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**TRANSFORMATION IN THE ECOSYSTEM
OF FINANCIAL INTERMEDIARIES IN THE
CONTEXT OF DIGITALIZATION**

**ТРАНСФОРМАЦІЙНІ ЗМІНИ В ЕКОСИСТЕМІ
ФІНАНСОВОГО ПОСЕРЕДНИЦТВА
В УМОВАХ ЦИФРОВІЗАЦІЇ**

Urgency of the research. The transformation of the activities of financial intermediaries in accordance with global trends is the key to the successful implementation of the goals of the digital economy as a strategy for sustainable economic development.

Target setting. The proliferation of digitalization has contributed to increased innovation in the practice of financial intermediation. Obviously, it is necessary to take into account the impact and capabilities of digital technologies in transforming the business model beyond the ecosystem approach.

Actual scientific researches and issues analysis. In the scientific problems of the transformational processes of financial intermediary monitoring, systematization and generalization relate to the influence of the potential of digital technologies at the level of financial intermediary, region, financial and banking systems, leading to economic and social effects.

Uninvestigated parts of general matters defining. We are interested in the problem of transforming the ecosystem of financial intermediation, the drivers of which are digital technologies.

The research objective. What influence does the appearance of FinTech-companies as new financial intermediaries in the market have on innovation activity and competition. How business models and business processes of financial intermediaries are changing under the influence of digital technologies. How and what new products and services based on digital technologies are introduced by financial intermediaries.

The statement of basic materials. The world trends of financial intermediation are identified and typologized. The evolutionary change of business models is proved, transformational changes are illustrated by foreign experience, the prerequisites, institutional structure, innovative activity of financial intermediaries and the regulator in Ukraine are determined.

Conclusions. Knowledge of the adoption of digital technologies as drivers of transformation of ecosystems of financial intermediation can serve as a basis for further assessment and forecasting of the effects on the financial system and the national economy as a whole.

Keywords: digital economy; digitalization; financial innovation; financial intermediation; digital financial intermediation; digital ecosystem; digital technologies; FinTech.

Актуальність теми дослідження. Трансформація діяльності фінансових посередників відповідно до світових трендів є запорукою успішної реалізації цілей цифрової економіки як стратегії сталого економічного розвитку.

Постановка проблеми. Поширення процесів цифровізації сприяло підвищенню інноваційної активності в практиці фінансового посередництва. Очевідно необхідно врахувати вплив і можливості цифрових технологій в трансформації бізнес-моделі за екосистемним підходом.

Аналіз останніх досліджень і публікацій. В науковій проблематиці трансформаційних процесів фінансового посередництва спостереження, систематизація та узагальнення стосуються впливу потенціалу цифрових технологій на рівні фінансового посередника, регіону, фінансової та банківської системи, що призводять до економічних і соціальних ефектів.

Виділення недосліджених частин загальної проблеми. Нас цікавлять проблеми трансформації екосистеми фінансового посередництва, драйверами якої виступають цифрові технології.

Постановка завдання. Який вплив оказує на інноваційну активність і конкуренцію поява FinTech-компаній як нових фінансових посередників на ринку. Яким чином змінюються бізнес-моделі і бізнес-процеси фінансових посередників під впливом цифрових технологій. Як і які нові продукти і послуги на основі цифрових технологій впроваджують фінансові посередники.

Виклад основного матеріалу. Визначено та проведено типологізацією світових трендів фінансового посередництва. Доведено еволюційну зміну бізнес-моделей, проілюстровано трансформаційні зміни за зарубіжним досвідом, визначено передумови, інституційну структуру, інноваційну активність фінансових посередників і регулятора в Україні.

Висновки. Знання особливостей прийняття цифрових технологій як драйверів трансформації екосистем фінансового посередництва може слугувати базою для подальшої оцінки і прогнозування ефектів впливу на фінансову систему та національну економіку в цілому.

Ключові слова: цифрова економіка; цифровізація; фінансові інновації; фінансове посередництво; цифрове фінансове посередництво; цифрова екосистема; цифрові технології; FinTech.

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Urgency of the research. Opportunities to achieve economic growth and improve the well-being of society are determined by the degree of development of the financial market, including financial intermediation as its segment. After the last financial crisis, the trend of forming a single financial space has made the orientation towards convergence of interests of financial intermediaries in terms of financial stability, efficiency and profitability. At the same time, financial intermediaries are facing new challenges regarding the ability to meet the requirements of the EU Payment Services Directive (PSD2), introduction of financial innovations and implementation of modern digital technologies into their own activities, and maintaining competitiveness in the context of growing disintermediation in the financial services market, where the major competitors of traditional financial institutions are high-tech companies (BigTech and FinTech companies). They have rapidly entered the financial services industry and are opening up large-scale, more transparent access to them, flexible to the requirements and preferences of consumers, that spurs increased investment in this ecosystem. In these circumstances, there is a need to explore the transformational processes of financial intermediation in the context of spread of digital technologies. The transformation of the activities of financial intermediaries in accordance with global trends is the key to the successful implementation of the goals of the digital economy as a strategy for sustainable economic development.

Target setting. The proliferation of digitalization has contributed to increase innovation in the practice of financial intermediation. Obviously, it is necessary to take into account the impact and capabilities of digital technologies in transforming the business model beyond the ecosystem approach. However, success depends on adaptability its own technological platform, the use of weaknesses of FinTech solutions in the market segments, as well as on the formation of partnerships with FinTech- companies.

Actual scientific researches and issues analysis. In the scientific problems of the transformational processes of financial intermediary monitoring, systematization and generalization relate to the influence of the potential of digital technologies at the level of financial intermediary, region, financial and banking systems, leading to economic and social effects. Thus, the digital transformation of financial intermediation is considered from the perspective of the influence of the Internet and FinTech, in particular, the possible consequences, uncertainty, the need to adapt and compete with new service providers in the face of increased competition and disintermediation, convergence of financial market participants and the formation of a new type of partnership [1; 2; 3]. From the perspective of the potential of digital technologies, an analysis is made of the improvement of operational activities, the development of new products and services, their proposals for a customer-oriented approach [4]. The scientific works on determining regional features of distribution of digital transformation of financial services attract attention [5; 6; 7; 8], as well as ensuring digital financial inclusion, prosperity, protecting clients' interests and building trust in financial intermediaries [9; 10; 11].

Uninvestigated parts of general matters defining. Along with this, we are interested in problems of transformation and the basic principles of the formation of the ecosystem of financial intermediation in response to global digital trends.

The research objective. The aim of the study is to analyze trends, determine the benefits and opportunities of the digital transformation of the financial intermediation ecosystem in the context of dynamic digitalization, increasing innovation activity and market competition.

The statement of basic materials.

Digital trends in financial intermediation. Factor analysis of the features of financial intermediation digital transformation is not possible without clear understanding of current global trends of spreading and increasing impact of FinTech. According to the implementation of FinTech solutions and today's market demand for them, despite the change in their system of mutual positioning and priority, we can see sustainability of positions of the main digital trends during 2017-2019. In particular, sustainable trends include:

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1) increasing the accessibility of financial services through the transition from multichannel system to omni-channel one, where mobile channels and, consequently, mobile wallet, payment and money services are increasingly prevalent. This changes customers' behavioral habits and payment competencies toward contactless payments, mobile and digital banking;

2) chatbots, machine learning, artificial intelligence and Big Data analytics – embedding these technologies and / or implementing them through operational, analytical, management tasks allows managing capital, loyalty programs and personalized banking services and investment models on a new level, transforming business models, making payments and money transfers, credit scoring, financial trading and monitoring, compliance control, etc;

3) risk optimization and increased security in situations of cyber threats.

A revolutionary trend is certainly the emergence of cryptocurrencies, their rapid expansion in the financial market and formation of its separate segment (cryptocurrency market), the existence of which causes ambiguous position / debate both in terms of subject matter and legitimacy. Along with cryptocurrencies, digital financial assets have emerged as assets in electronic form created by cryptographic means, which also include tokens, stablecoins, and cryptogoods. Blockchain technology is associated with cryptocurrencies, but not just as a technology of their creation. Blockchain has recently opened up new opportunities in many areas thanks to its uniqueness in storing, accessing and processing data, and the volume of investment in its extensions confirms it [12].

Trends that have a restorative or aggravating effect for financial intermediation should include:

1) integration processes to strengthen market positions that focus on collaboration according three vectors - FinTech, social networks and the Internet of Things (IoT). It should be noted that this is facilitated by the adoption of the PSD2 (Revised Payment Service Directive), which was not unambiguously adopted at the beginning, but over time it proved its expediency for the construction of a single ecosystem of open financial services, electronic transactions security in financial flows of marketplaces. In this regard, digital platforms and ecosystems, Open API (Application Programming Interface) and Open Banking are becoming key elements;

2) renewal or entry into a new stage of development of the insurance market at the expense of InsurTech [13, p.148-149];

3) development of the RegTech direction in response to increased regulatory pressure and significant financial penalties, and the introduction of SupTech (Supervisory Technology or RegTech for supervisors) to support the modernization of data-based financial supervision. RegTech's effects are expected to optimize regulations, reduce reporting load and errors in reports, reduce compliance costs, etc. [14]. According to the functionality, today there are RegTech solutions that provide: compliance with regulatory requirements; risk management, when combined with the identification of market risks, it is allowed to counter cyber risks and insider behavior of employees; prompt, real-time transaction monitoring to prevent fraud, abuse, money laundering; identity management. But the success of such decisions depends on collaboration between regulators, financial intermediaries, experts and high-tech IT companies and startups.

Therefore, these digital trends create the preconditions and set directions for innovative development of financial intermediation, as each of them tries to make the most of the opportunities of digital technologies.

Formation of a financial intermediation ecosystem based on digital integration. There are several approaches to interpreting the concept of "ecosystem", in particular: a set of interacting participants; a site offering integrated products and services able to meet a wide range of customer needs; an organization that operates on an innovative basis of development. The main prerequisites for creating an ecosystem are the need for customers to receive quality goods and services using digital distribution channels; development of technologies that enable effective interaction with clients; the willingness of today's generation to open up access to personal data in order to obtain the optimum product offer through personalized communication channels. An ecosystem allows to apply innovative ways of interaction to a range of stakeholders. So, within the ecosystem, there are financial intermediaries, consumers of financial services and regulatory organizations.

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The center of the ecosystem are financial intermediary, which has formed a broad client base on a high level of trust; is willing to accept adaptation changes in the organization of business processes; has formed a strong and well-known financial services brand. The evidence of formation of the ecosystem is the innovative activity of financial intermediaries in the implementation of digital technologies such as BigData, Timechain, Artificial Intelligence (AI), Machine Learning, Internet of Things (IoT), Application Programming Interface (API), Platform as a Service (PaaS), Software as a service (SaaS), Sloud Technology, Biometrics Identification, Mobile virtual network operator, Marketplace, Virtual reality.

Moreover, banks are the leaders of innovation in terms of breadth of business processes digitalization. At the same time, FinTech companies demonstrate the highest level of willingness to innovate in order to gain synergies from the combination of financial services and customer satisfaction. This makes it possible for these financial intermediaries to get ecosystem center functions, which is quite realistic taking into account the recent tendencies of their integration.

Non-banking financial institutions in the financial intermediation ecosystem.

Traditional insurance companies, with their conservatism about introducing digital-based financial innovations, are actively competing with InsurTech companies which develop insurance products and services, relying on big data analytics to evaluate, forecast and optimize risks. Due to digital technology we are witnessing a transformation of insurers' business models, where the vector of priorities has changed from risk protection to forecasting and prevention.

We fully support the opinion that the insurance industry, especially in countries where the insurance market is in a state of unstable dynamics of development and adaptation to the European and world markets, now has a chance of revival or a rapid breakthrough, when the chosen policy can determine the relevance and values of future development, ensure positive socio-economic effects and optimize negative effects.

In our opinion, insurance companies are now transforming their business in two ways, on the one hand, it is a digital restructuring of their traditional business models and business processes, entry into new segments, and on the other hand it is responding to cyberspace, including the emergence of new crypto-assets and cyber- risks. To date, digital mainstreaming technologies that shape and support new digital ecosystems important for insurers, include Blockchain, Internet of Things (IoT), Big Data, Intelligence Technologies (AI) (Fig. 1). Digital technologies are cross-cutting and provide: 1) Big Data – financial analytics based on large amounts of information for market segmentation and personalization, fraud reduction, detection of new drivers and improvement of claims settlement processes; 2) Blockchain – data sharing, cost savings, increased trust in online products, digital policies, smart contracts and claims management; 3) AI – insurance process automation, portfolio management, credit analysis, machine training for fraud prevention, underwriting and loss management, risk assessment.

Global insurance giants, including Lemonade, American International Group (USA), Ping An Insurance Group (China), Allianz (Germany), AXA Group (France), respond to digital trends and become the flagship of their advancement in the insurance market [13, p.149].

The proliferation of digitalization along with new opportunities creates new risks – Cyber risks, which were identified as key commercial risks [15]. Despite the growing demand for this type of insurance, especially after large-scale cyberattacks, its trend cannot be called sustainable, as many aspects are still debatable the inherent nature of this risk, standardization, coverage, cost, taxation, etc. Note that offering new solutions, insurance companies themselves seek to implement them through special digital platforms, such as AXA XL's Slice ICS cyber risk insurance for small and medium businesses, or collaborate with InsurTech companies and startups.

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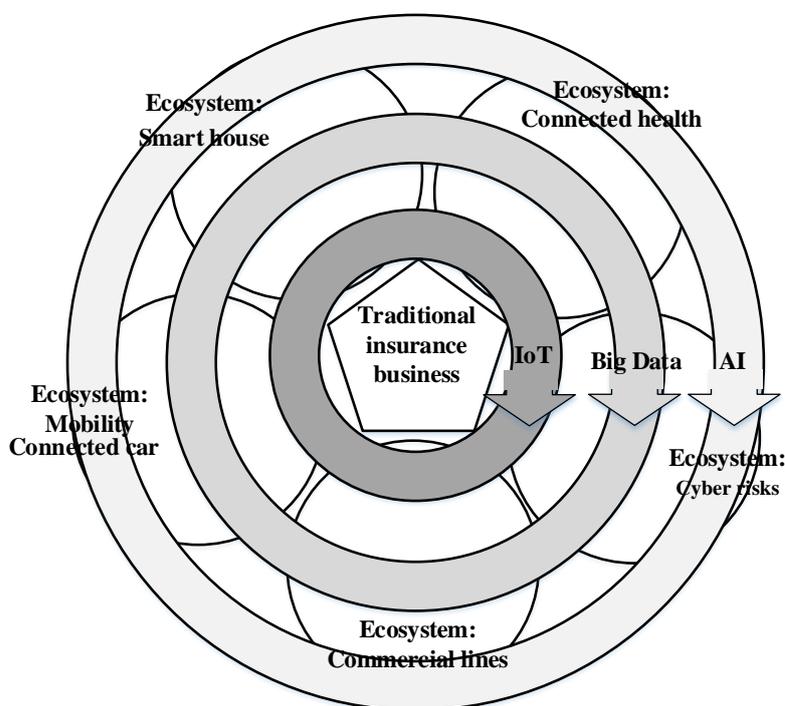


Fig. 1 Transformation of the insurance business for the ecosystem approach

Source: created by the authors

Prospects for the introduction of digital technologies are also seen by pension funds, despite the fact that they are significantly behind in their implementation from other financial intermediaries. Today, the innovation leaders are the US, the UK, Canada, the Netherlands, Australia, and Spain. Digital technologies and innovative PenTech solutions have significant potential for modernizing pension systems, trust to most of which have recently been shaken (Tab. 1).

Table 1

Supporting digital trends by pension funds

Trend	Opportunities
Blockchain	optimization of internal management processes of institutional and non-state pension funds, transparency of financial transactions, guarantee of purposeful use, security and quality of administration and services, free and transparent transition between funds, synchronization of information regarding clients and funds, protection of personal data
Big Data	segmentation of participants, optimization of public service delivery, taking into account the migration of personal data, increasing the efficiency of funds and interaction with citizens; calculation of pensions based on individual account analysis; determining the status of citizens' rights with respect to tax benefits, social support and other rights; personalization and flexibility; analytics and risk assessment, etc.
Artificial Intelligence Technologies, AI	chatbots, robot consultants, dashboards, administrative asset management functions, pension strategy risk assessment models, analytics and typology of bankruptcy risk funds

Source: Based [16; 17; 18]

Only in the context of adoption of digital technologies and investments in the development of Pentech specialized solutions should be expected to gain the experience, economic and social benefits of creating personalized retirement and individual communication strategies, providing flexibility of offers and freedom of choice for fund participants, reducing administrative costs through decentralization, and so on.

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Increasing popularity of credit unions, which there are currently more than 85 thousand in the world, is driven by a desire to end dependency on banks. Their peculiarity lies mainly in the non-commercial nature of the activity and the construction of the latter on the close relationships of members forming a different system of economic relations.

Credit unions, like other financial intermediaries, recognize the importance of acquiring innovative digital experiences for the future growth and progressive development of the industry. In particular, the catalysts for these processes are Blockchain and AI technologies.

Thus, with Blockchain, they plan to improve access to, and trust in, financial services, risk management, regulatory compliance, data security, and identity management. Blockchain-based smart contracts are able to improve the quality of contractual processes and increase the efficiency of credit unions, as they allow to automatically check all transactions (mortgages, wills, trusts, funds transfers, etc.), which increases their speed and reduces their value. They are also actively investing in blockchain startups, in particular to develop digital credentials for credit union members and ensure reliable identification. Besides, credit unions, such as the US, demonstrate integration with leading IT companies (IBM, Oracle, etc.) and cooperate with each other to create their own blockchain-based free access network to shared financial resources and new services.

But AI is capable of recognizing the needs for specific services and forming a personal offer (loans, bonds, insurance, mortgage, savings). AI is built into call center service programs and recognizes a caller's behavior, analyzes records and emails, can perform typing and clustering not only of clients but also of common issues, compliance monitoring and anti-fraud [19].

In this way, credit unions, with the introduction of digital technologies, are hoping for a new wave of financial innovation and market dynamics.

Investments: functional orientation of artificial intelligence and alternative data for financial intermediaries. The solution to the problem of lack of investment resources, the new FinTech solutions are directed at, the growth of interest in and demand for which, along with the above, can be explained directly by the potential of digital technologies, such as artificial intelligence and Big Data.

The prerequisites for financial intermediaries for new FinTech solutions are an increase in the amount of relevant information on threats to the existence and prospects of business development, high flexibility of making suboptimal decisions due to lack of time, as a result of the high dynamism of the environment. At the same time, financial intermediaries are seeking guarantees for sustainable business development and new product creation, and as a consequence, markets, that implies inductive thinking and reengineering methodologies in strategic management, business process modeling, and imitation models to evaluate efficiency and avoid risks. Solving these issues requires using innovative approaches. In this respect, Artificial Intelligence (AI) [20; 21] opens up new opportunities due to its ability to continuously search, organize, evaluate, and combine arrays of market information (Fig. 2).

Today, AI tools are already embodied. Thus, the Government Pension Investment Fund of Japan (GPIF, \$ 1.4 trn), in conjunction with Sony Computer Science Laboratories (Sony CSL), is introducing AI into the long-term asset portfolio management process to improve investment practices and minimize risks, monitoring and analyzing investment styles in real time and ect. [24].

The largest investment fund in Europe, APG, is also changing its business model by implementing AI to increase operational efficiency and profitability. A comprehensive, real-time automatic forecast for a wide range of assets, which is not possible on the one hand without the ability of the AI trading systems to machine learning, and without the use of large amounts of data, including market data, is becoming promising. The transformation of the business model drives institutional investors to strike a balance between investments in AI capable of delivering high returns and optimizing management structure and costs.

Thus, the introduction of AI, machine learning, alternative data changes the investment landscape, eliminates the dependence of institutional investors on individual strategies of investment professionals who do not have quantitative confirmation of their quality, increases the efficiency of the investment process and responsibility for investment practices.

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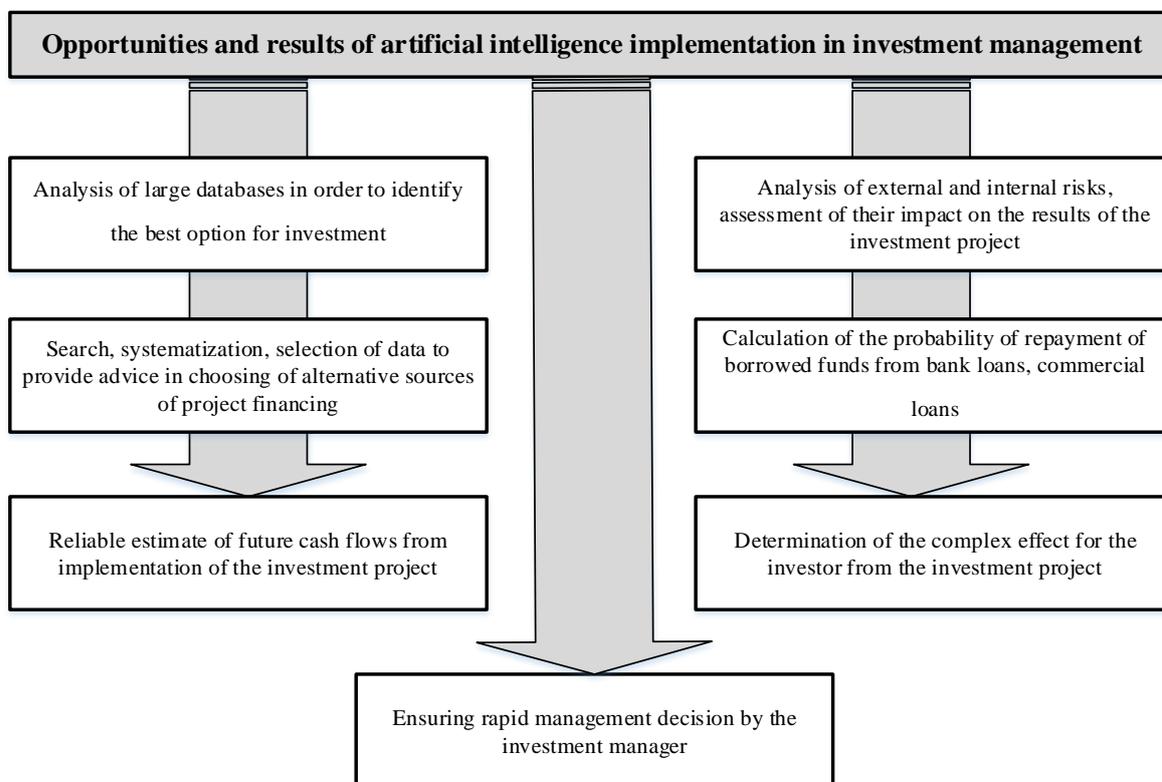


Fig. 2 AI potential opportunities in investment management

Source: Based on [22; 23]

The processes of digitalization of financial intermediation in Ukraine: today's realities. Like most countries in the world, Ukraine is responding to the challenges of the digital world [25]. Taking into account the bank-centric financial system, innovative leadership in the financial services market has long been maintained by Ukrainian banks. Among the main digital trends they have been supporting lately are customer service (remote, mobile and e-banking), remote identification through BankID of the NBU and use of e-signature to provide banking and financial services, and the Open Banking concept in response to PSD2 standards (open digital ecosystem), cloud platforms (operating and service centers, service center), intelligent platforms (Big Data, AI).

Thus, Ukrainian PrivatBank became the first bank in the world to open a public API, which is used by almost five thousand partners today, including ones outside Ukraine. The API allows transfers between bank cards, payments on cards of any bank of Ukraine and international bank, purchase of vouchers of Skype, selected face value, mobile connection payments, sale of tickets for sports and entertaining events, etc.

Ukrainian banks have long recognized cashless payments as one of their priorities, so today Ukraine is one of the leading countries in Europe in terms of both quantitative indicators and services and payment innovations. The payment space of Ukraine is formed by 22 and 19 domestic and international systems, respectively, of which 26 are funds transfer systems, 9 are interbank systems, and 5 are card payment systems. According to the NBU, over the past five years, there has been a positive trend in the growth of the number of payment cards and the volume of transactions with their use.

Innovative developments of Ukrainian banks were awarded at the "Innovation in Banking Technology Awards" international competition, namely: the electronic deposit system of Liqpay of PrivatBank in the field of cash handling and treasury technologies (2010), "Online Collection"

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technology (2011). At the Teleopti Global User Forum, Alfa Bank (Ukraine) was awarded the Best Practice Award 2012 for implementing Teleopti CCC system, a comprehensive project for the construction of a distributed contact center with the introduction of additional modules with evaluate the quality of ZOOM QM conversations and personnel management systems. Such recognition can certainly be considered a golden Oscar for Ukrainian banks.

Fully supporting innovation, Ukrainian banks have not yet felt the threat of disintermediation. Now we are rather looking at establishing partnerships and forming new integrations between financial intermediaries and FinTech startups. Thus, in 2018 PayLastic, Uplata, MOcash are recognized as the best FinTech startups of Ukraine, which are alternative solutions for cashless payments using smartphones, Telegram, Viber and Facebook messengers, QR codes and e-commerce [26].

In recent years, the main regulator, the National Bank of Ukraine, has been actively supporting the development of the FinTech market in Ukraine. In 2019, an important step was the creation of an Expert Panel on Communication with Innovative Companies to understand FinTech trends clearly, to provide legislative support, and to pursue a forward-looking regulatory policy. Among the initiatives of the regulator are the fundamental updating of the legislative regulation system of the Ukrainian market of payments and funds transfer in accordance with PSD2, the BankID remote identification system, the modernization of the NBU Electronic Payment System in accordance with the 24/7 format and the international standards IBAN and ISO 20022. During 2016-2019, it completed a closed pilot project on the development of the E-hryvnia blockchain platform to increase financial inclusion, reduce the share of cash in circulation, increase speed, convenience and transparency of payments. The NBU stipulates that E-hryvnia may be a national digital currency that is exchanged (1:1) for cash or non-cash without limitation and is a means of payment, and not a profitable instrument. The pilot tests included: 1) the creation of e-wallets and transactions with them, including the installation of their mobile applications on Android or iOS systems, replenishment of the wallet and exchange of e-hryvnia for cash using the "PROSTIR" national payment system through an integrated virtual terminal ; 2) P2P transfers between wallets; 3) trading operations – replenishing mobile phone balance; 4) charitable contributions to the assistance to soldiers of Joint Forces Operation [27].

The prerequisites for the development of the FinTech industry in Ukraine are global trends, the absence of pressure from FinTech companies at the international level, the crisis of 2014-2015 and the clearing of the banking system, defining the development of digital economy and FinTech as a priority project for the development of the financial sector, economy and society by 2020, the creation of the Ukrainian National Startup Fund. Today it employs more than 100 companies, 58% of which have been established in the last three years, 43% operate in the international market, 63% are financed by their own funds, and 82% of them are located in Kyiv. Of the 57% of FinTech domestic companies, 73% are planning to enter the international market in the near future [28].

In the FinTech industry, InsureTech technologies for the insurance market are developing in a separate direction. But their position in Ukraine now is only 5.3%. Today, InsureTech technologies on the Ukrainian insurance market are represented with such startups: CIVILKIN – a web service and mobile application for selecting, acquiring and managing insurance policies, EWA – SaaS insurance platform, Alfa Protection – an e-commerce security service, INSART – an insurance broker providing risk and financial management consulting services [29].

Conclusion. The issue of transforming traditional financial intermediation and building innovative ecosystems under digital trends has become a new research trend. In this aspect, it is important not only to monitor global trends, but also to identify the prerequisites for adopting digital financial intermediaries at the regional level, with a focus on developing countries, taking into account their functionality for transforming business models and operating business processes, not excluding the analysis and forecasting of the possible positive and negative effects on the financial system and the national economy as a whole.

At the same time, the processes of digital transformation of financial intermediation should be based on a developed institutional infrastructure, which, along with traditional financial intermediaries, has rapidly included FinTech companies and startups, as well as reliable legislative and regulatory support, which will give development dynamics while maintaining financial stability and ensuring

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financial services client protection. This requires innovation, investment and business activity. Among the promising areas for further research, we see justification of the need for the introduction of digital technologies to the activities of financial intermediaries, the development of conceptual approaches for the construction of digital ecosystems, modeling of economic changes and possible social consequences, providing practical guidance on risk management etc.

References

- Hawkins, R., Mansell, R. & Steinmueller, E. (1999). Toward Digital Intermediation in the Information Society. *Journal of Economic Issues*, 33:2, 383-391. doi: 10.1080/00213624.1999.11506169 [in English].
- Omarini, A. (2017). The Digital Transformation in Banking and The Role of FinTechs in the New Financial Intermediation Scenario. *mpa.ub.uni-muenchen.de*. Retrieved from https://mpa.ub.uni-muenchen.de/85228/1/MPRA_paper_85228.pdf [in English].
- Saal, M., Starnes, S. & Rehermann, T. (2017). Digital Financial Services: Challenges and Opportunities for Emerging Market Banks. *openknowledge.worldbank.org*. Retrieved from <https://openknowledge.worldbank.org/bitstream/handle/10986/30368/118736-BRI-EMCompass-Note-42-DFS-Challenges-and-Opportunities-PUBLIC.pdf?sequence=1> [in English].
- Frost, J., Gambacorta, L., Huang, Yi., Song Shin, H. & Zbinden, P. (2019). BigTech and the changing structure of financial intermediation. *BIS Working Papers from Bank for International Settlements*, 779. Retrieved from <https://www.bis.org/publ/work779.pdf> [in English].
- Elsinger, H., Fessler, P., Feyrer, J., Richter, K., Silgone, M.A. & Timel, A. (2018). Digitalization in financial services and household finance: fintech, financial literacy and financial. *Financial Stability Report*, 35, 50-58 [in English].
- Tsai, K. (2017). FinTech and Financial Inclusion in China. *Thought Leadership Brief Series*, 20, 1-4 [in English].
- Creehan, S. & Borst, N. (2017). Asia's Fintech Revolution. *Federal Reserve Bank of San Francisco*, 1-17 [in English].
- Demertzis, M., Merler, S. & Wolff, G. (2018). Capital Markets Union and the Fintech Opportunity. *Journal of Financial Regulation*, 4(1), 157-165 [in English].
- Mazer, R. & Garg, N. (2015). Recourse in Digital Financial Services: Opportunities for Innovation. *documents.worldbank.org*. Retrieved from <http://documents.worldbank.org/curated/en/364971468197630787/pdf/106036-BRI-PUBLIC-KNOWLEDGE-NOTE-Brief-Recourse-in-Digital-Financial-Services-Dec-2015.pdf> [in English].
- Karlan, D., Kendall, J., Mann, R., Pande, R., Suri, T. & Zinman, J. (2016). Research and Impacts of Digital Financial Services. *NBER Working Paper Series*, 22633. Retrieved from <https://www.nber.org/papers/w22633.pdf> [in English].
- Izaguirre, J.C., Lyman, T., McGuire, C. & Grace, D. (2016). Deposit Insurance and Digital Financial Inclusion. *World Bank*, 25707. Retrieved from <https://openknowledge.worldbank.org/bitstream/handle/10986/25707/110632-BRI-PUBLIC-ADD-VC-Brief-Deposit-Insurance-and-Digital-Financial-Inclusion.pdf?sequence=1> [in English].
- 10 Use Cases of Blockchain Technology in Banking. (2018). *youteam.co.uk*. Retrieved from <https://youteam.co.uk/blog/10-use-cases-of-blockchain-technology-in-banking/> [in English].
- Pantelieieva, N., Zaporozhets, S., Nagaichuk, N. & Bartosh, O. (2019) Transformation of financial intermediation in the context of spread of digital trends. *Bulletin of the National Academy of Sciences of the Republic of Kazakhstan*,

Література

- Hawkins, R. Toward Digital Intermediation in the Information Society / R. Hawkins, R. Mansell, E. Steinmueller, // *Journal of Economic Issues*, 33:2, 1999. – P. 383–391. doi: 10.1080/00213624.1999.11506169.
- Omarini A. The Digital Transformation in Banking and The Role of FinTechs in the New Financial Intermediation Scenario. – Access mode: https://mpa.ub.uni-muenchen.de/85228/1/MPRA_paper_85228.pdf.
- Saal M., Starnes S., Rehermann T. Digital Financial Services: Challenges and Opportunities for Emerging Market Banks. – Access mode: <https://openknowledge.worldbank.org/bitstream/handle/10986/30368/118736-BRI-EMCompass-Note-42-DFS-Challenges-and-Opportunities-PUBLIC.pdf?sequence=1>.
- Frost J. BigTech and the changing structure of financial intermediation / J. Frost, L. Gambacorta, Yi. Huang, H. Song Shin, P. Zbinden // *BIS Working Papers from Bank for International Settlements*, 2019. – No 779. – Access mode: <https://www.bis.org/publ/work779.pdf>.
- Elsinger H. Digitalization in financial services and household finance: fintech, financial literacy and financial / H. Elsinger, P. Fessler, J. Feyrer, K. Richter, M. A. Silgone, A. Timel // *Financial Stability Report*, 2018. – P. 35, 50–58.
- Tsai K. FinTech and Financial Inclusion in China / K. Tsai // *Thought Leadership Brief Series*, 2017. – P. 20, 1–4.
- Creehan, S. Asia's Fintech Revolution / S. Creehan, N. Borst // *Federal Reserve Bank of San Francisco*, 2017. – P. 1–17.
- Demertzis M. Union and the Fintech Opportunity / M. Demertzis, S. Merler, G. Wolff, // *Journal of Financial Regulation*, 2018. – No 4(1), – P. 157–165.
- Mazer R. Opportunities for Innovation / R. Mazer, N. Garg // *Recourse in Digital Financial Services: Opportunities for Innovation*. 2015. – Access mode: <http://documents.worldbank.org/curated/en/364971468197630787/pdf/106036-BRI-PUBLIC-KNOWLEDGE-NOTE-Brief-Recourse-in-Digital-Financial-Services-Dec-2015.pdf>.
- Karlan D. Research and Impacts of Digital Financial Services / D. Karlan, J. Kendall, R. Mann, R. Pande, T. Suri, J. Zinman // *NBER Working Paper Series*, 2016. – No 22633. – Access mode: <https://www.nber.org/papers/w22633.pdf>.
- Izaguirre J.C. Deposit Insurance and Digital Financial Inclusion J.C. Izaguirre, T. Lyman, C. McGuire, Grace D. // *World Bank*. 2016. – No 25707. – Access mode: <https://openknowledge.worldbank.org/bitstream/handle/10986/25707/110632-BRI-PUBLIC-ADD-VC-Brief-Deposit-Insurance-and-Digital-Financial-Inclusion.pdf?sequence=1>.
- 10 Use Cases of Blockchain Technology in Banking / YouTeam, 2018. – Access mode: <https://youteam.co.uk/blog/10-use-cases-of-blockchain-technology-in-banking/>.
- Pantelieieva N. Transformation of financial intermediation in the context of spread of digital trends / N. Pantelieieva, S. Zaporozhets, N. Nagaichuk, O. Bartosh // *Bulletin of the National Academy of Sciences of the Republic of Kazakhstan*, 2019. – No 3, – P. 144–152. doi: 10.32014/2019.2518-1467.81.
- Piechocki M. BearingPoint Reforming regulatory

ФІНАНСИ. БАНКІВСЬКА СПРАВА

- 3, 144-152. doi: 10.32014/2019.2518-1467.81 [in English].
14. Piechocki, M. & Lux, J. (2018). BearingPoint Reforming regulatory reporting: are we headed toward real-time? *www.reg.tech*. Retrieved from https://www.reg.tech/files/BEI_Reforming-regulatory-reporting-are-we-headed-toward-real-time.pdf?download=0&itemId=6423 [in English].
15. Cyber Security Risk Report. (2019). *www.aon.com*. Retrieved from <https://www.aon.com/unitedkingdom/insights/2019-cyber-security-risk-report.jsp> [in English].
16. China Pensions Outlook: Evolution, diversification and convergence. (2017). *assets.kpmg*. Retrieved from <https://assets.kpmg/content/dam/kpmg/cn/pdf/en/2017/12/china-pension-outlook.pdf> [in English].
17. Technology and pensions: The potential for FinTech to transform the way pensions operate and how governments are supporting its development. (2017). *www.oecd.org*. Retrieved from <https://www.oecd.org/pensions/Technology-and-Pensions-2017.pdf> [in English].
18. Pensions Technology. (2018). *www.pwc.co.uk*. Retrieved from <https://www.pwc.co.uk/pensions/pensions-technology.html> [in English].
19. Why Credit Unions Need to Implement Artificial Intelligence ASAP. (2018). *www.paymentsjournal.com*. Retrieved from <https://www.paymentsjournal.com/credit-unions-implement-artificial-intelligence/> [in English].
20. Fiorentino, R. (2019). AI and investing: The artificial intelligence analytical revolution. *www.information-age.com*. Retrieved from <https://www.information-age.com/ai-investing-123477422/> [in English].
21. Artificial Intelligence at Investment Banks – 5 Current Applications. (2017). *emerj.com*. Retrieved from <https://emerj.com/ai-sector-overviews/artificial-intelligence-at-investment-banks-5-current-applications/> [in English].
22. Pollari, I. & Ruddenklau, A. (2018). The Pulse of Fintech 2018. Biannual global analysis of investment in Fintech. *assets.kpmg*. Retrieved from <https://assets.kpmg/content/dam/kpmg/xx/pdf/2019/02/the-pulse-of-fintech-2018.pdf> [in English].
23. Artificial intelligence: what it is and why it matters. (2018). *www.everest.ua*. Retrieved from www.everest.ua/ai-platform/analytics/shtuchnij-intelekt-ai-shho-ce-take-i-chomu-ce-v/ [in English].
24. Sasaki, T., Koizumi, H., Tajiri, T. & Kitano, H. (2018). A Study on the Use of Artificial Intelligence within Government Pension Investment Fund's Investment Management Practices (Summary Report) / T. Sasaki, H. Koizumi, T. Tajiri, H. Kitano, 2018. – Japan: Tokyo, Government Pension Investment Fund. – Access mode: https://www.gpif.go.jp/en/investment/research_2017_1_en.pdf [in English].
25. Pantielieieva, N., Krynytsia, S., Zhezherun, Y., Rebyrk, M. & Potapenko, L. (2018). *Digitization of the Economy of Ukraine: Strategic Challenges and Implementation Technologies*. doi: 10.1109/DESSERT.2018.8409186 [in English].
26. PaySpace Magazine Awards 2018. Best Ukrainian FinTech-Startup. *psm7.com*. Retrieved from <https://psm7.com/awards-2018/nomination/company/ukrainian-fintech-startup/> [in English].
27. Analytical note on the results of the E-hryvnia project. (2019). *bank.gov.ua*. Retrieved from https://bank.gov.ua/control/uk/publish/category?cat_id=96166824 [in English].
28. Directory of FinTech companies in Ukraine. (2019). *fintechua.org*. Retrieved from <http://fintechua.org/FintechCatalog19Ukr.pdf> [in English].
29. The FinTech in Ukraine report. (2018). *data.unit.city*. reporting: are we headed toward real-time? / M. Piechocki, J. Lux, 2018. – Access mode: https://www.reg.tech/files/BEI_Reforming-regulatory-reporting-are-we-headed-toward-real-time.pdf?download=0&itemId=6423.
15. Cyber Security Risk Report, 2019. – Access mode: <https://www.aon.com/unitedkingdom/insights/2019-cyber-security-risk-report.jsp>.
16. China Pensions Outlook: Evolution, diversification and convergence / KPMG, 2017. – Access mode: <https://assets.kpmg/content/dam/kpmg/cn/pdf/en/2017/12/china-pension-outlook.pdf>.
17. Technology and pensions: The potential for FinTech to transform the way pensions operate and how governments are supporting its development / OECD, 2017. – Access mode: <https://www.oecd.org/pensions/Technology-and-Pensions-2017.pdf>.
18. Pensions Technology // PWC, 2018. – Access mode: <https://www.pwc.co.uk/pensions/pensions-technology.html>.
19. Why Credit Unions Need to Implement Artificial Intelligence ASAP // Payments Journal, 2018. – Access mode: <https://www.paymentsjournal.com/credit-unions-implement-artificial-intelligence/>.
20. Fiorentino R. AI and investing: The artificial intelligence analytical revolution, 2019. – Access mode: <https://www.information-age.com/ai-investing-123477422/>
21. Artificial Intelligence at Investment Banks – 5 Current Applications / EMERJ, 2017. – Access mode: <https://emerj.com/ai-sector-overviews/artificial-intelligence-at-investment-banks-5-current-applications/>.
22. Pollari I. The Pulse of Fintech 2018 / I. Pollari, A. Ruddenklau // Biannual global analysis of investment in Fintech, 2018. – Access mode: <https://assets.kpmg/content/dam/kpmg/xx/pdf/2019/02/the-pulse-of-fintech-2018.pdf>.
23. Artificial intelligence: what it is and why it matters / EVEREST, 2018. – Access mode: www.everest.ua/ai-platform/analytics/shtuchnij-intelekt-ai-shho-ce-take-i-chomu-ce-v/.
24. Sasaki T., A Study on the Use of Artificial Intelligence within Government Pension Investment Fund's Investment Management Practices (Summary Report) / T. Sasaki, H. Koizumi, T. Tajiri, H. Kitano, 2018. – Japan: Tokyo, Government Pension Investment Fund. – Access mode: https://www.gpif.go.jp/en/investment/research_2017_1_en.pdf.
25. Pantielieieva N. Digitization of the Economy of Ukraine: Strategic Challenges and Implementation Technologies / N. Pantielieieva, S. Krynytsia, Y. Zhezherun, M. Rebyrk, L. Potapenko, 2018. – P. 508–515. doi: 10.1109/DESSERT.2018.8409186.
26. PaySpace Magazine Awards 2018. Best Ukrainian FinTech-Startup. – Access mode: <https://psm7.com/awards-2018/nomination/company/ukrainian-fintech-startup/>.
27. Analytical note on the results of the E-hryvnia project / NBU, 2019. – Access mode: https://bank.gov.ua/control/uk/publish/category?cat_id=96166824.
28. Directory of FinTech companies in Ukraine / UAFIC, 2019. – Access mode: <http://fintechua.org/FintechCatalog19Ukr.pdf>.
29. The FinTech in Ukraine report / USAID, 2018. – Access mode: http://data.unit.city/fintech/fgt34ko67mok/fintech_in_Ukraine_2018_en.pdf.

ФІНАНСИ. БАНКІВСЬКА СПРАВА

Retrieved from http://data.unit.city/fintech/fgt34ko67mok/fintech_in_Ukraine_2018_en.pdf [in English].

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