

SMART CONTRACT IN BANKING FOR UKRAINE'S ECONOMY DIGITALIZATION¹

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Smart contracts are one of the digital technologies that have the potential to significantly alter the way market participants interact. It is emphasized in the research that a smart contract is a specialized computer protocol that allows negotiating parties to exchange assets between themselves: stocks, money, or property without involving a third party as an intermediary. It should be noted that smart contracts also have a wide area for use not only in the financial sector, but also in other sectors of the economy, and the global trend towards digitalization is one of the fundamental drivers of the development of this tool. The most recognizable technology for the operation of smart contracts today is blockchain. It is mentioned that blockchain guarantees the reliability and security of the concluded contracts in terms of their confidentiality, immutability, and permanence. Four basic stages of a blockchain-based smart contract were revealed. It is stated in the article that one of the most promising applications for smart contracts is the automation of the provision of banking services, such as supply chain financing, mortgage lending and small business lending. The automatic implementation of the full lending process, from application to credit risk assessment, mortgage renewals, title transfer, and mortgage servicing and securitization, can be facilitated by sharing borrower information and digital versions of multiple registries and title documents. It is emphasized that smart contracts have a number of advantages over traditional paper-based contracts. It's important to remember that no matter how advanced technology gets, there's always the risk of IT-system vulnerabilities. The future of smart contracts in banking was forecasted. Many banking processes and legal agreements will be substituted by blockchain-based finance solutions in the future; however the shift will be slow. Incumbent banking institutions are unlikely to completely relinquish control of their databases from unknown third parties. Most likely, groups of banking institutions will use authorized blockchains, and customers will only interact with trusted nodes, and not directly with the ledger.

Keywords: smart contract, blockchain, digitalization, banking, technology.

DOI:10.21272/1817-9215.2022.2-10

¹ The paper is prepared within the scientific research project "Sustainable development and resource security: from disruptive technologies to digital transformation of Ukrainian economy" (№ 0121U100470) and within European commission project «Jean Monnet Chair in EU Economic Policies and Civil Society» (619878-EPP-1-2020-1-UA-EPPJMO-CHAIR).

INTRODUCTION

Digitalization and the introduction of new financial technologies are fundamentally transforming the existing principles and instruments in the financial markets of the economies of most countries of the world. Smart contracts, which are created in the blockchain environment, are one of the digital technologies that can significantly change the form and process of interaction of economic entities. For the first time, the idea of a smart contract was proposed in 1994 by Nick Szabo, a scientist in the field of computer science, cryptography and law. He described a smart contract as "a digital representation of a set of obligations between parties, including a protocol for fulfilling those obligations." [5, p. 20] The smart contract is a software source code, contributed and usually stored on the blockchain, that monitors and enforces certain obligations. It should be noted that there are «classic» smart contracts that are not tied to the blockchain environment. A modern example of the idea of a smart contract is the work format of Uber companies. Aggregators play the role of an intermediary and an arbiter who ensures that the agreement between the taxi driver and the client is fulfilled: the client agrees to pay for the trip at a price predetermined by the intermediary system (aggregator), and the driver, in turn, undertakes to perform the service of transporting the client to predetermined places [3, p. 12]. It is possible to make almost safe transactions with the help of smart contracts since all the conditions and agreed actions for the fulfillment of the contract are contained in it. It turns out that a smart contract not only transmits information, but at the same time is a guarantor of the fulfillment of the terms of the transaction by all parties. Today, in world practice, smart contracts are used in government, retail, healthcare, in the initial coin offering (ICO), and, of course, in financial transactions. Many scientists believe that smart contracts will significantly expand their use in the nearest future. Banking is the sphere, where smart contracts can already be used, but their opportunities for developing different financial operations are numerous.

ANALYSIS OF RECENT RESEARCHES AND PUBLICATIONS

Xuan S. and colleagues focus on the technological side of smart contracts. They state that blockchain technology has had a great impact on the development of smart contracts [15]. Teperdjia R. explores the legal status of such contracts [12]. Salmerón-Manzano E. and Manzano-Agugliaro F. reveal the role of smart contracts for sustainable development [10]. L. Thomas has substantiated the role of such contracts in energy efficiency [14].

However, there is still a lack of researches (especially, in Ukrainian scientific publications) concerning the current state and future development of smart contracts for banking.

OBJECTIVES OF THE ARTICLE

The purpose of the research is to investigate the current role of smart contracts in banking and to describe the prospects of their future development.

METHODS OF THE RESEARCH

In this study, research methods were used, such as: analysis and synthesis, induction and deduction, abstraction, generalization, modeling, analogy.

RESULTS OF THE RESEARCH

When analyzing smart contracts in a certain sphere of application, it is important to understand different approaches for defining the concept of a smart contract. Some of them are presented in Table 1.

The most recognizable technology for the operation of smart contracts today is blockchain. It is assumed that with the help of blockchain it is possible to resolve the issue of trust between participants in legal relations – the same copy for several entities should guarantee the invariability of data and resistance to a technical attack. In Figure 1 it is possible to observe four basic stages of a blockchain-based smart contract.

Table 1 – Definitions of the concept «smart contract»

Authors	Definition
Thakor A. V	Computer programs that register and (or) fulfill the terms of a contract, the characteristics of which were previously clearly defined [13, p. 105]
Cong L. W., He Z.	A specialized computer protocol that allows negotiating parties to exchange assets between themselves: stocks, money or property without involving a third party as an intermediary [2, p. 1757]
Kolvart M., Poola M., Rull A	An automatically executing process in which all possible scenarios are provided and there is no possibility of making changes [6, p. 134]

Source: [2; 6; 13]

Distributed ledger technology and the smart contracts it builds have a number of advantages that have garnered much attention from users and developers alike. A smart contract allows to reduce transaction costs and automate the process of contract execution, reducing the impact of the human factor after the conclusion of the contract and excluding intermediaries involved in the execution of the terms of the agreement [9, p. 3081]. In addition, the blockchain guarantees the reliability and security of the concluded contracts in terms of their confidentiality, immutability and permanence.

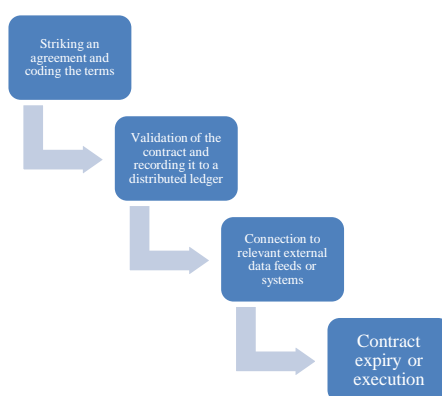


Figure 1 – Four Basic Stages of a Blockchain-based Smart Contract

Source: [1]

There is a huge range of uses for smart contracts - from simple multisignature (the simplest, classic example of a smart contract. With its help, counterparties that do not trust each other can freeze a certain amount of coins in the blockchain in such a way that, if necessary, more than half of the participants will need to sign this amount) to transactions with derivative financial instruments.

The practice of using smart contracts today comes down mainly to the partial automation of certain aspects of agreements, such as the exchange of digital assets, for example, the exchange of funds for property rights [10, p. 145]. However, it is very likely that as infrastructure and platforms develop based on distributed ledger technology, smart contracts will no longer be just an addition to the paper version of the document and will become the main guarantor of the parties' obligations when concluding agreements, ensuring the transition to digital contracts without the need to confirm them with paper documents.

One of the most promising applications for smart contracts is the automation of the provision of banking services, such as supply chain financing, mortgage lending and small business lending. Smart contracts will automate payments and reduce uncertainty and credit risks.

Sharing borrower information and digital versions of various registries and title deeds can facilitate the automatic execution of the entire lending process, from the application stage,

credit risk assessment, mortgage renewals, transfer of title to mortgage servicing and securitization.

Smart contracts can replace the need for time-consuming and complex legal documentation - it's just that new bank customers will adhere to KYC (know your customer) processes [8, p. 126]. Customer information can be easily verified against records stored on the blockchain. This, in turn, may satisfy the conditions to unlock additional services based on smart contracts.

The clearing and settlement process, in which all payments and transactions are agreed and verified, is associated with high administrative costs. They are completely eliminated if agreements are executed autonomously on the blockchain.

By implementing decentralized consensus protocols, banks will ultimately no longer need many of the services that required third-party intermediation prior to the blockchain.

The only thing that banks can and cryptocurrency cannot do is to create money out of thin air at their own discretion. But then, one of the main goals of cryptocurrency is precisely to take over control of the money supply from established, self-motivated organizations and entrust it to impartial algorithms.

It looks like many banking processes and legal contracts will eventually be replaced by blockchain-based finance solutions, although this transition process will be gradual. Smart contracts certainly offer significant advantages over traditional paper-based agreements. It should be borne in mind that, no matter how advanced the technology is, there is always a risk of vulnerabilities in IT systems, as well as vulnerabilities associated with direct executors, limited time and resources for making a decision, incomplete or insufficient data.

First, it will take a combination of legal expertise and coding prowess to recreate traditional legal contracts on the blockchain [4, p. 71]. There is also a need for compliance officers who understand how this should all comply with current and evolving regulatory requirements.

Obviously, the legal functions and DLT functions of bank development should grow significantly, and many intermediary administrative functions will become obsolete.

Moreover, incumbent financial institutions are unlikely to want to completely relinquish control of their databases for unknown third parties. Most likely, groups of institutions will use authorized blockchains, and customers will only interact with trusted nodes, and not directly with the ledger.

Despite the presence of shortcomings, the popularity of smart contracts is increasing, the convenience of their use is growing. A number of organizations are working to improve technologies that use smart contracts. The main ways of optimization are the standardization of "smart contract templates" and the creation of visualization tools for forming the logic of smart contracts from ready-made blocks. It should be noted that smart contracts cannot be the only tool for ensuring the activities of an organization - there are always uncertain situations, to get out of which requires interaction in the administrative mode (for example, it is possible to resolve disputes arising on the execution of a smart contract by negotiating parties or resolving disputes in court).

The British bank Barclays used smart contracts to conduct transactions with letters of credit in the international delivery of goods (cheese and butter). The documents confirming the fulfillment of the terms of the letter of credit included electronic documents: certificate of origin of goods, insurance certificate, invoice, consignment note. The transaction was carried out using fiat money.

Banco Bilbao Vizcaya Argentaria (BBVA) uses smart contracts to provide lending. BBVA issued a loan to a corporate client in the amount of 75 million euros. The deal was registered using a smart contract on the Ethereum network. The use of distributed ledger technology and smart contracts to execute a transaction reduces the risk of fraud and significantly reduces time costs [7, p. 282].

CONCLUSIONS

Currently, many participants in the financial market, as well as representatives of other sectors of the economy, are conducting various experiments on the use of smart contracts in order to optimize business processes and reduce the cost of financial transactions. The use of smart contracts in traditional processes can potentially create a more convenient environment for interaction between government, organizations and citizens. In many cases, experimentation and development of smart contract solutions are integral to using distributed ledger technology. One of the most promising applications for smart contracts is the automation of the provision of banking services, such as supply chain financing, mortgage lending and small business lending. The automatic implementation of the full lending process, from application to credit risk assessment, mortgage renewals, title transfer, and mortgage servicing and securitization, can be facilitated by sharing borrower information and digital versions of multiple registries and title documents. Examples of using smart contracts in banking were mentioned, including financial operations conducted by the British bank Barclays and Banco Bilbao Vizcaya Argentaria. Nevertheless, one should not expect the rapid and widespread introduction of smart contracts in banking, since any innovation must go through a certain development path before being widely used.

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