Exploring the Potential: Smart Contracts and the Fight against Trade-Based Money Laundering in International Trade

Md Romel Sharif
Fintracester Inc., Khulna, Bangladesh

Email: romel.sharif@gmail.com (M.R.S.)
Manuscript received January 25, 2024; accepted March 19, 2024; published May 24, 2024
DOI: 10.18178/IJBTA. 2024.2.1.38-47

Abstract: In the evolving landscape of international trade, this comprehensive exploration delves into the paradigm shift enabled by smart contracts, challenging the traditional role of Documentary Credits (LCs). By prioritizing transparency, the article showcases how the integration of smart contracts revolutionizes proforma invoicing submission and offers a robust mechanism for scrutinizing over and under-invoicing—an entrenched tactic in Trade-Based Money Laundering (TBML). The innovative concept of introducing a bidding process within smart contracts opens doors for global participation, reducing entry barriers for startups and entrepreneurs, thereby transforming poverty into prosperity. These transformative mechanisms, rooted in blockchain technology, mark a compelling shift towards combatting TBML and fostering a more inclusive and dynamic global economy.

Keywords: smart contracts, international trade, transparency, Trade-Based Money Laundering (TBML), over and under invoicing, blockchain technology

1. Introduction

Trade-Based Money Laundering, often referred to as TBML, is a sophisticated financial crime method that involves the manipulation of international trade transactions for the purpose of laundering illicit funds [1]. In TBML schemes, criminals exploit the complexity of global trade to obscure the origins of illegally obtained money, making it appear as though it comes from legitimate commercial activities. TBML is considered one of the most intricate and challenging forms of money laundering, primarily due to its multi-faceted nature, and its potential to impact economies and financial systems significantly [2].

TBML is a multifaceted financial crime method that manipulates international trade transactions to obscure the origins of illicit funds [3, 4]. The process of TBML involves several deceptive techniques, such as:

Over and Under-Invoicing:

1) Over-Invoicing: Criminals inflate the value of goods or services in international trade transactions, creating a surplus of funds that can be moved across borders [5].
2) Under-Invoicing: Conversely, under-invoicing involves understating the value of goods or services, making it appear as though less money is involved [6].

Phantom Shipments: Criminals create fictitious invoices for non-existent or phantom shipments. Shipping documents and invoices are manipulated to depict non-existent trade transactions [7].

Manipulated Quantities: Criminals manipulate the quantity of goods in invoices, exaggerating the number, weight, or volume to artificially inflate the transaction's value [8].

Trade in Restricted or Controlled Goods: Criminals engage in trade involving restricted or controlled goods, such as weapons, to disguise the illicit origins of funds. These goods are often sold on the black market [9].

Shell Companies and Complex Supply Chains: Criminals establish shell companies and employ complex supply chains with multiple entities across jurisdictions to add layers of complexity to transactions [10].

Trade Mispricing: TBML can involve the mispricing of commodities, such as manipulating the value of goods subject to price fluctuations, like oil or minerals [11].

Multiple Payment Channels: Criminals use multiple payment channels, including wire transfers, cash transactions, or cryptocurrencies, to complicate the traceability of funds [12].

Smurfing and Structuring: To evade detection, criminals divide large transactions into smaller ones (smurfing) and may use "structuring" techniques to make it more difficult for authorities to detect and track large sums of money.

Complicit Traders and Professionals: TBML schemes often involve the collaboration of complicit traders, customs officials, bankers, and professionals who facilitate illicit transactions.

Collusion in Shipping and Customs: Collusion between individuals in shipping and customs agencies may enable the creation of false documentation or the bypassing of standard inspections.

TBML is an adaptable financial crime, and perpetrators continuously evolve their methods to evade detection. These intricate schemes exploit the complexity of global trade and pose a significant challenge for authorities and financial institutions in their efforts to prevent money laundering in international trade. Effective countermeasures against TBML require international cooperation and advanced Anti-Money Laundering (AML) techniques.

Money launderers have, over time, honed their skills in exploiting traditional Letter of Credit (LC) mechanisms, making it imperative for us to explore alternative, more reliable solutions. In this context, smart contracts leveraging blockchain technology emerge as a viable and promising option. While traditional LCs have been the go-to avenue for money launderers, smart contracts introduce a new level of sophistication, transparency, and security. By automating trade processes, employing immutable ledger technology, and integrating real-time verification through oracles, smart contracts offer a robust defense against TBML and offer a compelling proposition for a more secure and trustworthy framework in international trade. It's high time to consider this innovative approach as a solution to mitigate the vulnerabilities inherent in traditional LC-based transactions, making it increasingly challenging for money launderers to exploit trade for illicit gain.

2. Methodology

For this research article, the chosen methodology was a literature review, which involved a comprehensive examination of existing literature, research studies, and scholarly articles related to the chosen topic. The literature review methodology allowed for a systematic analysis, evaluation, and synthesis of relevant information from a variety of reputable sources.

To conduct the literature review, a thorough search was conducted using a range of materials, including academic journals, books, websites, whitepapers, and other relevant publications. The search was guided by specific keywords and criteria, ensuring the inclusion of a diverse and representative collection of literature pertaining to the research topic.

Moreover, various databases, such as PubMed, IEEE Xplore, Google Scholar, and academic libraries, were utilized to access a wide range of scholarly resources. Additionally, reputable websites and industry-specific platforms were explored to gather insights and information from industry reports, whitepapers, and expert opinions.

Each selected source underwent a critical analysis and evaluation process. The quality, relevance, and

reliability of the materials were assessed to ensure the inclusion of reputable and authoritative sources in the literature review. The evaluation considered factors such as the credibility of the authors, the validity of the research methods employed, and the impact of the findings within the field.

During the analysis phase, detailed notes were taken, summarizing the main findings, arguments, and key points from each source. The literature was categorized based on common themes, research questions, or areas of focus, aiming to facilitate the organization and synthesis of the information.

The synthesis of the findings involved the integration and summarization of the main points and arguments from the reviewed sources. A coherent and comprehensive narrative was developed, which provided an overview of the existing knowledge on the research topic. Areas of consensus, disagreements, and gaps in the literature were highlighted, serving as a foundation for further research and investigation.

Proper citation and referencing guidelines were followed throughout the literature review, adhering to any other specified citation style. This ensured that credit was given to the original authors and sources, maintaining academic integrity and avoiding plagiarism.

The literature review methodology employed in this research article aimed to provide a thorough examination of existing knowledge and insights related to the chosen topic. The review identified gaps, informed research questions, and provided a contextual framework for the subsequent sections of the article.

3. Smart Contracts *vs.* Letters of Credit: A Modern Solution for International Trade

The utilization of a Documentary Credit, commonly known as a Letter of Credit (LC), in the context of international trade has long been a cornerstone of ensuring security and confidence for both buyers and sellers. It effectively mitigates payment risks for the seller while assuring the buyer that they will receive the goods in accordance with the agreed terms. Moreover, the involvement of banks in LCs adds an extra layer of trust and credibility to the entire transaction process.

However, with the advent of blockchain technology, a revolutionary paradigm shift has emerged in the form of smart contracts, rendering traditional intermediaries, such as Letters of Credit, less indispensable in international trade transactions. Instead, smart contracts are constructed on the bedrock of blockchain networks, employing a predefined coding language to autonomously execute agreements.

In international trade, the utilization of traditional financial instruments, such as LCs, has been the norm for decades. LCs have provided a measure of security and trust in transactions. However, the emergence of blockchain technology and smart contracts offers a promising alternative that can significantly streamline and enhance international trade processes.

Here's how a smart contract can serve as a robust replacement for LCs:

Automating Transactions: Traditional LCs often involve a lengthy and manual process. Smart contracts, on the other hand, are self-executing and can automate the entire trade process, from order placement to payment. This automation reduces the risk of human error and accelerates transaction speed [13].

Transparency and Trust: Smart contracts are recorded on a decentralized blockchain, providing all parties with real-time visibility into the trade process. This transparency builds trust among participants as they can verify the status of the transaction at any point [14].

Reduced Costs: Smart contracts significantly reduce the costs associated with international trade. Traditional LCs involve fees, administrative costs, and intermediary charges. In contrast, smart contracts eliminate the need for intermediaries and streamline the process, reducing associated costs [15].

Enhanced Security: Blockchain technology provides a high level of security and immutability. Smart contracts are tamper-proof, reducing the risk of fraud and unauthorized changes to the terms of the agreement [16].

Customizable Terms: Smart contracts are flexible and allow for the creation of custom terms and

conditions to meet the specific needs of the trade agreement. Parties can define payment terms, shipping conditions, and other relevant details in a transparent and enforceable manner [17].

Verification and Compliance: Smart contracts can be programmed to ensure that all parties comply with international trade regulations and standards, reducing the risk of non-compliance. This feature is particularly important in industries with stringent regulatory requirements [18].

Risk Mitigation: Smart contracts can include predefined triggers and conditions. For instance, if a shipment is delayed or goods do not meet quality standards, the contract can automatically trigger actions such as adjusting payment terms or involving an escrow service [19].

Instant Settlement: Traditional international trade transactions can take weeks for settlement. With smart contracts, payments can be settled instantly upon the fulfillment of the agreed-upon terms, accelerating the cash flow for all parties involved [20].

Global Accessibility: Smart contracts are not limited by geographical boundaries. They can be accessed and executed by parties worldwide, making them an ideal solution for global trade [21].

Interoperability: Smart contracts can be integrated with existing trade platforms, making it easier for businesses to transition from traditional methods to blockchain-based solutions [22].

In fact, smart contracts have the potential to revolutionize international trade by offering a more efficient, cost-effective, and secure alternative to traditional Letters of Credit. As the technology continues to mature and gain wider adoption, businesses engaged in global trade should consider the advantages of smart contracts in their operations.

4. How the Smart Contracts work as replacement of LCs

Here's a simplified explanation of how smart contracts work in international trade with the involvement of oracles and predefined assumptions:

Parties Involved:

1) Buyer: The entity purchasing goods
2) Seller: The entity selling goods
3) Oracle: A trusted third-party or system providing real-time information and verification.

Predefined Assumptions:

1) All verifiers have a blockchain oracle or DAO platform responsible for document confirmation
2) These platforms issue electronic Bill of Lading (eBL), Electronic Insurance Policy (eIP), and Electronic Inspection Report (eIR).

Step-by-Step Process:

1) Agreement Formation: The buyer and seller agree on the terms and conditions of an international trade deal. These terms include the type and quantity of goods, price, shipment details, and quality standards.
2) Smart Contract Creation: The agreed-upon terms are encoded into a smart contract on a blockchain platform.
3) Oracle Verification: The smart contract interacts with a trusted oracle, which verifies key conditions. This could include confirming the arrival of goods at the destination port or checking the quality of products.
4) Document Issuance: Once conditions are met, the blockchain oracle platform generates electronic documents: Electronic Bill of Lading (eBL), Electronic Insurance Policy (eIP), Electronic Inspection Report.(eIR)
5) Escrow and Payment Terms: The smart contract holds the funds in escrow. Payment is released automatically when conditions are met, and electronic documents are issued.

6) Shipping and Logistics: IoT devices and sensors attached to the shipment provide real-time data on the location and condition of goods. This data is fed into the smart contract, which can trigger actions in response to discrepancies.
7) Customs and Regulatory Compliance: The smart contract ensures compliance with customs and regulatory requirements. It generates and submits necessary electronic documentation to authorities.
8) Multi-Signature Authorization: Various parties, like the shipping company, customs authorities, and the buyer, may need to provide authorization at different stages of the trade process. Multi-signature authorization ensures consensus.
9) Dispute Resolution: In case of disputes, the smart contract includes predefined mechanisms for resolution, possibly involving a neutral third party or an arbitration process.
10) Settlement and Finalization: Once all conditions are met, the smart contract executes the final settlement. Funds are released, ownership is transferred, and the trade transaction is completed.
11) Audit and Traceability: The blockchain ledger keeps a secure record of all transactions, providing an audit trail for all parties involved. This ensures transparency and traceability.
12) Integration with Existing Systems: Smart contracts seamlessly integrate with existing trade platforms and systems used by businesses.
13) International Accessibility: Smart contracts are accessible and executable by parties around the world, making them ideal for global trade.

In essence, smart contracts function as a series of conditional clauses, automating actions based on specific predefined criteria. To facilitate clearer comprehension, we can consider the following: "IF the exporter fulfills the stipulated documentation and adheres to the agreed-upon shipping terms, THEN the smart contract instantaneously triggers the payment to the exporter."

This approach encapsulates the essence of smart contracts as digital IF-THEN agreements, ensuring that trade transactions unfold precisely as contracted, with no manual intervention required. Consequently, this streamlines the entire international trade process, circumventing the need for a banking intermediary to establish a Letter of Credit (L/C), thereby significantly reducing associated costs and processing durations.

To further illustrate, contemplate this scenario: An exporter and importer embark on a trade arrangement facilitated by a smart contract on the blockchain network. The exporter ships the goods, and upon successful delivery, coupled with the verification of all contractual conditions, the smart contract triggers an automatic payment to the exporter, rendering the process swift and devoid of third-party involvement. In this manner, smart contracts enhance the efficiency of international trade, providing both parties with a seamless experience. An exemplary smart contract is crafted in Fig. 1.

Fig. 1. Smart contract for an example basis.

In the previously described scenario, the sequence of events unfolds as follows: Initially, the exporter conducts thorough research to ensure the reliability and credibility of the mentioned companies. Once a level of trust is established, the exporter accepts the contract and communicates this acceptance to the buyer. Subsequently, the exporter proceeds with the procurement of the specified goods, in this instance, 100 HP laptops, and makes the necessary preparations for shipment. As an added layer of assurance, the exporter arranges for an inspection to be carried out, typically through Oracle or DAO Global Inspection, to verify the quantity, quality, and condition of the goods. Furthermore, the exporter secures insurance coverage for the shipment, often done through Insure Oracle or DAO Lloyd, which serves to mitigate potential risks during the goods' transit. To facilitate the actual shipment, the exporter engages the services of Oracle or DAO Maersk Shipping, entrusted with overseeing the logistics, transportation of the goods, and handling all relevant documentation.

With all the requisite arrangements in place, the exporter uploads all pertinent documents or links associated with the shipment onto the dedicated field or option within the smart contract. This step is instrumental in providing transparency and accessibility to the information necessary for the transaction.

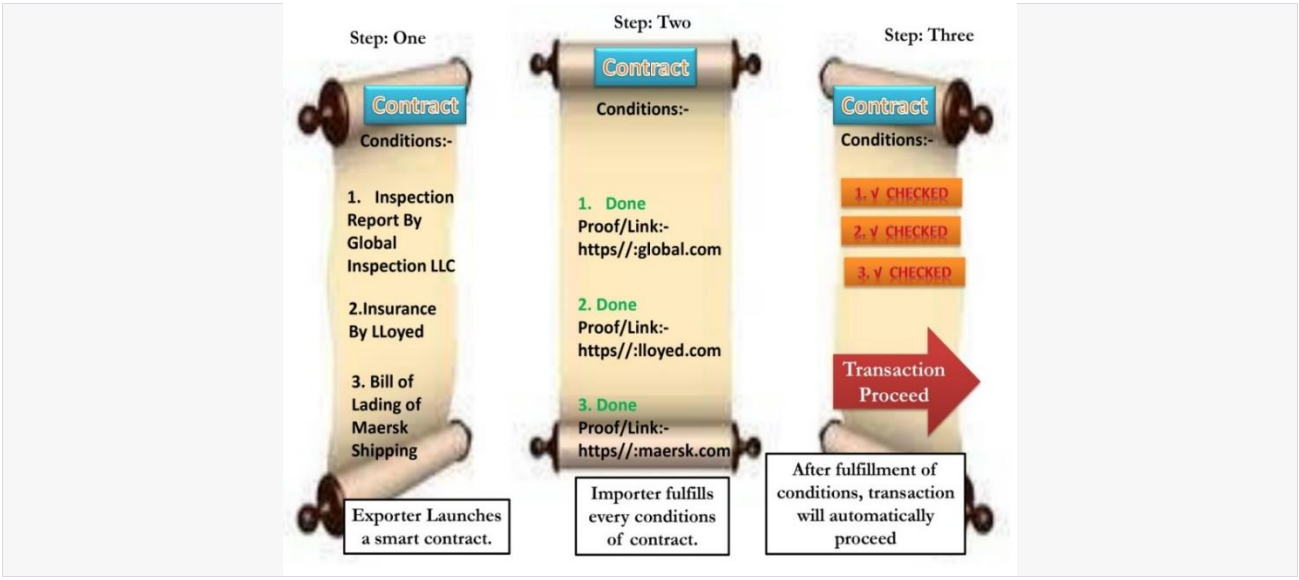


Fig. 2. Use of smart contract for international trade.

In the final phase, the exporter initiates a request for verification and authentication checks on the uploaded documents or links, a process overseen by the Oracles or DAOs. These entities, functioning as decentralized autonomous organizations, efficiently and independently conduct the verification process. Upon the successful verification by the Oracles or DAOs, the exporter promptly receives the agreed-upon payment. This streamlined process aptly demonstrates, as shown in Fig. 2, how smart contracts enable international trade without the reliance on traditional banking intermediaries.

By harnessing the capabilities of smart contracts and collaborating with specialized Oracles or DAOs for inspection, insurance, and shipping, both individuals and businesses can engage in international trade with heightened efficiency and security. The absence of traditional banking institutions in this scenario underscores the transformative potential of blockchain technology, offering an inclusive and accessible platform for seamless cross-border transactions.

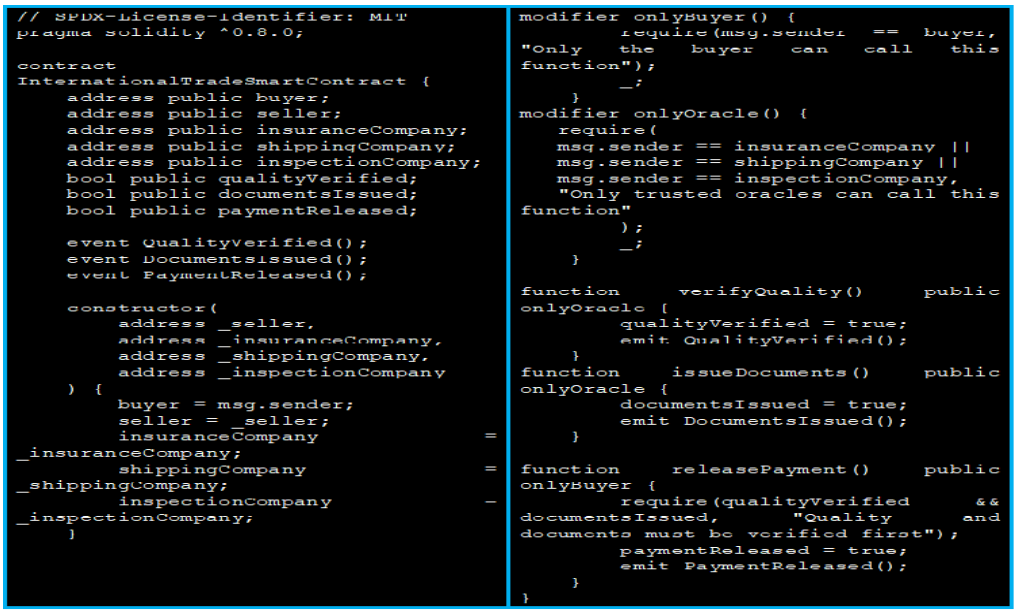
The adoption of smart contracts within the blockchain network not only ensures swift and secure payment settlements but also extends a welcoming hand to startups and entrepreneurs on a global scale. By removing the reliance on substantial capital reserves and alleviating bureaucratic barriers, smart contracts empower businesses of all magnitudes to partake in international trade with greater ease, thus nurturing a more

inclusive and vibrant global economy.

Furthermore, the transformative potential of these smart contracts reaches even the economically underserved. Consider a scenario where an individual, with limited capital support from a local NGO, engages in micro financing. Through the use of smart contracts, this person can efficiently revolve their initial capital repeatedly and reinvest profits back into their enterprise. The key advantage lies in the instantaneous payments that smart contracts facilitate, sparing them from prolonged waits through conventional banking channels. This mechanism fundamentally paves the path for the transition from poverty to prosperity, as individuals effectively access and leverage the opportunities offered by smart contracts, transcending local limitations to become global entrepreneurs, thus redefining economic trajectories.

In a word, smart contracts in international trade offer a streamlined, automated, and transparent approach to managing trade transactions. They have the potential to reduce costs, enhance security, and improve the efficiency of international trade while providing trust and transparency along with transforming global economy among all parties involved.

Fig.3. shows a simplified example of a smart contract for international trade written in Solidity, which is a popular programming language for creating smart contracts on the Ethereum blockchain:



```
// SPDX-License-Identifier: MIT
pragma solidity ^0.8.0;

contract
InternationalTradeSmartContract {
    address public buyer;
    address public seller;
    address public insuranceCompany;
    address public shippingCompany;
    address public inspectionCompany;
    bool public qualityVerified;
    bool public documentsIssued;
    bool public paymentReleased;

    event QualityVerified();
    event DocumentsIssued();
    event PaymentReleased();

    constructor(
        address _seller,
        address _insuranceCompany,
        address _shippingCompany,
        address _inspectionCompany
    ) {
        buyer = msg.sender;
        seller = _seller;
        insuranceCompany =
_insuranceCompany;
        shippingCompany =
_shippingCompany;
        inspectionCompany =
_inspectionCompany;
    }
```

```
modifier onlyBuyer() {
        require(msg.sender == buyer,
"Only the buyer can call this
function");
        _;
    }
modifier onlyOracle() {
   require(
   msg.sender == insuranceCompany ||
   msg.sender == shippingCompany ||
   msg.sender == inspectionCompany,
   "Only trusted oracles can call this
function"
        );
        _;
    }

function verifyQuality() public
onlyOracle {
        qualityVerified = true;
        emit QualityVerified();
    }
function issueDocuments() public
onlyOracle {
        documentsIssued = true;
        emit DocumentsIssued();
    }

function releasePayment() public
onlyBuyer {
        require(qualityVerified &&
documentsIssued, "Quality and
documents must be verified first");
        paymentReleased = true;
        emit PaymentReleased();
    }
}
```

Fig. 3. Basic coding of the proposed smart contract.

In this enhanced example:

- The trusted oracles are specified as real-world entities:
- 'insuranceCompany' represents a reputable insurance company that issues electronic insurance policies (eIP).
- 'shippingCompany' represents a well-known shipping and logistics provider that issues the electronic Bill of Lading (eBL) and provides real-time location and condition data.
- 'inspectionCompany' represents an established inspection company responsible for verifying the quality and quantity of goods and providing real-time inspection reports.
- The modifiers ensure that only the buyer and the trusted oracles (insurance company, shipping company, and inspection company) can call specific functions within the smart contract.
- The contract simulates the process of verifying quality, issuing electronic documents, and releasing payment upon successful verification.

The above example serves as a conceptual model and does not directly integrate with real-world companies. However, it demonstrates how smart contracts can involve trusted oracles from well-known entities like Lloyd's of London (a notable insurance provider) and prominent shipping and inspection companies to facilitate secure and automated international trade.

5. Benefits of Using Smart Contracts in International Trade for Reducing Trade-Based Money Laundering (TBML)

The adoption of smart contracts in international trade can offer a range of benefits that contribute to the reduction of TBML risks. Here are some key advantages:

Transparency and Traceability: Smart contracts operate on blockchain technology, providing an immutable and transparent ledger of all trade transactions. This transparency makes it extremely difficult for money launderers to conceal their illicit activities.

Automatic Verification: Smart contracts can integrate with trusted oracles and verification platforms to ensure the authenticity of trade documents, such as bills of lading, inspection reports, and insurance policies. This significantly reduces the risk of counterfeit documentation used for TBML.

Real-time Monitoring: IoT devices and sensors connected to smart contracts enable real-time monitoring of goods in transit. This minimizes the opportunity for criminals to use fake shipments to launder money.

Immutable Records: Once information is recorded on the blockchain, it cannot be altered or deleted. This feature ensures that all trade-related data remains secure and tamper-proof, making it challenging for money launderers to manipulate records.

Reduced Over/Under-Invoicing: In the broader context, where a significant proportion of money laundering takes root in the realms of over and under-invoicing, the potential of smart contracts can be magnified. By introducing an additional feature within smart contracts, all exporters and sellers, regardless of their geographical location, are granted the opportunity to engage in a bidding process by submitting their pro forma invoices directly into the smart contract. These pro forma invoices effectively serve as expressions of interest (EOIs) showcasing the lowest bids to secure the contract within a Distributed Ledger Technology (DLT) framework. The transparency of the DLT allows for comprehensive analysis, enabling anyone to scrutinize whether over or under-invoicing has occurred. This pivotal advantage illustrates how smart contracts, in contrast to traditional LCs, have the capacity to significantly mitigate over and under-invoicing, thereby curbing a prevalent tactic in Trade-Based Money Laundering (TBML).

Elimination of Intermediaries: Smart contracts streamline trade processes by automating tasks and eliminating the need for multiple intermediaries. This reduces the complexity of transactions and the opportunities for money laundering through intermediaries.

Instant Settlement: Smart contracts enable immediate settlement upon the fulfillment of predefined conditions. This reduces the time window for money launderers to obscure the source of their funds during lengthy trade transactions.

Customized Compliance Rules: Smart contracts can be programmed to ensure that all trade activities adhere to specific compliance rules and regulations. Non-compliant transactions are automatically flagged and investigated.

Multi-signature Authorization: Multi-signature features in smart contracts require authorization from multiple parties for various stages of the trade process. This adds an additional layer of security and transparency to prevent TBML.

Global Accessibility: Smart contracts are accessible to parties around the world, making it easier for regulators and law enforcement agencies to monitor and investigate cross-border trade activities.

Improved Due Diligence: Smart contracts facilitate thorough due diligence as all trade-related data is stored on the blockchain. Regulators and financial institutions can access this data for enhanced compliance checks.

Cost Reduction: By automating many aspects of international trade and reducing the need for intermediaries, smart contracts can lead to cost savings for businesses. This makes TBML less attractive due to the increased efficiency and transparency.

Indeed, the use of smart contracts in international trade offers a range of benefits that can significantly reduce the risk of TBML. These benefits include enhanced transparency, automation, real-time monitoring, and improved compliance, all of which contribute to making it more challenging for money launderers to exploit trade transactions for illicit purposes.

6. Conclusion

The incorporation of smart contracts in international trade, although currently in a conceptual stage, presents a groundbreaking opportunity to fortify the sector against the perils of Trade-Based Money Laundering (TBML). Smart contracts offer an array of distinct benefits, such as heightened transparency, real-time verification capabilities, automated monitoring, the establishment of immutable records, a reduced susceptibility to over/under-invoicing, the elimination of intermediaries, and universal accessibility. Delving into the horizon, the future prospects are profoundly promising. These encompass bolstered security, a substantial surge in operational efficiency, worldwide adoption, a harmonization with evolving regulatory demands, diminished operational overheads, and the advanced employment of data analytics for anomaly detection and TBML prevention. However, it is imperative to acknowledge that realizing these potential advantages necessitates diligent research, rigorous testing, and close collaboration with experts versed in the domains of international trade, blockchain technology, and anti-money laundering efforts. Smart contracts represent a potent solution, and while they are currently at a conceptual juncture, they carry the potential to usher in a more secure, efficient, and transparent era for international trade on a global scale.

Competing interest

The authors declare no conflict of interest

References

[1] U.S. Department of State, "Trade-Based Money Laundering." https://2009-2017.state.gov/j/inl/rls/nrcrpt/2015/vol2/247158.htm
[2] FATF (Financial Action Task Force), "Trade-Based Money Laundering." http://www.fatf-gafi.org/media/fatf/documents/reports/Guidance-trade-based-money-laundering-2013.pdf
[3] U.S. Department of State. "Trade-Based Money Laundering." https://2009-2017.state.gov/j/inl/rls/nrcrpt/2015/vol2/247158.htm
[4] FATF (Financial Action Task Force). "Trade-Based Money Laundering." http://www.fatf-gafi.org/media/fatf/documents/reports/Guidance-trade-based-money-laundering-2013.pdf
[5] United Nations Office on Drugs and Crime (UNODC). "Trade-Based Money Laundering." https://www.unodc.org/e4j/en/money-laundering/module-10/key-issues/trade-based-money-laundering.html
[6] Transparency International. "Trade Misinvoicing and Trade-Based Money Laundering." https://www.transparency.org/whatwedo/publication/trade_misinvoicing_and_trade_based_money_laundering.html
[7] Wolfsberg Group. "Trade Finance Principles." https://www.wolfsberg-principles.com/sites/default/files/wb/Trade%20Finance%20Principles%20for%20AML.pdf
[8] Deloitte. "Trade-Based Money Laundering." https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/risk/LU_TBML.pdf
[9] World Bank. "Trade-Based Money Laundering: Risks and Regulatory Responses." https://openknowledge.worldbank.org/handle/10986/22047
[10] Financial Crimes Enforcement Network (FinCEN). "Advisory on Trade-Based Money Laundering." https://www.fincen.gov/resources/advisories/fincen-advisory-fin-2012-a003
[11] UNODC. "Trade-Based Money Laundering." https://www.unodc.org/e4j/en/money-laundering/module-10/key-issues/trade-based-money-laundering.html
[12] Wolfsberg Group. "Trade Finance Principles." http://www.cbr.ru/content/document/file/124091/wg_trade_finance_principles_final_jan_09.pdf

[13] W. Mougayar, "The Business Blockchain: Promise, Practice, and Application of the Next Internet Technology." Wiley, 2016.
[14] D. Tapscott and A. Tapscott, "Blockchain Revolution: How the Technology Behind Bitcoin is Changing Money, Business, and the World." Penguin, 2016.
[15] R. Beck, and C. Müller-Bloch, "Blockchain as Radical Innovation: A Framework for Engaging with Distributed Ledgers," in *Proc. Twenty-Third Americas Conference on Information Systems*, Boston, 2017.
[16] M. Nofer, P. Gomber, O. Hinz, and D. Schiereck, "Blockchain," *Business & Information Systems Engineering*, vol. 59, no. 3, pp. 183–187, 2017.
[17] K. Werbach, "The Blockchain and the New Architecture of Trust," *MIT Sloan Management Review*, vol. 59, no. 2, pp. 45–53, 2018.
[18] UN/CEFACT, "Blockchain and Trade Facilitation: Proof of Concept," United Nations Centre for Trade Facilitation and Electronic Business, 2017.
[19] A. Kosba, A. Miller, E. Shi, Z. Wen, and C. Papamanthou, "Hawk: The Blockchain Model of Cryptography and Privacy-Preserving Smart Contracts," in *Proc. 2016 ACM SIGSAC Conference on Computer and Communications Security (CCS)*, 2016, pp. 839–858.
[20] R. Ali and D. Clarke, "Smart Contracts in Financial Services: Getting from Hype to Reality," *Deloitte Insights*, 2019.
[21] M. Möser and M. Klems, "Smart Contracts: Challenges and Opportunities for IT Adoption," in *Proc. the 50th Hawaii International Conference on System Sciences*, 2017.
[22] E. Hofmann, M. Rüsch, and M. Böhm, "The Internet of Things, Smart Manufacturing, and Industry 4.0," Implications for the Smart Service Business Model: A User-Centric Approach, in *Proc. Conference on Advanced Information Systems Engineering*, 2017, pp. 389–396.