LC, asking a deep question of whether blockchain is that useful and can provide solutions for LC problems by examining it through the LC stage.

**Table 4:** Letter of credit stage through Smart Contracts and Blockchain technology:

<b>Stage</b>	<b>Solutions through Smart Contracts and Blockchain Technology</b>
<b>Issue Letter of Credit</b>	The utilization of smart contracts and blockchain can be helpful at this phase of the LC in light of the fact that blockchain can share the data through the blockchain network so that all gatherings can observe the data straightforwardly. Nonetheless, numerous media transmission strategies can be utilized similarly.
<b>Presentation of Documents</b>	<p>At the point when documents are introduced, electronic introductions are generally finished through Bolero stages. The paper show the most well-known strategy in the letter of acknowledgment industry, as proven by the low reception of e-Uniform Customs and Practice (eUCP). This is mostly due to the questions about whether electronic documents are treated as what might be compared to paper reports, except if the ongoing regulation treats electronic archives as identical to paper records. Smart contracts and blockchain technology cannot keep misleading data from being taken care of in the network.</p> <p>It is imperative to recollect that the most popular type of extortion in L/C connects with the issuance of non-guaranteed archives as opposed to altering reports after they have been given. It implies that utilizing Smart Contracts and Blockchain Innovation will not stop extortion in L/C connected with the issuance of non-guaranteed documents since blockchain cannot prevent not</p>

	genuine data from being sustained into the organization.
<b>Examining Documents</b>	<p>The key objective of checking reports presented under an LC is to choose if they agree to the subtleties of the LC. To check whether the affirmation can be automated, it is essential to scrutinize the game plans of UCP 600.</p> <p>Article 3 of the UCP 600 would facilitate the mechanization of record checking. In any case, some arrangements would require human association. As stated in Article 3, "... A requirement for a document to be legalized, visaed, certified or similar will be satisfied by any signature, mark, stamp, or label on the document which appears to satisfy that requirement." The assessment under this test could require the activity of significant worth judgment and, accordingly, cannot be computerized. It must, subsequently, be presumed that the assessment of records under an LC cannot, at present, practically be computerized.</p>
<b>Payment</b>	<p>At the point when the parties to a buy contract pick a government-issued money as the method for installment for their agreement, installment under an LC is typically made by electronic assets. The utilization of blockchain innovation brings the same old thing in this unique situation. Regardless of whether the gatherings to a buy contract pick a cryptocurrency as the installment cash for their agreement, the installment cycle essentially includes a bank as a middle person in the event that they opt for an LC.</p>

Table 5 below summarizes l/c pain points and the potential utilization of blockchain L/C. This table was created after analyzing the responses from the interview, which was made in this study with the literature review.

**Table 5: L/C pain points and potentials via using blockchain L/C**

<b>Issues</b>	<b>L/C Pain points</b>	<b>Potentials utilizing blockchain L/C</b>
<b>Trust Mechanism</b>	Heavily relying on an authorized central party (e.g., banks) as the intermediary to cope with trade finance.	Use of immutable, consensus-based, and distributed ledger network to build up a trustful trade environment
<b>Fraud and authenticity</b>	Malicious attempts may cause fraud, alterations, and later trade disputes. Authorities are involved in building up trust among trade parties.	Keeping contract terms on blocks and permanently recording alterations of contract terms on a chain, Mitigating the tampering issue.
<b>Document type</b>	Paper-based and manual processing; Lengthy delivery.	Digitized documents deployed on a secured and distributed shared ledger.
<b>Transactions</b>	Risk-sensitive: Relying on authorized third parties.	Risk mitigation. Trust is ensured through the use of consensus mechanisms.

## **Implications**

The findings highlighted earlier lead to several implications. The discussion on these implications will be divided into three perspectives, namely theoretical, methodological, and practical perspectives

### **Theoretical and Methodological Implications**

This study provides several theoretical implications. First is the advancement of international trade practices. The study findings demonstrate the potential of using smart contracts and blockchain technology to improve international trade transactions, specifically in the context of LC processes. This contributes to the scientific understanding of how emerging technologies can revolutionize traditional banking practices. Secondly, in the assessment of technology limitations, the study highlights the limitations of using blockchain and smart contracts in specific stages of the LC process, such as fraud prevention and document examination. This provides valuable insights for researchers and developers to address the challenges and refine the technology for practical implementation. Thirdly, in the examination of existing writing, the review gives a relative investigation of existing writing, distinguishing similarities and contrasts in points of view on the advantages and ramifications of blockchain innovation in LC exchanges. This adds to the continuous insightful conversation on the likely effect of blockchain on banking and exchange enterprises. Fourthly, focus on specific study objectives. The study focuses on identifying the benefits and shortcomings of using blockchain and smart contracts in LC transactions and their capabilities to eliminate risks and problems. This focused approach provides a clear understanding of the technology's relevance in the specific context of international trade. Fifthly, considering regulatory and legal challenges, by highlighting the doubt surrounding the legal equivalence of electronic and paper documents in LC transactions, the study underscores the importance of addressing regulatory and legal challenges in adopting blockchain technology. This calls for further exploration of legal frameworks to ensure the technology's widespread adoption.

## **Practical Perspective**

This study provides several first-hand upgrades to security and productivity, the execution of smart contracts, and blockchain innovation in the LC cycle. It can further develop security by decreasing the risk of archive misfortune, alteration, and misrepresentation. It can likewise prompt expanded effectiveness via automating manual errands, smoothing out cycles, and lessening postpones in exchanges. Secondly, regarding Reception Difficulties and Preparing Needs, the study discoveries show potential work dislodging inside banks due to mechanization. As blockchain innovation is embraced, banks might have to put resources into preparing their staff for vital abilities in framework advancement and upkeep. This has practical implications for bank workforce planning strategies and HR departments. Thirdly, there is scope for new job opportunities: while the technology may lead to job displacement in certain areas, it also creates new job opportunities, such as blockchain experts, developers, and smart contract specialists. Banks need to embrace this transformation and adapt their hiring strategies to stay competitive in the evolving market. Fourthly, there is a need for industry collaboration. The study emphasizes that successfully implementing blockchain technology in LC transactions requires collaboration among various stakeholders, including banks, technology providers, and regulatory bodies. Collaborative efforts can help address challenges and ensure a smooth integration of blockchain into the banking industry. Fifthly, the potential for industry disruption: the study findings suggest that adopting blockchain and smart contracts could disrupt the banking industry by changing the roles of individuals within banks and increasing competition. Banks should proactively plan for these potential disruptions and adapt their business models accordingly. In conclusion, the study provides valuable scientific insights into the potential benefits and limitations of adopting blockchain and smart contracts in LC transactions. The practical implications highlight the need for banks to adapt their strategies, invest in training, and collaborate with stakeholders to leverage the full potential of blockchain technology in enhancing international trade practices and banking operations.

## **Recommendations for Future Research**

The present study introduced insights into smart contracts and blockchain technology and its crucial aspect of banking international trade through LC in the context of the banking sector. This study offered new knowledge relating to smart contracts and blockchain technology in LC practices and its implications in international banking trade. Although the consequences of this study addressed another estimation by directing factors, further exploration is expected to affirm these outcomes in different settings. Thus, future research needs to examine whether the same results can be achieved by examining these variables that contribute to the scientific understanding of how emerging technologies can revolutionize traditional banking practices by addressing the challenges and refining the technology for practical implementation. Nonetheless, although the results of this study presented a potential of using smart contracts and blockchain technology to improve international trade transactions, specifically in the context of LC processes such as fraud prevention and document examination, this provides valuable insights for researchers and developers to address the challenges and refine the technology for practical implementation. Besides this, the study underscores the importance of addressing regulatory and legal challenges in adopting blockchain technology. This calls for further exploration of legal frameworks to ensure the technology's widespread adoption. Also, future analysts can examine the aftereffects of the ongoing concentration exhaustively and investigate other significant discoveries by analyzing a few ideas. In the first place, future exploration ought to investigate the review structure for over one year. Secondly, researchers are also recommended to investigate other determinants. For example, the banks should proactively plan for these potential disruptions, adapt their business models according to the new smart contract and blockchain technology, and adapt new workforce planning strategies. Thirdly, it is prescribed for future investigations to apply qualitative methods, for example, contextual analyses explicitly on every one of the free factors and arbitrators, to more readily grasp the smart contracts and blockchain innovation. Furthermore, it is recommended that future researchers conduct more studies about smart contracts and blockchain technology and its ability in the banking system in whole phases and collaborate with the technicians in the blockchain field to increase the potential of implementing a real banking system based on blockchain technology.

## **Conclusion**

This study has made a unique contribution to the body of literature concerning the influence of determinants (LC, blockchain technology, and smart contracts) on international trade in the banking sector. Furthermore, it seeks to identify the benefits and shortcomings of using blockchain and smart contracts in LC, how capable blockchain and smart contracts are to eliminate the risk and the problems in the LC transactions, and how the third party acts like an inspector and observer, to restore a hassle with banking international trade. The results of this study have discovered the benefits of using blockchain and smart contracts in the LC and discovered challenges to implement in the banking sector. The findings confirmed a positive relationship between the advantages of the blockchain smart contract technology and the disadvantages of the LC. The current results also indicated that the role of the banking sector in the LC process is to provide additional assurance and oversight, as these technologies can facilitate the secure sharing of relevant information. The results revealed challenges that blockchain smart contract technology will face if implemented in the banking international trade or system, such as regulatory and legal challenges, adapting their business models according to the new smart contract and blockchain technology, and new workforce planning strategies challenges. The study compared the interview results with the literature review to determine the Impact of the Smart Contract and Blockchain in the LC on the banking industry, banking jobs, and International Trade and discovered similar ideas. This study also critically analyzes the benefit of using smart contracts and blockchain in the LC stages based on the interview that the researcher conducted and the literature review.

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## **LIST OF ATTACHMENTS**

**Attachments 1 : Questionnaire**

**Appendix**  
**Questionnaire**

**TC.**

**KARABUK UNIVERSITY**

**Survey on Improvement of Banking International Trade Transaction (Letter of Credit) by Smart Contracts and Blockchain Technology**

**Dear Respondent,**

Currently, we are collecting data that is required as a basis for examining the Improvement of Banking International Trade Transaction (Letter of Credit) by Smart Contracts and Blockchain Technology . This questionnaire, which starts on the following page, gives you an opportunity to tell us your reactions to these regarding your knowledge about Banking International Trade Transaction. Your response will help us understand the aspects, problems and the best solutions through smart contracts and blockchain technology of Banking International Trade Transaction (Letter of Credit) that you are particularly concerned with and the aspects that satisfy you. I hereby assure you that the responses collected from this survey will be kept confidential. Should you need any clarification or if you have any recommendations.

Thank you for your co-operation in completing this survey.

**SECTION (A) : DEMOGRAPHIC INFORMATION**

Gender :	<input type="checkbox"/> Male <span style="float: right;"><input type="checkbox"/></span> <input type="checkbox"/> Female
Age Group :	<input type="checkbox"/> 24yrs-40yrs old <span style="margin-left: 100px;"><input type="checkbox"/> 41yrs-55 yrs old</span> <span style="float: right;"><input type="checkbox"/></span> <input type="checkbox"/> >=56 yrs old
In which department you are today?	<input type="checkbox"/> Sales/Marketing <span style="margin-left: 20px;"><input type="checkbox"/> Accounting/Finance</span> <span style="margin-left: 20px;"><input type="checkbox"/> IS/IT</span> <input type="checkbox"/> Manufacturing <span style="margin-left: 20px;"><input type="checkbox"/> Customer service</span> <span style="margin-left: 20px;"><input type="checkbox"/> Other</span> (clarify):..... .....
Educational Qualifications:	<input type="checkbox"/> Bachelor <span style="margin-left: 50px;"><input type="checkbox"/> Bachelor</span> <span style="margin-left: 50px;"><input type="checkbox"/> Masters</span> <input type="checkbox"/> MBA <span style="margin-left: 100px;"><input type="checkbox"/> PhD</span> <span style="margin-left: 50px;"><input type="checkbox"/> others...</span> .....
At what level of management are you at?	<input type="checkbox"/> senior manager <span style="margin-left: 50px;"><input type="checkbox"/> manager</span> <span style="margin-left: 50px;"><input type="checkbox"/> supervisor</span> <input type="checkbox"/> technician
How long have you been here in this bank?	<input type="checkbox"/> 1 yr-5 yrs <span style="margin-left: 100px;"><input type="checkbox"/> 6yrs-10 yrs</span> <span style="float: right;"><input type="checkbox"/></span> <input type="checkbox"/> >=11

The following contains demographic information about you and your firm. Please answer by ticking (✓) in the appropriate brackets given below:

**SECTION (B): Questions**

Please answer the following questions regarding the Improvement of Banking International Trade Transaction (Letter of Credit) by Smart Contracts and Blockchain Technology and give us your answers and opinions that come from your good experience in the banking industry.

What are the problems and risks that face the bank management and bank client in the traditional system of letter of credit ?

Can blockchain and smart contracts eliminate the risks and the problems in letter of credit transactions and how the third-party acts as an inspector and observer, to restore a hassle with global trade ?

How can the banks use smart contracts and blockchain technology in their letter of credit preparations and process ?

What is your opinion about the IBM-Maersks, TradeLens and we.trade platforms which adopted the smart contracts and blockchain technology in their international trade transactions through letters of credit ?

How can we build a banking international trade system that deals with letter of credit using smart contracts and blockchain technology ?

Is it possible that the implementation of smart contracts and blockchain technology in the letter of credit process could lead to some changes in the banking industry and disappearance of existing bank jobs ?

## **CURRICULUM VITAE**

The researcher graduated from Sudan Academy for Banking & Financial Sciences, Department of Banking Information Systems. The researcher started his master's degree at Karabük University, Department of Finance and Participation Banking.