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# FINANCIAL TECHNOLOGIES DEVELOPMENT PROSPECTS IN THE COUNTRIES OF EASTERN EUROPE AND UKRAINE

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## ABSTRACT

*Analysis of the implementation of financial technologies (FinTech) has shown that their use causes the rapid transformation of financial services into new forms, expands the possibilities of their use. In these conditions, the economic feasibility of studying the foreign experience of FinTech development increases. The subject of the research is instrumental and mathematical aspects of modeling the influence of factors on the functioning of FinTech in Hungary, Poland, Slovakia, Romania and Ukraine. The aim of the work is to study components of the infrastructure and factors*

*influencing the FinTech functioning in the Eastern Europe countries and Ukraine based on the construction of a multi-factor econometric model as a basis for making effective management decisions to ensure sustainable development of the financial services market in Ukraine. It examined through hypotheses different scenarios of the impact of factors such as: GDP, population, consumer spending and Internet access on the functioning of FinTech. It is determined that the priority areas and tools for the development of FinTech in Ukraine are: modernization of FinTech business models in the direction of the technology development and customer needs, partnerships and cooperation with banking institutions; use of services of your own IT companies or software of well-known international suppliers such as SAP; overcoming the problem of the financial services market development in Ukraine due to low mentality and lack of financial literacy on the basis of building the institute of trust; formation of the favorable investment climate for the financial assets inflow for the FinTech development.*

**JEL Classification:** E44, G1, G20, G21.

**Key words:** bank, insurance company, investment fund, FinTech company, financial services market

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## 1. INTRODUCTION

Nowadays, revolutionary changes of the modern financial market take place in the vector of the FinTech innovation development, in particular: rapid transformation of financial services into new forms and expansion of their use, changes in the conditions of functioning of securities markets, payments, credit and deposit operations, peculiarities of the transformation and circulation of personal and corporate finances, etc.

In recent years, FinTech has strengthened its functional position and confidently provides both a favorable environment for start-ups and entrepreneurs and has an impact on the national business performance. Today we are talking about the internationalization of this type of business. The process of the FinTech investigation in Ukraine and its comparison with FinTech operating in European countries creates opportunities to accumulate complete information about FinTech from the perspective of its sub-sectors and markets, and will create a clear picture of the management and provision of conditions for further development. FinTech is able to reformat drastically the finance in order to digitize all areas of business and life, transform and create new services and financial instruments.

## 2. LITERATURE REVIEW

The emergence of FinTech is primarily associated with the rapid development of the digital economy in the world. Today, the economy is being actively digitized. The notion of digitization, more precisely “digital literacy”, was first used by Gilster (1997) in the interpretation of computer literacy, in which this definition is defined as accentuation of critical thinking and evaluation of information more than technical and procedural skills. However, during all this time, scientists have made numerous attempts to investigate this category (Rachinger M. et al., 2019). The issue of digital literacy has significantly intensified over the last twenty to thirty years, along with the digitalization of most business activities,

while growing its role in the financial services market (FinTach) and in banking and consumer lending, in particular (Gobble M., 2018). A significant number of scholars have devoted their work to studying the impact of digitalization processes on the global financial services market. Such studies have been conducted, in particular: Akerlof G.A. (2015), Babenko V. (2019) and Shkarlet S. (2016). The question arises: why is the digitalization process so important today? The answer is very simple: first, it is a mandatory element for a conscious choice of reasons and ways to use new technologies; second, when digitizing activities, we are faced with a socio-cultural process that is responsible for acquiring and processing basic information and knowledge (Burciu, 2015).

The term “FinTech” was first used in the 1990s, the essence of which is the use of computer programs or other technologies to help the financial industry (Hochstein, 2015). Starting in 2011, FinTech began to attract the attention of regulators, customers and scientists Arner (2016), Chernadchuk V. (2017), Laktionova A. (2013), Lerner J. (2011), Llewellyn D.T. (2018), Gulamhuseinwala I. (2015) and Deng X. (2019). The use of FinTach is complicating the institutional structure of the global financial system. Ways to reduce the negative impact of FinTach on the stability of the financial system can be: the work of “regulatory sandboxes” in which new technologies, business models and algorithms underlying FinTach innovations are tested, ie digitization and legal regulation of digital ownership tokens and a clear definition of blockchain technology in various spheres of life (Azarenkova et al., 2018). The development of the FinTech sector, taking into account modern processes of digitization of activities, based on the development of “blockchain” in the FinTech sector can become an ascending element (Fernandez-Vazquez et al., 2019). Modern research on the development of FinTech shows that the use of information technology provides access to international markets, develops business online and thus – contributes to the progress of the digital economy (Berisha-Shaqiri et al., 2015). To date, FinTech companies have formed a new niche in the financial services market, which is based on intersectoral cooperation between government agencies (Bukhtiarova et al., 2018). Analysis of the value and structure of investment flows as the most obvious indicators showed the high potential of the FinTech industry to process international transfers. FinTech (Petrushenko et al., 2018).

The development of an effective approach to the creation of FinTech information platform should be based on the characteristics of FinTech platforms, their types, participants and the most influential factors, the main of which are: level of investment, impact of FinTech platforms in the EU worldwide, features of investing in B2B FinTech platform (Ivashchenko et al., 2018).

In general, the vast majority of research focuses on finance and the banking sector (Lavrov R. et al., 2019). The study of the model of functioning of the financial services market in its separate segments: deposit, credit, insurance and investment showed the important role of banking institutions in the economic development of this country (Yoo Y. et al., 2010). A detailed analysis of transformations in the banking system shows that in the future the same changes should occur in other segments of the financial services market, which is a necessary condition for its development (Shkarlet et al., 2019). Determining the impact of the FinTech industry on the development of the banking business should be based on the basic models of banks’ participation in the creation of FinTech companies. Modern trends in FinTech development should be taken into account when determining the key determinants of the transformation of the banking sector in the formation of new business models of the banking business (Zveryakov et al., 2019).

Thus, economic feasibility of the FinTech development in today’s environment is an important part of the overall process of studying peculiarities of the functioning of the

financial services market to manage them. To this end, the analysis of foreign experience in this field becomes relevant. Accordingly, the state of the FinTech development of Eastern European countries and Ukraine is analysed within the article.

### 3. AIMS

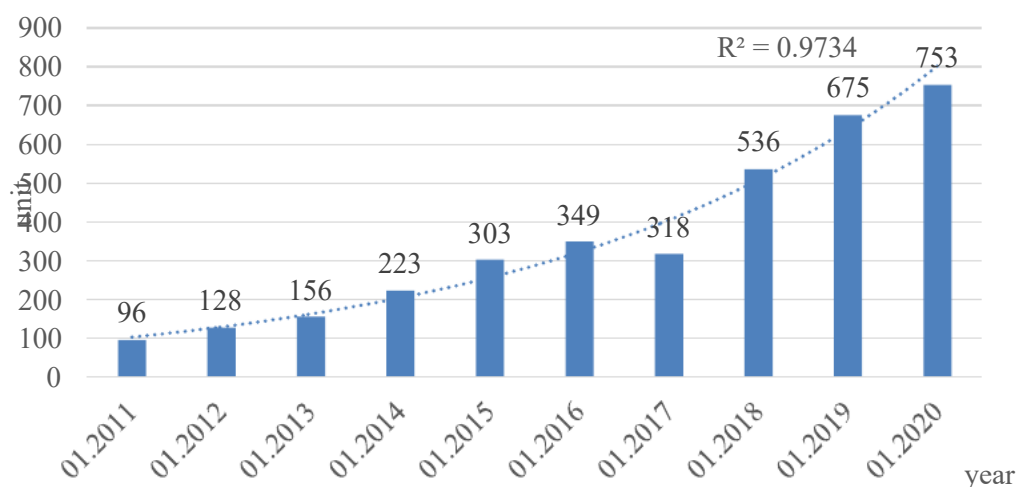
The aim of the article is to study components of the infrastructure and factors influencing the FinTech functioning in the Eastern Europe's countries and Ukraine based on the construction of a multi-factor econometric model as a basis for making effective management decisions to ensure sustainable development of the financial services market in Ukraine.

### 4. METHODS

The following methods of scientific knowledge are used during the writing of the study: theoretical generalizations – to substantiate (Kozlovskiy et al., 2018) the importance of the development of the FinTech market in Ukraine and some Eastern European countries; comparison method – to study the FinTech indicators of Ukraine and Hungary, Poland, Slovakia, Romania; methods of analysis and synthesis – to summarize the number of Fintech investment transactions in Europe, quantity of financial institutions in Europe that cooperate with FinTech companies, distribution of FinTech companies by areas of activity, assessment (Kozlovskiy, Butyrskiy et al., 2019) of the landscape of FinTech services in the Eastern European countries and Ukraine; methods of economic and mathematical modeling – to identify factors influencing the level of development of the FinTech market in Eastern Europe and Ukraine in order to form the investment attractiveness of FinTech companies in Ukraine; SWOT analysis – to identify strengths, weaknesses, threats, benefits and opportunities to improve the investment attractiveness of FinTech market in Ukraine; graphic and tabular methods – to visually illustrate the studied phenomena and processes; abstract-logical method – to summarize the results of the study and determine the priority areas and tools for further development of FinTech in Ukraine.

### 5. RESULTS

For Ukraine, the potential of the FinTech industry extends to the banking, insurance, management of the asset and financial market, and concerns new financial technologies in the field of payments, raising capital, personal finance, cyber security (Kozlovskiy et al., 2019), data bases and analytics, other types of software.

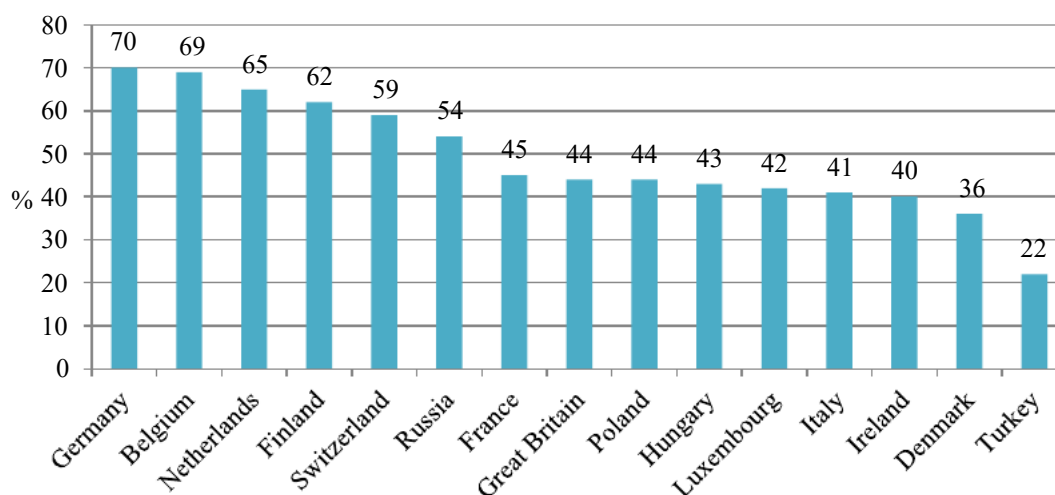


**Figure 1** Dynamics of FinTech investment contracts in Europe

Source: Compiled by the authors

Definition of the financial landscape, strengths, weaknesses, opportunities and threats to their development, as well as future market prospects and customer demand is important in terms of the FinTech development in Ukraine. The economic role and enhancement of the FinTech development in Ukraine gains strategic importance every minute, given the indicators of growth in the total number of FinTech investment transactions in Europe (Fig. 1).

Increase in the number of FinTech companies, confidence in their activity and benefits of cooperation with them during 01.2011-01.2020 gives an opportunity to confirm the overall consolidation and development of this sector. The information on the cooperation of financial institutions in European countries is confirmed (Fig. 2).



**Figure 2.** The share of financial institutions in Europe that partner with FinTech companies

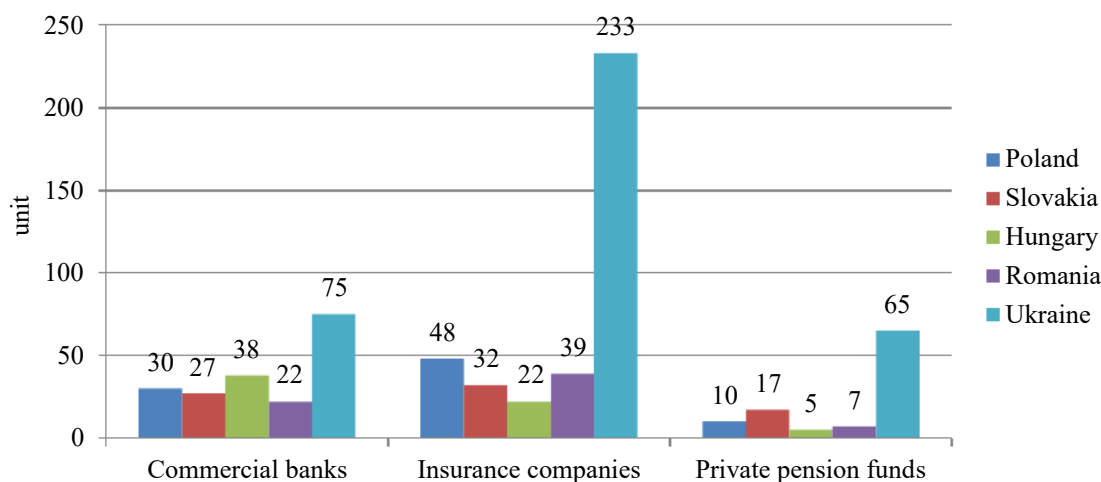
Source: Compiled by the authors

In particular, countries with high levels of financial and economic development overwhelmingly prefer the cooperation with the leaders of the FinTech industry – more than 50%.

Let's estimate the size of the FinTech market of the Eastern European countries which territories are adjacent to Ukraine (Poland, Slovakia, Hungary, Romania). Overall, the value of their FinTech markets is over € 1.13 billion (Poland – EUR 856 million, Hungary – EUR 83 million, Slovakia – EUR 73 million, Romania – EUR 119 million).

Investigating foreign experience of the FinTech market functioning, government agencies (regulators, central banks, institutions influencing the financial sector), traditional FinTech companies (as investors, strategic buyers, sellers of innovations), technology companies (providing FinTech services with their core products), companies that are part of the FinTech ecosystem and which create technologies for financial transactions, professional investors and etc. are key players in the financial services arena.

In order to compare and establish the real landscape of the FinTech services projection of Ukraine with the studied countries, let us turn to the data in Fig. 3, demonstrating Ukraine's superiority over Eastern European countries in terms of the number of financial institutions that are the main providers of FinTech services, however, their assets are much smaller than their assets and their efficiency compared to the Eastern European countries (Kozlovskyi et al., 2020). The closest indicators are in Hungary.



**Figure 3.** The landscape of FinTech services in Eastern European countries and Ukraine on a 01.01.2020

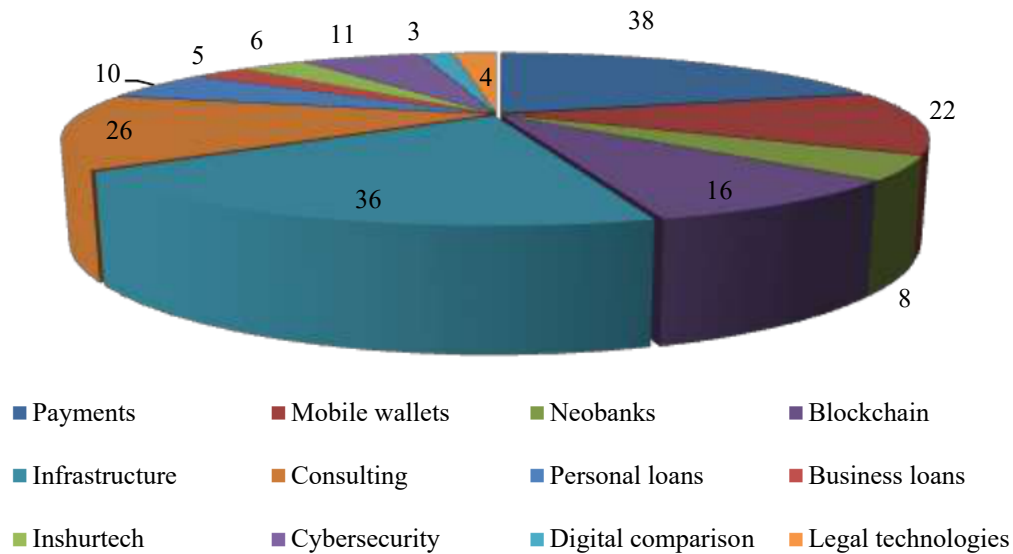
Source: Compiled by the authors

Phenomenon of the participants’ number in the insurance market of Ukraine is of interest, about 233 institutions in 2019, compared to other countries, but the quality and volume of insurance operations differ significantly. However, markets of the countries studied are different not only depending on their size but also on the dominant technology and propensity to innovate. For Ukraine, this number of financial institutions creates real prospects for expanding existing and introducing the latest FinTech services and tools.

Domestic financial technology market is in a rapid phase of growth due to the close cooperation of Ukrainian commercial banks and FinTech companies and government regulation, in particular, the implementation of the Comprehensive Program for the Development of the Financial Sector of Ukraine 2020 and the Strategy for the Development of the Financial Sector of Ukraine until 2025 (BankID, OpenBanking, improvement of the NBU electronic payment system, increasing access of financial market participants to public registers, e-hryvnia, bigdata, blockchain and cloud technologies, etc.) as a motivator for the introduction of new financial instruments. The peculiarity of Ukrainian FinTech companies is the beginning of cooperation in the insurance sector, which creates positive opportunities for the development of the financial sector of the economy.

We believe that the main arguments for this development are global trends and performance indicators of FinTech companies (as of 2018, 43% of domestic FinTech companies operate in the international market), enhancing the desire of traditional financial institutions to cooperate in order to maintain customer markets, absence of FinTech companies – leaders of the domestic market, availability of financial resources in Ukraine and desire to invest in start-ups and, finally, increase in financial literacy of the population and desire to manage their own finances, etc.

Distribution of FinTech companies by their activity according to the results 2019 in Ukraine is presented in Fig. 4.

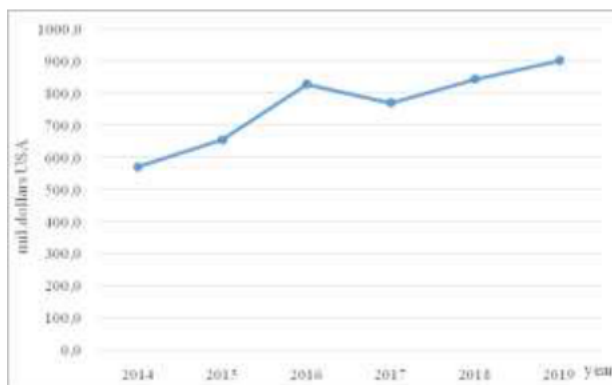


**Figure 4.** Types of FinTech companies by scopes of activity

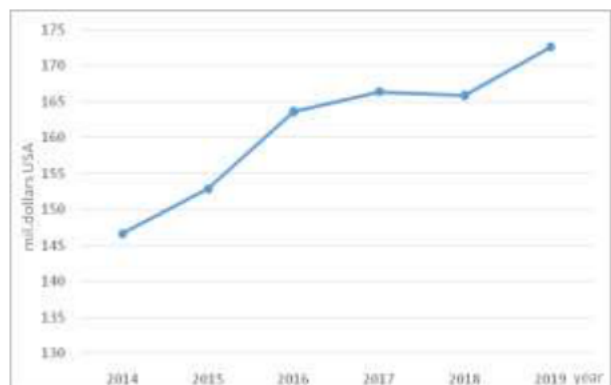
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Investigating the prospects and factors that determine the development level of FinTech of European countries, it is established that they include the GDP of the country, population size, amount of consumer spending, number of households, number of Internet users, and number of devices that make FinTech work. The most influential of these are suggested to take as a basis of the multifactorial model formation, in particular, the regression of the linear form:  $Y = b_0 + b_1 * X_1 + + b_n * X_n$ , where  $Y$  – p productive indicator – expected market demand for FinTec,  $b_{0-n}$  – unknown investigated coefficients,  $X_{1-n}$  – factors of influence.

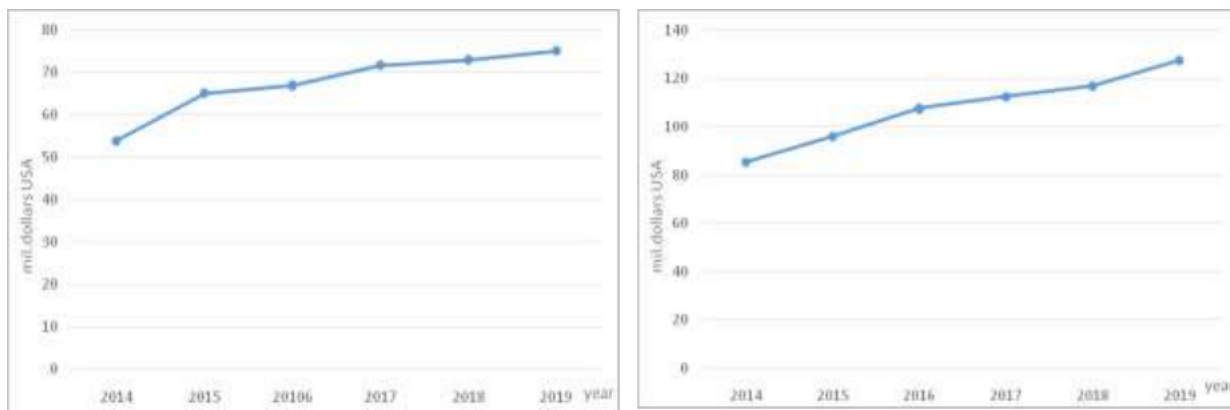
Preliminary, results of the calculation of paired correlation coefficients revealed that in the next study it is advisable to include only such factors as: GDP size ( $X_1$ ), population size ( $X_2$ ), amount of consumer spending ( $X_3$ ) and number of Internet users ( $X_4$ ), since the other factors mentioned above either have little or no effect on the test result, or are repetitive, so they are excluded from the study. Thus, a study of estimated demand in the FinTech market for the Eastern European countries and Ukraine has been carried out based on the construction of a multifactor econometric model, and, as a consequence, the coefficient of determination ( $R^2$ ), which value is close to 1, is set. The value of this coefficient indicates high influence of factors  $X_1, X_2, X_3, X_4$  on the value  $Y$ . The multiple correlation coefficient ( $R$ ) also attests to the adequacy of the calculated model. The results of the analysis are presented in Fig. 5.



$$Y = 207016,4 - 0,01016 * X_1 - 5507,6 * X_2 + 0,017159 * X_3 + 111,6787 * X_4 \text{ Poland}$$



$$Y = 1295,457 + 0,000312 * X_1 - 110,847 * X_2 - 0,00105 * X_3 - 3,11421 * X_4 \text{ Hungary}$$

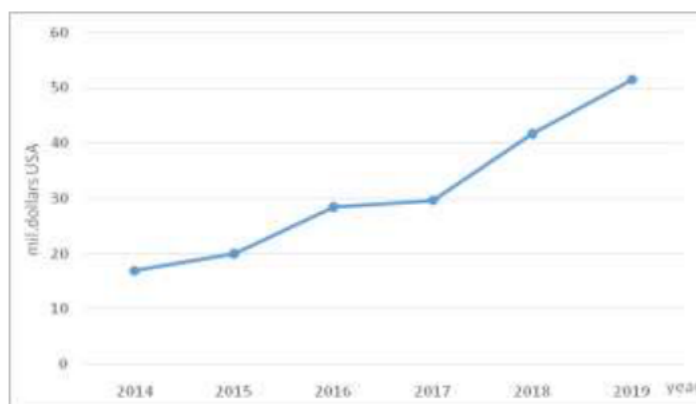


$$Y = 8018,107 - 0,46495 - 1597,71 + 20,72898 + 125,2872$$

Slovakia

$$Y = -46,4267 - 1,28618 * X1 + 11,80217 * X2 + 1,7474 * X3 + 14,30853 * X4$$

Romania



$$Y = -75,8068 + 0,160984 * X1 + 1,767356 * X2 - 0,25357462 * X3 + 0,969169 * X4$$

Ukraine

**Figure 5.** Estimated demand in the FinTech market in Eastern European countries and Ukraine

Source: Compiled by the authors

The use of economic and mathematical modeling made it possible to collect and organize statistical information and identify the hidden characteristics of the factors selected for the study, the effect of which is determined by peculiarities of the economic activity of countries and their reflection in GDP (growth in FinTech demand is increasing in Hungary, Poland and Ukraine), population size (in Romania, population growth leads to an increase in demand, in other studied countries we observe a decrease in population, which causes an inverse dependence in the equation), volume of consumer spending (significant influence of the factor Slovakia and Romania) and number of Internet users (in Poland due to the positive population dynamics).

The results obtained indicate that determining factors for influencing FinTech are the level of access to the Internet that provides FinTech operations and the number of users of the network. As for the estimated values inherent in the Ukrainian environment, it is also worth noting the impact of such a factor as GDP.

Having identified the impact of key factors on the level of the companies development of the FinTech market – to shape Ukraine’s investment attractiveness of FinTech companies in Ukraine, we will conduct a SWOT analysis, which will identify strengths, weaknesses, threats, benefits and opportunities for improving investment attractiveness of the investigated market in Ukraine (Table 1).



**Table 1** SWOT-analysis results of factors and conditions of the investment attractiveness formation of FinTech market in Ukraine

<b>Strengths</b>	<b>Weaknesses</b>
<ul style="list-style-type: none"> <li>- FinTech market in Ukraine ranks 4th in the world in contactless payments;</li> <li>- more than 100 FinTech companies operating in the domestic market;</li> <li>- 43% of FinTech companies operate in the international market;</li> <li>- 58% of FinTech companies have been created in the last three years;</li> <li>- 63% of the population uses the Internet regularly;</li> <li>- 4% of GDP is IT industry;</li> <li>- 79,4% of payment terminals support contactless payment</li> </ul>	<ul style="list-style-type: none"> <li>- lack of proper level of support for start-ups and their efficient accelerators;</li> <li>- the need for further development of the domestic FinTech ecosystem;</li> <li>- difficult access to financing and raising investment funds (63% of companies are financed by their own funds);</li> <li>- segment disproportions (37% – for SMEs, 21% – for individuals and 6% – for segment premiums);</li> <li>- FinTech companies revenue sources (mainly one-time licenses and commission income);</li> <li>- 83% of FinTech companies are based in Kiev</li> </ul>
<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"> <li>- real GDP grew by 3,2% in 2019;</li> <li>- in 2019 there was a break in the trend of rising unemployment;</li> <li>- the income tax rate in Ukraine is the highest – 18%, the lowest in the EU – 10%;</li> <li>- activity of FinTech companies goes outside the financial market, cooperation with the insurance market and the market of legal technologies;</li> <li>- expanding sources of funding from non-state pension funds, investment companies and the private financial sector</li> </ul>	<ul style="list-style-type: none"> <li>- estimated working age population – will decrease by 41% from 2011 and 2030;</li> <li>- share of ICT specialists among the total number of employed persons is the lowest;</li> <li>- a few Ukrainian enterprises use electronic accounts (up to 9%) comparing to 12% in Eastern European countries;</li> <li>- Ukraine has one of the lowest proportions of banks' clients;</li> <li>- Ukraine has one of the lowest levels of financial literacy and trust in FinTech companies</li> </ul>

Source: Compiled by the authors

Based on the SWOT analysis, the relationship between the country's strengths and opportunities to improve the state of the FinTech market in Ukraine, between the opportunities and the weaknesses that affect it, have been identified. Considering the current state of the FinTech market in Ukraine, we believe that the main components of its development should be:

- 1) technical support for the FinTech market functioning (increasing penetration of smartphones and tablets, implementation of data transmission technologies (HSPA +, LTE), increased 3G/4G coverage, reduction of the cost of mobile traffic in the basic tariff plans of Ukrainian operators, interest of operators and vendors in expanding the LTE ecosystem of networks, in high-tech equipment of devices, etc.;
- 2) FinTech business models need to change in the direction of technology and customer needs, seeking partnerships and collaborations with banking institutions;
- 3) with regard to banking sector innovation, it is important that the largest banks have their own IT technology subsidiaries and data to demonstrate the focus of the most popular warehousing and banking information solutions (CRM, billing and compliance). In particular, the banking system of Eastern European countries is increasingly concentrating on optimizing customer relationships via the Internet / mobile phone on the principle of digitizing banking functions and payments using their own data;
- 4) in Eastern European countries, insurance companies also use the services of their own IT companies or software from renowned international suppliers, such as SAP. At this time, the insurance sector, its technologies and the market are not well developed. Innovation is mainly focused on comparing insurance products to insurers. To date, some elements of the above experience have already been tried on the Ukrainian insurance market;

5) overcoming the problem of the financial services market development in Ukraine due to low mentality, confidence and lack of financial literacy on the basis of building the institute of trust;

6) creating a favorable investment climate for the inflow of financial assets into the FinTech development through the provision of state support for investment activities with tax incentives (tax breaks and benefits).

## 6. DISCUSSION

Insufficient efficiency of the existing financial environment of Ukraine against the background of systemic risks, global economic, social and natural crises, rapid development of the financial sector of foreign countries, the need to operate in rapid technological change and expectations of financial market participants in the country make strong demands for further implementation and adaptation in Ukraine. We agree with (Antikainen M., 2018) and argue that expanding FinTech will increase the efficiency of the financial sector and change the traditional concept of financial services against the background of reducing their costs, limited financial resources in a highly competitive environment, and change financial behavior of players and the global use of FinTech by both businesses and individuals.

FinTech's modern research in the financial services market is presented by Arner D.W. (2020), Chmutova I. (2017), Doszhan R. (2020), Ringe W. (2020) and other. The analysis shows the functioning of a significant number of financial institutions in Ukraine compared to the CE countries, but the quality of their FinTech services is much lower, and the existing size of assets requires constant growth in the short term. Under such conditions, the effect of quantity can be strategically used to expand the landscape of FinTech implementation in the near future. Special hope is placed on the payments market, the insurance market and the sphere of infrastructure development and consulting.

Based on research to establish the factors influencing the development of FinTech in some countries of Eastern Europe and Ukraine, it is confirmed that for the latter such factors are the level of Internet access, the value of real GDP, income and business entities.

Lack of domestic experience and an effective model of implementation and operation of FinTech in Ukraine have led to the existence of a significant set of problems and threats to their implementation. We share the vision (Azarenkova G. et al., 2018) on the impact of destructive factors on the level of development of Fintech in Ukraine and supplement them with their own identified challenges facing potential opportunities. The key ones are:

- problems related to the implementation of new business models, data collection and management, requirements for cooperation and competence;
- insufficient effectiveness of financial infrastructure, financial and investment climate, regulatory framework;
- risks of cyber threats and cyberattacks;
- regional disparities in the development of financial sector participants and the implementation of Fintech in their activities, etc.

These destructive effects require a rapid response in order to overcome them and further support the strengths of the financial sector. In our study, we identified the following:

- total national and global virtualization of financial products and processes;
- cooperation with stakeholders and the use of digitalization on the basis of constant expansion of Internet access, ease of use and other technical factors of influence;

- individualization of the approach to the client sector within the development of FinTech products and services and joint accumulation of opportunities of related entities of FinTech;
- generation and development of IT industries and systems, increasing the efficiency of innovations, reducing imitation innovations with low efficiency and expanding the high efficiency of FinTech;
- increasing the real incomes of citizens and businesses in terms of reducing inflation, the effectiveness of monetary and fiscal policy, the development of advanced sectors of the economy;
- constant search for new sources of financial resources of the domestic financial sector;
- development of trust of clients to Fintech services and increase of level of literacy of their users;
- constant reconstruction of models and theories of public financial supervision, over-running and solving the negative effects of ineffective or excessive regulation of FinTech.

We consider it necessary to expand the main provisions in the works (Bukhtiarova A. et al., 2018, Doszhan R. et al., 2020) on the operation of market rules and mechanisms for continuous independent development of the financial sector in market economies in the context of detailing the specific process of financial sector transformation Ukraine, as an exception, needs governmental and municipal systemic barriers to minimize financial risks in today's challenges (Bondarenko S. et al., 2020).

We share the statement (Arner D.W. et al., 2020) that the full realization of FinTech's potential in Ukraine becomes possible under the conditions of further formation of basic financial infrastructure, which would provide simplification of financial operations, strengthening the relevance and scale of electronic payments and their systems, digital financial markets and systems to intensify investment processes.

Prospects for further research are the existing potential for transformation in the field of finance, growing digitalization and development of FinTech in Ukraine, which in the future have all the prerequisites to strengthen not only the financial sector but also the national economy as a whole. We believe in the quality of the presented main motives and directions of state regulation of the researched sphere in the market of financial services, which are formed on the basis of the conducted analysis of types of FinTech companies by spheres in Ukraine.

## 7. CONCLUSIONS

The research is aimed at improving the scientific and methodological approach to the development of FinTech in Central and Eastern Europe and Ukraine. The analysis gives grounds to assert about the wide opportunities and favorable conditions for the development of FinTech in Ukraine in the near future, the key of which is the number of financial institutions.

Having conducted a study of the theoretical and applied approach to the development of FinTech in the countries of the Council of Europe and Ukraine, the ambiguous influence of factors in building an econometric model on the growth of demand and development of the environment of FinTech. The proposed multiplicative model enhances the content of information and determines the demand factors for the development of the FinTech environment. The analysis demonstrated and identified a detailed list of objective factors, among which the key is the level of Internet access in the context of increasing financial

literacy for users of financial services and the level of consumption, which is ultimately determined by the level of income of citizens and businesses.

A SWOT-analysis was conducted to make effective management decisions in the field of sustainable development of the financial services market in Ukraine. Its results became the basis for the development of recommendations, presentation of directions and tools for the implementation of future effective management decisions to ensure the development of a sustainable, high-tech and inclusive financial services market in Ukraine.

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