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DIGITAL BANKING TECHNOLOGIES AND THEM DIRECTIONS FOR EFFECTIVE USE IN THE ACTIVITIES OF COMMERCIAL BANKS

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A B S T R A C T

In this article, digital banking technologies, their composition, and directions for their effective use in the activities of commercial banks are widely covered. The scientific views of foreign and domestic scientists on banking technologies are deeply studied, analyzed and author's opinions are expressed. Also, the banking technologies used in the world's banks today are presented and their specific features and advantages are revealed. In addition, scientifically based suggestions on the effective use of banking technologies have been developed.

K E Y W O R D S

Commercial banks, banking technologies, information technologies, mobile banking, risk, computer technologies, credit card.

Introduction

It is known that all the achievements in the fields achieved by humanity in the present era are unimaginable without technologies and their software. Because, don't take any industry, technologies are used. It includes everything from nano-technologies to mega-technologies. Today's technological advancements have reached remote controlled and artificial intelligence powered technologies.

There is almost no field that has not been affected by such advances in technological development. In particular, technologies such as information, computer, communication, medicine, transport in the fields of social (education, medicine, culture, art, etc.) and economy (such as agriculture, industry, construction, service, transport and communication), as well as It is also widely used in the banking sector.

It is impossible to modernize the banking activity without intensive implementation of the latest achievements of scientific and technical development. As can be seen from the world practice, scientific and technical development and the rapid growth of new information technologies (IT) have a significant impact on the overall assessment of the bank's attractiveness. The development of the technological process allows not only to increase the speed of processing documents and cash transactions, but also to expand the range of customers [1].

In turn, the development of modern technologies significantly reduces the distance between banks and users of banking services, increases interbank competition, and thus contributes to the quantitative and qualitative development of banking services.

Literature Review

IT enables rapid redesign of operations by developing banks and their relationships [2]. Instead, the internal and external business activities of the banking sector are further developed with the development of IT [3] and the banking system can be pointed out as the most affected area [4].

In other words, the IT sector is developing and making a great contribution to ensure the stability of banks in the era of increasing global competition [5].

In general, elements such as IT technologies, their use in banking, software and communication tools constitute "banking technologies".

In the economic literature and scientific studies, different views and explanations are given to "banking technologies". For example:

M.V. According to Dubinin [6], banking technologies are various telecommunications, information technologies, computer networks, software products, internal procedures, risk management models, etc. used in banks.

The term "banking technology" refers to the use of modern information and communication technologies in order for banks to offer their customers safe, reliable and better services at low prices and to achieve a competitive advantage in the market of banking services. Banking technology also involves the use of modern computer algorithms to uncover patterns of customer behavior by sifting through customer details such as demographic, psychographic and transactional data. This activity, also called data collection, helps banks achieve their business goals by solving various marketing problems such as customer segmentation, customer scoring, target marketing, market basket analysis, cross-selling, sales, customer retention modeling [7]. Also, the successful use of data collection helps banks to significantly increase profits, thereby maintaining a sustainable advantage over their competitors. In theory, banking technology is not a single discipline, but finance is formed as a result of the integration of several areas that differ from each other, such as risk management, information and communication technologies, computer and marketing knowledge, and its structural elements can be expressed as follows:

1. Information technologies;
2. Communication technologies;
3. Computer knowledge;
4. Finance and risk management;
5. Marketing knowledge.

In R. Vadlamani's research, from a functional point of view, banking technology has the following three important dimensions:

1. The use of appropriate hardware and related software to operate and serve customers through various delivery channels and payment systems is one dimension of banking technology.
2. Modern computer programs are used to classify (categorize) clients and analyze the market of banking services and solve problems. This measure enables banks to manage and effectively use their data warehouse.
3. Quantifying, measuring, mitigating and managing all types of risks is the third important dimension of banking technologies. This measure covers the process of measuring and managing credit risk, market risk and operational risk.

In our opinion, banking technologies mean a collection of the newest approaches, methods, and tools for implementation and support of banking activities.

Research Methodology

In this study, statistical tables and graphs, analytical comparison, logical and comparative analysis, grouping methods and research works of foreign and local scientists on the subject were widely used.

Analysis and Results

It should be noted that the above concept of banking technology did not exist before in some sources, that is, it is said that it was founded in the period of today's scientific and technical development.

However, history and scientific studies show that banking technology has existed since the early days of banking, albeit in a simpler form. It can be explained in the following development hierarchy in harmony with the period of technological development stages and development periods of banks [8,9,10,11,12,13].

1) XVII-XVIII centuries - the period before the classical period;
2) from the 17th century to the first half of the 18th century - the classical period;
3) 1950-1980 - non-classical period (systematic development);
4) 1980 - to the present - post-noclassic period (socio-economic integration).

The Pre-Classical Period. Simple forms of basic banking operations began to take shape. Including credit, deposit operations, settlements between depositors.

Classical period. It is characterized by the emergence of banks as enterprises engaged only in banking operations, and it is these limited operations that constitute banking technologies. Also, during this period, regional and national banking systems were formed, issuing banks appeared, banknotes, transaction accounting systems and document circulation were integrated.

Non-classical period (period of systematic development). Attention has begun to be paid to the relationship between the bank and the client. Also, the technologies introduced into the banking activity are aimed at creating a convenient service infrastructure for customers, increasing the quality of services, and offering new services required by the customer. The goal of introducing new banking technologies was to gain a competitive advantage, expand the customer base, and increase profitability due to in-demand technological services.

Postnoclassic period (period of socio-economic integration). This period includes the bank's constant involvement in the client's life. Banking services are first integrated into the complex of financial relations of the client, and then with all areas of his economic activity.

In general, the banking technologies of the present era are aimed at ensuring the maximum availability, reliability and convenience of services as a means of achieving the client's goals, which serves his interests and takes into account his motives. The technologies introduced by the bank are aimed at meeting the needs of the client who uses complex banking services as a partner.

It should be noted that the historical processes of technological development in banking and finance in general can be expressed as follows. That is, the history of technological innovation in the field of finance began with the appearance of checks as a means of payment (1945). Later, Bank of America produced the first credit card (1958) and ATMs helped process financial transactions in 1967, followed by the debit card as a means of transaction. In the 1990s, supported by the development of the Internet, the "Internet banking" system was launched. In 2000, the financial technologies of "Mobile payments" and "Crowdfunding" (fintech) were introduced. This suggests that fintech is a rapidly evolving field and therefore a review of previous research is necessary to reflect the evolution of financial services [14].

So, the evolution of financial technology includes 1945 (cheque), 1958 (credit card), 1967 (ATM and debit card), 1990 (internet banking) and 2000 (mobile banking).

In recent times, computers have improved to such an extent that they are giving banks possibilities they could only dream of and giving bank customers great opportunities. The changes brought to banks by new technologies not only have a great impact on the managers, employees and customers of banks, but also enable the delivery of banking products and services more conveniently and efficiently than ever before, thus creating new competitive grounds [15].

Banking technologies include the creation of a customer service system for individual operations and the bank as a whole, a set of tools (including technical tools) for carrying out operations, for example, plastic cards, interactive customer service, or any other. The field of banking technologies includes automation tools and information systems, working with modern payment systems, implementation of cross-industry interactions, management technologies and security systems, telecommunications and many other things, without which a bank cannot be imagined today.

Today, it is impossible to imagine solving any problems related to banking operations and managing processes without banking technologies, because in the last few years, the requirements for the speed of decision-making have changed dramatically, the computer software used in the process of banking operations has improved, and the volume of data has increased.

The concept of "traditional banking" and the science of the same name are now turning into "banking technologies" and the science about them. Because today, not theoretical, but practical methods of providing banking services and the technical means of their implementation are in the first place.

That is why banking technologies play an important role in the modern communication world. They are a set of information and telecommunication technologies.

Banking technologies include special computer programs, internal procedures and various models related to risk management.

Financial stability of banks is ensured by a balanced monetary policy. Modern banking technologies are being introduced to ensure the loyalty of account holders and expand the customer base. Therefore, banking technologies describe a set of methods of analysis of banks' activities that help to increase material stability, effective interaction with customers.

In the future, more technologies will be introduced and used in the developing and developed world. The development of technologies will greatly help in the development of the banking sector. Some of the old and new technologies used in the banking system today are as follows [16,17,18,19,20,21,22,23].

- Automated Teller Machine (ATM);
- Mobile Banking;
- Internet Banking;
- SIM Application-toolkit;
- RFID Technology;
- Contactless Payments using Near Field Technology (NFC);
- Mobile Money;
- Video Teller Machine (VTM);
- Secure Short Messaging Service (SSMS);
- Near Sound Data Transfer (NSDT);
- Telephone Banking or Interactive Voice Response (IVR);

- Wireless Application Protocol (WAP);
- Unstructured Supplementary Service Data (USSD);

Automated Teller Machine (ATM). It is an automated teller machine, a technology that is used all over the world. An ATM helps customers to have access to cash whenever they need cash. The PIN code provided by the bank is used to identify the client. To use this service, the customer must have a bank account, debit or credit card. Money can be withdrawn from anywhere in the world.

Mobile Banking. Mobile banking is the newest technology used in the field of banking offered to customers. Customer must have a smart phone, tablet or personal digital device. A program compatible with the operating software of Windows, Android, IOS and other mobile phones has been developed. The mobile application is downloaded directly to the mobile device. Customer must have active internet connection on mobile internet or Wi-Fi network to use mobile banking service.

Internet Banking. Customers will be able to access their bank account balance inquiry online, make payments, make money transfers, international money payments, create and update standing orders and direct debits, and check recent transactions. The customer accesses the website through a PC or laptop and the account information can be accessed from anywhere in the world. The following services can be used on the Internet; including account balance enquiry, transferring money between accounts, creating and updating standing orders and direct debits, money transfers, account overview, account history, loan repayment, prepaid card top-up and password change.

Video Teller Machine (VTM): a new and innovative service provided by banks. The customer is remotely connected to the customer service representative through VTM for all banking transactions. All branches of VTM offer banking services to customers.

Secure Short Messaging Service (SSMS): SSMS is used by banking customers to send and receive text messages to their mobile phones. Banks keep track of customers' mobile phone numbers, and customers can make inquiries about their bank account numbers. To use the SSMS banking service through the bank, the customer must register his mobile number. Also, the bank sends a message to clients about every operation that takes place on the account. The transaction is carried out by sending an SMS to the number assigned to the mobile banking service.

SIM Application-toolkit: This is shown as a standard SIM card programmed with an interactive menu that allows the client to interact with it. The interaction is between the client and the network, and the exchange is carried out by inputting information to the client through an interactive menu and program. Mobile operators can either issue in-network updates to their SIM cards for customers or issue entirely new SIM cards. The biggest advantage of implementing SIM-based programs for mobile operators and financial institutions is that it guarantees that the application of these firms is on the SIM, thus giving the bank a competitive advantage.

Near Sound Data Transfer (NSDT): This is a fast, secure and convenient contactless payment technology used in mobile banking using any mobile phone. NSDT does not use SMS or USSD

technologies, but a one-time audio password that is issued every time the customer wants to make payments to confirm the transaction. The NSDT platform enables secure transactions. NSDT transactions are done through the customer's mobile connection and the payment acceptance device of the dealer or operators. The customer deposits the money through the registered agent and the money goes into the virtual wallet. The goal of all NSDT transactions is communication speed and data compression, security and cryptography, error detection and correction, and ultimately voice optimization. Therefore, NSDT performs efficient and perfect operations and can be used even in very noisy environments.

RFID Technology. The bank card is equipped with a payment chip and the payment is made by simply placing the card in front of the RFID reader and the payment is made automatically.

Telephone Banking or Interactive Voice Response (IVR). Telephone banking is an information technology that allows the customer to interact with the system after calling a special number provided by the bank. The customer interacts with the selection of various options from the voice message system or can speak for selection options. The customer should select the most appropriate option when prompted by a pre-recorded voice on the designated number for the phone bank. The voice prompt system uses speech recognition that interprets the customer's voice. To select an option, the customer must use simple words such as "yes", "no" or a number.

Wireless Application Protocol (WAP). This is a technology used in mobile banking, where the customer connects to the bank's website via the internet using a browser on their mobile phone. A customer can access their bank account information using a mobile phone that acts as a computer. The customer gets access without having to download any software.

Unstructured Supplementary Service Data (USSD). This is an SMS service with a menu and a fixed session. This is the standard used by all phone models. The customer has to choose from a list of options in the menu to proceed as opposed to using sentences to respond. The main advantage of USSD: the client responds quickly by selecting appropriate options from the menu. USSD allows communication between the client, the mobile network and the bank. To use the USSD service, the customer's SIM card is pre-installed with the commands necessary for the service. The customer uses numbers allocated for the USSD service provided by the bank or mobile operator. The client starts the request by dialing the USSD service number, the mobile operator returns the menu. The client chooses one of the available options.

Contactless Payments using Near Field Technology (NFC). It is a form of mobile communication and wireless payment using two-way radio wave communication, as well as smart mobile devices running compatible software and placed in close proximity to each other. NFC is a short-range, high-frequency technology that allows data to be exchanged between devices at a distance of 10 cm. NFC is built on RFID technology. Allow wireless communication and data exchange between devices. The device is active or passive modes. Encryption is used to protect confidential data, if the phone is lost or stolen, you should use antivirus and phone lock to protect it. NFC technology is mainly popular in

Europe, America and Asia. The goal of NFC is to make transaction queues shorter and faster, carry fewer cards, as all you need to do is carry a mobile device for payment.

Mobile Money. Also known as mobile wallet, mobile payment and mobile money transfer. Mobile money service is used all over the world, mostly in Africa for those with or without bank accounts. The service is provided by mobile operators in cooperation with commercial banks. Mobile money accounts can also be linked to a customer's bank account. Mobile money service is another way of funds without the hassle of opening a bank account. The money in the virtual "wallet" can be used to pay for anything, such as buying mobile credit, paying bills, and specified products and services. In this case, the PIN code is used to verify the transactions.

Based on the analysis and research, the specific characteristics of banking technologies and the factors influencing its improvement can be expressed as follows (Table 1).

Table 1 **Specific characteristics of banking technologies and factors influencing its improvement**[1]

Features	Factors
- determines the level of banks; - ensures competitiveness; - enables optimization and digitization of activities; - reduces costs; - increases profitability.	- science and technology development; - improvement of software; - level and base of technical support of banks; - scientific and practical potential of employees; - level of development of the area.

In order to succeed in today's complex and rapidly changing conditions, it is desirable to form a group of "IT managers" and organize their effective use.

In addition, the following priorities should be taken into account when developing sustainable development strategies:

- update of "IT operation" models to be ready for new competitive conditions;
- reduction of costs through simplification and robotization of the activity system;
- creation and use of technological opportunities to optimize offers by studying and analyzing customer needs;
- making the website and mobile applications ready for seamless connection with the Internet and various servers in any case and everywhere;
- pay serious attention to cyber-security, but it should not take up too much time of users and should not cause inconvenience;
- paying great attention to the continuous improvement of the abilities and skills of employees and using models of achieving this that do not have a negative impact on work activities.

The digital banking system consists of several organizational elements, and for the development of this activity, from an organizational point of view, these elements simultaneously play a role as influencing factors:

[1] Compiled by the author.

Stage 1 – strategy;
Phase 2 – Fintech and banking API;
Stage 3 – experience in IT;
Stage 4 – security and internal control;
Stage 5 - management and marketing.
In general, currently operating banks can be organizationally divided into 3 groups:
1. Traditional banks;
2. Digital banks;
3. Mixed (hybrid) banks.
No matter which direction banks operate in these groups, especially in digital and hybrid banks, the banking technologies used include a number of common components or processes, and this relationship can be expressed as follows (Figure 1).

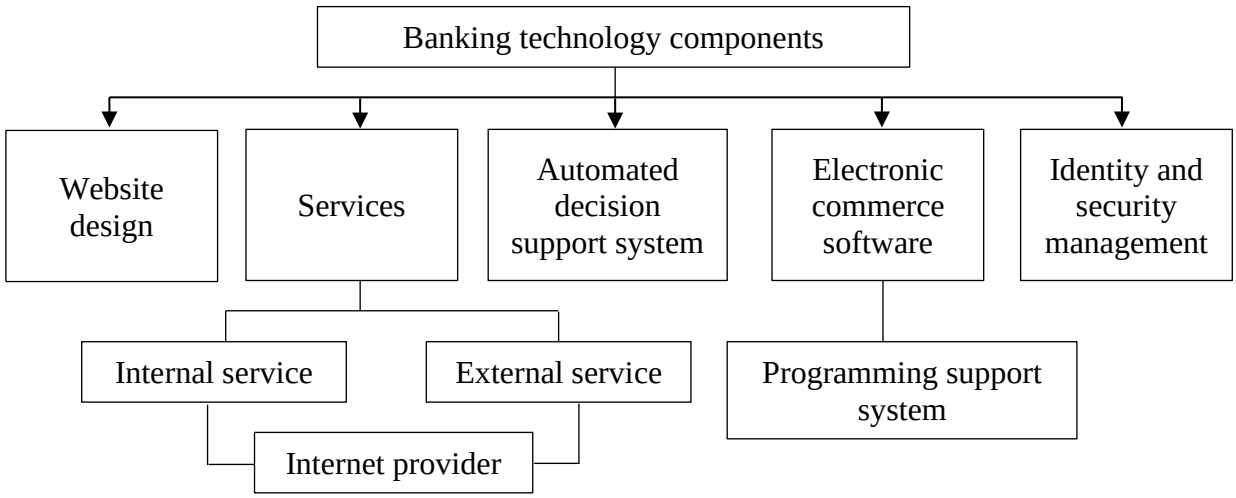

Figure 1. Banking technology components[2]

These components work together to provide digital banking services. Each component is important as a key factor in the systemic functioning of the bank.

Conclusions

Based on the research, it is appropriate to take into account the following when using banking technologies effectively and increasing their effectiveness:
- development of an addressable program of the central bank to attract innovative digital technologies to the banking system in order to further increase the popularity of banking services, to expand the quality and weight of the digital services provided;
- carrying out special rating and promotion work by the Bank Association on the level of use of innovative technologies by banks;
- developing a rating of innovative projects created by IT companies implementing bank software and creating a pure competitive environment;

[2] Compiled by the author.

- widespread use of biometric technologies in practice for the purpose of identification of customers in the provision of bank digital services;
- reduction of bank costs by the wide involvement of artificial intelligence and robot technologies in the banking system, further increase of transparency in banks and optimization of bank staffs;
- integration of platforms to achieve the provision of banking and non-banking services with a single application based on banking APIs, entering the market of banking services of foreign countries through the development of multi-currency programs, etc.

In conclusion, it can be said that the use of modern digital information technologies and their software in the banking sector not only gives a competitive advantage in the market of banking services, but also has positive effects such as reducing administrative costs, increasing labor productivity, and reducing excessive time consumption. In particular, based on the analysis of problem loans and the automation of work on them, it allows to work with a large number of problem loans easily and in a short time. For example, sending automatic SMS messages warning about the deadlines for the repayment of principal and interest on loans, automatic preparation and electronic sending of court documents on problem loans that have expired.

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