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STRATEGIES FOR IMPLEMENTING FINTECH SOLUTIONS IN PUBLIC FINANCE MANAGEMENT SYSTEMS

Summary

Relevance. Problem statement. The relevance of implementing fintech solutions in public financial management systems is due to the modern challenges of digital transformation, the need to increase transparency, efficiency and accountability of management. Financial technologies have significant potential to optimise budget processes, reduce corruption risks and increase fiscal discipline. This is particularly important for Ukraine, which is working on economic stability and effective distribution of international aid in wartime conditions.

Aim of the article – to study strategies for implementing fintech solutions in public financial management systems, as well as to identify the main benefits and challenges of digital technologies for public financial management.

Methodology. The article uses methods of analysis, synthesis and scientific abstraction, which contributed to an objective and comprehensive study of strategies for implementing fintech solutions in public finance management systems. The application of the analysis method made it possible to carefully consider the main aspects of implementing fintech solutions in public financial systems. The synthesis method made it possible to integrate the data obtained from various sources, identifying the most effective strategies for improving public finance management using fintech. Thanks to the synthesis of theoretical and practical approaches, it was possible to formulate recommendations that substantiate the possibilities for achieving the sustainability of financial systems in the long term. The application of scientific abstraction helped to identify general patterns in the implementation of technologies in financial processes.

Results. The article considers the implementation of fintech solutions in public financial management systems. The main strategies and tasks identified for the development of financial technologies in Ukraine were studied, and ways of integrating innovative technologies into state financial institutions were identified.

The practical significance of the results is that the recommendations and proposals made in the study are aimed at improving public financial management processes through the introduction of innovative financial technologies, which will contribute to increasing transparency, reducing corruption risks and improving interaction between government agencies and citizens. **Prospects for further research** include studying the impact of fintech solutions on the stability of public finances and their role in reducing budgetary expenditure. Another important direction is to study the effectiveness of integrating the latest technologies in public financial management.

Keywords: digital transformation, fintech, fintech solutions, public administration, public finance management, budget processes.

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СТРАТЕГІЇ ВПРОВАДЖЕННЯ ФІНТЕХ-РІШЕНЬ У СИСТЕМИ УПРАВЛІННЯ ДЕРЖАВНИМИ ФІНАНСАМИ

Анотація

Актуальність упровадження фінтех-рішень у системи управління державними фінансами зумовлена сучасними викликами цифрової трансформації, необхідністю підвищення прозорості, ефективності і підзвітності управління. Фінансові технології мають значний потенціал в оптимізації бюджетних процесів, зменшенні корупційних ризиків і підвищенні фіскальної дисципліни. Це особливо важливо для України, яка працює над економічною стійкістю та ефективним розподілом міжнародної допомоги в умовах війни. Водночас упровадження фінтех-рішень постає перед проблемами, серед яких відсутність чітких стратегій інтеграції інновацій, низький рівень цифрової грамотності й кіберзагрози. Для подолання цих проблем потрібна комплексна стратегія, що враховуватиме національні пріоритети та кращі світові практики. Таким чином, питання впровадження фінтех-рішень є критично важливим для забезпечення прозорого та ефективного фінансового управління.

Мета статті – дослідження стратегій упровадження фінтех-рішень у системи управління державними фінансами, а також визначення основних переваг і викликів цифрових технологій для державного управління фінансами.

У статті розглянуто впровадження фінтех-рішень у системи управління державними фінансами. Досліджено основні стратегії та завдання, визначені для

розвитку фінансових технологій в Україні, а також з'ясовано шляхи інтеграції інноваційних технологій у державні фінансові інституції.

Практичне значення отриманих результатів полягає в тому, що рекомендації та пропозиції, викладені в дослідженні, спрямовані на удосконалення процесів управління державними фінансами через упровадження інноваційних фінансових технологій, що сприятиме підвищенню прозорості, зниженню корупційних ризиків і покращенню взаємодії між державними органами й громадянами. Перспективи подальших досліджень передбачають вивчення впливу фінтех-рішень на стабільність державних фінансів та їхню роль у зниженні бюджетних витрат. Важливим напрямом також є дослідження ефективності інтеграції новітніх технологій в управлінні державними фінансами.

Ключові слова: цифрова трансформація, фінтех, фінтех-рішення, державне управління, управління державними фінансами, бюджетні процеси.

Кількість джерел: 14; кількість рисунків: 2; кількість таблиць: 3.

Problem Statement. The relevance of implementing fintech solutions in public financial management systems is driven by the current challenges of digital transformation, the need to increase transparency, efficiency and accountability of public administration. Financial technologies such as blockchain, artificial intelligence, big data and automation have great potential to optimise budget processes, monitor public spending, reduce corruption risks and improve fiscal discipline. This issue is particularly relevant for Ukraine, which is at war and working to ensure economic resilience and efficient distribution of international aid.

However, the process of implementing fintech solutions in the public sector faces a number of challenges, including an incomplete legal framework, a lack of a strategic approach to integrating fintech innovations, low digital literacy among staff, insufficient funding and cybersecurity threats. Overcoming these challenges requires the development of a comprehensive strategy based on national priorities and taking into account international best practices. Thus, the issue of integrating fintech solutions into public financial management systems is not only relevant, but also critical to achieving transparent, efficient and sustainable financial management.

Analysis of recent sources and publications. The issue of introducing financial technologies in public administration is highly

relevant and is being actively studied by both domestic and foreign researchers. For example, M. Balytska and K. Brovenko analyse the development of fintech in Ukraine, its impact on the banking sector and the role of the NBU in facilitating its implementation. The authors note that financial technologies improve the quality of customer service, automate management processes and increase the level of protection against cyber-attacks, which has a positive impact on the banking industry, especially in times of crisis [1].

Scientists S. Radynskyi and O. Diachun study the nature of financial innovations and their classification. The researchers analyse different types of financial innovations and determine their role in the development of financial systems, improvement of financial services and ensuring the efficiency of management processes.

Researchers N. Petrukha, S. Petrukha, A. Zhmaiev and M. Sinkevych study the peculiarities of implementing fintech solutions in public financial management systems with a focus on security. The authors analyse the main aspects of integrating the latest technologies into government financial processes, taking into account the need to ensure protection against cyber threats and misuse. They offer recommendations for improving the effectiveness of cyber security, stressing the importance of implementing digital transformations and integrating existing strategic documents into a single cyber defence system in Ukraine [3].

S. Krynytsia reviews the main documents defining the tasks of digitalisation of public financial management in Ukraine for the coming period. The researcher emphasises the importance of transition to a paperless environment, process automation and centralisation of IT systems, but notes that the strategic documents do not take into account the latest digital technologies, such as artificial intelligence and big data analysis, which need to be integrated into strategies for further digital transformation after 2025 [4].

The challenges of introducing the central bank's digital currency in Ukraine in the context of a new evolutionary form of money are

analysed by M. Riabokin [5]. The impact of financial literacy on the level of acceptance of financial inclusion in the era of digital transformation has been studied by M. Al-Okaily and co-authors [6].

Despite the considerable attention paid by scholars to the selected issues, there are still problems that require more in-depth consideration. In particular, it is about identifying the most effective strategies for introducing financial technologies in public administration and integrating the latest technologies in existing financial institutions. The proposed study aims to fill the existing gaps in the implementation of fintech solutions in the public financial management system. It focuses on the main directions of development of financial technologies in Ukraine and justification of approaches to their integration into public financial institutions. Special attention is paid to cybersecurity, process automation, increased transparency and reduction of corruption risks.

Formulation of the objectives of the article (statement of the task). The purpose of the article is to explore strategies for implementing fintech solutions in public financial management systems, to identify the main benefits and challenges of digital technologies for public financial management, and to develop recommendations for the effective integration of financial technologies, taking into account national needs and international best practices.

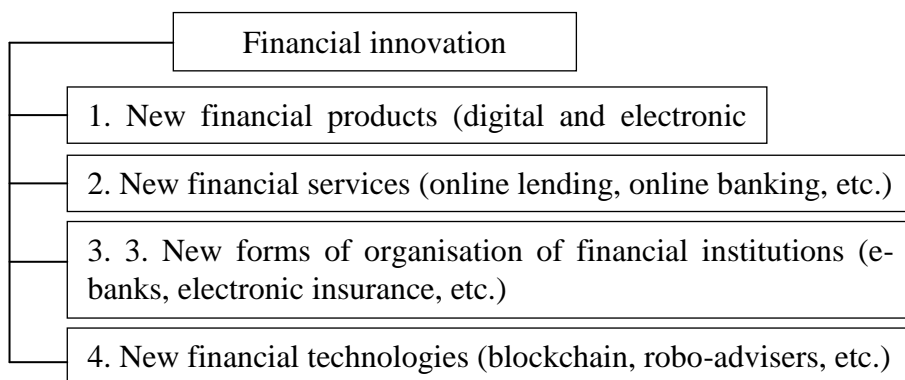
In order to achieve this goal, the following objectives were formulated:

- 1) to identify how the introduction of the latest technologies can improve public resource management processes and ensure government accountability;
- 2) to study the main strategies and tasks defined for the digitalisation of public finances in Ukraine;
- 3) to identify ways to integrate new technologies into public financial institutions in order to improve public services and ensure transparency of financial processes.

Summary of key material. Financial technology is a separate branch of finance that involves the use of innovative technologies to provide, obtain, improve and optimise financial services [1, p. 60].

Today, financial technologies play an important role in the development of the financial sector, significantly changing it and opening up new opportunities for the future. They make financial services more convenient and accessible to users. Thanks to online banking, mobile applications and electronic payment systems, people can carry out financial transactions from anywhere in the world using their devices. Financial technologies enable the creation of new financial products and services that meet today's needs: online lending, cryptocurrencies and other innovations made possible by fintech platforms. They also contribute to financial inclusion by providing greater access to financial services for people who previously had no access to banking instruments, in particular through microfinance, electronic payment systems for the unbanked and other similar initiatives.

In the academic literature, different classifications of financial innovations are presented, which differ mainly in terms of their subject matter and degree of novelty. The general structure of financial innovations is shown in Drawing 1.

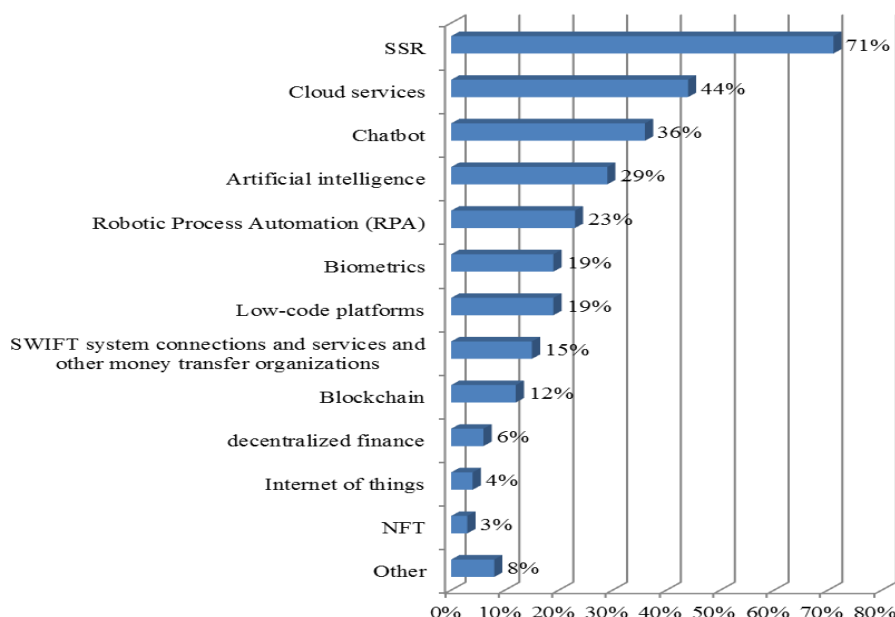


*Drawing 1. Generalised structure of financial innovations**

*Source: author's development based on [2].

The main technologies among Ukrainian FinTech companies in 2024 are shown in Drawing 2.

The introduction of modern information technologies in the financial sector contributes to increasing the efficiency of the use of public resources, provides access to information and improves the accountability of public authorities.



*Drawing 2. Main technologies of Ukrainian FinTech companies in 2024**

*Source: Author's development based on [7].

The sub-objective 'Information Technology in Public Finance Management' within the 'Strategy for Reforming the Public Finance Management System for 2022-2025' [8] emphasises the importance of creating a modern information infrastructure to ensure transparency, accountability and efficiency in the use of public funds.

The main areas of implementation of this sub-objective are:

1) Process automation (introducing technology to automate financial processes such as budgeting, accounting and reporting, thereby increasing the speed and accuracy of operations);

2) Integration of information systems (creating a single platform for data exchange between different authorities and other stakeholders. This will help to avoid duplication of data, reduce administrative burdens and increase the efficiency of public services);

3) digital transparency (use of open data and information systems for public access to financial information, which

contributes to the fight against corruption and increases trust in public authorities);

4) ensuring cybersecurity (given the importance of protecting financial information, the strategy foresees the introduction of the latest cybersecurity standards to prevent threats in the digital environment);

5) developing digital payment systems (introducing electronic payment systems to simplify the process of paying taxes and fees, in particular through mobile applications and platforms) [8].

Another important strategic document related to the digitalisation of public finances is the National Revenue Strategy until 2030 (hereafter NRS), approved by the Cabinet of Ministers of Ukraine on 27 December 2023 [9]. One of its main goals is to create and implement modern digital solutions for tax and customs administration. To achieve this goal, several tasks in the field of tax administration are envisaged, such as IT consolidation of resources of public financial management entities, implementation of an information security management system, and integration with European systems for monitoring the movement of VAT and excise goods and payment information. It is also important to develop IT and digitise the State Customs Service, which will help improve customs clearance, protect intellectual property rights and integrate with EU IT solutions. These steps are priority areas for reforming the public financial management system and bringing it closer to European standards.

In our view, the main strategies for introducing financial technologies in public finance include

1. Adoption of electronic payments and digital currencies

Electronic payments and digital currencies are important tools for modernising financial systems around the world. They ensure convenience, speed and security of transactions, reduce costs and promote transparency in the economy. The introduction of digital currencies, such as central bank digital currencies (CBDCs), can help governments control the circulation of funds, improve the management of public resources and reduce the cost of traditional financial services. At the same time, electronic payment systems facilitate the collection of taxes, fines and penalties, making these processes more efficient and accessible to citizens.

Central bank digital currency is an innovative form of digital money issued directly by the central bank, which almost completely eliminates the need for intermediaries such as commercial banks or credit unions [5].

The introduction of digital currency will significantly change the rules for users: banks will no longer be payment intermediaries and nominal holders of digital money. Having invested heavily in modern financial infrastructure, banks are likely to be interested in avoiding additional costs, given the risk of losing their most valuable resource - their customers' current accounts. Virtual currencies, such as bitcoin, ethereum and other cryptocurrencies (the total number of which exceeds 2000), are digital assets based on decentralised technologies, in particular blockchain.

According to the report 'The 2024 Global Adoption Index by Chainalysis', the top ten countries in terms of cryptocurrency use include India, Nigeria, Indonesia, the United States, Vietnam and Ukraine. As in 2023, India maintains its lead in this ranking, while Ukraine is in 6th place [10].

Table 1 lists the most popular cryptocurrencies by market capitalisation at the end of December 2024.

2.Implementing blockchain technologies for transparency

Blockchain technologies are being used in public financial management to increase the transparency, security and efficiency of financial transactions and accounting [12].

Smart contracts based on blockchain technology can significantly improve transparency and accountability in public procurement and contracts. They are automatically executed when certain conditions are met, reducing the likelihood of fraud and corruption [4]. Smart contracts also facilitate the process of monitoring and auditing public contracts, as all actions are recorded in an immutable blockchain. This increases trust in public financial processes and ensures more efficient use of budgetary resources. In general, the introduction of digital technologies into the public financial management system creates the conditions for a more transparent, efficient and accountable

use of public resources, which has a positive impact on public trust in government institutions and contributes to the development of a stable and successful economy [13].

Table 1

The most popular cryptocurrencies by market capitalisation as of the end of December 2024*

<i>Nº</i>	<i>Cryptocurrency</i>	<i>Price, USD</i>	<i>Market capitalisation, USD</i>
1	Bitcoin	94 685,00	1 874 942 421 483
2	Ethereum	3 378,69	406 996 576 554
3	Tether	0,998243	138 750 668 322
4	XRP	2,19	125 509 837 078
5	BNB	725,09	105 776 397 479
6	Solana	191,85	91 902 588 231
7	Dogecoin	0,321263	47 321 384 680
8	USDC	1,00	43 588 566 326
9	Lido Staked Ether	3 374,60	32 608 962 134
10	Cardano	0,881237	31 579 951 038

*Source: author's development based on [10].

3. Using big data analytics and artificial intelligence

Digital technologies such as artificial intelligence (AI), machine learning and big data analytics [4, p. 317] make it possible to automate many routine tasks, such as processing financial transactions and detecting anomalies in data, which reduces errors and speeds up the processing of financial information. They also help to create predictive models that contribute to more efficient budget planning and resource management. AI and machine learning can also be used to identify patterns that indicate possible cases of tax fraud, or to analyse risks associated with transfer pricing [4].

Big data analytics is another powerful tool that can significantly improve public financial management. By processing large amounts of data, government agencies can obtain more detailed information on expenditures and revenues, identify trends and anomalies, and make more informed decisions. For example, it helps to identify inefficient spending and find opportunities for savings. Big data can also be used to improve

tax administration, enabling more accurate and faster detection of tax abuse and evasion [3].

4. Integrating digital platforms and systems to widen access to financial services.

Digital technologies play an important role in widening access to financial services and ensuring transparency in the use of public funds. The introduction of digital platforms allows citizens to quickly access public services, pay taxes and fees, and track public spending in real time (Table 2). This increases the efficiency of financial management, reduces the risk of corruption and ensures public control over public spending.

Table 2

Digital platforms for access to financial services and control over public spending*

<i>Type</i>	<i>Name of the system/platform</i>	<i>Description</i>	<i>Link</i>
Digital public service platforms	Taxpayer's personal account	A platform for filling out tax returns, checking tax liabilities, submitting requests to tax authorities	https://cabinet.sfs.gov.ua
	Action	A platform for receiving government services, filing tax returns, paying fines and other services	https://diia.gov.ua
	Electronic declaration system	Platform for submission of electronic declarations by civil servants and officials	https://public.nazk.gov.ua
Mobile applications for paying taxes	Privat 24	Mobile application for paying taxes, fees, fines and other payments	https://privat24.ua
	Monobank	Mobile application for paying taxes, utility bills, fees, and other financial transactions	https://monobank.ua
Budget execution monitoring systems	E-data	Open data platform for public procurement, budget expenditures and financial reports	https://www.e-data.gov.ua
	Prozorro	A system for electronic public procurement that ensures transparency of expenditures	https://prozorro.gov.ua
	OpenBudget	A platform for publishing data on state budget execution and budget funds allocation	https://openbudget.gov.ua

*Source: author's elaboration.

Thus, the use of fintech solutions in public finance significantly increases the efficiency of management processes, reduces the processing time of financial transactions, reduces corruption risks, and ensures greater transparency and accessibility for citizens [14].

5. Cyber security protection strategy

Cyber attacks on public finances pose a serious threat to the stability of the economy, the efficiency of budgetary management and the fulfilment of the State's financial obligations. With the development of digital technologies and the introduction of IT systems for the management of public finances, the risks of fraud and security breaches are increasing. Attacks can cause a wide range of problems, from temporary disruption of systems to large-scale loss of confidential information and financial losses (Table 3).

Table 3

Main types of cyber threats to public finance*

<i>Type of attack</i>	<i>Description</i>	<i>Possible consequences</i>	<i>Example</i>
DDoS-attacks	Overloading of servers of state financial institutions, which leads to temporary suspension of access	Temporary suspension of services for budget spending units, destabilisation of IT systems for budget planning	Attack on the GRK-VEB system, making it impossible to prepare budget requests
Phishing and social engineering	Use of deception to obtain confidential information that allows access to payment systems	Unauthorised access to the Treasury system, data theft or falsification of payment instructions	Phishing attack on employees working with electronic offices
Malicious software	Using viruses to infect systems and steal or corrupt data	Paralysing the operation of the Treasury Client, destroying or stealing financial data, disrupting the banking system	Attack by Petya and NotPetya viruses that paralysed financial transactions

*Source: author's development based on [3, p. 71].

Strengthening cybersecurity in public financial management is essential to protect information systems from potential cyber threats. To maintain an adequate level of security and prevent possible attacks, it is necessary to implement multi-level measures:

1) Multi-factor authentication (MFA) is one of the most important security tools, involving the use of multiple levels of verification to access financial systems. This can be a combination of passwords, biometrics and one-time codes, providing a high level of security;

2) Encryption is important for protecting confidential information transmitted over the Internet or stored in databases. The use of advanced encryption algorithms to protect financial data reduces the risk of theft or unauthorised access;

3) Regular software updates are important to maintain effective protection against new vulnerabilities. It is important to develop and implement specialised software for financial institutions that protects data from cyber threats and meets the requirements of modern cybersecurity [3, p. 73].

The integration of these measures will significantly increase the level of cybersecurity in public financial institutions, reduce the vulnerability of systems and ensure resilience to potential cyberattacks.

Conclusions of this study and perspectives for further research. The implementation of fintech solutions in public financial management systems therefore requires clear strategies aimed at increasing the efficiency and transparency of financial processes. One of the main strategies is the integration of digital payment systems, which makes it possible to ensure fast and secure financial transactions. Another important strategy is the implementation of blockchain technology, which ensures transparency and immutability. AI helps to improve decision-making by predicting financial risks and optimising the budgeting process. Other important strategies include creating a single digital platform for data exchange between government agencies, which improves the integration of financial management systems, and ensuring cybersecurity, which should be implemented at all stages of digitisation to protect financial data and ensure its confidentiality.

Prospects for further research include studying the impact of fintech solutions on the stability of public finances and their role in reducing budgetary expenditure. Another important area is to study the effectiveness of integrating the latest technologies in public financial management.

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