TRANSFORMING THE FINANCIAL SYSTEM TOWARDS SUSTAINABILITY BY INTEGRATING ADVANCED INFORMATION TECHNOLOGIES

DOI: https://doi.org/10.53486/dri2025.38 UDC: 336.71:004.78(478)

Eduard KENIG

editlv@mail.ru ORCID number: 0009-0001-0785-3386 Angela SECRIERU secrieru.angela@ase.md ORCID ID: 0000-0002-5782-8840 Academy of Economic Studies of Moldova

Abstract: The article addresses the issue of integrating advanced information technologies at the level of financial institutions, arguing the importance of these technologies for sustainable development. The research results result from the application of a complex methodology, the authors applying the method of synthesis, abstraction, induction and deduction. At the same time, an important place in the applied methodology belongs to the expert method. The main conclusion derived from the research conducted within this publication is that the advanced information technologies evaluated by the authors (digital experience platforms for banks, blockchain, chatbots and artificial intelligence, robotic process automation) are important for ensuring the sustainability of the financial system in the Republic of Moldova, although in different proportions. At the same time, the technologies with the greatest potential to contribute to the consolidation of the financial system in accordance with the needs of sustainable development are digital experience platforms for banks and blockchain technology.

Key words: Information technologies, financial system, sustainability

JEL: G2, M15, Q5

1. Introduction

New technologies are emerging and changing all over the world. The availability of internet connectivity accompanied by smartphone support services has made it easy for a wide range of people to access high-speed technological advances.



Figure 1. Number of people using the Internet

Source: developed by the author based on the Statistics of the International Telecommunication Union.

According to the International Telecommunication Union (ITU), approximately 5.4 billion people, or 67% of the world's population, used the Internet in 2023 (Figure 1). This is 24% more than in 2019, with an estimated 1.1 billion people connecting to the network during this period. However, 2.7 billion people are still offline.

As can be seen from Table 1, the share of individuals using the Internet in the total population of the Republic of Moldova in 2017 was 76%, which is below the level recorded by Israel and developed

countries. At the same time, according to this indicator, the Republic of Moldova is at the average level recorded by the Central European and Baltic countries.

Table 1. Individuals using the internet (70 of population)										
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Israel	70.8	70.3	75.0	77.4	79.7	81.6	83.7	86.8	90.1	n/a
Moldova	43.4	60.0	67.0	69.0	71.0	76.1	n/a	n/a	n/a	n/a
High-income countries	74.8	76.2	77.9	79.4	83.8	85.3	86.9	88.3	89.4	n/a
Lower-middle- income countries	14.4	16.1	18.5	20.9	23.8	26.8	30.1	36.1	45.0	n/a
Middle East and North Africa	31.2	35.2	40.1	44.5	50.0	56.9	61.1	67.2	75.5	n/a
Central Europe and the Baltics	61.7	63.5	66.5	67.3	71.3	73.4	76.0	78.7	81.8	84.7
Europe and Central Asia	63.9	66.3	68.9	70.0	72.4	74.5	79.1	81.4	83.8	86.5

Table 1. Individuals using the Internet (% of population)

n/a – data not available

Source: developed by the author based on World Telecommunication/ICT Indicators Database.

According to the International Telecommunication Union (ITU) database, the indicator expressing the share of individuals using the Internet recorded a value of 63.5% in the Republic of Moldova and 91.9% in Israel in 2023. For comparison, in the same year, this global figure was 67.4%.



Figure 2. Number of fintech startups worldwide from 2018 to 2024 by region Source: Statista Database.

This dynamic creates favorable conditions for the development and implementation of innovative technologies at the level of the financial system of the Republic of Moldova.

Mobile and digital payment systems remain a key driver for Fintech. The number of Fintech companies is growing rapidly worldwide, offering service options in many areas, such as payment systems, asset management, credit solutions and insurance services. This technology is well designed to support businesses, and is well adapted to regulatory standards and principles.

As of May 2024, there were 13,100 fintech startups in the Americas, making it the region with the largest number of fintech startups in the world. In comparison, there were 10,969 such startups in the EMEA (Europe, Middle East, and Africa) region and 5,886 in the Asia-Pacific region (Figure 3.11).

1. Financial Technologies (Fintech): Nature and Scope

The restructuring of the banking and financial sector entails the interplay of financial technologies (Fintech) and blockchain technologies. Fintech is considered one of the most significant revolutions in the financial industry. It has progressed at an accelerated pace, partly due to the sharing economy, favorable legislation, and advances in information technology. Finance and technology have been involved in a long-term process of developing Fintech based on new technologies.

Fintech refers to the application of innovative technological solutions in the financial services industry.

Fintech adoption varies geographically depending on several factors. Naturally, the level of internet penetration plays a major role, especially mobile internet usage. Trust in technology firms also influences adoption, as well as trust and access to traditional financial services. Finally, access to capital depends on the local volume of investment in fintech, which also depends on regional variables. Table 2 presents the number of automated remote service systems in the Republic of Moldova. As can be seen from the data in this table, the annual growth of this indicator is significant, which indicates significant prospects for fintech technologies in the Republic of Moldova.

Table 2. Banking automated remote service systems (ARSS) in the Republic of Moldova

Quantitative indicators of ARSS	2017	2018	2019	2020	2021
Total number of ARSS holders, thousand	545.9	898.3	1600.2	2085.9	2572.6
Number of active ARSS holders, thousand	138.1	230.5	384.2	626.6	787.8
~				1 01 6 1 1	

Source: developed by the author based on the Annual Reports of the National Bank of Moldova.

Table 3 shows the distribution of holders of automated remote service systems (ARSS) in the Republic of Moldova depending on the type of systems used. Thus, of the total number of holders of ARSS, the largest share is for Internet payments, although this value is decreasing. Mobile payments occupy the second position and are constantly growing.

	<u> </u>				
System type	2017	2018	2019	2020	2021
Internet payments	71.7	70.9	55.7	56.1	56.5
Mobile payments	16.1	21.4	40.6	41.1	43.4
PC payments	1.8	1.2	0.1	0.1	0.1
Phone payments	10.4	6.5	3.6	2.7	0

Table 3. Distribution of holders of banking ARSS by type of systems used, %

Source: developed by the author based on the Annual Reports of the National Bank of Moldova.

Fintech provides an online platform that can electronically increase the convenience of access to such services. An e-wallet makes payment transactions directly to transfer cash from one wallet to another, simply with a mobile phone number as a key identifier. No account details are required to transfer funds.

FinTech solutions are better equipped than banks and other lending institutions to provide quick access to cash reserves and loans for people with low or no income (Ozili, 2018).

FinTech has also changed the traditional position of a financial investment adviser. FinTech companies in this position can provide high-tech advice related to money through a digital platform, helping clients invest in financial products.

2. The Future of Fintech in Banking

The banking and financial industry is a dynamic industry with intense competition for products and services. Accordingly, banks are constantly determined to grow and transform to avoid being outpaced by competitors.

The banks of the future aim to become efficient, technologically advanced branches where bottlenecks are no longer present and where services will be provided through self-service machines. Online services will be targeted at consumers, who are the primary target of the bank.

The future of banking will involve digital technologies to transform traditional banking into digital banking. Banking and customer relationships will remain the focus (Mekinji, 2019).

The use of digital technologies has prompted traditional banks and other financial institutions that have traditionally been at the forefront to upgrade their skills and knowledge (Iman, 2019).

The rise of fintech in the past few years has changed the way we do business. It is helping cash-centric countries to move towards cashlessness. Therefore, FinTech customers must change their values and morals in light of the adoption of new digital practices (Pousttchi, 2018).

FinTech creates innovative products and services to meet customer needs that are not met by traditional financial institutions. The obligation of FinTech implementers is to implement business practices that are responsible for consumer protection. FinTech aims to provide bank customers with continuous access to financial services. Therefore, the banking sector must focus on confirming more secure transactions, since the privacy of their customers' data can be hacked. FinTech has begun to offer efficient and dynamic solutions for banks and financial service providers such as loans, money transfers, insurance, and remittances. Financial services and banks are experiencing an increasing need to achieve strong, fast, and flexible results.

Parallel technology performs the best functions of FinTech. Blockchain technology is currently being considered for its impact on banking and financial services in a general context with other industries and sectors. Blockchain technology is decentralized, transparent, anonymous (or pseudonymous) and immutable. Blockchain uses encryption technology to form digital currencies, a new favorable medium of exchange that is safer and better than cash. Blockchain technology has the potential to change the financial services sector in many ways. This technology can undoubtedly reduce problems, failures and failures in many aspects of fintech service, so blockchain should be considered as a promising technology to solve significant problems in the banking and financial sector that have hindered the development of the industry for many years.

In order to develop a common transmission scheme (common transmission mechanism) of the potential benefits of information technology to financial institutions in a way that promotes sustainable growth, authors applied the following methodology:

- In the first stage: Identify the advanced information technologies used in the financial systems of developed countries. Identify the benefits of these technologies in terms of supporting sustainable economic growth;

- In the second stage: Identify the characteristics of a financial system that promotes sustainable economic growth;

- In the third stage: Identify the advanced information technologies that can best realize and enhance the characteristics of a financial system associated with sustainable economic growth.

Stage One. Advanced information technologies used in financial systems of developed countries and the benefits of these technologies for sustainable economic growth. New information technologies used in the financial sector change the interaction between consumers of financial services and their money.

At the same time, the impact of these technologies on the work of financial institutions depends on the type and functions of these technologies, which must be well studied and adapted to the specifics of a particular institution in order to obtain maximum benefit.

Analysis of international experience in the use of advanced information technologies in financial institutions of developed countries allowed the author to identify the following types of advanced information technologies used in the financial systems of developed countries and the benefits of these technologies that contribute to sustainable economic growth:

Digital Experience Platforms for Banks. New technologies allow financial institutions to adopt relatively new platforms, such as hybrid platforms, which are able to offer consumers privacy and accessibility, intelligent data integration in real time (digitization, personalization, and advanced)

analytics in real time). Application Programming Interface (API) platforms are one of the most important changes, allowing customers to integrate their banking data into other applications (for example, applications related to budget services and the use of money management tools) and vice versa. Notably, many US financial institutions have abandoned platforms related to APIs. At the same time, since EU regulations oblige organizations to offer open API platforms, US financial institutions have adopted this practice.

Blockchain. Blockchain technology is relatively uncommon in the financial sector, not least because it is difficult to access. At the same time, the financial industry recognizes the key role of blockchain technology in generating new revenue for financial institutions, reducing risks and increasing operational efficiency of these organizations, improving the experience of end users, etc. It is worth noting that blockchain is the technology that underlies Bitcoin. According to a report by Accenture, blockchain technology can help the world's largest investment banks reduce infrastructure costs by \$8-12 billion per year by 2025. This conclusion is based on an analysis of the costs of eight of the ten largest investment banks in the world. Given the trend of rapid adoption of blockchain over the past few years, it can be assumed that this technology can quickly become an important solution in the field of payments, fraud prevention, loan processing, etc.

Chatbots and Artificial Intelligence. Chatbots and other artificial intelligence-based solutions are becoming increasingly popular among financial institutions of all sizes. According to a recent study, 48% of bank customers now manage their accounts using apps and other mobile devices. Financial institutions are increasingly turning to chatbots (computer programs that stimulate human conversation through text and voice commands) as a cost-effective solution for managing accounts online. Advanced chatbots in the financial industry use natural language processes, powered by machine learning and artificial intelligence, to gather information about past interactions and improve responses. Chatbots answer questions asked by customers, with these questions being common and repetitive. Typically, questions relate to deadlines, transactions, and payments. Customers have access to instant answers, rather than having to wait several business days to get an answer to their question. It is worth noting that chatbots are the most visual version of artificial intelligence. At the same time, artificial intelligence is influencing and changing the risk management, product and service delivery, marketing, and back office activities of financial institutions.

Robotic Process Automation. In the financial sector, robotic process automation allows you to save the most important resource - time. Fixed and repetitive processes are subject to automation. Automation uses a simple set of rules to obtain relatively simple and reliable results. The main function of robotic process automation is data recording, report generation, logging, automation of repetitive processes. Robotic process automation offers financial institutions the following benefits: digitalization and automation of tasks, avoidance of errors in processes, automation of documentation and standardization, achieving greater efficiency. The following possibilities of using robotic automation in the financial sector can be noted: collection and distribution of supplier invoices; data collection, report generation, calculation of taxes payable and reconciliation of tax data; analysis of automatic recording of journal entries, invoice reconciliation and management of daily transactions; creation of a workflow for customer accounts, verification of transactions and reporting of discrepancies; analysis of historical data, accumulation of financial statements and preparation of forecasts, etc.

Analysis of advanced information technologies used in the financial systems of developed countries allowed the author to identify the following advantages of these technologies for sustainable economic growth:

a) Increased operational efficiency of financial institutions can be achieved primarily through automation of financial operations and technologies. Information technology can be involved in customer service and transaction processing in these financial institutions. As a result, it is possible to optimize resource flow management, reduce the number of manual errors and increase labor

productivity. Automation of routine operations will lead to time savings, which will allow employees of these institutions to focus on other strategic and quasi-strategic activities.

b) Increased security and data protection. Financial institutions process huge amounts of confidential and sensitive information. In these circumstances, information technology can offer security solutions that will protect this information from various risks and unauthorized interference. Such solutions include, in particular, intrusion detection systems, encryption, etc. Regular updates and security audits play an important role in this regard.

c) Advanced data analytics. Advanced information technologies offer comprehensive solutions in the form of tools and technologies for data processing and analysis. The subject of analysis can be the following areas of activity of financial institutions:

- trends in various markets;

- risks and risk profile;

- customer behavior, etc.

Thus, financial institutions can make the following categories of decisions based on data:

- identifying growth opportunities;

- developing solutions to reduce potential risks;

- preventing fraud.

d) Scalability and flexibility. In the process of growth or restructuring, financial institutions can benefit from specialized IT solutions that provide flexibility and scalability. In this context, cloud computing stands out - a solution that allows expanding the computing resources of a financial institution to the required scale. Thus, the need for investment in infrastructure can be eliminated.

e) Seamless customer service. Information technology can provide financial institutions with customized solutions that they can in turn offer to their customers. Moreover, online banking platforms and mobile applications allow customers to use these solutions seamlessly, regardless of their location. Information technology, which underlies various customer management systems, allows financial institutions to monitor and track customer communications, transactions, and behavior, as well as track and control the behavior of their customers. This allows for targeted marketing campaigns and personalized financial service offers.

Stage Two. Characteristics of a Financial System Conducive to Sustainable Economic Growth. In identifying and formulating the characteristics of a financial system for sustainable growth, the author relied on his own definition explaining the concept of "sustainable finance": sustainable finance is a set of tools, methods, relationships, laws, national, regional and international financial institutions, regulations that ensure the integration of environmental, social and governance criteria into investment decisions. This approach to making investment decisions is aimed at combining economic profitability with their positive impact on society and the environmental considerations are based on several factors, while factors related to social and environmental considerations are not taken into account sufficiently. This is explained by the fact that the risks associated with such investment decisions are likely to be realized over a longer time horizon. At the same time, it is important to understand that taking into account the long-term interests of sustainable development is economically justified and will not necessarily lead to a decrease in returns for investors. From the above it follows that *the most prominent characteristics of sustainable finance are*:

a) The integration of social, environmental and governance considerations into investment decision-making: - environmental issues relate to climate change mitigation and adaptation, as well as broader environmental issues and associated risks; - social issues relate to inequality, inclusion, labour relations, investment in human capital and communities. Social and environmental issues are often interlinked, as climate change in particular can exacerbate existing systems of inequality; - the governance of public and private institutions (governance structures, employee relations, executive remuneration, etc.) plays a critical role in ensuring that social and environmental aspects are taken into account in decision-making;

b) significant investment and a long-term time horizon for investment. Against this background, the author believes that the following three areas of action need to be implemented:

- redirecting capital flows to sustainable investments to achieve sustainable and inclusive growth;
- managing financial risks arising from social issues, resource depletion, climate change and environmental degradation;
- ensuring transparency and a long-term vision of financial and economic activities.

Stage Three. Advanced information technologies that can best implement and enhance the characteristics of a financial system associated with sustainable economic growth. Having completed all three stages of the methodology proposed by the authors, the results were obtained, which are presented in the form of a three-dimensional matrix (formed by the interaction of three factors: information technologies used in financial institutions; the advantages of information technologies for sustainable growth; characteristics of a sustainable financial system) in Table 4.

Table 4. Transfer Map of Potential Benefits of Information Technology to FinancialInstitutions to Drive Sustainable Growth

	Potential Benefits of IT for Financial Institutions							
Advanced information technologies applied in financial system institutions	Increased operational efficiency	Enhanced data security and	Advanced data analytics	Scalability and flexibility	Privacy and availability	Uninterrupt ed customer service		
Digital experience platforms for banks	5*	1, 2, 3, 4, 5			1, 2, 3, 4, 5	1, 2, 3, 4, 5		
Blockchain	1, 2, 3, 4	1, 2, 3, 4		1, 2, 3, 4, 5, 6	1, 2, 3, 4			
Chatbots and artificial intelligence	1, 2, 3, 4					1, 2, 3, 4		
Robotic process automation	1, 2, 3, 4, 5, 6		1, 2, 3, 4, 5, 6					

*Note:	
--------	--

Characteristics of a financial system that promotes sustainable growth	The number under which it is presented	
Integration of environmental considerations into investment processes	1	
Integration of social aspects into investment processes	2	
Integration of governance issues into investment processes	3	
Management of financial risks associated with resource depletion, social issues, climate change	4	
Ensuring transparency of financial and economic activities	5	
Ensuring a long-term vision of financial and economic activities	6	

Source: developed by the author.

3. Conclusion.

The energy crisis, the effects of the pandemic, as well as the conflict in Ukraine, have led to major changes in the global economy and financial system. These aspects have also changed the attitude of customers towards financial institutions, so that consumers now prefer to become clients of financial institutions that can provide financial and banking services through various digital solutions. Currently, financial institutions are in the process of full digital transformation, and financial and banking platforms have become the main channel of communication and interaction with consumers. This is evidenced by the phenomena and trends observed in the financial system of the Republic of Moldova. Information technology (IT), due to the advantages it can provide, has great potential to

become one of the key factors determining the restructuring of the financial system so that it can play a decisive role in achieving the Sustainable Development Goals.

All four advanced information technologies assessed by the authors (digital experience platforms for banks, blockchain, chatbots and artificial intelligence, robotic process automation) are important for ensuring the sustainability of the financial system in the Republic of Moldova, although in different proportions. At the same time, the technologies with the greatest potential to contribute to strengthening the financial system in line with the needs of sustainable development are digital experience platforms for banks and blockchain technology.

References

- 1. Annual Reports of the National Bank of Moldova. Available at: https://www.bnm.md/search?partitions[0]=674&post_types[674][0]=846.
- 2. Iman, N. Traditional Banks Against Fintech Startups: A field investigation of a regional bank in Indonesia. In: *Bank and Bank Systems*, 2019, 14(3), pp. 20-33.
- 3. Mekinji, B. The impact of Industry 4.0 on the Transformation of the Banking Sector. In: *Journal of Contemporary Economics*, 2019, 1, pp. 8-17.
- 4. Ozili, P. K. Impact of Digital Finance on Financial Inclusion and Stability. In: *Borsa Istanbul Review*, 2018, pp. 329-340. Доступно на: https://doi.org/10.1016/j.bir.2017.12.003.
- 5. Pousttchi, P. Exploring the digitalization impact on consumer decision-making in retail banking. In: *Electronic Markets*, 2018, 28(3), pp. 265-286.
- 6. *Statista Database*. Available at: https://www.statista.com/statistics/893954/number-fintech-startups-by-region/.
- 7. *Statistics of the International Telecommunication Union*. Available at: https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.
- 8. *World Telecommunication/ICT Indicators Database*. Available at: https://data.worldbank.org/indicator/IT.NET.USER.ZS.