

DIGITALIZATION OF THE MONETARY SYSTEM: INSTITUTIONAL AND REGULATORY ASPECTS

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За сучасних умов грошово-кредитні системи всіх країн світу схильні до трансформації, обумовленої впровадженням і розповсюдженням цифрових технологій, систем та інструментів. Структурні зміни зачіпають усі її рівні: технологічний, організаційний та інституційний. Важливе значення при цифровізації грошово-кредитної системи має дослідження сутності цифрового інституту та інституційного регулятивного середовища цифрової екосистеми. В статті досліджено вплив процесу діджиталізації на інституційну структуру світової грошово-кредитної системи, яка трансформується у використання цифрових технологій, появу нових гравців та проблем на фінансовому ринку, а також питань, пов'язаних із запровадженням цифрових валют та можливими змінами в регулятивному інструментарії грошово-кредитної політики.

Ключові слова: *цифровізація, цифровий інвестиційно-фінансовий простір, регулювання, екосистеми, цифрові валюти центральних банків, пропорційне регулювання.*

Problem statement. The digitalization of the monetary system in modern environment is characterized by dynamism. Few scholars and practitioners doubt that the monetary system is changing radically. With the development of new technologies such as blockchain, cryptocurrencies, and digital payment systems, there is a growing trend towards the digitization of money. Moreover, not only its organizational and technical, but also institutional characteristics are changing. This creates new challenges for both existing entities, primarily banks, and regulators, who face new tasks. At the same time, this shift raises concerns about the stability and safety of the financial system, as well as issues related to privacy and security. In this context, it is important to explore the institutional and regulatory aspects of the digitalization of the monetary system, as well as the role of central banks and other financial institutions in overseeing and regulating the digitalization of money, as well as the need for clear and consistent regulatory frameworks that can adapt to the changing landscape of digital finance.

The review of recent research and publications. Many scholars, especially from countries with developed market relations, have studied aspects of digitalization, including institutional aspects, as well as the problems and challenges faced by

regulators [1]. Ukrainian scientists have been exploring various aspects of digital finance, including the impact of digital currencies on the monetary system, the regulatory challenges associated with digital finance, and the potential benefits and risks of the digitalization of money. Among scientists researching the process of digitalization of monetary system, it is appropriate to distinguish the successes of such scientists as Khaustova M. H. [1], Kloba L. H. [2], Sirko A. V. [3], Hrytsenko O. A. [11], Polishchuk E. A. [7] thoroughly researched the peculiarities of the global financial market development. At the same time, the current and dynamic situation requires further study, using both foreign and native experience in order to face all possible challenges.

Research methodology. The methodological background of the study the digitalization of the monetary system from an institutional and regulatory perspective, a mixed-methods research methodology has been applied. This would involve combining both quantitative and qualitative research methods to gain a more comprehensive understanding of the phenomenon. During the research, the following techniques were applied: abstract logical, method of comparison, monographic and scientific synthesis.

The purpose of the research is to study the impact of the digitalization process on the institutional structure of the monetary system in world practice, which is transforming into the use of digital technologies, the emergence of new players and problems in the financial market, as well as issues related to the introduction of digital currencies, and possible changes in the monetary policy toolkit.

Research results. According to the results of the study, the problems related to the principles and methodology of regulating the new digital monetary system, the specific content of which should take into account the peculiarities of digitalization models existing in a particular country and its new institutional properties, have not yet been sufficiently investigated. When studying this issue, it is important to consider the institutional and regulatory aspects of digitalization and, on this basis, to reveal the institutional features of the digital monetary system, classify digitalization models, and identify the main trends in the development of regulation of digital monetary systems.

In today's environment, monetary systems around the world are being transformed by the introduction and proliferation of digital technologies, systems, and tools. Structural changes affect all levels of the system: technological, organizational, and institutional. The first level characterizes the technical and technological basis for organizing economic activities and interactions among entities. The organizational level is characterized by a set of rules for the interaction, coordination and management of economic processes that operate within a particular structure or group of economic entities and are local in nature. Researchers, especially in developed market economies, are actively studying various institutional issues related to the digitalization of both the economy in general and the monetary system in particular. Many of these studies are devoted to the impact of the digitalization process on the existing institutional structure.

In particular, a study conducted by L. G. Kleba shows that the digitalization of the financial system leads to the emergence of new institutional players in the financial sector, changes the structure of transaction costs, and leads to a significant reduction

in the structure of transaction costs associated with digitalization [2]. Another part of researchers focuses on the institutional qualities of the newest economic systems emerging on the basis of digital technologies, which are inherent in the institutional properties of network systems based on the periodization of the stages of formation of the digital economy [3].

The study of the essence of "digital institution" and "institutional regulatory environment of the digital ecosystem" is important in the digitalization of the monetary system. According to the study by T. Kvasha, a digital institution is interpreted as regulatory instruments of the digital ecosystem, and the regulatory environment is a system of regulatory procedures that determine the decision-making process and the creation of new products in the digital ecosystem [4]. The digitalization of the monetary system in the current environment faces new challenges. At the same time, the economic literature still lacks a systematic approach to regulating the digitalization of monetary systems. Some issues are raised in the studies of foreign scholars.

In this context, the need to systematize research and approaches to regulating the digitalization of the financial sector is becoming more urgent. The need to develop coordinated regulatory measures for both traditional banks and new categories of financial intermediaries. Experts of the *KPMG* consulting company emphasize that the regulation of digitalization in the financial services sector has been one of the key tasks for the financial sectors for several years [5]. At the same time, the issue of defining and choosing a regulatory model in the context of digitalization remains a primary and not fully resolved task for monetary regulatory institutions. This trend is already evident today, for example, in the fact that large trading companies are entering the financial services market, which leads to significant transformations of the monetary system at all its levels: technological, organizational, and institutional. These levels are closely interconnected, and most studies of the digitalization of the economy and financial system address issues that include a combination of these levels and aspects.

A significant part of them belongs to the organizational and technological level, including new opportunities, benefits, and threats associated with the introduction and spread of new digital technologies, systems, and tools, such as blockchain, digital money and tokens, etc. In this context, the institutional aspects of the digitalization of the financial system, which are manifested primarily in the change in the structure of transaction costs, should be subject to constant attention. The most important institutional features of the digital investment and financial space that radically distinguish it from the traditional, pre-digital monetary system include a significant reduction in numerous types of transaction costs associated with verification and control of contractual obligations (including contractual capacity), identification and management of credit and operational risk, exchange of information, money and financial assets, and establishment of communications. In addition, the monetary system is becoming "smart" and capable of analyzing and perceiving a huge amount of information, which also gives it new institutional properties, and the introduction and distribution of digital currency by central banks should make it more transparent.

The digitalization of the monetary and financial system is manifested in the fact that a digital financial and investment space is being formed in the world, which creates

new opportunities for payment, credit, deposit, investment, and other financial transactions. This space is global in nature and, at least in organizational and technical terms, has no national borders. Business models and schemes for organizing interaction between customers and banking institutions are changing significantly. Traditional financial market participants, such as lenders and borrowers, can interact directly with each other in the context of the digitalization of the monetary system, bypassing intermediate links. The formation of a new digital space is, of course, not limited to the monetary system, but covers the entire economy.

In particular, the classical banking system arose primarily due to the fact that the exchange of financial assets always involves the risk of non-fulfillment of contractual obligations. This applies not only to credit but also to payment transactions. To carry out these transactions, a trustworthy intermediary with experience in risk management was needed. A classic "pre-digital" bank was just such an intermediary. With the digitalization of the economy and monetary system, the situation is changing. One of the main advantages of the digital investment and financial space is its higher contractual capacity compared to the traditional monetary system, which is able to provide clear verification and control over the fulfillment of contractual obligations, allowing for the automation of transactions for the exchange of money or other assets, which makes it possible to include the possibility of influencing the terms of the transaction by either party after the conclusion of the contract. Such systems may indeed lead to a certain disintermediation of banking activities in payment and credit transactions, as they make it unnecessary to involve a trusted intermediary (i.e., a traditional bank) to complete a transaction. It is quite possible that in the future payments based on such systems will replace bank letters of credit and other traditional documentary transactions, and will facilitate easier and simpler financing of commercial and possibly investment projects. However, the need for intermediary advisors and organizers is unlikely to disappear entirely, as banks will continue to exist in a slightly different form for the foreseeable future as hubs for a variety of services and as institutional units with diverse and systematic knowledge of finance.

Transparency as an institutional property of the digital investment and financial space is of great importance in the digitalization of the monetary system. Under such conditions, any entity, both individual and legal entity, can simultaneously be a client of not one but several (in principle, an unlimited number) banks and integrate their finances (personal or corporate) with banking services. Moreover, the transaction costs associated with establishing such a relationship are close to zero, which seems unimaginable in a traditional pre-digital banking system. The digital investment and financial space is characterized by continuity of communication, which means that financial institutions can maintain continuous communication with customers and predict their needs.

The digital investment and financial space is open not only to potential clients but also to new non-banking companies that develop and offer traditional banking services. In the pre-digital financial system, it would have been impossible to imagine that a powerful non-financial commercial company or a group of enthusiastic specialists in a particular narrow field (programmers) would suddenly start developing

and offering financial products. Currently, bigtechs (large non-financial companies) and fintechs (groups of specialists) are doing this and are squeezing traditional banks. Digitalization is leading to changes in the structure of both banks and the financial sector as a whole. Despite the tendency towards some disintermediation of the banking system, banks will still survive in the digital economy. Their role as an intermediary that guarantees payment and credit and deposit transactions will decrease, but not be reduced to zero. This is because:

- first, uncertainty and classic banking risks will never be completely eliminated;
- second, banks, unlike other financial sector entities, possess the most diverse and systemic knowledge;
- third, the need for traditional banking operations, primarily deposits and lending will remain at least for a long period of time, while maintaining coordination and management of the asset and liability structure.

From this perspective, future banks will undergo major transformations in terms of technology, organization, and institutions. The formation of ecosystems and other forms of partnerships is not the only trend, but it is the most sustainable and likely to prevail given international best practices [6]. Positive effects are reflected in increased banking margins, technological efficiencies in business processes, and an expanded customer base. On the other hand, these activities are associated with a number of risks, such as operational (cyber) risks, consumer protection and customer data security risks, a decline in profitability and brand value of traditional banks, and the emergence of new systemically important institutions that operate beyond traditional banks and are characterized as inter-industry.

Global practice has not yet developed approaches to regulating forms of partnerships, whose activities are mostly coordinated by the following key aspects: financial, antitrust, and product. According to experts, "in international practice, the institutional specifics of a country and the structure of its financial market play a decisive role in shaping the digital transformation model." In this context, the following main models of digitalization of financial systems have been identified in the world practice: the US-Chinese, European, and Indian (Table 1). The data in the table show that the transformation of the monetary systems of the United States and China is carried out by building ecosystems created by big tech companies, while the Indian financial sector is transforming through the active creation of fintech. For European markets, the banking infrastructure plays a crucial role, which is being transformed through the introduction of open banking. Both global and regional financial markets are experiencing increased competitive pressure on traditional banks from non-financial, mainly technology and telecommunications companies. Such companies provide a wide range of payment services (*Apple, Google*), lending services (*MPesa, eBay*) and insurance, and some of them can provide the full range of banking operations (*Amazon* is an example) [9].

Banks' response to the changing operating environment is to adapt business models and formats of financial services, expand interaction with non-bank institutions in various forms, such as marketplaces, cross-selling, super applications, ecosystems, and other forms of partnerships.

Table 1. Digital transformation models [8]

Model name	Main characteristics of the model	Examples
American-Chinese	<ul style="list-style-type: none"> - increased trust of the population to technologies; - financial services are a secondary element of the ecosystem; - high consolidation of client data with the bigtech 	<i>Facebook, Amazon, Microsoft, Google, Apple, Baidu, Ant Financial, Tencent</i>
European	<ul style="list-style-type: none"> - the trend to conscious (“smart”) consumption; - increasing role of a client and their involvement into the value adding chain; - niche character of financial services 	<i>Revolut, Monzo, N26, Starling Bank</i>
Indian	<ul style="list-style-type: none"> - domination of startups; - consumer demand as a driver for innovations; - low level of banking services penetration 	<i>One97, Paytm</i>

In such cooperation, banks can play the role of both owner and participant. The formation of ecosystems and other forms of partnerships is not the only trend, but given the progressive global practice, it is the most sustainable and likely to spread. Its positive effects are reflected in increased margins in the banking business, technological sophistication of business processes, and expansion of the customer base. However, in addition to these, such activities are associated with a number of risks, including operational (cyber) risks, the risk of consumer protection and customer data security, a decrease in the profitability of traditional banks and the value of their brands, and the emergence of new systemically important institutions whose activities go beyond traditional banking and can be characterized as inter-industry.

As a result, the regulatory environment in which traditional banks and new financial service providers operate is also changing. This requires appropriate actions by financial regulators in the form of effective solutions that ensure, on the one hand, the sustainable functioning of financial institutions, and, on the other hand, stimulate innovation and protect the interests of financial services consumers. As the digital transformation of the financial sector leads to an expansion of the types of financial service providers, the regulatory perimeter needs to be adapted accordingly. In other words, financial regulators need to develop approaches to regulating the activities of non-traditional financial service providers (including fintechs, bigtechs, and telecommunications companies). Regulatory mechanisms should also take into account the challenges faced by traditional banks to support their sustainable operation and ensure financial stability. Currently, the following main regulatory models are used, which are described in (Table 2).

Table 2. Models of financial regulation of monetary systems [9]

The approach	Brief description of the model	Countries that apply this approach
Institutional	Regulations are enforced based on the legal status of the financial institution, regardless of the type of activity being carried out	China, Mexico, Hong Kong
Functional	Regulation is based on the functions performed, regardless of the legal status of the financial institution.	Italy, France, Brazil, Spain
Integrated (hybrid)	All activities and types of financial institutions are regulated by a single regulator (mega-regulator).	Great Britain, Germany, Canada, Japan, Singapore, Switzerland
Twin Peaks	Regulation is usually carried out by two bodies with different with different responsibilities. For example, one regulator performs macro and micro prudential supervision, while the other regulates business behavior and consumer protection	Australia, Netherlands

Currently, financial regulation is being transformed by adjusting the model used. In particular, an increasing number of countries are moving from an institutional model to a functional, hybrid, or a combination of their elements. At the level of approaches to regulating monetary systems, there are the following types of regulation

- Principle-based;
- Rules-based regulation.

In the vast majority of countries with developed market relations, regulation is based on principles characterized by a high degree of formality. This approach limits the possibility of introducing financial innovations and increases the costs (time, financial and other) of complying with regulatory requirements [10]. Regulation based on these principles provides a general description of approaches to conducting business in which the regulator does not assess the application of policy rules, but determines compliance with regulatory rules regardless of the approach used. Regulation based on these principles requires supervisory institutions to have an effective corporate governance system in place, as the "comply or explain" principle applies in this case. This approach is characterized by regulatory flexibility and high adaptability to innovations. Regulation based on the above principles has been most developed in countries such as the United Kingdom, Singapore, Mumbai, Iceland, the Netherlands, and Switzerland [7].

Another trend in improving regulation is the application of the proportionality principle. In this regard, there is no single approach in global practice to building a

system for regulating monetary systems. For example, Hong Kong, China, and Mexico use an institutional model of regulation, which provides for the development of measures based on the legal (institutional) status of a financial intermediary (e.g., bank, non-bank financial institution, etc.) and its licensing powers. In countries such as France, Spain, Italy, and Brazil, a functional model is used, where the type of activity (payment services, lending, etc.) is subject to regulation rather than the legal status. The so-called integrated (hybrid) model, which provides for a single regulatory body - a mega-regulator -, is becoming increasingly common in modern conditions. This model is used in Germany, Japan, Canada, Singapore, and Switzerland. In countries that are global financial centers, such as the UK, the USA, Finland, New Zealand, South Africa, the Netherlands, and Australia, the Twin Peaks model is used. This model involves regulation by two or more authorities.

The analysis of foreign practice makes it possible to conclude that "proportional regulation is required primarily for the most complex regulatory requirements. The criteria for distinguishing between requirements based on the principle of proportional regulation may include, in particular, the amount of total assets, the scale of international activities, and the level of risks [11].

Conclusions. The results of the study show that the most relevant aspects for national regulators in developing measures aimed at managing the process of digitalization of monetary systems will be the following:

- Development of elements of the functional model of regulation with a gradual reduction of elements of the institutional model. "The functional model envisages the application of regulatory approaches based on the economic substance of operations and functions rather than on legal status, with additional requirements, in particular, compliance with regulatory capital adequacy standards, taking into account the systemic importance buffer, and the establishment of a remuneration committee."

- Implementation of regulation based on principles rather than rules. This approach implies a shift from prescriptive rules for conducting banking business to setting standards of market behavior.

- Developing approaches to regulating non-bank financial service providers. The need to develop them is due to the fact that the use of forms of partnerships (ecosystems, marketplaces, etc.) entails structural changes in the financial sector and, therefore, gives rise to new types of risks for monetary systems. In this regard, appropriate regulation is needed to ensure a balance between achieving the goals of central banks and stimulating innovation;

- Studying the possibilities of introducing central bank digital currencies into circulation as a third form of national currency alongside cash and non-cash money.

Implementation of these measures will contribute to the formation of effective regulation of monetary systems in the context of digital transformation. In turn, this will help improve the efficiency of national financial market participants, the predictability of the regulatory environment, and competition in the financial market.

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Annotation

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Digitalization of the monetary system: institutional and regulatory aspects

The digitalization of monetary systems is characterized by significant changes not only in the organizational and technological aspects, but also in the institutional and regulatory aspects. They relate to both the specifics of the functioning of monetary system entities, the way they conduct operations, and the role and tasks of financial regulators.

The institutional development of the monetary system in the long run is characterized by the formation of a new digital investment and financial space, which is reflected in a change in the structure of transaction costs, the formation of new institutional properties of the monetary system, as well as the emergence of new types of risks, the transformation of existing players and the emergence of new ones, due to the active introduction of digital financial technologies.

The impact of digital transformation models on the change in the regulatory environment is important, as it implies both changes and approaches to regulating the activities of financial service providers and the role of direct regulators, applying the main models of monetary system regulation. In today's environment, monetary systems around the world are being transformed by the introduction and diffusion of digital technologies, systems, and tools. Structural changes affect all levels of the system: technological, organizational, and institutional.

The study of the essence of the digital institution and the institutional regulatory environment of the digital ecosystem is of great importance in the digitalization of the monetary system. The paper is devoted to the analysis of the impact of the digitalization process on the institutional structure of the global monetary system, which is transforming into the use of digital technologies, the emergence of new players and problems in the financial market, as well as issues related to the introduction of digital currencies and possible changes in the regulatory tools of monetary policy.

Key words: *digitalization, digital investment and financial space, regulation, ecosystems, central bank digital currencies, proportional regulation.*