

**Oleksandr Manoylenko**

ORCID: 0000-0001-5979-4077

National Technical University “Kharkiv Polytechnic Institute”

[oleksandr.manoylenko@kphi.edu.ua](mailto:oleksandr.manoylenko@kphi.edu.ua)

**Svitlana Kuznetsova**

ORCID: 0000-0002-1567-4791

National Technical University “Kharkiv Polytechnic Institute”

[svitlana.kuznetsova@kphi.edu.ua](mailto:svitlana.kuznetsova@kphi.edu.ua)

# Development of digital financial instruments and their use in the activities of entities of the pharmaceutical industry of Ukraine

**JEL classification:** G15, G23, G40

**Keywords:** digital financial instruments, embedded finance, digital economy, pharmaceutical industry, business technologies, financial results

## Abstract

The pharmaceutical industry of Ukraine is an important component of its economy and the health of its population. At all stages of its development, it was and remains the centre of innovations, where the scientific and technological potential of the region is concentrated.

Theoretical and practical aspects of the development of innovative digital financial instruments and financial support were investigated and on their basis the activities of enterprises of the pharmaceutical industry in the conditions of the digital economy and electronic commerce as the most perspective segment of the modern market in the conditions of restrictions on direct contacts and the movement of people due to measures to combat the pandemic have been studied, military actions and security of people have been studied. It was determined that financial instruments can be conditionally divided into traditional and digital. They have similar content, functions, and features, however, they have different spheres of manifestation, advantages, disadvantages, and risks. At the same time, the implementation of digital financial instruments allows to significantly save the time of entrepreneurs and customers or services; it also saves cash; simplifies administration and, as a result, it increases the profitability of enterprises, in particular, the pharmaceutical industry.

The study shows wide opportunities for the development and application of embedded finance in the pharmaceutical sphere with the aim of increasing business profitability by saving time, prem-

ises and other means of providing and implementing financial activities; and economic benefits to consumers and partners; optimization of business processes and management of activities in general; promotion of innovation, investment and integration processes.

## 1. Introduction

The current conditions of operating the enterprises require the transition to new business model processes in management, finance, and production with the active involvement of modern information technologies. Similar changes in business are inextricably linked with the phenomena of digitalization and digital transformation.

In the last decade, digital financial instruments have become more and more widespread. In response to the pandemic, most large international and Ukrainian corporations, including the pharmaceutical industry, have already accelerated investments in digitalization.

According to the outlook, more than half of the global economy will be based on digital technologies or will be influenced by them. This, in turn, will help to increase business efficiency and profitability (Haltsova, 2021). Therefore, the formation and development of digital financial instruments, and their use for financing the pharmaceutical industry business is becoming more and more relevant, gaining theoretical and practical importance.

The pharmaceutical industry of Ukraine is an important component of its economy and the health of its population. The pharmaceutical industry of Ukraine is more than a century old. It is a centre of innovation, where the scientific and technological potential of the country is concentrated. The modern pharmaceutical industry is among the leaders in spending on innovation, although it is far from being the largest branch of the economy (Darnitsa, 2021). The COVID-19 pandemic and the war in Ukraine clearly showed the importance of a strong pharmaceutical industry as a component of the healthcare system and as a factor in strengthening national security: in addition to the economic impact, the growth of pharmaceutical production has a positive effect on the standard of living of the population.

The purpose of the article is to determine the main factors in the formation of digital financial instruments and their components, as well as to identify their features, possible risks of implementation, and to justify further prospects for their use in order to increase the efficiency of the activities of enterprises of the pharmaceutical industry of Ukraine.

## 2. Theoretical framework of the research

It should be noted that the digital economy and digitalization have become a trend, a stable trend and a fundamental condition for the development of modern global

and national business. According to the outlooks of various expert groups such as McKinsey, Bain & Company (McKinsey & Company, 2022; Bain & Company, 2022), investments in digitalization will continue to grow at a rapid pace. There is no exact percentage of international business revenues based on digital financial instruments, as they cover different sectors of the economy and are used to varying degrees in different countries.

However, digital financial instruments are becoming increasingly popular and widely used in the global economy.

In recent years, this was encouraged locally by the war in Ukraine, and at the international level by unprecedented restrictions on offline work, studying, all types of activities that previously involved personal contact, accepted globally as a means to combat the spread of the COVID-19 pandemic and to ensure the safety of the population (Marmul, Chorny, Penkovsky, 2022).

In the course of research for determining the content of digital financial instrument the important tasks must be solved. First of all, it is advisable to substantiate the main categories and concepts. This will allow to define and generalize the structure and components, identify the competitive advantages and risks of digital financial instruments.

It was determined that financial instruments can be conditionally divided into traditional and digital. They have similar content, functions, and properties, but different areas of manifestation, advantages, disadvantages, and risks (Marmul, Chorny, Penkovsky, 2022; Wiśniewski, Marchewka-Bartkowiak, 2022).

Digital financial instruments are various technological solutions that allow to conduct financial transactions using the Internet (Ozili, 2018; Andrew, Stephen, 2023). They are modern financial instruments that are now widely used in the banking sector, trade, the pharmaceutical field, and other fields of activity (Figure 1).

Among such tools, the following can be distinguished:

1. Cryptocurrencies are digital currencies that use blockchain technology to ensure the security and transparency of transactions.

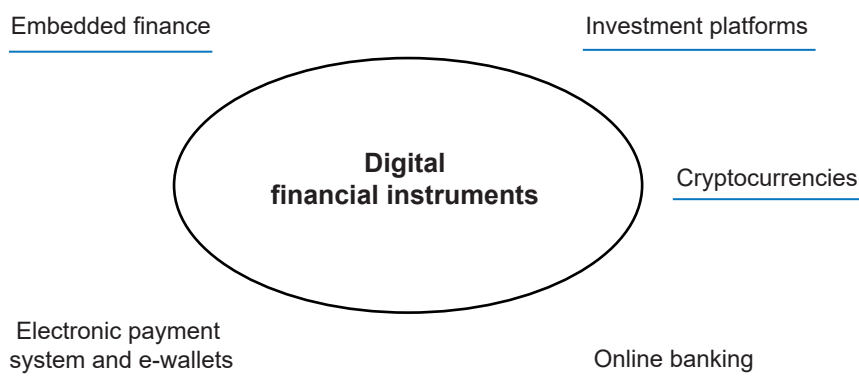
2. Investment platforms are platforms that allow to invest in different assets via the Internet. Investors can buy and sell stocks, bonds, funds, and other investment instruments.

3. Online banking is a way of managing finances via the Internet. Online banking allows to check your balance, pay bills, and transfer money anytime, anywhere.

4. Electronic payment systems and electronic wallets (e-wallets) are systems that allow to pay online using bank cards, electronic wallets, and other methods.

5. Embedded finance is a new trend in modern financial technologies that integrates payments for loans, insurance, debit cards, and investment instruments with almost any non-financial product.

It is especially important for e-commerce, where profit and consumer loyalty depend on the speed of processing the transaction (Andrew and Stephen, 2023).



**Figure 1.** Structure of digital financial instruments

Source: Haltsova (2021).

Using digital financial instruments will allow businesses to be more efficient. For example, investment platforms will allow attracting new capital, and online banking will speed up payments and activate electronic document flow and reporting, which will lead to faster management decisions. The analysis of the components of digital financial instruments made it possible to highlight embedded finance as a new trend in business development, which will allow the pharmaceutical industry to increase sales through the introduction of e-commerce.

### 3. Research methodology

The methodological basis of the research are the methods of: system-structural analysis and synthesis (established the set of factors and the level of influence on digital financial instruments; determining the composition and structure of the digital economy, e-commerce, digital finance; historical and monographic (identifying the stages of development, sectoral and territorial spread of implementation of digital financial instruments); statistical and economic (to establish and analyze quantitative indicators of the status, problems, trends and prospects of the development of digital financial instruments; the effectiveness of their use in the activities of enterprises of the pharmaceutical industry).

In order to study the formation of digital financial instruments and their use in the activities of enterprises of the pharmaceutical industry of Ukraine, the state and development trends of the production of basic pharmaceutical products and pharmaceutical medications, wholesale and retail trade of pharmaceuticals is monitored (The State Statistics Service: Ukraine, 2023) (Figures 2, 3, 4).

The COVID-19 pandemic and war have made it clear that an independent and sustainable healthcare industry is imperative and urgent.

Sustainable and crisis-resistant local production of medicines is a must for the country, because the health and well-being of the people depend on it, in other words, it is a component of national security.

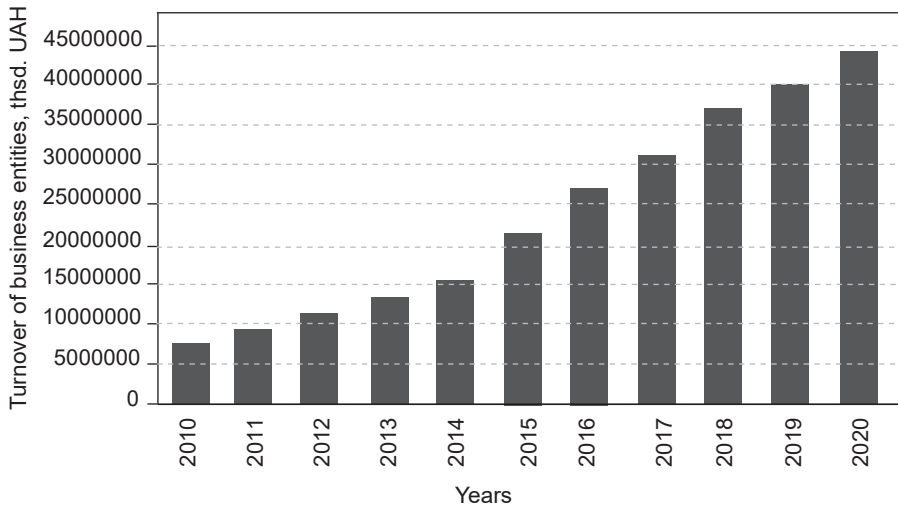
The post-war recovery of the country and the sustainable development of the pharmaceutical industry are possible only under two conditions. The first is the terms of Ukraine's victory in the war. And the second is investment in innovation and talent (Obrizan, 2022; Darnitsa, 2021).

Despite the war, there is considerable interest from potential investors looking for opportunities for cooperation.

The Ukrainian pharmaceutical industry was one of the first to adapt to the negative effects of the pandemic and the war. This is due to the high penetration of innovation in all processes. The pharmaceutical sector has the highest share of innovatively active industries among all branches of the manufacturing industry. 48% of pharmaceutical manufacturers are focused on innovation in the field of R&D, technologies and equipment, obtaining and applying new knowledge (The State Statistics Service: Ukraine, 2023). Pharmaceutical companies allocated 1.5 billion UAH for this purpose.

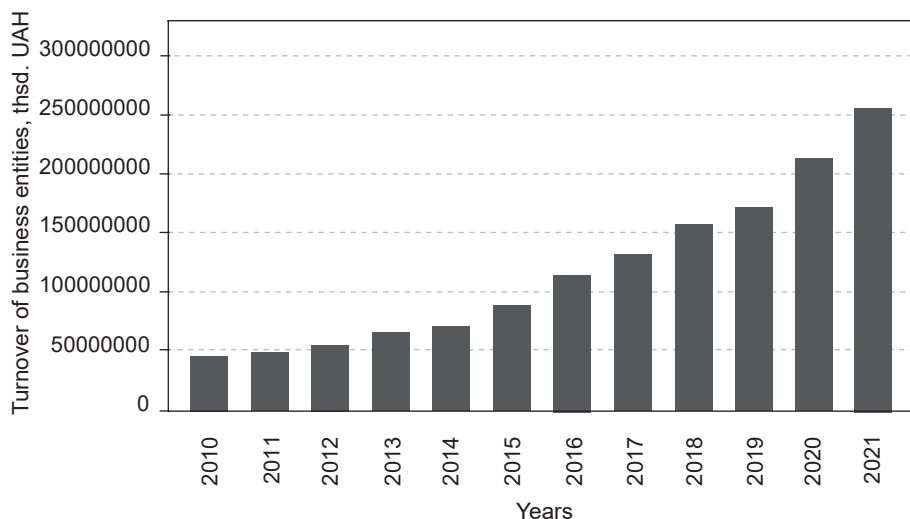
Thanks to a strong local pharmaceutical industry, the shortage of drugs has been avoided in recent years. The high level of automation and digitalization of processes allowed Ukrainian pharmaceutical manufacturers to adapt quickly to the needs of the market and ensure the production of necessary drugs.

Pharmaceutical production is one of the leaders in productivity. According to the indicator of GDP per employee – 1 million 356 thousand UAH, pharmaceut-



**Figure 2.** Turnover of business entities by type of economic activity in 2010–2020 (production of basic pharmaceutical products and pharmaceutical preparations) in Ukraine

Source: own calculations based on the State Statistics Service: Ukraine (2023).



**Figure 3.** Turnover of business entities by type of economic activity in 2010–2021 (wholesale in pharmaceutical goods) in Ukraine

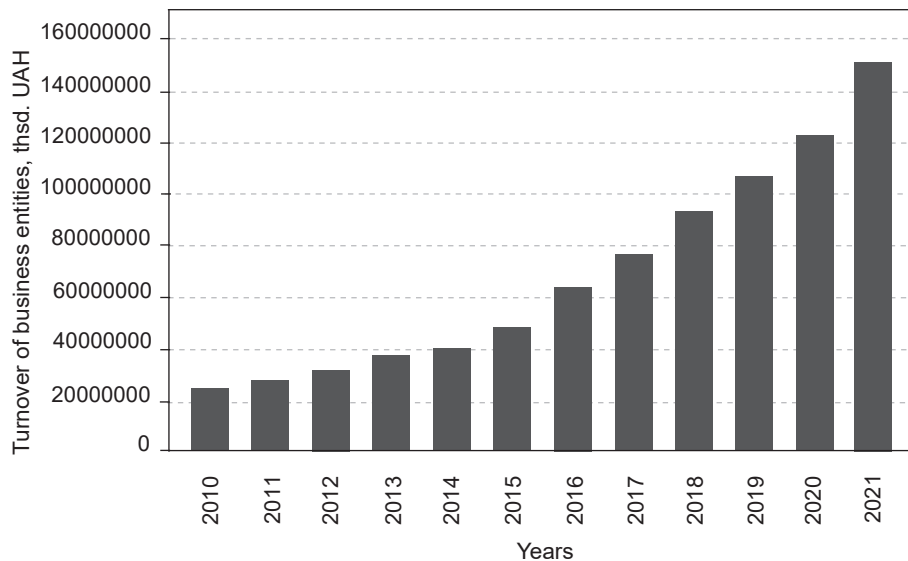
Source: own calculations based on the State Statistics Service: Ukraine (2023).

icals surpassed all branches of the manufacturing industry (The State Statistics Service: Ukraine, 2023). A high level of productivity in the pharmaceutical industry creates resources for investment in development and attracting the best highly paid personnel. According to the State Statistics Service of Ukraine, wages in this sector are twice the level of wages in the manufacturing industry.

At the beginning of 2021, the volume of the medical market was 4 billion USD, and the consumption of medicines increased to 96 USD per person per year. This is less than in European countries, but the growth rate is significant against the background of the positive dynamics of the last 5 years.

The dominant role still belongs to the pharmacy segment – 85% of the market is financed directly by consumers and only 15% by the state. A positive trend can be observed: the pharmacy market grows by an average of 12.6% every year. Under the influence of the COVID-19 pandemic in 2020, this pace slowed down to 7.9%, but the pharmaceutical sphere feels more confident against the background of other sectors of the economy (Apteka.ua, 2023).

The hospital market has increased over the past 5 years. It has grown by an average of 10.9% every year and last year reached the mark of 0.6 billion USD. The increase in the volume of sales is connected with the growth of state purchases of medicines and the centralization of these purchases thanks to the state enterprise “Medical Purchases of Ukraine”, which acts on behalf of the Ministry of Health of Ukraine.



**Figure 4.** Turnover of business entities by type of economic activity in 2010–2021 (retail of pharmaceutical goods)

Source: own calculations based on the State Statistics Service: Ukraine (2023).

Ukrainian manufacturers are gradually increasing their presence in the retail segment. The share of medicines produced in Ukraine in monetary terms has increased from 28% in 2010 to 37% in 2020. At the same time, the share of medicines sales in physical terms did not significantly decrease – to 69%, which indicates a higher rate of price growth for medicines of foreign production.

In the structure of foreign trade in medicinal products, import prevails, which reflects the general situation in the economy. Since 2015, it has increased by 79% to almost 2 billion USD, while Ukraine imported medicine mainly from European countries and India. Exports are growing at similar rates: over the past 6 years, they have increased by 68% to 235 million USD (Darnitsa, 2021). The countries of the Middle East, North Africa, and the EU remain the key regions of presence. Further geographical expansion of the Ukrainian presence of pharmaceutical manufacturers is assessed by analysts as promising, provided the integration of the legislation of Ukraine and the EU continues, as well as the elimination of barriers in the field of regulation, which significantly slow down the activities of companies and the release of new products.

Positive developments have taken place in the direction of harmonization of regulations regulating the production and circulation of medicinal products in Ukraine and the EU. The process continues in the following directions:

- digitalization of the registration of medicines and acceleration of the registration process, which will reduce the cost of bringing medicines to the market and speed up consumer access to new medicines;
- providing mutual recognition of production certification (GMP) to expand opportunities for Ukrainian companies to enter the EU market and remove barriers to the development of trade in medicines;
- acceleration of the process of coordinating clinical research protocols, which will increase the competitiveness of national pharmaceutical manufacturers.

## 4. Research results

The study identifies positive transformations in the field of healthcare system digitalization and medicine production, as well as the development of the market regulation system, which stimulates its development. In particular, it is possible to note the importance of the transition to electronic prescriptions, the development of Internet trade in medicines, the digitalization of medicine production, and the introduction of electronic document management by market participants.

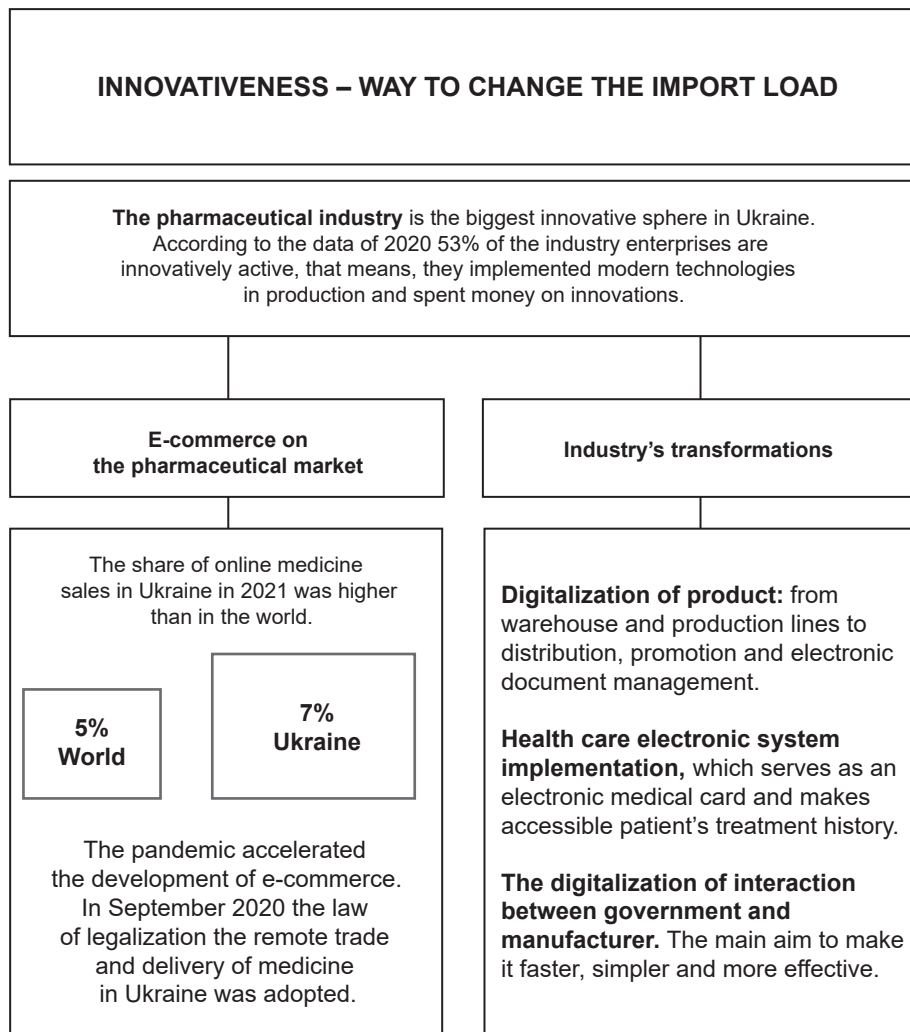
Thus, the pharmaceutical industry of Ukraine is one of the most innovative and continues to be actively transformed. Innovations are introduced in production, document management, and the sale of products. According to 2020 data, 53% of enterprises are innovatively active. For example, the Ukrainian pharmaceutical company “Darnytsia” has been operating a single fully robotic warehouse since 2007. The company is also actively implementing modern digitalization systems: saving drug files in the “cloud” on the OtiPharm Data Pro platform, the SMART HCM personnel management system using artificial intelligence, a modern reporting visualization system, and a new electronic document management system.

This means that the innovative capacity of the pharmaceutical industry becomes a prerequisite for the introduction of digital financial instruments based on the transformation of the industry in the directions of digitalization of production, electronic commerce, introduction of an electronic healthcare system, digitalization of interaction between manufacturers and the government (Figure 5).

According to forecasts, the share of e-commerce in the Ukrainian pharmaceutical market will grow at a higher rate than in the world and will reach 15% in 2026 (Obrizan, 2022; Darnitsa, 2021).

In terms of promoting pharmaceutical products, the main task for market participants will be to find an effective balance between offline and online communication. Pharmaceutical companies increase their investments in TV advertising every year. However, digital channels are increasingly competing with TV advertising. The activity of pharmaceutical brands in Internet promotion is actively growing from year to year, especially in the last two years. Under the influence of lockdowns, the weight of digital has also increased in the segment of drug promotion.





**Figure 5.** Prerequisites for the introduction of digital financial tools based on pharmaceutical industry innovation

Source: own research.

These measures should be aimed at attracting additional consumers of services and products through the introduction of online payments and digital financial instruments.

Since the introduction (December 2021) of the business licensing activities in electronic retail trade, the State Medical Service has issued 24 licenses, based on which 619 pharmacies carry out this type of activity. This is approximately 2.5% of the total number of pharmacies in Ukraine (Apteka.ua, 2023). This is still a small

percentage, but there is a trend of development. E-commerce in the pharmaceutical field requires new innovative digital approaches in the process of activity.

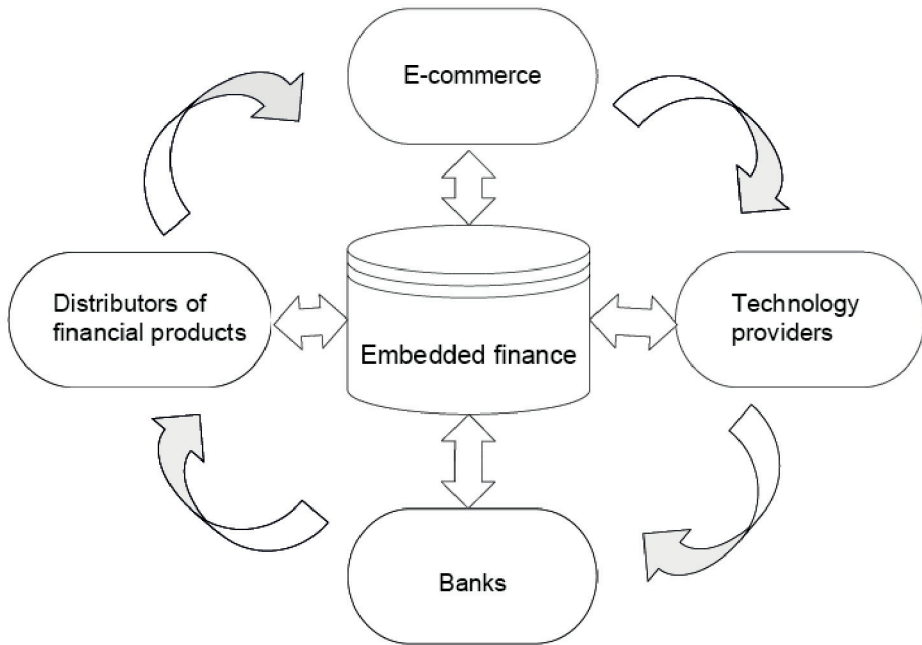
Today, business does not need to interact with a regular bank. By logging into their e-commerce or accounting platform, they can open a deposit account, order a debit card, and meet most of their financial requirements. Banks are not usually the operators of these platforms. They are mostly software development companies that cooperate with banks and technology providers to integrate financial products into a unified, convenient, and easy-to-use client experience. This new form of partnership between banks, e-commerce, technology providers, and distributors of financial products through non-financial platforms is at the heart of what has been proclaimed the embedded finance revolution. Situated at the intersection of trade, banking, and business services, payments became one of the first opportunities for using embedded finance (Figure 6).

Embedded finance reached 20 billion USD in profits in the United States in 2021, according to McKinsey's market valuation model. The market is expected to double in the next three to five years (McKinsey & Company, 2022).

Embedded finance is a financial technology included in the functionality of any non-financial digital service. That is, the financial service is only a part of a third-party service (marketplaces, insurance companies websites, pharmacies, accounting services, etc.) and it does not have the status of an independent product. Usually, embedded finance is a credit service or payment method embedded in a non-banking service: for example, BNPL (buy now, pay later) on the marketplace. The goal of embedded finance is a seamless and convenient experience of the buyer's interaction with the service when paying for goods or services. The embedded finance module is integrated into the context of the site or page: the payment takes place in the same window, and not on third-party resources, the offer of a loan is a completely logical addition to the page of an insurance company, online store or marketplace. At the same time, banks and fintech companies are still recognized as service providers. The latter plays a major role in the development of the embedded finance industry thanks to their own flexibility and ability to adapt to partners. However, banks try to keep up with suppliers and provide financial White Label solutions to large partners (social networks, marketplaces, online stores). By the way, a similar activity of banks (related to the B2B market) was named BaaS (Bank as a Service). Banks, in this case, are recognized as a developer for a large third-party platform. On the basis of the implementation of embedded finance in non-bank services from the side of both developers, the API plays a major role – it is a package of information for the integration of one service into another. It contains the necessary data libraries, instructions, implementation methods, etc.

According to data from Bain & Company, the turnover of funds through built-in finance modules will reach 7 trillion USD by 2026 (Bain & Company, 2022).

Research shows that the next generation of embedded finance will be more powerful, due to the integration of financial products into digital interfaces that



**Figure 6.** Structural relationships of further development of embedded finance

Source: own research.

users interact with every day. The possibilities are diverse: among other things, customer loyalty applications, digital wallets, accounting software and shopping platforms. For customers and enterprises using these interfaces, purchasing financial services becomes a natural extension of non-financial experiences such as online shopping, scheduling employee shifts, or inventory management. This is a more deeply rooted form of embedded financing. This is what has grown so significantly in the US in recent years.

The development of embedded finance became possible thanks to fundamental changes in commerce, the behaviour of sellers and consumers, as well as in technology. Digitalization of trade and business management has significantly expanded the possibilities of introducing finance into non-financial client experience. As much as 33% of global card payments – 50% in the United States – is currently done on the Internet, while most small and medium-sized companies in the United States rely on software solutions to manage their business (McKinsey & Company, 2022). In addition, the development of digital financial instruments expanded the range of consumers and businesses open to receiving all their financial services through digital platforms. Finally, open banking innovations supported in the European Union and the United States have helped reveal hidden demand, giving third-party fintech players access to consumers' banking data and even conducting transactions on their behalf.

Embedded finance is most likely to appear in any environment in which a critical mass of end clients (consumers or businesses) interacts in digital format frequently (often daily) with a digital platform operator, which we call a “distributor” of embedded finance. For a non-bank company acting as a distributor, embedded financing offers a way to improve quality customer service and creates a new income source without the overhead costs connected with bank management. The types of businesses that have good opportunities to offer embedded financing include retailers, also pharmaceutical sphere, software companies, online marketplaces, platforms, telecommunications companies, and original equipment manufacturers (OEMs). All of these categories have seen a high level of activity and innovation in embedded finance recently.

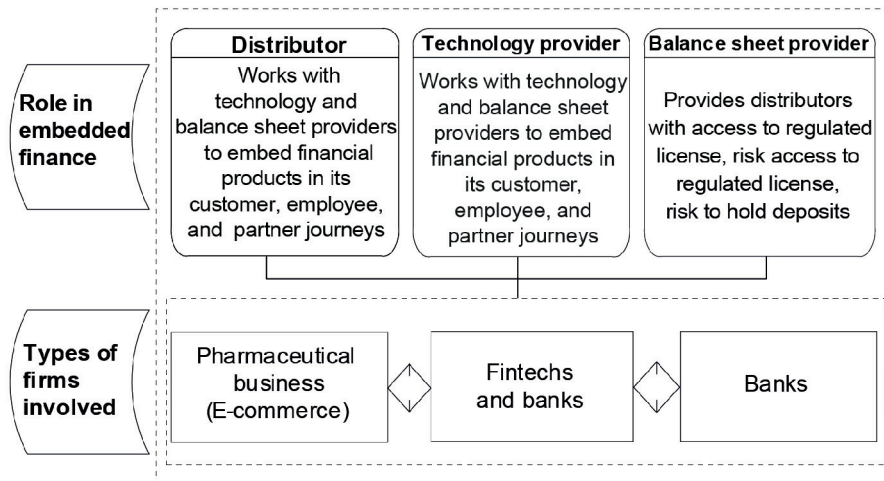
The research showed that there is already a demand for a number of deposit, payment, emission and credit products among the distributors of embedded financial instruments and their customers. In addition to these traditional financial products, new usage options are emerging. For example, distributors of embedded financial services offer employees prepaid cards as part of programs to access earned wages; giving sellers the opportunity to use their deposit accounts for payments with instant payments. Some of them provide just-in-time top-up debit cards for gig-economy workers to use when making purchases for platform members. Therefore, the portfolio of embedded finance products will expand as the processes of customer adaptation and product service gradually digitalize, and real-time risk analytics and services become more complex (Figure 7).

However, risk is likely to remain a restraining factor for growth, as products that require individual assessment, personal contact or regulatory waiting periods, such as commercial real estate financing, are less susceptible to end-to-end digitalization.

Technology providers (fintechs) offer a platform through which distributors can access, configure and offer embedded financial products. Some, including Marqeta, provide point solutions for certain categories of financial products, such as card issuance. Others, including Unit, Bond and Alviere, operate platforms that offer distributors several financial products, such as deposits, money transfers and loans.

Although leaders have already emerged, there is still plenty of room for new entrants in the embedded finance market. On the basis of the conducted research, we predict that the embedded finance market will grow over the next three to five years. The long-term winners are likely to be those that create the technologies, experiences, and relationships necessary for future leadership. Financial services firms and fintech companies that want to claim their rights to the business of embedded finance would do well to commit to four initiatives: choosing a strategy, creating a developer experience, creating opportunities to support distributors, and developing a support service and risk management.

While embedded finance can provide many benefits, there are also disadvantages to this model that pharmaceutical companies need to be aware of:



**Figure 7.** Development of digital financial instruments and their use in the activities of entities of the pharmaceutical industry of Ukraine

Source: own research.

1. Dependency on third-party providers. If a company uses embedded finance, it becomes dependent on third-party financial providers. In the event of problems with the provider, the reliability and performance of the product may be impaired.

2. Data security. Embedded finance may raise concerns about the security of user data as information about financial transactions is transferred between different platforms. This may create additional vulnerabilities and risks to privacy and data security.

3. Complexity of implementation. Implementing embedded financial solutions can be a complex process, especially for small companies or start-ups.

All in all, embedded finance can be a powerful tool to improve the user experience and extend the functionality of products. However, there are also certain risks and complexities that companies must consider when deciding whether to implement such solutions.

## 5. Conclusions

The creation and use of digital financial instruments have led to truly revolutionary changes in the financing of economic activity and its investment support, the implementation of settlement, credit, insurance, and other operations. Yes, it is not just about the speed, but the immediacy of their implementation, therefore, the various agreements in the field of pharmaceutical business. It is also about significant cost savings due to automation, online processes of working with financial

instruments, which eliminate the necessity to hire a large number of employees, operate premises, and their maintenance.

This conclusion is confirmed by effective digital activity as a strategic direction for the development of the pharmaceutical business in Ukraine, which has transferred a significant part of its financial operations to the online system. At the same time, it is possible to use electronic signatures, electronic registration, and receive, store and use all documents in electronic form without visiting pharmacies and hospitals. This saves time and money for both customers and entrepreneurs, eliminates unnecessary transactions, and makes organizational and administration work extremely convenient.

On the basis of the conducted considerations the benefits of embedded finance include increased customer engagement, enhanced user experience, and additional revenue streams for non-financial businesses. It allows users to access financial services seamlessly within the platforms they already use, eliminating the need to switch between different applications or websites.

However, embedded finance raises concerns related to data privacy, security, and regulatory compliance. Businesses must ensure appropriate safeguards to protect sensitive financial information and comply with relevant financial regulations.

Overall, embedded finance is a growing trend that is reshaping the financial industry by integrating financial services directly into the everyday activities of consumers.

Thus, in general, the indispensable users of digital financial instruments are supranational financial institutions and states; insurance, banking and financial institutions; pension, investment and hedge funds; enterprises, corporations, industrial and financial groups; individuals. This testifies to the broad possibilities of their application, including in the pharmaceutical field with the aim of increasing business profitability by saving time, premises and other means of providing and carrying out financial activities; providing convenience and economic benefits to consumers and partners; optimizing of business processes and managing activities in general; promoting innovation, investment and integration processes.

## References

- Andrew, J., Stephen, L. (2023). Accounting For Digital Assets. *Australian Accounting Review*. 10(1111). DOI: 10.1111/auar.12402.
- Apteka.ua (2023). Farmapohliad–2023. Retrieved March 4, 2023 from <https://www.apteka.ua/article/659212>.
- Bain & Company (2022). *Embedded finance transaction value to more than double to \$7 trillion in US by 2026, but financial institutions must move quickly to keep up*. Bain & Company and Bain Capital report. Retrieved March 15, 2023 from <https://www.bain.com/>.
- Darnitsa (2021). *Innovations in the pharmaceutical industry stimulate positive changes in the healthcare system - research data*. Retrieved December 21, 2022 from <https://www.darnitsa.ua/en/company>.

- Haltsova, O. (2021) *Tsyfrova ekonomika yak faktor ekonomichnoho zrostantia derzhavy: kolektyvna monohrafiia*. Kherson: Vydavnychi dim «Helvetyka».
- Marmul, L., Chorny, B., Penkovsky, V. (2022). Development of digital financial tools and their use in tourism, hotel, and restaurant business enterprises. *Ekonomichniy visnyk universytetu*. 55, 127–131. DOI: 10.31470/2306-546X-2022-55-126-131.
- McKinsey & Company (2022). *The 2022 McKinsey Global Payments Report*. Retrieved February 4, 2023 from <https://www.mckinsey.com/>.
- Obrizan, A. (2022). *The pharmaceutical market after the cob of war fell. What will be given? Economic truth*. Retrieved March 16, 2023 from <https://www.epravda.com.ua/columns/2022/06/27/688567/>.
- Ozili, P.K. (2018). Impact of digital finance on financial inclusion and stability. *Borsa Istanbul Review*, 18(4), 329–340.
- The State Statistics Service: Ukraine (2023). *Turnover of business entities by type of economic activity in 2010-2021*. Retrieved December 3, 2022 from <https://www.ukrstat.gov.ua/>.
- Wiśniewski, M., Marchewka-Bartkowiak, K. (2022). Energy tokens as digital instruments of financial investment. *Economics and Business Review*. 8(3), 109–129. DOI: 10.18559/ebr.2022.3.6.