Abstract
The article identifies the essence of the concept of banking innovations and their role in the financial security of banking institutions. Features of development of technological banking innovations in Ukraine, including in the conditions of influence of COVID-19 are considered. The characteristics of banking innovations are considered, the criteria to be met by banking innovations both on the part of the client and on the part of the bank are identified. The classification of banking innovations according to such features as: by time aspect, by novelty, by causes of occurrence, by volume of influence, by influence on behavior, by scale of innovation, etc. is given. It is proved that the financial security of a banking institution should provide protection of banks from the impact of external and internal threats, as well as minimize the level of their negative impact. The basic principles of financial security of banking innovations in order to ensure the stable development of the latter are described. It is established that the most relevant and in demand in the market in the development of coronavirus infection were such technological innovations of remote capabilities as: contactless payments, online services, mobile banking applications, electronic money transfers, virtual cards. The peculiarities of the use of technological innovations by banking institutions in Ukraine and their impact on the security of banking institutions and customers are noted.

Keywords: innovation; bank; banking innovation; security, COVID-19.

Introduction
Today's innovation is aimed at minimizing the human factor and automating all life processes. The banking sector in this matter creates an unusual symbiosis of conservative security of funds, operations, and customer data, with relentless progress and innovation in the life cycle. Classic banking operations in a set form simplify the work of bank managers and spread brand awareness, but immutability and constancy create a risk of danger. The introduction of innovation is provincially accompanied by the readiness to ensure that it meets all the criteria for banking innovation. With the advent of pandemic shocks, the time for innovation has been significantly reduced, and humanity is increasingly entering the digital plane, so each technological solution must include ensuring the security of the client, his funds, and the bank.
Material and methods

In order to conduct the study, general scientific and specific methods of scientific knowledge were used. In particular, we note that the theoretical aspects of financial security of banking institutions, its principles and features are used by the logical method, the method of analysis and synthesis, and the system method. The method of synthesis and analysis, comparison and the method of theoretical generalization is used to outline the criteria of banking innovations from the point of view of a banking institution and from the point of view of a consumer of banking services. The logical analysis method is used to draw conclusions about the relevance and feasibility of digitalization of the banking sector in the context of the spread of the pandemic COVID-19. At the same time, the expert method was used to identify and systematize risks and threats to the financial security of the banking sector in modern conditions.

The theoretical main research was the scientific developments of domestic and world scientists on the issues of financial security and banking innovations. The information basis of the work is the domestic regulatory and legal framework that defines the basis for the functioning of banking institutions and the peculiarities of ensuring their financial security, data from the National Bank of Ukraine, materials from official websites of banking institutions.

A problem setting

No sector of the country's economy is as closely linked to innovation as the banking sector. The viability of the banking service is based on such qualities as reliability, efficiency, and security. The security of banking institutions, transactions, and customers is one of the most important tasks in the development of banking innovations, so banks invest considerable financial resources in the development and maintenance of modern innovative technologies. All of this, from reliable repositories to the use of retinal scanners, is designed to create a safer environment for financial transactions.

In 2019, the world economy suffered significant shocks and imbalances due to the unprecedented wave of the COVID-19 pandemic. In the new circumstances of life in a more advantageous position were those businesses in various sectors of the economy, which were the first to bring their operation closer to the latest contactless innovative developments.

Modern domestic economic conditions and global economic challenges lead to the rapid development of innovative technologies. The dynamic development of the financial intermediation sector exacerbates competition in the banking services market in Ukraine. These conditions require the development of advanced solutions in customer service and the creation of fundamentally new products; as a result, banking institutions become not an intermediary, but a financial partner. Inventions, scientific achievements, digital technologies provide continuous improvement of banking products, services, and technologies used to serve customers. Therefore, the study of the topic of innovation of domestic banking institutions is extremely relevant.

Analysis of recent research and publications

Problems of research of banking innovations and their security are the subject of research of many leading domestic and foreign scientists, among which it is worth noting Belousov V., Yegorychev S., Epifanov A., Karp J., Kuznetsov A. and others. However, the vast majority of existing research is aimed at establishing theoretical aspects of the nature, principles and mechanisms of implementation of innovative technologies in the activities of banking institutions, as well as mechanisms for managing their innovation. At the same time, in the conditions of modern challenges, there is a problem of ensuring the financial security of innovative activity of banking institutions, which actualizes the subject of the study.

The purpose of the article is to study the current state of technological banking
innovations in Ukraine, to identify the main threats affecting the development of innovations in the domestic banking system, and to establish prospects for the development of banking innovations.

**Results and discussion**

Innovation is the driving force of today's economic environment. Innovation is not only one of the economic phenomena that affect the growth of productivity of factors of production, structural changes, economic growth and national competitiveness. Innovation is identified with the development and improvement of all areas of the economy, including banking (Chaikovskyi & Kovalchuk, 2018). In a general sense, innovation can be a new product, a new structure or management system, an organization, a new culture, a new technological process or information system, and so on (Egoricheva, 2010). The set of fundamentally new banking products and services is considered as a banking innovation, it is the concept of purpose and results of the bank's activities in the field of new technologies aimed at obtaining additional income (Polishchuk, 2008). However, in our opinion, the proposed definitions of the essence of innovations are incomplete since they do not take into account their impact on the financial security of the banking institution.

The financial security of a bank is a state of a bank or the banking system in general, which is characterized by the ability to withstand possible external and internal negative factors of banking through a set of legal, organizational and managerial measures to ensure its stable operation and further development (N. & V., 2020). Given the current provisions and definition of innovation of banking institutions and their main criteria of financial security, we believe that banking innovation is a qualitatively new product, technology, structure, system at the disposal of a banking institution, used to carry out relevant financial transactions of a banking institution, provides additional income in the context of protection of financial interests, leveling the negative impact of external and internal threats of all subjects of financial activity of the banking institution. All this, in contrast to the existing definitions, allows to identify banking innovations in the context of achieving banking institutions a sufficient level of their financial security.

As we have already noted, banking innovations are a multifaceted complex system that combines the financial interests of the client and the bank itself; because the consumer is interested in receiving the full range of banking services, and more - individually (without queues and expectations), in a simple and accessible way. For its part, the bank agrees to meet customer requirements at the lowest possible cost; therefore, the innovation must meet such criteria.

**Table 1. The criteria for banking innovation**

| From the bank:                          | From the consumer:                          |
|----------------------------------------|---------------------------------------------|
| Economy                                | Safety                                      |
| Reliability                            | Intelligibility                             |
| Increase profitability (or reduce costs)| Accessibility                              |
| Popularity                             | Novelty (fundamentally new product)         |
| Optimality                             | Alternative                                |
| Novelty (new audience)                 | Cost reduction (financial)                  |
| Accelerate the financial transaction   |                                             |

The source * is formed by the authors
Criteria for banking innovation are fundamental, dissatisfaction with which, both in terms of one party and the other, will lead to a violation of the financial stability of the banking system, and hence to a lower level of its financial security. Examples of innovative solutions that meet the criteria of one of the parties are known: unsecured loans, optimization of bank security systems. The result of such innovations was a "bank failure" and the disclosure of the personal data of customers.

| №  | Classification criteria               | Types of innovations                                                                 |
|----|--------------------------------------|--------------------------------------------------------------------------------------|
| 1  | In terms of time                     | Supernew; operational and promising                                                  |
| 2  | For novelty                          | New from the technical point of view; new from the consumer                         |
| 3  | For reasons of occurrence            | Strategic and impulse                                                               |
| 4  | By the amount of influence           | Systemic, point                                                                      |
| 5  | By area of implementation            | Information technology, product / service, organizational                             |
| 6  | By influencing consumer behavior     | Simulated, fundamental                                                               |
| 7  | On the scale of innovation           | New to the banking system in the world; new for the banking sector in the country; new for a specific bank |
| 8  | By implementation rate (distribution)| Fast, slow, increasing, steady, impulse development                                 |
| 9  | By the nature of the decision        | Focused on the current needs; aimed at strategic goals                                |
| 10 | By object of innovation              | The process of creating and selling products / services; business process; the organizational structure |
| 11 | By appointment                       | Focused on improving the efficiency of sales of goods and services; improving the quality of products and services |

The source * is formed by the authors on the basis of (Bezugly, 2016; Drobotya et al., 2021)

Most banking innovations are of general economic, universal importance for all sectors of the economy:

1. Commodity innovation. Sales of a new product on an existing market. Commodity innovation is the highest priority aspect of business. This is primarily due to the fact that the efficiency of a commercial bank is directly dependent on the steady demand of customers for its goods and services. Other types of innovations have a market orientation, dependence on the environment and customer preferences.

2. Technological innovation. Introduction of a new method of production, equipment, process in order to reduce the cost of time, money, materials; as a result of reducing the cost of goods or services.

3. Market innovation. Creating a fundamentally new market for goods and / or services. Market innovation also includes innovations that make it possible to open new areas of use of existing goods and services.

4. Marketing innovation. Introduction of new resources, methods of work in the market, new forms of business.

5. Management innovations. Change the management structure of an organization or process to achieve greater business efficiency.

The creation of new goods and services in the banking sector of Ukraine often follows the world’s leading trends. And given the lack of ability to patent banking innovation in a short time, a new product will no longer have signs of innovation.
The bank’s long-term innovation policy is a consistent system of actions and measures that introduce innovations in working with customers, new banking products and services to strengthen and expand the customer base, as well as increase the strategic competitiveness of the bank (Kuznetsova & Karpa, 2004).

The improvement of the available tools is a continuous process, however, the effectiveness of innovative activities of banks is not only the ability to save a certain amount of labor, time, resources, and money, including for hedging innovative risks but also to generate additional income by increasing the number of clients attracted financial resources not only per unit of expenses (effects) but also per unit of activities (Karcheva & Karcheva, 2020). Thus, a crucial component of innovation is the results of attracting such to existing services.

Every year the number of frauds using magnetic stripe payment cards is growing, which causes and encourages banking institutions to introduce and disseminate new technologies for cashless payments and ways to protect their customers. According to the Office for Combating Cybercrime, more than a million hryvnias are criminally removed from Ukrainians’ cards every year, so work on improving non-cash customer service line is important for Ukraine’s banking system. The main ways to improve non-cash payments are the introduction and dissemination of mobile banking technologies, chip smart cards, payWave, PayPass, NFC, P2P. Due to these technologies, the main disadvantages of using magnetic stripe cards are eliminated: significant costs for telecommunications networks and not always sufficient speed of operations, the complexity of using these technologies for fraudulent purposes (Chaikovskyi & Kovalchuk, 2018).

A critical aspect of innovation is the root cause of implementation. Financially stable competitive banks develop a fundamentally new product to increase profits and attract new economically active customers, while financially unstable banks – imitate product innovation to minimize costs. As a rule, such a product is aimed at social groups, distinguishing their dishonesty in working with customers.

Innovation must simultaneously focus on many aspects related to new products, new production processes, and new market and organizational practices. Also, the simultaneous introduction of multiple innovations may be more effective in maintaining or improving a competitive position than the introduction of only one type of innovation. The introduction of a group of innovations should be directed in a single tranche, single innovative solutions lose efficiency in the life cycle of banking services.

The growing promise of innovative banking technologies that have a social connotation is increasingly evident. Therefore, the thinking of the heads of banking organizations begins to gradually transform – from an operational-tactical one aimed at quickly achieving its commercial result, to a strategic one focused on obtaining a result in the future while finding internal rather than external hedging mechanisms for financial risk (Bosak, 2009).

The financial security of a banking institution in the context of ensuring its innovation and digitalization must be established on the basis of certain principles of their provision, taking into account the specifics of banking. In particular, such principles include:

- the principle of legality – ensuring the financial security of the bank through innovation should not contradict the current legislation;
- the principle of planning – a non-natural activity to be spontaneous, organized in the functioning of the system, determines the activities of all links to fulfill a strategic goal;
- the principle of competence – guaranteeing the financial security of the bank with innovative solutions are provided by professionals in the relevant field who have the necessary knowledge and information necessary to make the right decisions;
- the principle of prevention – security is built by anticipating possible risks and threats;
- the principle of publicity – safety measures must be proved and explained to all
employees and customers, and unconditionally implemented;
- the principle of confidentiality – methods, ways and measures to ensure financial security should be ranked according to the degree of admission of specialists;
- the principle of continuity – the system of protection through the introduction of innovations must operate continuously and constantly improve.

Compliance with the above-mentioned principles guarantees financial stability and stable development of a commercial bank, helps to avoid risks of information leakage or violation of financial stability.

Considering the impact of innovations on the financial security of the banking sector, it is worth noting among the known internal and external risks and threats and pandemic shocks that in the domestic realities of the circumstances were imposed on the military conflict in the eastern regions of the country. The threats of the global economic recession, the internal state of instability, the consequences of the military operation, and pandemic restrictions – all this has caused a significant blow to Ukraine's banking system.

In the era of the COVID-19 pandemic, technological innovations designed to ensure social distance and ensure the health of customers were particularly important. Technological innovations of remote capabilities proved to be especially relevant: contactless payments, online services, mobile banking applications, electronic money transfers, virtual cards.

All of the above has given a significant impetus to the digitalization of the banking sector, in particular the creation of completely contactless service. Combining all the innovations of recent years, it is worth highlighting the following:

1) Internet and mobile banking and the significant expansion of banking operations that are available through these systems.
2) Cardless payments via mobile phone.
3) Activation of presence in social networks.
4) Availability of self-service terminals.
5) 24/7 mode.
6) Electronic balance (service when the balance in kopecks is transferred to the account or replenishes the customer's mobile phone).
7) Individualization of customer needs (used mainly for VIP customers of the bank) (Galamaga, 2019).

Using technical innovations and the already classic mobile application for a smartphone, Universal Bank has created a completely independent bank in the phone – MonoBank. Opening a bank account no longer requires personal communication with the manager, or a paper application, customer identification with biometrics, and electronic document management eliminate the bureaucratic component. The security of such a relationship is multilevel, blocking a remotely lost smartphone, encrypting access to personal files, and access to applications, this is only the first line of defense for mobile banking. Unique document encoding, fingerprint identification, or Face-ID, take the security of remote banking to a new level, which in turn prevents fraudulent abuse of personal accounts.

But most of these technological innovations are already being used by the banks of the world, combining everyone into a technological breakthrough has set a precedent for a new level.

However, along with the development of new technologies and digitalization of all spheres of the economy, new significant problems and threats arise. It is a well-known fact that attackers are sure to find a vulnerable place, the slightest imperfection in technical or software aspects. The spread of individualization of encryption increases the security of digital interaction, instead leads to a decrease in control over its implementation, and thus increases the likelihood of fraudulent interference, increases the risk of dissemination of personal information, and so on. Also, the constant cyberattacks necessitate the continuous modernization of the protection of banking applications, Internet resources,
automated banking systems, in terms of attracting additional investment to minimize the risks of the digital sphere of interaction.

The head of the National Bank of Ukraine, Kyrylo Shevchenko, noted, – “Ukrainian banking sector has never been so stable”, (Ukrainian banks have shown extraordinary resilience during the pandemic – the head of the NBU, n.d.) but by the end of 2020 Oschadbank shut down 490 branches (reducing their number to 1,837 thousand), PrivatBank – 211 (up to 1, 717 thousand), Raiffeisen Bank Aval – 100 (up to 396), Alfa Bank – 39 (up to 218), and others. In the 4th quarter of 2020 alone, banks closed 195 structural subdivisions, while in the same period only 79 branches were opened (Rating of reliable banks of Ukraine 2021, n.d.). Such statistics show a rapid transition of the banking sector to the digital field of activity. The conditions of the global pandemic have created a completely different environment not only for the banking sector but also for the entire economy. Instead, when certain sectors of the economy undergo new conditions with minimal changes in their daily operations, the banking sector is forced not only to reformat all activities into the digital plane but also to ensure the security of the new plane of interaction. As a financial intermediary in a pandemic, it is important not only to provide traditional services on time but also to create a secure economic and social environment.

Conclusions

The pandemic shock caused an unprecedented case of global crisis, which has a significant impact on the domestic economy. In particular, the lack of digitalization of services in the pre-pandemic period had a security aspect. In the era of the pandemic, this path led to the loss of competitive positions in comparison with the little-known less secure, but more technological solutions of interaction.

The creation of a digital platform of a partner bank, the combination of classic and latest technologies have set a precedent for a new level of global banking – a completely independent bank in a smartphone.

Compliance of innovations with the criteria of both the consumer and the commercial bank provides a reliable platform for its launch. Today's circumstances of the global pandemic give Ukraine and its banking system, in particular, new opportunities, equal to all countries of the world. Starting to emerge from the era of the pandemic in the direction of digitalization, security, and innovation, we have the opportunity to win the world championship.

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