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Impact of Integrating Blockchain in Letter of Credit Process

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Abstract- **The Letter of Credit (LC) is a critical instrument in international trade, ensuring payment security and trust between exporters and importers. However, the traditional LC process is often criticized for being paper-intensive, time-consuming, and vulnerable to fraud and inefficiencies. The integration of blockchain technology offers a transformative solution by digitizing and decentralizing LC operations, thereby improving transparency, speed, and security. This article explores the impact of integrating blockchain into the LC process, highlighting its benefits, challenges, and implications for global trade especially from the perspective of emerging economies like Bangladesh.**

Keywords: **Blockchain, Letter of Credit, Trade Finance, Bangladesh, Smart Contracts, Transparency, Digital Trade.**

I. INTRODUCTION

In global trade, trust between buyers and sellers is essential but often difficult to establish. The Letter of Credit (LC) bridges this gap by serving as a bank-issued guarantee that the exporter will receive payment once contractual terms are fulfilled. Despite its reliability, the LC process remains cumbersome, involving multiple intermediaries, repetitive document verification, and significant administrative costs. Blockchain technology—known for its transparency, immutability, and decentralized nature—offers an opportunity to modernize this traditional trade finance instrument [1]. Integrating blockchain into the LC process can reshape the entire trade ecosystem by ensuring data integrity, reducing operational friction, and enhancing trust across all parties.

II. TRADITIONAL LC PROCESS: PROBLEMS AND INEFFICIENCIES

In the conventional system, LC documentation passes through a long chain of entities: the importer, exporter, issuing bank, advising bank, shipping companies, and customs authorities. Each step involves manual verification of documents such as the bill of lading, invoice, and certificate of origin.

This process suffers from several drawbacks:

- Excessive paperwork and courier delays.
- Human errors in document verification.
- High operational costs and administrative burden.
- Fraud risks, such as forged or duplicated documents.
- Limited transparency among stakeholders [2].

These challenges contribute to longer transaction times (often 5–10 days or more) and higher costs, discouraging small and medium enterprises (SMEs) from participating in international trade.

III. BLOCKCHAIN INTEGRATION IN THE LC PROCESS

Blockchain technology introduces a shared, tamper-proof digital ledger where all LC-related transactions and documents can be securely stored and verified in real time. Key components include:

Smart Contracts: Automated code that executes LC conditions such as releasing payment once shipping and customs confirmations are verified.

Immutable Records: Each transaction is permanently recorded, eliminating the risk of document manipulation.

Shared Access: All authorized parties (banks, importers, exporters, and regulators) can view and verify the same data simultaneously.

Blockchain-based LC systems, such as Contour (built on R3's Corda platform), have been tested globally and shown to reduce LC processing time from several days to under 24 hours[3].

IV. POSITIVE IMPACTS OF BLOCKCHAIN INTEGRATION

I) *Increased Speed and Efficiency:* One of the most significant impacts is the drastic reduction in processing time. Traditional LC transactions may take up to a week or more due to document exchanges between parties. With blockchain, data verification is instantaneous, reducing processing time to less than a day. For instance, HSBC Bangladesh and Standard Chartered Bank executed blockchain-based LCs that completed transactions within 24 hours—an 80–90% time reduction [4].

2) *Cost Reduction:* Automating document flow reduces courier fees, manual labor, and administrative overhead. Banks and corporations save both time and money while improving liquidity by freeing up working capital faster.

3) *Enhanced Transparency and Traceability:* Each transaction is recorded on a shared ledger accessible to all stakeholders. This transparency helps prevent discrepancies, fraud, and document duplication. It also

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enables real-time tracking of trade progress, enhancing trust among participants.

4) *Fraud Prevention and Security:* Blockchain's immutability ensures that once documents are uploaded, they cannot be altered or forged without detection. Smart contracts further eliminate the possibility of human manipulation by enforcing predefined LC terms automatically.

5) *Improved Trust and Inclusion:* In emerging markets, lack of trust and documentation inefficiencies often exclude SMEs from trade finance. Blockchain builds a trustless environment where verification is automated and auditable, allowing smaller firms to engage more confidently in cross-border transactions.

6) *Sustainability Benefits:* Digitizing the LC process eliminates large volumes of paper documentation, reducing environmental impact. The reduced need for shipping and courier services further contributes to lower carbon emissions.

V. CASE STUDIES AND GLOBAL EXAMPLES

HSBC and ING (2018): Completed the world's first blockchain-based LC for a soybean shipment from Argentina to Malaysia, reducing processing time from 5–10 days to 24 hours.

Standard Chartered Bangladesh (2020): Executed the country's first blockchain LC for garment exporter Viyellatex Group, improving operational transparency and speed.

Mercantile Bank PLC (2024): Introduced Bangladesh's first blockchain-based *Green LC*, promoting sustainability and digital transformation in local trade [5].

These cases demonstrate that blockchain integration not only improves efficiency but also strengthens compliance and environmental performance.

VI. CHALLENGES AND LIMITATIONS

1) Legal and Regulatory Barriers: Current trade laws, such as UCP 600, are based on paper documentation. Many jurisdictions have yet to fully recognize electronic documents and blockchain records as legally binding, which creates uncertainty for global adoption.

2) *Interoperability and Standardization:* Different blockchain platforms (Contour, we.trade, Marco Polo) may use varying technical standards, limiting cross-platform integration. International standardization efforts are needed to enable global interoperability.

3) *Implementation Costs and Technical Skills:* Banks and trading companies must invest in blockchain infrastructure, training, and change management. Smaller institutions may find it difficult to bear these initial costs [6].

4). *Data Privacy and Governance:* While transparency is a benefit, excessive visibility can conflict with confidentiality requirements. Designing permissioned blockchain systems that balance openness and privacy remains a challenge [7].

VII. IMPLICATIONS FOR BANGLADESH AND DEVELOPING ECONOMIES

For developing countries like Bangladesh, integrating blockchain in LCs can bring transformative benefits:

Faster payment cycles for exporters, especially in sectors like Ready-Made Garments (RMG).

Reduced documentation errors and fraud risks, improving trade credibility.

Enhanced competitiveness in international markets through faster shipment clearance.

Support for digital trade initiatives promoted by Bangladesh Bank and other regulators.

Encouragement for sustainable trade, as digital processes replace paper-heavy workflows.

However, success depends on digital infrastructure legal reforms, and collaboration among banks and regulators [8]. To fully realize these benefits, Bangladesh must strengthen digital infrastructure, promote legal recognition of e-documents, and foster collaboration among banks, customs, and shipping authorities.

VIII. CONCLUSION

The integration of blockchain into the Letter of Credit process marks a significant evolution in global trade finance. By combining automation, transparency, and security, blockchain addresses the core inefficiencies of traditional LC systems. While challenges related to regulation, interoperability, and adoption remain, real-world cases demonstrate that blockchain-enabled LCs can reduce processing time by up to 90%, lower costs, and build trust across the trade ecosystem. For emerging economies like Bangladesh, adopting blockchain in trade finance represents not just a technological upgrade but a strategic move toward a more transparent, efficient, and sustainable trade future [9].

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