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Digitalization of Accounting for Snternational Payments as Componentsof Logistics Supply Chains Based on Smart Contracts

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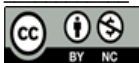
Abstract. *The digitalization of international trade, the rapid advancement of financial technologies, and the integration of information systems across supply chain participants require a fundamental transformation of accounting methodology for international monetary settlement transactions in line with contemporary digital business process models. The purpose is developing a transformed methodology for the digitalized accounting of international monetary settlement transactions within global logistics supply chains through the implementation of logistics smart contracts. The study systematizes the distinctive characteristics of international monetary settlement transactions within logistics supply chains and identifies their impact on supply chain continuity and the transformation of accounting methodology under the digitalization of international business activities. The research substantiates the application of blockchain technology as the information infrastructure for the digitalization of international monetary settlements across logistics supply chains. A smart contract–based accounting model for international payments is proposed, enabling the automated execution of contractual obligations, synchronization of logistics events with financial transactions, and real-time generation of accounting records. An information interaction algorithm for participants in the international logistics system is developed, covering smart contract formation, cargo transportation, customs clearance, automated payment execution, and the transfer of ownership rights. Methodological approaches to the automated recognition of international monetary settlement transactions, including the accounting treatment of funds in transit, accounts payable, and customs duties, are defined according to the sequential stages of the logistics process. The study also substantiates the potential application of central bank digital currencies (CBDCs) to accelerate cross-border payments and mitigate foreign exchange risk. Furthermore, the integration of accounting, banking, logistics, and customs information systems through application programming interfaces (APIs), open-source technologies, and the ISO 20022 international standard receives methodological justification as a means of standardizing information exchange and establishing the foundation for continuous digital accounting of international settlements within logistics supply chains.*

Keywords: *accounting, logistics, international payments, monetary transactions, logistics supply chains, digitalization, smart contracts.*

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Цифровізація обліку міжнародних розрахунків як складових логістичних ланцюгів постачання на основі смартконтрактів

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Анотація. Цифровізація міжнародної торгівлі, розвиток фінансових технологій та інтеграція інформаційних систем учасників логістичних ланцюгів постачання зумовлюють необхідність трансформації методики бухгалтерського обліку міжнародних грошово-розрахункових операцій відповідно до сучасних цифрових моделей організації бізнес-процесів. Мета дослідження полягає у трансформації методики цифровізованого обліку грошово-розрахункових операцій у міжнародній системі логістичних ланцюгів постачання в умовах запровадження практики логістичних смартконтрактів. Систематизовано специфічні особливості міжнародних грошово-розрахункових операцій у логістичних ланцюгах постачання, визначено їх вплив на безперервність логістичних процесів і трансформацію методики бухгалтерського обліку в умовах цифровізації зовнішньоекономічної діяльності. Обґрунтовано доцільність використання технології блокчейн як інформаційної основи цифровізації міжнародних грошових розрахунків у логістичних ланцюгах постачання. Запропоновано модель обліку міжнародних платежів на основі смартконтрактів, що передбачає автоматичне виконання договірних умов, синхронізацію логістичних подій із грошовими транзакціями та формування облікових записів у режимі реального часу. Розроблено алгоритм інформаційної взаємодії учасників міжнародної логістичної системи, який охоплює етапи укладання смартконтракту, переміщення товарів, митного оформлення, здійснення автоматичних платежів і переходу права власності. Визначено методичні підходи до автоматизованого відображення міжнародних грошово-розрахункових операцій, обліку транзитних коштів, кредиторської заборгованості та митних платежів відповідно до етапів реалізації логістичного процесу. Обґрунтовано можливості використання цифрових валют центральних банків (CBDC) для прискорення транскордонних платежів і зниження валютних ризиків. Доведено доцільність інтеграції облікових, банківських, логістичних та митних інформаційних систем на основі API, відкритого програмного коду та міжнародного стандарту ISO 20022, що забезпечує уніфікацію інформаційного обміну й створює передумови для переходу до безперервного цифрового бухгалтерського обліку міжнародних розрахунків у логістичних ланцюгах постачання.

Ключові слова: облік, логістика, міжнародні платежі, грошово-розрахункові операції, логістичні ланцюги постачання, цифровізація, смартконтракти.

Introduction. Logistics processes are intrinsically linked to the financial and operational activities of an enterprise, forming an integrated system of interdependent material, financial, and information flows. Within such a system, information infrastructure serves as a coordinating mechanism that facilitates managerial decision-making and ensures the effective synchronization of business processes. Settlement operations constitute an important element of logistics management, as they enable enterprises to fulfil financial obligations arising from transactions with business partners. Depending on the nature of contractual relationships, financial flows may be directed either toward the enterprise in the form of receivables or toward counterparties in the settlement of payables. The repayment of accounts receivable or payable may be regarded as the completion of a particular logistics cycle while simultaneously creating the financial prerequisites for subsequent operational activities. In enterprise logistics systems, advance payments typically precede procurement and delivery processes, whereas post-payment arrangements involve the transfer of funds following the fulfilment of contractual obligations and in accordance with the payment conditions stipulated in the agreement.

Settlement transactions represent the transition point that activates a new stage of the logistics cycle. Consequently, each complete logistics cycle either begins or concludes with the transfer of monetary funds. Within international business operations, however, the structure of logistics supply chains becomes more complex due to the involvement of cross-border transportation, customs procedures, currency conversion, international payment mechanisms, and compliance with the regulatory requirements of multiple jurisdictions.

Analysis of research and publications. Contemporary scholarly discourse increasingly emphasizes the digital transformation of monetary settlement processes within logistics supply chains and its impact on accounting, control, and information management systems. Existing research primarily examines the capacity of digital technologies to increase the transparency and traceability of logistics operations, automate document flows, enhance the accuracy and reliability of accounting data, and facilitate closer integration among supply chain participants. Accordingly, the digitalization of economic processes in logistics supply chains has developed into a comprehensive and multidimensional research domain that incorporates technological, financial, accounting, organizational, and managerial dimensions of logistics activities.

Most scholars emphasize the advantages of digitalizing monetary settlement transactions in conjunction with the ongoing transformation of logistics business models. For example, Vitale Gianluca demonstrates that integrating blockchain technology with logistics management systems facilitates the automation of monetary settlements, increases payment transparency, and improves supply chain management efficiency [1]. Zadorozhnyi Z.-M., Muravskiy V., Pochynok N., and Hrytsyshyn A. investigate the integration of electronic payments into chaotic logistics and warehouse management systems [2]. Berneis Moritz, Bartsch Devis, and Winkler Herwig conclude that blockchain technology and smart contracts enable the automatic execution of payment obligations, reduce transaction costs, and accelerate financial settlements between counterparties within logistics networks [3]. Pochynok N., Muravskiy V., and Farion V. develop methodological approaches to electronic financial communications in public procurement accounting, thereby supporting the digital transformation of logistics-related financial processes [4].

Another significant strand of academic research focuses on the international dimension of logistics supply chain activities. Kumar Ajay, Liu Rui, and Shan Zhejian demonstrate that blockchain technology enhances the security of documentary credit transactions, electronic bills of lading, and other digital settlement procedures in international trade [5]. Narayanam Krishnasuri, Goel Seep, Singh Abhishek, Shrinivasan Yedendra, and Selvam Parameswaram propose a blockchain-based platform for automating accounts payable management within supply chains by enabling digital verification of international invoices, automated claim reconciliation, and faster settlements among carriers, suppliers, and buyers [6]. Tönnissen Stefan and Teuteberg Frank examine the influence of blockchain technology on the transformation of logistics business models and conclude that digitalization simplifies financial settlements among supply chain participants while reducing the dependence on intermediaries in international payment processes [7].

The functional capabilities of blockchain technology as the technological foundation of logistics smart contracts constitute another major area of academic inquiry. Dutta Pankaj, Choi Tsan-Ming, Somani Surabhi, and Butala Richa classify the principal applications of blockchain in logistics systems, identifying financial flow digitalization, payment automation, and smart contracts as key drivers of modern supply chain development [8]. Natanelov Valeri, Cao Shoufeng, Foth Marcus, and Dulleck Uwe demonstrate that smart contracts in supply chain finance automate contractual execution, synchronize logistics events with monetary settlement transactions, and reduce reliance on financial intermediaries [9]. Luo Zhengdong reviews contemporary approaches to blockchain-based Supply Chain Finance and identifies smart contracts as the primary mechanism for automating factoring operations, accounts receivable financing, and digital settlements among supply chain participants [10]. Popivniak Yuliia highlights the prospects of blockchain adoption in accounting, demonstrating that distributed ledger technology automates the recording of business transactions, improves the reliability of accounting information, and mitigates risks associated with electronic payment processes [11].

Only a limited number of studies specifically address the accounting and control implications of digitalized monetary settlement transactions in logistics systems. Rijanto Arief investigates the role of blockchain technology in overcoming accounting, accountability, and assurance challenges within Supply Chain Finance, demonstrating its potential to automate monetary settlements, enhance financial transaction transparency, facilitate smart contract implementation, and reduce operational risks among logistics participants [12]. Percherla Anand Kumar examines the integration of blockchain-based smart contracts with enterprise resource planning (ERP) systems, substantiating their contribution to logistics process automation, synchronization of accounting with supply chain operations, automatic execution of payment obligations, real-time updating of accounting records, and enhanced transparency of financial settlements [13]. Shevchuk O. and Muravskyi V. analyze the influence of blockchain technology on accounting and control systems for electronic transactions, highlighting the potential of distributed ledger technology to improve accounting reliability, automate monetary settlement transactions, enhance financial transparency, and support the digital transformation of business processes [14]. Tolmach Palina, Li Yi, Lin Shang-Wei, Liu Yang, and Li Zengxiang summarize contemporary approaches to the formal specification and verification of smart contracts, emphasizing that their reliability represents a prerequisite for the automation of financial settlements and accounting processes within digital ecosystems [15].

Despite the expanding body of scholarly literature, existing research remains relatively fragmented and does not yet offer a coherent methodological framework for the digitalization of accounting procedures related to international monetary settlements within logistics systems. Addressing this limitation requires an integrated approach that combines digital technologies, international payment instruments, logistics and supply chain processes, and the specific features of cross-border business transactions. Such an interdisciplinary perspective provides a methodological basis for improving both the accounting treatment of international settlements and the organizational mechanisms supporting their implementation. The identified research gap therefore constitutes the principal rationale for and determines the objective of the present study.

The purpose of this article is to transform the methodology of digitalized accounting for international monetary settlement transactions within global logistics supply chains through the implementation of logistics smart contracts.

Results. International logistics activities involve cooperation with counterparties operating within heterogeneous legal and regulatory environments. As foreign business entities are subject to the legislation and regulatory requirements of their respective jurisdictions, logistics systems must demonstrate sufficient flexibility to accommodate differences in international legal frameworks and compliance practices. An additional source of complexity arises from the multicurrency nature of cross-border settlements, which frequently require transactions to be conducted in several foreign currencies. This characteristic substantially complicates the formation, allocation, and assessment of logistics costs associated with import and export operations. Exchange rate volatility further affects the reliability of monetary valuation prior to the completion of settlements and generates additional currency-related risks for enterprises engaged in international logistics activities. Significant fluctuations in exchange rates may modify the economic parameters and expected profitability of contractual arrangements, while unfavorable currency movements can weaken counterparties' ability to meet their financial obligations. Consequently, foreign exchange volatility may contribute to increased settlement risk and, ultimately, to disruptions in the continuity and stability of international supply chains.

Maintaining the continuity of international import and export supply chains requires consideration of the time needed for cross-border fund transfers between payers and beneficiaries. Unlike domestic payment systems that typically process transactions almost instantaneously, international settlements

depend on information synchronization among banking and financial infrastructures across multiple jurisdictions, resulting in longer transaction processing periods. Consequently, logistics operations and supply chain activities may experience delays while awaiting payment confirmation and settlement completion.

A further distinguishing feature of international logistics is the involvement of multiple stakeholders in cross-border settlement processes. Beyond buyers and sellers, international payment transactions typically engage customs authorities, customs brokers, freight forwarders, insurance providers, international carriers, warehouse operators, and other logistics intermediaries. The coordination of financial settlements among these participants requires effective cash-flow planning, accurate scheduling of payment obligations, and timely remuneration for logistics services. Delays or failures in settling liabilities with any party may generate cascading effects across interconnected logistics operations. Consequently, disruptions in individual settlement transactions can adversely affect the efficiency of the entire logistics cycle and undermine the continuity and resilience of international supply chains.

The expansion of international logistics activities has also accelerated the adoption of multimodal transportation networks. Cross-border logistics operations frequently require the movement of goods through combinations of maritime, air, rail, and road transport. Consequently, enterprises must continuously monitor cargo movements while coordinating timely payments to multiple transportation providers operating under different contractual arrangements. Efficient financial settlement mechanisms therefore become essential for ensuring uninterrupted logistics operations. Delayed payments to shipping companies, airlines, railway operators, or other transport providers may result in cargo detention, operational downtime, and significant disruptions to logistics supply chains. The distinctive characteristics of international monetary settlement transactions, their implications for logistics supply chains, and their impact on accounting methodology are summarized in Table 1.

Table 1

Specifics of international payments in logistics supply chains

Specifics of international payments in the logistics system	Impact on supply chains	Impact on accounting
Different regulatory requirements and regulations in different countries	Need to adapt logistics processes to the requirements of different jurisdictions; possible delays due to compliance	Accounting for transactions in accordance with international and national requirements; documentary confirmation of foreign economic activity operations
Multicurrency of payments	Makes cost and procurement planning more difficult, affects import and export prices	Accounting for currency transactions, exchange rate differences, revaluation of monetary items
Currency risks	Risk of contract failure, loss of solvency of counterparties and interruption of supply	Recognition of exchange rate differences, risk provisions, disclosure of financial risks
Long international payment times	Possible slowdown of the logistics cycle until payment confirmation	Control of receivables and payables, accounting for transit payments
A large number of participants (banks, customs, brokers, forwarders, insurers, carriers, warehouses)	Dependence of continuity of supply on timely settlements with all participants	Analytical accounting for each counterparty, distribution of logistics costs

Multimodal transportation	Need for timely payment of various carriers to avoid downtime	Accounting for transport and procurement costs, distribution of costs between delivery stages
Use of digital payment technologies (API, ISO 20022, electronic invoices)	Acceleration of information exchange and increased transparency of supply chains	Accounting automation, ERP integration with banks, operational display of settlements

Source: systematized by the author.

Mitigating the adverse effects of international settlement transactions on supply chains requires an accelerated digital transformation of financial processes. The implementation of advanced information technologies in cross-border monetary settlement transactions enhances information exchange among payers, beneficiaries, and financial institutions while increasing the efficiency of transaction processing. Digital communications become integrated into accounting information systems, transforming both accounting methodology and organizational practices. The digitalization of accounting for electronic transactions eliminates redundant information-processing procedures that traditionally delay international logistics operations and reduce supply chain efficiency.

The adoption of blockchain technology represents one of the most significant developments influencing the transformation of accounting practices related to international monetary settlements within logistics systems. The use of blockchain-based payment instruments, including electronic money and digital currencies, has the potential to reduce reliance on traditional financial intermediaries and streamline cross-border settlement procedures. Conventional international banking transactions generally involve multiple stages of verification, authorization, and processing, which may considerably increase the time required to complete payments. This issue becomes particularly significant when international shipments are divided into numerous smaller consignments, thereby generating a greater number of individual settlement transactions. Within traditional banking infrastructures, each additional payment may involve separate processing procedures and associated time delays. The cumulative effect of such delays can increase the overall duration of the logistics cycle and adversely affect the timely fulfilment of international logistics contracts.

The application of blockchain technology to international logistics settlements removes unnecessary intermediaries from information exchange processes. As the role of financial institutions in transaction verification declines, traditional bank statements become less significant as the primary source of accounting evidence. Under conventional accounting practices, bank statements provide legal confirmation of payment execution and serve as the basis for recording accounting entries. Blockchain-based payment systems fundamentally transform this process by automatically distributing verified transaction information to all authorized participants in the logistics network. Consequently, accounting records related to monetary settlement transactions can be generated immediately after transaction validation without waiting for paper or electronic bank statements.

The availability of authenticated electronic payment data provides a reliable basis for the automated generation of corresponding accounting entries. Upon receipt of verified transaction information, participants in the logistics network may automatically update cash accounts and related accounting records, thereby improving the timeliness and accuracy of financial reporting. Real-time confirmation of payment receipt also serves as an operational trigger for initiating subsequent stages of the logistics process. Accordingly, the recognition of incoming funds within the accounting system not only confirms the fulfilment of financial obligations but also supports the seamless progression and continuity of supply chain operations.

Blockchain technology provides the technological foundation for smart contracts, which enable the automatic execution of contractual obligations through predefined algorithms. Smart contracts can incorporate sequential logistics procedures and automatically execute financial transactions when predetermined supply chain events occur. Their integration into accounting and control systems offers significant opportunities for automating international logistics operations. In particular, payment instructions may be executed automatically after verified information confirms the completion of a specific logistics event, such as shipment dispatch, customs clearance, cargo delivery, or transfer of ownership. The information architecture of the proposed accounting model for international payments within logistics supply chains based on smart contract technology is presented in Fig. 1.

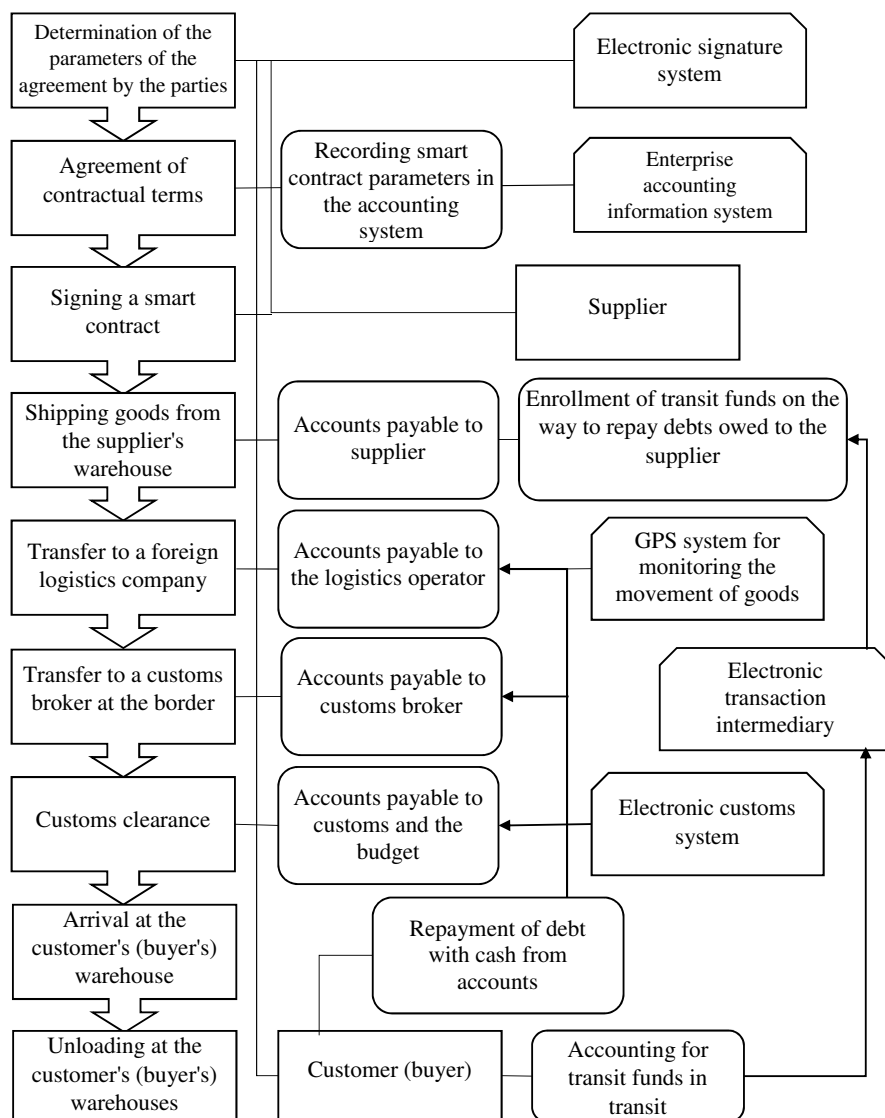


Fig. 1. Model for accounting for international payments in the logistics supply chain using smart contract technology.

Source: developed by the author.

The smart contract algorithm should define a clear sequence of events, including agreement on transaction parameters, contract approval and execution, shipment dispatch, transfer to an international logistics provider, border crossing, customs clearance, onward transportation, delivery to the buyer's warehouse, unloading, and transfer of ownership. Each stage of the international logistics process may trigger the automatic settlement of the corresponding financial obligation. The sequence of events may be adjusted depending on the specific terms of the international trade contract.

The automated execution of logistics-related contractual obligations can be facilitated through the integration of cargo consignments or shipping containers with GPS-enabled tracking technologies that provide continuous location monitoring. Geolocation data not only ensure real-time visibility of cargo movements but may also serve as objective indicators for verifying the fulfilment of predefined contractual conditions. Once specified conditions are satisfied, a smart contract can automatically trigger the corresponding payment transaction and generate the associated accounting entries. The effective implementation of such mechanisms requires the prior formulation, approval, and electronic authentication of the smart contract by the principal contracting parties, particularly the buyer and the supplier. To achieve comprehensive accounting, effective control, and automated execution of contractual obligations, other relevant participants in the logistics chain should also be integrated into the smart contract infrastructure. The broader application of smart contract technologies may therefore contribute to reducing operational, financial, settlement, and foreign exchange risks associated with international trade and logistics activities.

Prior to the execution of a smart contract, the parties are required to negotiate and approve both the substantive contractual provisions and the relevant technical parameters. Commercial conditions may initially be coordinated through conventional digital communication channels, including email and electronic business platforms, while the final agreement is subsequently formalized within the smart contract environment. To ensure legal validity, operational transparency, and automated execution, the smart contract should incorporate comprehensive information concerning the contracting parties, banking and payment details, product classification codes, quantities and prices of goods, settlement currency, key stages of the logistics process, expected delivery schedules, designated customs checkpoints and authorities, as well as penalty clauses and compensation mechanisms applicable in cases of contractual non-compliance.

The technical configuration should specify the blockchain platform (e.g., Ethereum, Hyperledger Fabric, Solana, Polygon, or BNB Chain), network architecture, consensus mechanism, virtual machine, and other infrastructure parameters. Once all contractual and technical conditions have been established, the agreement is digitally signed, giving the smart contract full legal effect within the blockchain network. No additional paper-based or electronic agreements are required. The execution phase begins when the supplier releases the goods to the logistics provider.

Once the shipment leaves the supplier's warehouse, the smart contract records the temporary transfer of custody while ownership remains unchanged until contractual conditions are fulfilled. To simplify settlements, advance payments should be minimized because the smart contract automatically transfers ownership rights and financial resources upon completion of predefined milestones. Consequently, the buyer is not required to prepay the goods before delivery. When the goods are transferred to an international logistics provider, the carrier temporarily assumes responsibility for the shipment. Upon arrival at the border and transfer to the customs broker, the smart contract may automatically release payment for transportation services. After customs clearance is confirmed, payments for brokerage services can also be executed automatically. Brokerage fees may be predefined as fixed amounts or percentages of the customs value. Customs duties, taxes, VAT, and related government charges may be settled automatically once official information is received from the electronic customs system. Therefore, the smart contract should be integrated with digital customs platforms to retrieve the required customs valuation and payment information.

Following the completion of customs clearance procedures, the shipment is transferred to the same or an alternative logistics service provider responsible for final delivery to the buyer. Confirmation of the arrival and unloading of the goods at the buyer's warehouse may serve as a predefined condition for the transfer of ownership. Upon formal acceptance of the goods, the smart contract can automatically release the previously reserved payment to the supplier. To mitigate the risk of insufficient funds being available after delivery, the smart contract may incorporate an escrow mechanism. Under such an arrangement, the agreed payment amount is secured at the time of contract execution, either in a blockchain-based escrow account or through a trusted financial intermediary, and remains reserved until all contractual conditions have been duly fulfilled.

The integration of smart contracts into accounting and control systems creates significant methodological challenges. The recognition date of accounting events should correspond to the timestamp recorded within the smart contract infrastructure. When goods are transferred to the logistics provider, the buyer should recognize accounts payable to the supplier while simultaneously reserving the corresponding amount of funds in an escrow or transit account. Accounting records should reflect the transfer of cash from bank accounts to restricted transit funds rather than immediate settlement. When goods are transferred to the customs broker, the buyer recognizes and automatically settles liabilities for customs brokerage services. Following electronic confirmation of customs clearance, liabilities for customs duties, excise taxes, VAT, and other statutory charges should be automatically recognized and settled using information received directly from the electronic customs information system.

Upon successful delivery of the shipment to the buyer's warehouse, liabilities to the logistics provider are automatically settled. After the buyer formally accepts the goods, the reserved funds are released from the escrow account to the supplier. In accounting terms, this event represents a decrease in restricted cash and the simultaneous settlement of the corresponding accounts payable. Such an accounting sequence is fully aligned with the operational logic of smart contract execution and complies with modern accounting principles governing international financial settlements within logistics supply chains. All components of the proposed smart contract methodology for transforming the accounting of international settlements within logistics supply chains are summarized in Table 2.

Table 2

Smart contract system in accounting for international settlements in logistics supply chains

Smart Contract System Components	Transformation of accounting for international payments in logistics supply chains
Blockchain	Decentralization of payments, elimination of intermediaries, automatic generation of accounting records, data synchronization between participants and confirmation of transactions in real time.
Smart Contracts	Digitization of fulfillment of contractual terms, initiation of payments after the occurrence of logistical events, ensuring continuous accounting and control.
CBDC	Direct international payments without SWIFT, reduction of currency risks, acceleration of accounting and minimization of exchange rate differences.
API and Open Source	Integration of ERP, accounting systems, banks, customs and logistics platforms, automatic data exchange and generation of accounting entries.
ISO 20022	Unification of the structure of financial messages, standardization of information flows and ensuring software compatibility.
GPS/IoT	Transmission of information about the location of cargo, which automatically triggers payments and accounting records.
Electronic Customs Systems	Automatic determination of customs payments, VAT and duties, ensuring their immediate reflection in accounting.
Electronic Transaction Systems	Reservation of funds until the fulfillment of the terms of the contract, reducing the risks of non-payment.

Source: generated by the author.

To ensure uninterrupted payment processing during periods of temporary restrictions or disruptions, cross-border settlements should increasingly rely on Central Bank Digital Currency (CBDC) infrastructure. CBDCs enable direct exchanges between national digital currencies without relying on the SWIFT network. As countries are progressing at different stages of CBDC implementation, the functionality of digital currencies continues to evolve. In Ukraine, the National Bank is currently evaluating several potential applications of the e-hryvnia, including retail cashless payments with programmable money functionality, transactions involving virtual assets, and cross-border payment settlements.

The use of CBDCs in international logistics creates opportunities for the automated accounting of cross-border financial transactions, thereby accelerating supply chain execution. Eliminating SWIFT from the payment process reduces foreign exchange risks, avoids multiple currency conversions, and simplifies accounting procedures. Since only a minimal processing time separates the debit and credit of digital fiat currencies, exchange-rate fluctuations during transaction execution can be substantially reduced. Consequently, international payments within logistics supply chains become operationally similar to domestic currency transactions, requiring only conventional recognition of exchange-rate differences.

A major obstacle to supply chain digitalization is the lack of information synchronization among heterogeneous software systems. Currently, each participant in the logistics network maintains separate accounting and logistics records within its own information environment. This challenge is further intensified by differences in national accounting regulations and the use of country-specific software solutions. Data exchange between logistics partners is still largely based on XML and PDF files. However, file-based information exchange is inefficient because it requires repeated manual transfer of data between independent information systems, preventing real-time processing and eliminating many of the advantages of smart contracts. As a result, accounting entries for financial transactions cannot be generated automatically.

To overcome these limitations, international logistics systems should support software interoperability through Application Programming Interfaces (APIs) and open software architectures. Accounting and logistics management systems should incorporate synchronization modules capable of exchanging information directly with external platforms. This approach has already been widely adopted by leading financial institutions, whose banking applications are integrated into enterprise accounting software. Consequently, payment instructions and the corresponding accounting entries can be generated simultaneously within a single information environment.

A similar integration model should be applied to smart contract platforms using APIs and open-source technologies. Every change in the status of a shipment or container throughout the international logistics process should automatically trigger accounting records within the information systems of all authorized supply chain participants. Such records can be generated almost instantaneously once the relevant event has been verified.

To ensure interoperability among different software platforms, the development of integration modules should follow the ISO 20022 standard. This international standard defines a unified structure for financial messaging by specifying mandatory information elements associated with cross-border financial transactions. ISO 20022 establishes a common methodology for organizing financial information flows, enabling standardized development of accounting modules for international logistics systems. Software solutions based on this standard can exchange accounting information seamlessly, thereby supporting the effective operation of smart contracts. Consequently, smart contracts become an integral component of the shared digital information environment across the entire logistics network.

Furthermore, ISO 20022 standardizes the structure of accounting messages, enabling the automatic reconciliation of logistics events with supporting business documents. This information model facilitates the transition from traditional discrete accounting – where transactions are recorded only after supporting documents are received – to a continuous, event-driven accounting system in which transaction recognition, control, and analytical processing occur almost simultaneously with the execution of logistics activities. Such a conceptual transformation provides the foundation for continuous, automated management of international logistics processes at the global level.

Conclusions. The digital transformation of international settlement processes within logistics supply chains facilitates a transition from conventional discrete accounting practices toward a continuous, integrated information environment in which business transactions are recognized concurrently with the corresponding logistics operations. Within this framework, events generated during the implementation of international trade contracts constitute a primary source of accounting data. Accounting records may therefore be created automatically on the basis of authenticated and verified changes in the status of material, financial, and information flows, thereby enhancing the timeliness, consistency, and integration of accounting information with logistics processes.

The further development of digital international settlements will rely on the integrated application of blockchain technology, Central Bank Digital Currencies (CBDCs), API-based integration, open software interfaces, electronic customs services, Global Positioning System (GPS) technologies, and the ISO 20022 international standard. Together, these technologies establish a unified digital ecosystem that supports the implementation of smart contracts across international logistics networks.

The smart contract concept integrates logistics, financial, and accounting processes into a single digital framework in which contractual obligations, international payments, and accounting recognition are executed as interconnected components of one automated algorithm. This approach minimizes delays in international settlements, reduces reliance on financial intermediaries, enables the use of escrow or transit funds during transaction processing, enhances transparency among supply chain participants, and mitigates operational, foreign exchange, and contractual risks.

The proposed methodology for accounting for international financial settlement transactions ensures interoperability among the software systems used by participants in international logistics, facilitates the automation of accounting procedures, and supports the creation of a unified digital environment for managing logistics supply chains. Consequently, it provides a methodological foundation for a new model of digital accounting that is aligned with the ongoing development of global logistics, e-commerce, and international financial technologies.

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