THE PARADIGM OF FORMATION OF FINTECH ECOSYSTEM IN UKRAINE: EDUCATIONAL-SCIENTIFIC POTENTIAL AND BUSINESS RESILIENCE IN THE CONDITIONS OF WAR

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Abstract. Globalization, digitization processes, and challenges facing the national economy prompt the search for novel approaches and instruments to ensure sustainable development and competitiveness of Ukraine's financial system. An important aspect in this direction is the research of the paradigm of fintech ecosystem formation within complex geopolitical conditions, taking into account educational and scientific potential, as well as business resilience. *The purpose of the paper* is to investigate the essence of the fintech ecosystem paradigm, analyze educational and scientific potential, and business resilience to complex economic conditions during war, as well as to substantiate recommendations whose practical implementation will promote the formation and effective functioning of the fintech ecosystem in Ukraine. One of the key factors for successful fintech ecosystem development is educational and scientific potential. Higher education institutions prepare professionals who have acquired knowledge and can apply it in practice, developing and improving fintech products and services, as well as creating new startups. Scientific research in the fintech sphere will not only promote the emergence of new fintech solutions and the enhancement of existing financial products and services that are actively used in the financial market, but also attract investments into the development of the digital economy, which will contribute to economic growth and post-war recovery. After analyzing the amount of funding for scientific research, it was found out that underfunding can pose a threat to economic recovery. The stages of the fintech ecosystem's formation have been justified, starting from 2008 to the present day, and its development at each stage has been examined in

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detail. The position of Ukraine in international innovation rankings has been highlighted. The factors that influence the development of the fintech ecosystem and are unique in today's realities have been considered, with particular attention focused on funding and regulation. Business resilience is an important aspect in the formation of the fintech ecosystem, which refers to the extent to which companies are able to withstand challenges in crisis conditions and adapt to them. Factors that influence business resilience in war conditions have been systematically and extensively analyzed. Practical recommendations have been proposed for the functioning of the fintech ecosystem in the context of increasing educational and scientific potential and enhancing business resilience in war conditions, the practical application of which will stimulate the development of this industry.

1. Introduction

Effective stimulation of proper dynamics in the development of the fintech ecosystem during times of war is hindered by multiple factors, which, despite their restraining effect, simultaneously demonstrate stimuli and opportunities. Therefore, the fintech industry requires massive support from the government and stakeholders interested in the advancement of financial technologies. In such complex economic and geopolitical conditions, the educational and scientific potential can become the driving force and key aspect of support and optimization of the fintech ecosystem's structure. A priori, education and science contribute to the preparation of highly qualified professionals who, applying their acquired knowledge and skills in practical activities, will not only develop new technologies but also products that combine elements of finance and technological solutions. Conducting scientific research in the fintech industry will enable the proposal of financial technologies, new products, and services, and will also positively impact post-war national economic recovery. Strategically important areas should be research on personal data protection, risk analysis, improvement of online communication channels, and other equally significant aspects of the fintech ecosystem. It is worth noting that it is necessary to change and develop relevant educational programs in higher education institutions, as well as promote an increase in the level of competence of specialists in preparing professionals to work in the fintech industry.

The government's support of small and medium-sized businesses through various incentives for the development of innovative financial products and technologies is essential to ensure their resilience. The war has presented unique challenges for fintech companies, which strategically opens up new prospects for the industry's growth. By utilizing technology to preserve their businesses, these companies will be able to adapt to the volatile external environment. The only challenge may lie in the instability of financial markets with regard to new investment opportunities and changing economic conditions. In such complex circumstances, fintech companies may become too vulnerable, leading them to develop a certain strategy for survival, recovery, and adaptation to new conditions. The fintech ecosystem will promote the development of resilient businesses since fintech companies are interested in developing secure and more attractive (convenient) financial products and services for consumers using new technologies. Specifically, blockchain technology will enable advantages such as reducing risks from financial fraud while ensuring transaction security.

2. The educational and scientific potential in building a fintech ecosystem

Overall, it is difficult to imagine progress in the fintech ecosystem without sufficient development in education and science, as this requires highly skilled professionals and researchers with deep knowledge of finance, information technology and related fields.

The educational and scientific potential is a crucial component in shaping an effective fintech ecosystem, as it provides the market with qualified personnel and knowledge for the development and implementation of innovative fintech solutions.

In order to implement cutting-edge fintech solutions, skills, knowledge, and experience are essential. These can be acquired directly through educational institutions by introducing fintech programs that cover technologies such as blockchain, artificial intelligence, cybersecurity, and others.

As for researchers and scientists, they can contribute to solving complex challenges in this field and create opportunities for the development of the fintech ecosystem by conducting in-depth research on innovative technologies and solutions and commercializing their developments. Education and science help to better understand the risks associated

with the use of new technologies in the financial sector, cybersecurity, regulation, and consumer protection. This has a positive effect on increasing financial literacy and providing access to financial services by improving the understanding of the essence of fintech, changing perceptions and approaches to using financial services among different population groups. As a result, financial services that use technology become accessible and convenient for consumers, while financial companies remain profitable and successful. This situation is a win-win for both fintech companies and educational institutions. However, incentives should be created to motivate scientists and employees of educational institutions, as they face financial underfunding and other problems. Market requirements for them are competitive, while incentives are absent or insignificant. Therefore, sources of funding for higher education institutions in European countries will be analyzed and compared with the situation in Ukraine.

Financing of higher education in European countries demonstrates certain common trends. Firstly, there is state funding. In Germany, France, and the Netherlands, this accounts for over 80% of the total budget of universities. Secondly, there is tuition payment. In the United Kingdom and Ireland, students pay only a partial cost of their education at universities. Thirdly, there is private funding, which entails financial support from private organizations, sponsors, and donors. The situation in Ukraine is similar, however, the volume of state funding is inadequate and does not increase significantly from year to year. Let us consider the share of GDP occupied by expenditures on scientific research in European countries (Table 1).

According to the data in Table 1, Sweden, Belgium, and Austria are leaders in terms of research and development expenditures as a percentage of GDP. Meanwhile, the following countries demonstrated the smallest amounts of funding for research and development as a percentage of GDP: Georgia – 0.3%, Ukraine – 0.41%, Romania – 0.47%. These data reflect a certain level of correlation and evidently indicate the relationship between a country's level of development and investments in education. Therefore, increasing expenditures on research and development in the future will undoubtedly contribute to economic growth and business resilience.

The Ukrainian Institute for Scientific and Technical Expertise and Information has analyzed the results of scientific and scientific-technical activities in Ukraine for 2021. The total expenditures of the Ukrainian

Table 1

Research and development expenditure (% of GDP)

Country	Years				
	2016	2017	2018	2019	2020
Austria	3,12	3,06	3,09	3,13	3,20
Belgium	2,52	2,67	2,86	3,16	3,48
Belarus	0,50	0,58	0,60	0,58	0,55
Bulgaria	0,77	0,74	0,75	0,83	0,85
Georgia	0,29	0,27	0,28	0,28	0,30
Denmark	3,09	2,93	2,97	2,89	2,96
Estonia	1,24	1,28	1,42	1,63	1,79
Spain	1,19	1,21	1,24	1,25	1,41
Italy	1,37	1,37	1,42	1,46	1,53
Latvia	0,44	0,51	0,64	0,64	0,71
Lithuania	0,84	0,90	0,94	0,99	1,16
Luxembourg	1,27	1,24	1,17	1,18	1,13
Netherlands	2,15	2,18	2,14	2,18	2,29
Germany	2,94	3,05	3,11	3,17	3,14
Norway	2,04	2,10	2,05	2,15	2,28
Poland	0,96	1,03	1,21	1,32	1,39
Romania	0,48	0,50	0,50	0,48	0,47
Serbia	0,84	0,87	0,92	0,89	0,91
Slovenia	2,01	1,87	1,95	2,05	2,15
Hungary	1,18	1,32	1,51	1,48	1,61
Ukraine	**0,48**	**0,45**	**0,47**	**0,43**	**0,41**
Finland	2,72	2,73	2,76	2,80	2,94
France	2,22	2,20	2,20	2,19	2,35
Croatia	0,85	0,85	0,95	1,08	1,25
Czech Republic	1,67	1,77	1,90	1,93	1,99
Sweden	3,25	3,36	3,32	3,39	3,53

Source: constructed based on [11]

state budget in 2021 aimed at financing the scientific sphere through 42 budget programs managed by 22 main executors amounted to UAH 12,171.01 million, including UAH 9,551.92 million (78.48% of the funded amount) from the general fund and UAH 2,619.09 million (21.51%) from the special fund (Table 2) [12].

Table 2

Funding of the scientific sphere of Ukraine from the general and special funds of the state budget broken down by directions of budget financing, million UAH

Direction of budget financing	The amount of state budget expenditures.							
	By general fund				By special fund			
	2018	2019	2020	2021	2018	2019	2020	2021
Scientific sphere of Ukraine, total	6551,14	6755,49	7547,59	9551,92	2388,7	2556,99	1870,05	2619,09
including:								
R&D, total	5195,77	5415,20	6055,24	7832,94	2124,47	2346,28	1621,45	2243,37
including:								
Fundamental scientific research	3232,99	3366,80	3652,61	4591,15	579,47	689,30	674,07	1177,46
Applied R&D	1766,80	1972,65	2335,18	3150,69	1544,79	1656,70	947,38	1065,12
State targeted scientific and scientific-technical programs	142,08	19,30	22,55	36,34	0,21	0,00	0,00	0,30
developments under state orders	42,21	42,88	30,32	36,41	0,00	0.00	0,00	0,00
projects within international scientific and technical cooperation	11,69	13,57	14,58	18,35	0,00	0,28	0,00	0,49
Share of R&D in the total amount of state budget expenditures on the scientific sector, %.	79,31	80,16	80,23	82,00	88,94	91,76	86,71	85,65

Source: constructed based on [12]

The share of total general fund expenditures for the scientific sector in Ukraine was 0.17% of GDP in 2021 (compared to 0.18% in 2020). In terms of budgetary financing for the scientific sector in 2021, general fund expenditures were distributed as follows: 82.00% (compared to 80.23% in 2020) was directed towards research and development, including 48.07% for fundamental scientific research (compared to 48.40% in 2020), 32.98% for applied research and development (compared to 30.94% in 2020), 0.37% for state-targeted scientific and technical programs (compared to 0.30% in 2020), 0.38% for state-ordered developments (compared to 0.40% in 2020), and 0.19% for projects within international scientific and technical cooperation (the same as in 2020). Additionally, 11.98% (compared to 10.13% in 2020) was allocated for financial support for the development of scientific infrastructure and the renewal of material and technical resources, while 6.02% (compared to 9.64% in 2020) was designated for other directions of budgetary financing for the scientific sector [12].

In Ukraine, the total funding for R&D in 2021 amounted to UAH 10,076.31 million, of which 77.74% came from the general fund. The ratio of expenditures from the general fund for R&D by types in 2021 compared to 2020 slightly changed towards an increase in the share of applied research and a decrease in the share of fundamental research [12]. Despite the increase in funding for education and science, this sector still remains underfunded in order to ensure economic growth. The insufficient level of funding is reflected in the opportunities for innovative development.

The basis for determining a country's level of innovation is the results of rankings formed by various countries and organizations, such as the Global Innovation Index, Bloomberg Innovation Index, Summary Innovation Index, and The Global Talent Competitiveness Index (Table 3).

Based on data from official websites, we obtain the following results (see Figure 1).

Here are the positions that Ukraine held in the ranking assessments during 2019–2022:

1. Global Innovation Index – Ukraine achieved its best ranking in 2020 at 45th place, gradually dropping to the 57th spot in 2022 due to the war, which caused a deterioration in the ranking.

2. Bloomberg Innovation Index – in 2019, Ukraine held the best ranking at 53rd place, which remained the same as of 2022. The situation remained

Table 3

Indicators for determining the level of innovation

Indicator	Essence
Global Innovation Index	The Global Innovation Index (GII) is an annual report developed by the INSEAD Business School, the Royal Institute of Technology in Stockholm, and the World Intellectual Property Organization (WIPO), and serves as an informational tool for determining the level of innovation in countries and understanding global trends and development prospects. It is based on a series of indicators, including intellectual property, research and development activity, technological development, startup ecosystems, and others. Both developed and underdeveloped countries are taken into account. By analyzing the obtained indicators, a country's innovation index is formed.
Bloomberg Innovation Index	The Bloomberg Innovation Index is an annual report that has been compiled by the American international financial information agency, Bloomberg L.P, since 2013. It highlights the innovation potential of countries in three areas: science, technology, and the level of economic development. A range of indicators is used for its calculation, including expenditures on research and development (R&D), the total number of technology companies, the number of scientists, the number of patents, the quality of education, communications, the development of high-tech products and services, among others. The next step is to rank each country separately based on these indicators and the overall innovation ranking. This indicator is a measure of the level of scientific and technical potential and innovation, and allows one to see opportunities and prospects for growth, as well as competitors.
Summary Innovation Index	The Composite Innovation Index is an indicator that demonstrates the level of innovative development of countries and regions of the world based on an analysis of aspects such as scientific research, technological development, economic indicators, infrastructure, and others. It is composed of a group of indices, including the United Nations Industrial Development Organization's Innovation Development Index, the World Bank Innovation Activity Index, the Global Competitiveness Index of the World Economic Forum, and others. This index is interesting because it enables the assessment and identification of which countries and regions are currently the most innovative and open, as well as their steps towards increasing their level of innovation and the possibility of borrowing their experiences and best practices.

(End of Table 3)

Indicator	Essence
The Global Talent Competitiveness Index	The Global Talent Competitiveness Index (GTCI) is a tool used to assess a country's competitiveness based on talent development. This annual index is developed by experts from various organizations and countries, including INSEAD, Adecco Group, and Tata Communications. The GTCI is based on the evaluation of several indicators related to factors that attract and foster talent and human capital development in a country. These indicators include the quality of education, the labor market, mobility and the emigration of experts abroad, the use of innovation and technology, and certain cultural and historical development factors. The GTCI allows for an assessment of a country's attractiveness for the recruitment of talented students and professionals, which is a key factor for economic growth.

Source: constructed based on [5–8]

stable throughout 2019–2022 with rankings of 56th in 2020, 58th in 2021, and 57th in 2022.

3. The Global Talent Competitiveness Index – the rankings ranged from 61 to 66th place. In 2019, Ukraine was ranked 63rd, in 2020 it dropped to

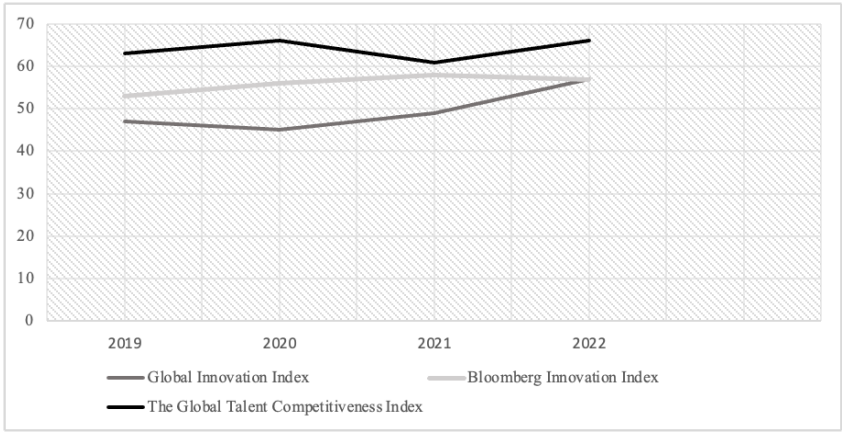

Figure 1. Dynamics of indices characterizing the level of country's innovation

Source: constructed based on [5–8]

66th place, in 2021 it improved to 61st place, and in 2022 it went back to 66th place.

All the efforts made by Ukraine in stimulating innovation in previous years were to some extent negated by the war, which at the same time creates a basis for searching for optimal solutions to this situation and justifying fundamentally new approaches.

The key to forming a fintech ecosystem is the educational and scientific potential. Let's take a closer look at the essence and development of the fintech ecosystem in Ukraine.

The fintech ecosystem in Ukraine is considered as a set of all interested parties, the synergistic effect of whose cooperation makes it possible to develop safe and high-quality financial services for making optimal financial decisions based on the principles of convenience, speed, and reliability. The basis for the development of the fintech ecosystem is technological innovations that improve the quality of financial services, making them more accessible and secure.

The following fintech startups can be highlighted during this period:

1. Online banks – Idea Bank, Bank Pivdennyi, Alfa-Bank.

2. Cryptocurrencies and blockchain – KUNA Bitcoin Agency, CryptoCoinsNews.

3. Mobile applications – PayMe, IPay.ua.

The next period – 2014–2016. Overall, this period was difficult for the national economy due to the crisis events that were accompanied by high inflation and devaluation of the national currency.

In addition, it was difficult to attract financial resources in external markets. This stage of fintech ecosystem development was challenging and at the same time opened up new opportunities for finding solutions in complicated conditions. In particular, highlight the following startups: 1) banking technologies – payment systems using QR codes and NFC technology; 2) cryptocurrency and blockchain – the first cryptocurrency exchanges and cryptocurrency payment systems appeared, such as BTCU and BitX; 3) innovative financial services – payment systems, e-wallets, and electronic money transfer services.

During 2017–2019, investments in fintech startups increased, which contributed to their active development. It is worth highlighting developments in blockchain technologies and crowdfunding. In this context, the following startups are noteworthy [10]:

– Coinypay is a service that operates at the intersection of financial technologies, artificial intelligence, and cryptocurrencies to implement modern solutions for businesses and users;

– Electrum is an operator of electronic financial and payment instruments. The company provides customers with the ability to quickly open anonymous electronic wallets with a real-time payment function for goods and services, as well as loyalty and product protection services against counterfeiting;

– bNesis is a service that combines various systems (payment, e-commerce, scoring systems, as well as social media and banking systems) into a single solution through their APIs;

– Alfa Protection is a system that protects companies operating in the e-commerce sector from payment fraud. The product is based on technical solutions such as Machine Learning, Device Fingerprint, and Rule Engine;

– INSART is a company specializing in the development of software for financial institutions and insurance companies;

– Monobank is an innovative internet bank that offers customers the ability to perform operations with their funds through a mobile application without the need to visit a bank institution.

The following period, 2020–2021, can be characterized as a time of active development for startups, which has led to an increase in innovative solutions and contributed to the growth of cooperation between clients and banks, particularly in online banking. This has reduced the duration of financial operations. During this period, the following fintech startups can be distinguished [10]:

1. WayForPay – a payment platform that provides card payment services, payment organization in B2C, B2B, internet acquiring, and other e-commerce solutions, as well as personalized solutions for various types of businesses.

2. Okchain – a platform for storing and exchanging cryptocurrencies that offers fast and secure transactions, as well as the possibility of asset insurance.

3. Nimses – a so-called social network that allows users to earn through digital currency (Nim) and applications and services.

In 2022, the fintech market actively attracted financial resources for the implementation of innovations. In particular, the number of electronic and

cashless transactions increased, which ensured the active development of payment systems and online acquiring, lending. Despite the challenging geopolitical and economic situation, international financial support only stimulated further development of the fintech ecosystem.

In 2022, the following startups were funded through the startup support fund Google for Startups for a total of 5 million US dollars [18]:

– Folderly – an AI-based platform that enhances the efficiency of clients' email;

– Happy Monday – connects people looking for work with companies that are the right fit for them;

– Mate Academy – IT courses adapted to the needs of individuals looking to begin working in the information technology industry;

– Pricer24 – a platform that provides brands, distributors, and online stores with market analytics;

– Workee – a simple website builder designed for private tutors and freelancers;

– YouControl – an online service for market analysis and legal entity verification.

In summary, it is evident that the fintech ecosystem in Ukraine is experiencing active development, and fintech is one of the priority industries of the national economy due to the processes of digitalization. As a participant in all economic processes, the state is interested in ensuring that fintech continues to develop actively, which will contribute to economic growth and facilitate access to financial operations, expand opportunities for financial management and search for sources of financing, including through the use of modern financial engineering tools.

Factors that will influence the development of the fintech ecosystem vary depending on the level of economic development of the countries. For Ukraine, the following are relevant:

1. Adequate financial resources from the government, investment and venture funds.

2. Existence of a regulatory framework to promote fintech development and proper regulation in line with internationally recognized standards.

3. Availability of fast internet to facilitate the implementation of technological solutions related to blockchain, artificial intelligence, machine learning, big data, and cloud technologies.

4. Financial literacy and inclusion to understand the essence of fintech solutions and popularize them.

5. Talented professionals who will create innovative financial products and develop fintech startups, with the appropriate level of skills and expertise acquired through education and research institutions.

6. Development of startup incubators and accelerators that provide financial, advisory, and other support, as well as expanding cooperation among stakeholders interested in promoting innovative products and services. In this regard, the role of developers and leading universities is also crucial.

According to the Ukrainian Association of Fintech and Innovative Companies (UAFIC), as of 2022, there were 203 companies operating in the Ukrainian fintech market, with 49% of them operating on the international market. The largest representation of Ukrainian fintech companies is in Europe, accounting for 15%, followed by the United States at 7%. UAFIC became the first non-EU country participant to join the European Digital Finance Association (EDFA). Both organizations collaborate to strengthen the fintech landscape in Ukraine [14].

Technological infrastructure is a leading activity of Ukrainian fintech startups, with the direct product being the development of IT solutions for financial companies and banks. According to UAFIC's survey, 22% of fintech companies work in the technology and infrastructure sub-sector. The main reason for this trend is the shift towards online services due to the pandemic, creating demand for product companies that can provide ease of doing business in a digital environment [14].

It is worth highlighting the following investment funds that have provided financial resources into Ukrainian fintech startups: Horizon Capital, Digital Future, AVentures Capital, ICU Ventures, and TA Ventures. Additionally, Ukrainian startups actively attracted funding from foreign investors in Europe and the United States. These startups include Grammarly, Revolut, SolarGaps, People.ai, and Depositphotos.

The most popular startup is Grammarly, an online platform for grammar checking based on artificial intelligence technologies. The startup was founded in 2009. In 2017, Grammarly raised $110 million and another $90 million in 2019. According to Pitchbook, the company was valued at $2.1 billion. In 2019, Grammarly also conducted a sale of secondary shares,

but the amount of this transaction is unknown. Investors valued Grammarly at $13 billion, making it the most expensive private technology company founded in Ukraine [4].

In turn, the National Bank of Ukraine serves as a regulator of financial markets and stimulates the development of the fintech ecosystem by improving the regulatory environment for fintech companies. Specifically, the "Strategy of Ukrainian Financial Sector Development until 2025" has been developed to promote financial and technological innovations in the ecosystem. According to this document, the vision for fintech in Ukraine by 2025 is to have a competitive and integrated fintech ecosystem that meets the needs of consumers, market participants, the government, service providers, and other stakeholders who closely collaborate and interact with each other. The fintech ecosystem should be attractive for investment and profitable, technologically and legally protected, have advanced and balanced regulation, be technologically open and accessible, ensure synergy, and provide equal rights and opportunities to all stakeholders. It should also be powerful and innovative, safe, and integrated into the global ecosystem [9; 13].

The mission of this Strategy is to stimulate the development of financial innovations in the market to create high-quality and accessible financial services, activate the startup movement, and promote effective competition in the interests of consumer protection through the development of a cashless economy, increased financial literacy, and the creation of a sustainable fintech ecosystem [13].

In August 2022, the Law of Ukraine "On Payment Services" finally came into force. It is revolutionary for the Ukrainian fintech sector, particularly in the field of payments. One of the innovations is the harmonization of Ukrainian legislation with the European Union legislation, namely the updated Payment Services Directive (PSD2). The result will be the implementation of open banking in Ukraine by August 1, 2025. For the successful implementation of open APIs, the National Bank of Ukraine (NBU) is developing a new regulatory framework and open banking standards in collaboration with market participants. In March 2022, the Law of Ukraine "On Virtual Assets" was signed, with the main goal of creating conditions for the development of the cryptocurrency market. After the law comes into force, cryptocurrency exchanges and companies engaged in digital assets,

upon obtaining the necessary permit from the National Commission for Securities and the Stock Market, will be able to operate legally in Ukraine, and banks will be allowed to open accounts for cryptocurrency companies [10]. The NBU, together with the government, is actively working on the implementation of best regulatory practices of developed countries to accelerate the development of the fintech industry. In this regard, we believe that a significant factor in encouraging and stimulating the development of the fintech ecosystem is ensuring cooperation between educational, scientific, and business institutions, taking into account global trends of globalization and digitization. This should be the paradigm of the fintech ecosystem for Ukraine. As a result of stakeholder cooperation, the state will obtain indisputable positive results in the process of digital transformation of the economy, as well as for ensuring its sustainable development and recovery in the post-war period.

3. Resilience of business in times of war

Resilience is the ability of a company to withstand difficult economic conditions and to resist challenges and risks caused by crisis situations, including war, as well as to recover from their aftermath. The factors that affect the resilience of businesses in times of war can be summarized as follows:

1. Risk management. All businesses should apply the basics of risk management in their operations, including assessing, planning, distributing and overall managing risks, both current and potential, including financial, operational and reputational risks. Equally important is an objective assessment of geopolitical risk, as it can lead to changes in the political situation, which in turn can affect changes in legislation, restrictions on the export or import of goods and services. For businesses, it is important to assess the current situation and market reaction to events. In addition, any institution or organization should prioritize safety, as war can threaten the safety of not only employees, but also clients and businesses as a whole. In this regard, businesses should form sufficient financial reserves to reduce the negative impact of this situation, as well as a specific action plan when income decreases and costs increase. We draw attention to another type of risk, namely reputational risk. This risk can only be managed through active communication with customers, partners and other stakeholders, as well as an information campaign.

2. Readiness for crisis. In general, businesses should always be prepared for crises, not just in times of war. This means that a business must be able to prevent, adapt, and react to crisis in the following areas:

– Adaptation – readiness to adjust the strategic model of business development;

– Planning – ability to develop action plans for crisis situations and form sufficient financial reserves to cover expenses or other financial problems;

– Communication – timely and reliable provision of information to stakeholders through various communication channels;

– Infrastructure – to continue operations even in conditions of restrictions (such as previous power outages in Ukraine), businesses must apply high-quality technologies and infrastructure to avoid disruptions and ensure productivity.

3. Innovation. Innovation is the key to solving problems that arise in the development of new products, services, and ideas, which allows businesses to adapt to a changing environment. The application of advanced technologies will facilitate adaptation to crisis situations and reduce costs. Active collaboration with clients and partners is also important for developing new solutions and ideas. Market and competitor research will also help to better understand the needs and prospects for further business development – whether to fold operations or transition to a new niche.

4. Skilled team. Having a team of employees who are exceptional experts in their field can make it easier to adapt to crisis situations and ensure the resilience and productivity of the business. A strong team from a management and psychological perspective includes the following elements:

– Leader: a person who makes important decisions and coordinates the team's work;

– Support: an atmosphere of interaction and support that creates a positive attitude and work environment;

– Expertise and competence: to perform complex tasks, including during a crisis, all team members must possess the necessary knowledge and skills to solve problems and perform routine tasks;

– Communication: effective communication enables the timely transmission of information, communication, and decision-making based on a shared understanding of the problem.

Thus, the team will be the key aspect of business success.

5. Adaptability and flexibility. It is important for businesses to be prepared for changes in approaches and strategies according to challenges and new conditions. Openness and flexibility are key factors that will help during times of war. Companies should always be ready to adopt new technologies, innovations, and flexible work methodologies. Various tools, such as Agile methodologies, should be considered for this purpose. As a result, a business that is adaptive and flexible responds more quickly to changes in war conditions and becomes more successful in overcoming emerging challenges.

During a month of war, the Ukrainian business community suffered more losses than during two years of the pandemic. Assessing the scale of damage and long-term consequences is difficult because the hostilities in the country are ongoing. According to the National Bank's estimates, Ukraine's economy loses 50% of the "unproduced" GDP during the war. This means that every week costs the national economy more than 50 billion UAH. And this is without losses from destruction. The IMF estimates Ukraine's losses from Russian military invasion at 35% of the GDP. Many enterprises found themselves in active combat areas and were forced to evacuate to safer regions or stop working. However, even businesses relatively far from shelling suffer from logistics problems and a shortage of raw materials. According to a survey by the European Business Association, only 17% of companies are working at full capacity, and every third company is not working. One-third of entrepreneurs plan to resume operations. Similar results were obtained in surveys by other organizations [1].

The IT market has proven to be the most resilient, however, according to the annual Global Startup Ecosystem 2022 ranking, Ukraine has dropped 16 positions compared to 2021 due to the effects of the war, when it held the 34th place.

The ability to work under crisis conditions can become the biggest competitive advantage for Ukrainian IT in the global market. Startups may form a new Ukrainian economy in the future. After the war, Ukraine will be in great need of smart solutions for post-war recovery. The modern war is being fought both on the battlefield and in cyberspace, requiring the production of modern weapons and cyber technologies. It is important that in the conditions of the state of war, the Ukrainian Startup Fund, among other things, focuses on supporting innovative projects that meet the urgent

needs of the state. This refers to a new program of grant support for dual-use projects to enhance the country's defense capability and post-war reconstruction. Services for remote work control, virtual event platforms, and online hospitals – everything related to digitization – may also be a priority on the market. Therefore, one of the success factors is that the product must be at the intersection of IT and other sectors [15]. This is where the complexity and significant potential for business development lie in the context of the progress of fintech and new solutions in various industries and sectors, while also exacerbating the problem of resilience in the long term.

4. Conclusions

The fintech ecosystem in Ukraine is rapidly developing, and the work on forming its paradigm is still in its early stages and subject to ongoing discussions. Nevertheless, there is no doubt that this will contribute to post-war recovery and provide opportunities for attracting significant investment. Innovations are a key element in the development of the modern digital economy, and their implementation in the rapidly developing financial market, driven by the active spread of information technologies, is a significant factor that contributes to the creation of new products and services capable of meeting the demands of customers and all other stakeholders.

In summary, the directions for shaping and optimizing the functioning of the fintech ecosystem in the context of using Ukraine's educational and scientific potential and the resilience of businesses in wartime conditions can be outlined as follows:

1. Increasing financial support for fintech startups involves creating favorable conditions for stimulation through increased funding, consulting services, incubation programs, and corresponding platforms that finance and support the development of startup culture.

2. Improving fintech regulation involves providing stable market rules in accordance with the best practices and standards of EU countries. This will promote the active development of the industry and ensure the safety and stability of fintech innovations' implementation.

3. Enhancing financial literacy will allow expanding the network of service provision and the number of users, as different categories of the population

will be familiar with the specifics of receiving financial services, understand how convenient and easy it is, and therefore, use them more often.

4. Accessibility of financial products and services involves expanding the technological infrastructure to gain access and internet coverage in all regions of Ukraine. At the same time, attention should be paid to ensuring cyber security and the protection of client transactions.

5. Stimulating the activity of scientific institutions and higher education institutions, particularly in the area of tax and budget research, including conducting scientific research in the direction of finding optimal fintech solutions, which is a guarantee of the fintech ecosystem's development.

6. Tax incentives for innovative activities of enterprises, particularly small and medium-sized businesses, could be optimal by introducing preferential taxation of startup income for a certain period, such as in the production of high-tech products.

7. Creating conditions to stimulate venture activities through preferential taxation of dividends.

8. Increasing banks' interest in the growth of financing innovative projects by reducing tax obligations of banks financing innovations.

The implementation of the outlined measures and priorities will stimulate the development of fintech, harmonize the interaction between educational and scientific institutions, and promote economic growth.

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