

# Cloud Technologies and Artificial Intelligence as the Basis of Digital Development of the Financial Sector of the Economy of Ukraine

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## Abstract

In the modern world, digitalization processes are the basis for stimulating the country's economic growth. The intensity of globalization processes leads to the economic integration of the economies and financial sectors of the countries of the world. The main trend of the modern financial sector is the accelerated introduction of technological innovations, innovative financial services and tools for their implementation. The use of digital technologies helps to reduce the cost of maintenance and operational risks. Creating a digital basis for serving consumers by finance companies increases their productivity and spurs more innovation in the financial arena. This, in turn, maintains the soundness of the financial sector. Restyling of financial services is based on the use of artificial intelligence and cloud technologies by financial companies, which allows to meet the needs and expectations of consumers. The use of tools for digital transformation of the financial sector provides maximum personalization, while using a large variety of parameters. Tracking and comparing changes in regulatory documents using RegTech and NLP provides an important area of activity for financial companies - compliance. An inevitable process is the virtualization of information interaction between financial sector entities based on the use of cloud technologies. However, the imperfection of these technologies at the moment does not allow them to be fully used. Therefore, in order to create favorable conditions for the introduction of innovations in the financial sector based on cloud technologies, it is necessary to implement a number of actions proposed in the article. The studies carried out allow us to assert that due to digital transformations of the financial sector, the efficiency of business processes increases and powerful advantages of its subjects are formed. But at the same time, there are some restrictions on their full implementation and risks on the way to the development of the digital financial sector in Ukraine. The proposed potential means of accelerated digitalization of the financial sector of the economy are in the large-scale and all-encompassing use of cloud technologies and artificial intelligence.

## Keywords

financial sector, digitalization, financial innovation, ICT, artificial intelligence, cloud technologies, restyling, RegTech

## 1. Introduction

A significant trend in the development of the world economy in the 21st century is the spread of ICT, which provided opportunities for the development of the “digital economy” and caused the

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introduction of the concepts of “digitalization” into scientific circulation. In the modern world, significant mega-regional changes are taking place with varying intensity and results. They are caused by the intensification of the processes of globalization of the world economy and the expansion of economic integration, changes in the structure of national economic systems [1], transformational shifts. At the same time, the process of transition from an industrial society to the development of the information space is under way. Its level of development significantly affects the economy, culture, politics and financial sector of countries.

The reorientation of the traditional economy to a digital one requires the use of innovative technologies, including in the financial sector. According to the adopted “Strategy for the development of the financial sector of Ukraine until 2025” [2], the main directions of innovative development of the financial market of Ukraine are determined: development of an open architecture of the financial market and oversight; ensuring the development of the FinTech market, digital technologies and regulatory platforms; ensuring the development of SupTech & RegTech; development of the digital economy. The development of the financial sector at the present stage is associated with the use of the latest information technologies.

The development and use of technological innovations by institutions of the financial sector is one of the important areas for the successful development of the national financial services market in Ukraine. The introduction of the latest ICTs leads to a reduction in costs and an increase in labor productivity, the creation of remote jobs, the development of distance learning, etc. This will help to increase the income of financial institutions, enhance their competitiveness in the market, improve the image and increase the level of confidence on the part of non-financial corporations and households.

## **2. Researches of the imperatives of the digital transformation of the financial sector**

The financial sector receives the greatest benefits from the use of digital technologies, therefore, scientists from different countries are studying the issues of transformation processes and digitalization of the financial sector. At the same time, the need to maintain stability in the

face of growing competition and transformation into service companies investing in the development of the digital economy, rather than traditional services, is emphasized [3]. The use of artificial intelligence and RegTech provide new opportunities for high-quality regulation and settlements in the financial sector [4], influencing the banking and financial stability [5]. The introduction of new technologies (cognitive technologies, robotics, IoT / connected devices, mobile / social media), depending on the level of investments and their place in the production process [6], affects the performance of financial companies. The effectiveness of investments in digital technologies is manifested in the indicators of the company’s performance and labor productivity. However, it is necessary to take into account their biggest threats [7], companies’ value chains, commodity risks.

The imperatives of the digital transformation of the financial sector (digital statistics, managed data, integrated customer experiences, digital marketing, digital operations, next-generation technologies and digital tools) act as a factor in maximizing the ROI of digital investments [8, 9, 10]. The use of cloud technologies in practice requires the selection of the most appropriate model for the secure deployment of such a cloud, taking into account the level of information security of the company, confidentiality and compliance with the necessary requirements [11, 12, 13]. At the same time, the introduction of cloud computing technologies and services in the financial sector of developed countries increases the efficiency of payment transactions, risk management and business processes. Ensuring digital development of the financial sector of the economy provides an opportunity to determine the further development [14] of companies from the standpoint of competition or symbiosis. Taking into account the research carried out, in order to ensure the digital development of the financial sector of the Ukrainian economy, additional research requires tools for the implementation of such development.

### **2.1. The financial services market in the context of digitalization**

Existing studies do not fully disclose the tools for implementing the strategy for the development of the financial sector in Ukraine. This requires the determination of the main development trend of the modern financial sector; substantiation of the objective need for the use of artificial

intelligence and cloud technologies, as well as actions to create favorable conditions for the introduction of innovations in the financial sector; identify the advantages, limitations, risks and means of accelerated digitalization of the financial sector of the Ukrainian economy.

The purpose of the article is to substantiation of the expediency of using cloud technologies and artificial intelligence as the main tools for ensuring the digital development of the financial sector of the Ukrainian economy.

### **2.1.1. The main development trend of the modern financial sector in Ukraine**

Digital transformation is a new direction in the development of the financial sector, which involves the use of new technologies, the Internet, mobile devices and a variety of electronic channels. In turn, digitalization of the financial sector is the introduction of new technologies and data into business processes in order to increase the efficiency of its activities. The factors that contribute to the spread and development of digitalization of the financial sector are the development of new technologies, the need to reduce costs, and increased competition. It is expected that plastic cards will be replaced by smartphones with an Internet bank, but, on the other hand, this requires significant investments and investments. The National Bank should become the driver of the development of digital technologies of the financial system in Ukraine, as clients begin to turn to digital services for certain forms of financial services that are needed by a modern Internet user.

In Ukraine, there are three main challenges to expanding the digital format of the financial sector: a significant amount of paperwork and a surplus of branch network; high share of cash transactions; differences in performance levels between financial institutions. Today in Ukraine, on average, there are 2-3 times fewer clients per bank branch than in developed countries, which indicates the feasibility of further network optimization. Ukrainian banks have strict regulation of processes and a significant amount of paperwork.

The branches of Ukrainian banks are overloaded with cash transactions, which reflects the high share of the shadow economy and the underdevelopment of the payment infrastructure. There is significant potential to reduce the share of cash transactions, as

well as manual processes in branches by organizing smooth operation and 24-hour availability of ATMs. Note that the performance indicators of financial institutions vary significantly. Leaders are significantly ahead of other institutions in terms of the number of retail customers served in one branch, and are successfully moving transactions to electronic channels. Consolidation and dissemination of best practices can help increase productivity in the sector. Relatively efficient financial institutions serve almost three times as many clients per branch. Building new IT infrastructures for financial institutions allows them to manage markets for profitability. The widespread use of digital services is the future of the financial system. Ukraine has a great competitive advantage in this area, since domestic financial institutions have long and effectively used advanced innovative technologies in their practice. At the moment, the financial sector of the Ukrainian economy is undergoing a stage of qualitative transformation and is capable of large-scale use of cloud technologies and artificial intelligence.

In the context of digitalization, the financial services market has changed dramatically and is developing dynamically. Today it is not enough to apply traditional methods of providing financial services. The digital transformation of the financial sector of the economy involves the restyling of financial services. Changes are taking place from customer service to machine learning and from artificial intelligence to mobility. The financial industry is changing from complex and time-consuming transactions to a more transparent structure. The transition from the classic "product" organization to the technological one is under way, new management models based on digital strategy are being used.

To be competitive, it is necessary to create and properly use new forms of customer acquisition and service based on the implementation of cloud technologies and artificial intelligence. The gradual digitalization of the financial sector covers its various areas - payment technologies, remote customer service, developing relationships with them, developing and mastering new products, risk management, internal operations and others. The implementation of such a transformation is possible by stimulating FinTech companies and introducing sustainable financial revolutionary technologies.

To be able to quickly and flexibly adapt to changes, there is a need to use cloud platforms. They can help meet customer needs and expectations, enhance workflows and data integration, and improve analytic processes and

corporate reporting. Therefore, financial companies are increasingly moving from “target audience” to personalization, thereby protecting new competitive advantages and customer loyalty.

### **2.1.2. The objective necessity for the use of artificial intelligence and cloud technologies**

Artificial intelligence is able to quickly find information about any customer or transaction, therefore a number of banks. It is used to monitor the negotiations between managers and clients and to conduct internal investigations. To do this, the program instantly analyzes recordings from many different sources and checks texts, audio and video recordings. Artificial intelligence systems help banks respond to various requests from regulators, including those connected to customer complaints, which usually take a lot of time and resources.

Big data helps finance companies maximize service levels and self-value. They form a complete data map of each client. At the same time, one of the main problems is the need to study huge volumes of information about client operations. The use of artificial intelligence can be used to solve many of such problems as modeling, scenario analysis and forecasting; conducting customer identification; monitoring of organizational culture; collection and analysis of data for risk management. Artificial intelligence algorithms analyze transactions in many more parameters than is possible with human work. Leverage machine learning to identify suspicious transactions and dramatically reduce false alerts by empowering employees to focus on real issues.

Many banks are testing artificial intelligence technologies for stress testing, as well as implementing a system for combating money laundering and terrorist financing. Corresponding algorithms scan client documents and check the received information with data from the Internet. If a discrepancy is found, the so-called “red flags” are raised, that is, a warning to bank employees about the need for additional study of the client. Artificial intelligence technologies do not replace humans in making management decisions, but help to do it faster and better.

Information technologies are being introduced quite actively into compliance, which is one of the important areas of activity of financial companies all over the world. Since the realization of risks of

non-compliance can lead to the application of various sanctions, financial or reputational losses. Natural language processing (NLP) algorithms allow you to track and compare changes in regulatory documents. Therefore, the implementation of ICT for compliance is a vital necessity for financial companies and a promising field of activity for IT companies through the development of RegTech.

Digital technologies make it possible to virtualize the information interaction between customers and financial workers providing services, use cloud services that provide end users with the ability to use dynamic access to services, computing resources and applications over the Internet remotely. With the digitalization of the financial sector, the use of cloud computing solutions is increasing.

Complementary digitalization of any financial company is taking place. There is a complementarity of financial services, in which the consumption of some services causes a constant need for others. At the same time, it is critical to modernize the business model of a financial company and transform it into a cloud platform. The use of cloud technologies allows: to reduce the time and financial costs of maintaining the physical IT infrastructure; provide customers with effective multi-channel digital interaction in real time; simplify and optimize business processes through standardization, optimization and implementation of cloud solutions; creates opportunities for the introduction of advanced technologies, in particular artificial intelligence, the Internet of things, blockchain, etc.

With cloud computing, finance companies can focus on their core business, increasing productivity during peak periods. Here’s a good example: using a smartphone, today you can make contactless payments instead of using a plastic card and paper money. The implementation of this process is based on a cloud-based approach and a specialized service. It is built using HCE (Host Card Emulation) technology, which allows you to emulate a physical card on a host system in the cloud and transfer customer payment data to a smartphone. It is noteworthy that no data remains on the device itself, since during the transaction they come from the cloud in encrypted form.

### **2.1.3. Accelerated digitalization of the financial sector of the Ukrainian economy: advantages, limitations, risks and means**

Cloud computing and artificial intelligence provides virtually limitless opportunities for the financial sector. However, the technologies themselves are quite young and have certain problems that require solutions. Financial institutions have large and complex IT infrastructures that rely on mission-critical applications and meet stringent criteria and extremely stringent security requirements. Therefore, until now, key banking applications are not used in the cloud. The main reason is the risk of transferring confidential financial information to the cloud, since the security of the clouds is uncertain. To create an enabling environment for cloud-based innovation in the financial sector, a number of actions need to be taken.

The use of cloud technologies in the financial sector leads to risks of transferring confidential information to the cloud. They are associated with a lack of visibility and control over processes in the clouds; shadow IT; the likelihood of accidental data publication; malicious data breach; distortion or loss of critical data; non-compliance with regulatory requirements; the presence of cloud-based malware; the likelihood of malware spreading to the entire corporate network. To minimize these risks, it is necessary to take actions to create an enabling environment for the introduction of innovations in the financial sector based on cloud technologies. Namely: analysis and determination of the composition of cloud services on the market and regulatory barriers to their development. Creation of standard clauses for outsourcing agreements, taking into account the requirements of the financial regulator for the IT service provider, including in the field of risk management, audit and supervision. Stimulate the development of qualified auditing and cloud service provider certification practices by setting contractual and quality label requirements in line with internal control maturity.

Thanks to the digital transformations of the financial sector, the efficiency of business processes is increasing and powerful advantages of its subjects are formed. Namely: intensification of the development of the financial sector; significant increase in the return on investment in digitalization; ensuring the continuity of banking

activities; minimization of the risk of the human factor; an increase in the speed of decision making; providing additional opportunities for all subjects of the financial sector; lower user costs; expanding access to finance for individuals, small and medium-sized enterprises, underserved by financial services; consolidation of information technologies by financial organizations to diversify the risks of their business; expanding the range of financial services and the circle of potential clients; reducing information asymmetry and improving pricing efficiency.

At the same time, existing restrictions (an increase in the number of cases of implementation of operational decisions in the short term; imperfection of legislation in the field of digital technologies; underdevelopment of digital infrastructure; insufficient digital culture of business and other users of banking services; lack of highly qualified personnel; insufficient level of regulatory regulation of the use of FinTech companies that differ from traditional business model institutions; unpredictable decision-making by consumers of online services; limited access due to the inadequate level of skills and the ability of consumers' available gadgets to carry out online transactions) prevent the full realization of the benefits.

At the same time, the pace of development of the digital financial sector is reducing macroeconomic threats, digital divide, and various kinds of risks. Macroeconomic threats to digitalization are caused by a mismatch and lack of skills, reduced spending on science and innovation, and demographic factors. Digital divide, digital divide, polarization refers to inequalities in access to social, economic, educational, cultural and other opportunities. Market risk implies the negative consequences of a significant change in market conditions. Cyber risks arise due to the specifics of the financial technology environment. Technological risk implies a disruption in the uninterrupted provision of services as a result of failures or errors in the operation of the service. Legal risks touches upon the problem of insufficient consumer protection.

Limitations and risks are not new. They can be strengthened by the rapid development of FinTech and new forms of interconnection, the regulation of which is currently insufficient. However, it is the processes of digitalization of the financial sector that contribute to the improvement of regulatory documents.

### 3. Conclusions

To overcome the existing limitations and risks of digitalization of the financial sector of the economy, it is necessary to increase the volume of investments in the digitalization of the sector's activities. While paying special attention to investing in the development of mobile applications, the use of cloud technologies and artificial intelligence in activities.

Increasing the protection of data and intellectual property of financial companies, taking into account vulnerable assets exposed to the impact of cyber incidents, will optimize business processes and increase the level of competitiveness of sector entities. The creation of remote jobs / jobs of a new type will attract specialists of digital services, contributing to their popularization and effective implementation in the country.

Thus, the proposed potential means of accelerated digitalization of the financial sector of the economy lie in the large-scale and all-encompassing use of cloud technologies and artificial intelligence. They should be aimed at meeting the needs of financial sector entities, monitoring the degree of their digitalization, the level of provision of digital services and their quality.

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