

РОЗДІЛ 4. ЦИФРОВІ ТЕХНОЛОГІЇ В РОЗВИТКУ ЕКОНОМІКИ ТА СУСПІЛЬСТВА

DOI <https://doi.org/10.30525/978-9934-26-535-8-19>

DIGITAL TECHNOLOGIES IN THE TRANSFORMATION OF THE GLOBAL FINANCIAL SECURITY SYSTEM: A THEORETICAL AND SOCIAL CONCEPT

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INTRODUCTION

The modern era of digitalization is accelerating financial changes and processes of globalization, debt regulation for balancing financial stability and sustainable development of society. Theories of the global financial security system are evolving from traditional methods to modernized digital technologies, the use of artificial intelligence, blockchain and big data analytics. These instruments allow monitoring financial flows, predicting risks and responding to changes in the financial sector in a timely manner¹.

In the context of the global financial security system, the world economy faces significant challenges, and structural reforms can improve economic resilience, accelerate adaptation to new conditions and help restore sustainable development. Priority spending areas include climate-related and demographic spending, and in emerging market countries, investments aimed at closing the gap in economic development. According to IMF research, by 2030, these spending needs will increase annual spending by about 7% of GDP in advanced economies, 9% of GDP in emerging market countries and 14% in low-income developing countries².

The Digital Innovation Development Strategy of Ukraine (WINWIN) until 2030 determines the vision of Ukraine as a country of innovation and outlines the key directions, principles, goals and objectives of state policy in the field of digital development of innovation activities. Digital transformation within the framework of the UNDP and Ministry of Digital Transformation of Ukraine project will contribute to the implementation of

¹ Рожко О., Алексеєнко Л., Тулай О. Преференційний доступ до фінансування у контексті становлення ефективної цифрової держави: теоретичний концепт. Модерні фінанси: глобальні виклики і сучасні тренди. Монографія / за ред. д.е.н., проф. А. І. Крисоватого. Тернопіль: Економічна думка, 2024. С. 778-798.

² How To Do Better. URL: <https://www.imf.org/en/News/Articles/2024/10/25/sp102524-annual-meetings-plenary>

digital education programs³, accessibility of government websites, Administrative Service Centers and the provision of comfort for people with disabilities.

1. A Vision for Regulatory Action to Support a Global Financial Security System

The political and economic dimensions of the IMF's regulatory work confirm that clear communication about the benefits of governance reforms and their focus on the common good will contribute to public awareness and positive attitudes towards a global financial security system. Despite the economic feasibility of reforms, society often shows distrust in state institutions and the acceptability of political change, the spread of disinformation and misconceptions about reforms⁴. This highlights the importance of trust as a key factor⁵. International institutions provide advice to countries: from supporting institutional development in conflict-affected countries to managing capital flows in emerging market countries, and also justify monetary policy recommendations on interest rates in advanced economies⁶.

In the area of financial security, the European Commission recognises that deepening European integration is also the most effective response to increasing global uncertainty⁷. In the EU, the application of protectionist measures to the real sector and labor markets from the problems associated with global fragmentation allows a more developed single market to strengthen economic stability in the world economy⁸. These are multifaceted strategic challenges, but Europe is able to solve them, relying on sound macroeconomic policies and a commitment to economic integration and continued multilateral cooperation.

³ Alekseyenko L. M., Tulai O. I. Management of education in the conditions of internationalization communicability of state values / Education, science, research during martial law : Collective monograph. Riga, Latvia : "Baltija Publishing", 2022. P. 126-146.

⁴ Petrushenko, Y., Alekseyenko, L., Dmytryshyn, M., Tulai, O., Sydor, I. Information and Communication Support for the Diversification of Business Processes in Conditions of Global Financial Uncertainty. In: Mansour, N., Bujosa Vadell, L.M. (eds) Finance and Law in the Metaverse World. Contributions to Finance and Accounting. 2024. Springer, Cham. https://doi.org/10.1007/978-3-031-67547-8_34

⁵ Nicolo Fraccaroli, Rhiannon Sowerbutts, Andrew Whitworth. Does regulatory and supervisory independence affect financial stability? Journal of Banking & Finance. January 2025. Vol. 170. 107318. <https://doi.org/10.1016/j.jbankfin.2024.107318>

⁶ How To Do Better. URL: <https://www.imf.org/en/News/Articles/2024/10/25/sp102524-annual-meetings-plenary>

⁷ European Commission. URL: https://commission.europa.eu/index_en

⁸ Alekseyenko Lyudmyla, Tulai Oksana. Communication support of local self-government in the context of the implementation of EU investment framework instruments. Моделювання соціально-економічного розвитку в системі забезпечення продовольчої безпеки: зб. тез VII Всеукр. наук.-практ. конф. (м. Миколаїв, 8–9 травн. 2024 р.). Миколаїв: МНАУ, 2024. С. 4.

In the context of global political and economic challenges, the institutional basis and two-way communications (dialogue) are preferential for legitimizing reforms. A transparent and accessible communication system strengthens trust and ensures mutual understanding between the government, society and communities. Citizens should feel involved in the reform process and understand its ultimate goal. Ukraine is actively integrating the EU acquis in the field of free movement of capital, demonstrating a desire to harmonize financial regulation even in conditions of full-scale war⁹. Despite the challenges associated with military restrictions, the country is purposefully working on the implementation of EU law and the gradual lifting of these restrictions. Particular attention is paid to accelerating integration into the EU financial space, including preparations for joining the Single Euro Payments Area (SEPA).

In international practice, reducing discount rates reduces the burden on the state budget by reducing the cost of debt financing, but this is not enough to maintain stable debt in the long term¹⁰. Higher real interest rates compared to pre-pandemic levels maintain a strain on the budget, and therefore many countries need to improve their primary balance to reduce dependence on external financing.

In the paradigm of the financial security system, monetary policy in “extreme cases” deserves attention¹¹. When supply constraints cover significant sectors of the economy, tight monetary policy can help reduce inflation, although this is associated with risks for the real sector of the economy. We believe that these measures remain effective if they are used in the short term with the use of scientific and methodological approaches.

In an applied aspect, if supply constraints are localized only in certain industries, traditional monetary policy methods can be effective¹². This is due to the fact that reducing inflation does not require radical measures,

⁹ Алексеевко Л., Тулай О. Новітні тренди забезпечення безбар'єрності фінансового сектору у контексті євроінтеграції України. Науковий вимір осмислення та пошуку оптимальних моделей розвитку України: маркетинговий, економічний, фінансовий та управлінський аспекти : збірник матеріалів Міжнар. наук.-практ. конф. [м. Київ, 4-5 бер. 2024 р.]. Київ : Академія праці, соціальних відносин та туризму / За заг. ред.: Н. В. Писаренко, І. С. Чорнодіда. Київ : Вид-во АПСВТ, 2024. С. 20–21. DOI: 10.5281/zenodo.11222359

¹⁰ Alekseyenko L., Tulai O. Restarting financial communications in the conditions of geopolitical confrontation. Економіка, фінанси, банківська справа та освіта: актуальні питання розвитку, досягнення та інновації: матеріали IX Міжнар. наук.-практ. Інтернет-конф. (м. Одеса, 4–5 квіт. 2024 р.) / за ред. д-ра екон. наук, проф. Д.В. Завадської. Одеса: ОНЕУ, 2024. С. 17–20.

¹¹ Є три варіанти. У Нацбанку розповіли, що чекає на економіку України. URL: <https://biz.nv.ua/ukr/economics/nacbank-ociniv-zrostannya-vvp-ukrajini-v-iii-kv-2024-u-4-50465381.html>

¹² Інфляційний звіт, жовтень 2024 року. URL: <https://bank.gov.ua/ua/news/all/inflyatsiyniy-zvit-jovten-2024-roku>

since the overall economic situation remains controlled. Medium-term fiscal policy creates space for central banks to act more leniently in monetary policy, which allows them to lower interest rates without the risk of an inflationary surge¹³. In such conditions, monetary policy can promote growth by supporting the private sector through affordable financing, which reduces the cost of capital and stimulates investment¹⁴.

The IMF has been advocating fiscal restraint in recent years to support central banks in targeting inflation. It is important to focus on new approaches to fiscal policy, as fiscal reserves are depleted and debt levels in most countries are high. The trend towards rising debt began during a prolonged period of very low interest rates. The pandemic has necessitated unprecedented fiscal measures to save people's lives, and debts have grown even more. Kristalina Georgieva states that, firstly, in a world of systemic shocks and increased uncertainty, the need for the right policies is becoming more urgent, and making the right policy decisions will determine the future of the global economy. Second, geopolitical tensions increase the risks of fragmentation of the global economy, since in today's world we must be prepared for surprises¹⁵.

The growth of aggregate external public debt reflects a variety of factors, including increased military spending, insufficient tax revenues, economic crises, and external pressures. The debt cycle is the result of an ever-increasing accumulation of borrowing by consumers and governments. Atif Mian notes that total debt was about 140 percent of GDP from 1960 to 1980 in the United States, but has more than doubled since then to 300 percent of GDP¹⁶. This trend is global. Public and state-guaranteed external debt in Ukraine amounted to USD 159.74 billion¹⁷. The significant financial obligations that the Ukrainian government has to creditors can affect the country's financial stability and require compliance with fiscal discipline.

¹³ Alekseyenko Lyudmyla, Tulai Oksana. Strategic orientations of investment banking business in conditions of geopolitical tension. Світові тенденції та перспективи розвитку фінансової системи України: Матеріали XVII Міжнар. наук.-практ. конф. (м. Київ, 23 травн. 2024 р.). Київ: КНУ імені Тараса Шевченка, 2024. С. 13.

¹⁴ Lyudmyla Alekseyenko, Oksana Tulai, Bohdan Ferens, Volodymyr Tsap, Viktoriia Tsokalo, Liudmyla Artemenko. Informational Support for Communication of Reinvestment Recovery of the Economy. In: Alareeni, B., Hamdan, A. (eds) Technology: Toward Business Sustainability. ICBT 2023. Lecture Notes in Networks and Systems, 2024, vol 927, 927 LNNS, pp. 197–201. Springer, Scopus, Cham. https://doi.org/10.1007/978-3-031-54009-7_18.

¹⁵ Kristalina Georgieva. The 2020s: Turbulent, Tepid or Transformational? Policy Choices for a Weak Global Economy. URL: <https://www.imf.org/en/News/Articles/2024/04/sp041124-outlook-global-economy-policy-priorities-kristalina-georgieva>

¹⁶ Atif Mian. Breaking the Debt Supercycle. March 2024. URL: <https://www.imf.org/en/Publications/fandd/issues/2024/03/Symposium-Breaking-the-debt-supercycle-Atif-Mian>

¹⁷ Державний та гарантований державний борг України в 2024 р. URL: <https://www.index.minfin.com.ua/ua/finance/debtgov/>

Traditional methods of regulating debt obligations are based on standard legal norms and international conventions. Such approaches typically involve limiting debt levels and establishing credit risk controls. However, with the advent of new financial instruments and technologies, traditional methods are becoming less effective. In the short term, debt can stimulate aggregate demand, whether it is used for consumption or investment. However, in the long term, debt financing of consumption can have negative consequences, as consumers are forced to repay borrowed funds. Debt repayment is accompanied by a decrease in consumption, which can lead to a decrease in aggregate demand and cause economic problems. Therefore, debt management should be directed to its effective use for productive purposes, such as investment, which will contribute to sustainable economic development. We share Atif Mian's view that debt cycles reflect problems on the demand side, with rising inequality and excessive accumulation by wealthy citizens, and problems on the supply side, with a limited response of investment, despite very low interest rates and the need for financing¹⁸.

Sovereign debt can be used to attract investment and smooth out fluctuations in income, but in reality it can lead to a deterioration in the financial situation of citizens due to increased economic volatility and reduced investment. Mark Aguiar in his publication "The Poisoned Chalice of Debt" notes that the negative consequences of sovereign loans lead to increased risks and a decrease in the attractiveness of the country's investment climate¹⁹. Such approaches to loans can contribute to further economic instability and deepening economic inequalities.

As part of the process of Ukraine's accession to the EU, legislation is being screened under the negotiating Chapter 3 "Freedom of enterprise and provision of services", which belongs to Cluster 2 "Internal market". This will facilitate the provision of services, the recognition of professional contracts, qualifications and the regulation of postal services. Funding from the G7 countries through the ERA program is important for maintaining macroeconomic stability²⁰. This will allow citizens to maintain access to

¹⁸ Atif Mian. Breaking the Debt Supercycle. March 2024. URL: <https://www.imf.org/en/Publications/fandd/issues/2024/03/Symposium-Breaking-the-debt-supercycle-Atif-Mian>

¹⁹ Mark Aguiar. The Poisoned Chalice of Debt. June 2024. URL: <https://www.imf.org/en/Publications/fandd/issues/2024/06/The-Poisoned-Chalice-of-Debt-Mark-Aguiar>

²⁰ Ukraine: Fifth Review Under the Extended Arrangement Under the Extended Fund Facility, Requests for Waivers of Applicability of Performance Criteria, Modification of Performance Criterion, Rephasing of Access, and Financing Assurances Review-Press Release; Staff Report; and Statement by the Executive Director for Ukraine. IMF. Country Report No. 2024/314. 2024. <https://doi.org/10.5089/9798400290534.002>

financial services, microfinance and other financial instruments even during a prolonged crisis²¹.

In the context of Ukraine's accession to the EU internal market in 2025, investment demand, which is a driver of economic dynamics, has continued to recover²². State investments in defense projects, such as weapons production, as well as costs for the restoration of destroyed infrastructure, have contributed to this process²³. Private investments have increased due to the improvement of financial indicators of enterprises and the need to purchase energy-independent equipment due to the difficult situation in the energy sector²⁴.

From a security perspective, the NBU updated its estimate of real GDP growth in the third quarter of 2024, increasing it to 4% year-on-year (the previous forecast was 3.1%)²⁵. This indicates higher than expected economic activity. The favorable factors were, firstly, a soft fiscal policy that supported aggregate demand in the economy. Secondly, the earlier start of harvesting late crops, which had a positive impact on the agricultural sector. At the end of the third quarter, the harvesting area exceeded last year's by 81%, and the harvest volume increased by 68%. Thirdly, the active work of the maritime corridor, due to which the volume of cargo transshipment in ports increased by 2.1 times compared to 2023.

The preferential nature of economic and security criteria in the segment of accession to the EU internal market highlights the multiplier effect of

²¹ Tulai Oksana, Alekseyenko Lyudmyla, Bilan Oleksandr, Viktoriia Tsokalo. Organizational and applied principles of financial security for the restoration of territorial communities in the conditions of geopolitical challenges. Інвестиції: практика та досвід. 2023. № 19. С. 62-68. DOI: 10.32702/2306_6814.2023.19.62; Alekseyenko L., Tulai O., Babii S. Financial sector: regulatory and communication transformations in the digital economy. Economic Analysis. 2023. Vol. 33 (3). pp. 222-231. DOI: <https://doi.org/10.35774/econa2023.03.222>

²² Alekseyenko Lyudmyla. Transaction costs of the market impact of share trading: digital manoeuvring technologies. Ukrainian Journal of Applied Economics and Technology. 2023. Vol. 8 (3). pp. 279-284. DOI: <https://doi.org/10.36887/2415-8453-2023-3-42>; Alekseyenko L. Investment activities on the stock market: information security in the network economy. Economic Analysis. 2023. 33 (2). pp. 282-290. DOI: <https://doi.org/10.35774/econa2023.02.282>

²³ Alekseyenko L., Tulai O., Dmytryshyn M., Bulavynets V., Savchuk S. Information Support for Financial Communication of Economic Recovery. In: Alareeni, B., Hamdan, A. (eds) Navigating the Technological Tide: The Evolution and Challenges of Business Model Innovation. ICBT 2024. Lecture Notes in Networks and Systems. 2024, vol 1083, pp. 273–277. https://doi.org/10.1007/978-3-031-67431-0_26

²⁴ Alekseyenko, L., Tulai, O., Dmytryshyn, M., Bulavynets, V., Savchuk, S. Information Support for Financial Communication of Economic Recovery. In: Alareeni, B., Hamdan, A. (eds) Navigating the Technological Tide: The Evolution and Challenges of Business Model Innovation. ICBT 2024. Lecture Notes in Networks and Systems, 2024, vol 1083. Springer, Cham. https://doi.org/10.1007/978-3-031-67431-0_26

²⁵ Є три варіанти. У Нацбанку розповіли, що чекає на економіку України. URL: <https://biz.nv.ua/ukr/economics/nacbank-ociniv-zrostannya-vvp-ukrajini-v-iii-kv-2024-u-4-50465381.html>

public investments²⁶. According to Keynesian theory, increased government spending in strategic sectors, such as defense and infrastructure, stimulates economic activity, creating additional demand in related sectors. Investment in renewable resources due to the instability of energy infrastructure stimulates the private sector to invest in sustainable and energy-efficient equipment, which contributes to the modernization of production and increased economic productivity. The restoration of an export-oriented economy (increased cargo handling through seaports) contributes to the activation of foreign trade, which forms a positive contribution to GDP, since exports are an important component of national income.

In the context of the intensification of conflicts (military actions), there was a redistribution of demand between sectors, caused by changes in consumer behavior and a shift towards essential goods. This is accompanied by supply disruptions, which increases inflationary pressure. The shift to online ordering has led to increased demand for electronics and logistics services, causing prices to rise in these sectors. As for the business activity expectations index, in October 2024 this index approached the neutral level (49.4) compared to 48.7 in September²⁷. Expectations will be positive if the index value exceeds the neutral level.

2. Digital transformation in the global financial inclusion segment

The systemic development of financial markets and the increasing complexity of financial instruments necessitate the constant adaptability of scientific approaches to regulating the scaling of digital technologies. Given the rapid technological changes and global financial trends, innovative strategies can become crucial for ensuring the stability and reliability of the financial system.

The Digital Innovation Development Strategy until 2030 determines the creation of favorable conditions for business, startups, investors and international partners in the sphere of innovation to protect the sovereignty and territorial integrity, reconstruction and support of the transformation process of Ukraine. The WINWIN Strategy is a comprehensive vision of concrete steps to strengthen the innovation ecosystem in Ukraine, effective regulation and opening new markets (Table 1).

²⁶ Alekseyenko Lyudmyla, Tulai Oksana. European Integration Vectors of Development: Implementation of the Ukraine Facility Program and Electronic Case Management. Майбутнє – аудит : Матеріали Міжнародної науково-практичної інтернет-конференції, м. Кривий Ріг, 15 січня 2024 р. / редкол.: М. І. Ступнік, В. С. Адамовська, М. Л. Крапивко, Є. В. Мішук [Електронний ресурс]. Кривий Ріг : Вид. Р.А. Козлов, 2024. С. 12-14.

²⁷ Індекс очікувань ділової активності. URL: <https://bank.gov.ua/ua/news/all/indeks-ochikuvan-dilovoyi-aktivnosti-mayje-dosyag-rivnovajnego-rivnya---pidsumki-opituvannya-pidpriyemstv-u-jovtni>

Table 1

Priority areas of innovation development until 2030

	Dimensions	Parameters of innovation development
1.	Fundamental directions:	opening markets for priority industries
		development and support of innovation infrastructure
		deregulation of innovation
		access to finance
		effective management of state institutions in the field of innovation
		protection of intellectual property
		development of knowledge-intensive innovations
		creation of inclusive innovations
		international cooperation
		creation of WINWIN CoE (Centres of Excellence) for each of the priority industries (list below)
2.	Key industries that are the basis for the development of innovations:	DefenseTech
		MedTech
		BioTech
		GreenTech
		EdTech
		AgroTech
		AI
		XR
		AUV
		Semiconductors
		Secure Cyberspace
		SpaceTech
		GovTech
3.	Transforming defense technologies into a global intelligent national security operating system:	unmanned (robotic) weapons systems
		biological and genetic engineering technologies
		artificial intelligence and machine learning in defense
		modern electronics and advanced materials
		sensors and data acquisition systems
		energy systems
		space technologies for defense
		development of innovative cyber defense systems

Based on²⁸.

²⁸ Цифрова держава без перешкод – як Мінцифра впроваджує стратегію безбар'єрності. URL: <https://thedigital.gov.ua>; WINWIN: Україна затвердила Стратегію цифрового розвитку інновацій до 2030 року. URL: <https://thedigital.gov.ua/news/winwin-ukraina-zatverdila-strategiyu-tsifrovogo-rozvitku-innovatsiy-do-2030-roku>

Digitalization and big data analytics affect traditional economic models and the consequences of sovereign borrowing for countries' economies. The value of sovereign debt markets for borrowing countries is ambiguous, whether viewed from the perspective of data or quantitative models²⁹. According to the traditional “neoclassical paradigm”, financial inclusion should contribute to faster economic growth and less volatility of financial costs. Gregor Boehl, Flora Budianto and Elod Takats believe that the right combination of economic and innovation instruments can not only accelerate the energy transition, but also provide long-term benefits for the economy and the environment³⁰. Yanfei Dong, Jiayin Hu, Yiping Huang, Han Qiu and Yingguang Zhang recognize that regulatory measures in the field of credit reporting can effectively reduce the risks of excessive debt, promoting transparency in financial markets and the introduction of digital innovation³¹. The integration of non-bank lenders into national credit registries increases discipline among consumers and provides better control over credit risks, which is especially important in the context of BNPL's growing popularity.

Countries with large external public savings are in a better position compared to those that have actively borrowed on external markets. This suggests that sovereign borrowing can have negative effects on the economy, increasing volatility and limiting opportunities for economic growth. Paula Beltran Saavedra, Nicolas Fernandez-Arias, Chanpheng Fizzarotti and Alberto Musso acknowledge that the challenges highlight the importance of innovative development and the promotion of transformative reforms³². Li Nan, Papageorgiou Chris, Xu Tong and Zha Tao, using a structural model, identified the relationship between contemporary reforms and their impact on global financial inclusion³³.

Theoretical concepts of financial security trace the trade-off between the benefits of financial integration for the economic and social development of society. Matteo Maggiori, Chris Clayton and Jesse Schreger note that in the context of financial globalization, countries

²⁹ Mark Aguiar. The Poisoned Chalice of Debt. June 2024. URL: <https://www.imf.org/en/Publications/fandd/issues/2024/06/The-Poisoned-Chalice-of-Debt-Mark-Aguiar>

³⁰ Gregor Boehl, Flora Budianto, Elod Takats. The macroeconomics of green transitions. BIS Working Papers. 2024. No 1237. P. 19-28.

³¹ Yanfei Dong, Jiayin Hu, Yiping Huang, Han Qiu, Yingguang Zhang. The use and disuse of FinTech credit: When buy-now-pay-later meets credit reporting. BIS Working Papers. 2025. No 1239. P. 55-78.

³² Paula Beltran Saavedra, Nicolas Fernandez-Arias, Chanpheng Fizzarotti, Alberto Musso. G20 Economies Should Target Reforms to Boost Medium-Term Growth Prospects. URL: <https://www.imf.org/en/Blogs/Articles/2024/11/21/g20-economies-should-target-reforms-to-boost-medium-term-growth-prospects>

³³ Li Nan, Papageorgiou Chris, Xu Tong, Zha Tao. Global Contagion of Financial Reforms. IMF. Working Paper. 2024. No. 2024/243. P. 26-44. <https://doi.org/10.5089/9798400295980.001>

depend on digital transformation, trade networks and resources³⁴. Sami Ben Naceur, Bertrand Candelon and Farah Mugarbi outline the importance of financial inclusion for designing and implementing stabilization policies that take into account various challenges and risks³⁵. Giulio Cornelli, Jon Frost, Jonathan Warren, Clair Yang and Carolina Velasquez emphasize modern finance and innovative technology landscapes for the development of the financial industry³⁶. Dominic Cucic and Denis Gorea note that non-bank institutions should be more actively involved in financial inclusion to enhance monetary policy³⁷. The expansion of the insurance system should contribute to the development of global financial inclusion³⁸.

Digital transformation within the framework of the UNDP and the Ministry of Digital Transformation of Ukraine project contributes to: monitoring the accessibility of government websites in accordance with the Resolution of the Cabinet of Ministers No. 757; conducting annual monitoring on more than 100 websites of executive bodies; more than 2,000 public servants from central bodies and regions have received training on the basics of digital accessibility³⁹. The strategy of barrier-free and digital accessibility in Ukraine is presented in Table 2.

Diia.Accessibility will facilitate the implementation of flagship projects aimed at creating an inclusive environment in the country. Experts from the Digital Accessibility Competence Center based on Action, with support from UNDP, are introducing mandatory accessibility criteria to ensure inclusion as a standard in digital transformation⁴⁰.

³⁴ Matteo Maggiori, Chris Clayton, Jesse Schreger. A theory of economic coercion and fragmentation. BIS Working Papers. 30 October 2024. No 1224. P. 38-56.

³⁵ Sami Ben Naceur, Bertrand Candelon, Farah Mugarbi. Systemic Implications of Financial Inclusion. IMF. Working Paper. 2024. No. 2024/203. P. 10-39. <https://doi.org/10.5089/9798400290763.001>

³⁶ Giulio Cornelli, Jon Frost, Jonathan Warren, Clair Yang, Carolina Velasquez. Retail fast payment systems as a catalyst for digital finance. BIS Working Papers. 21 November 2024. No 1228. P. 7-26.

³⁷ Dominic Cucic, Denis Gorea. Non-bank lending and the transmission of monetary policy. BIS Working Papers. 11 September 2024. P. 22-74.

³⁸ Алексеєнко Л. М. Теоретико-концептуальні підходи страхування вкладів у контексті глобальної фінансової інклюзії. Світ фінансів. 2024. № 4. С. 169–174. DOI: 10.35774/sf2024.04.167

³⁹ Цифрова держава без перешкод – як Мінцифра впроваджує стратегію безбар'єрності. URL: <https://thedigital.gov.ua>

⁴⁰ Цифрова держава без перешкод – як Мінцифра впроваджує стратегію безбар'єрності. URL: <https://thedigital.gov.ua>; WINWIN: Україна затвердила Стратегію цифрового розвитку інновацій до 2030 року. URL: <https://thedigital.gov.ua/news/winwin-ukraina-zatverdila-strategiyu-tsifrovogo-rozvitku-innovatsiy-do-2030-roku>

Table 2

Barrier-free and digital accessibility strategy in Ukraine

1.	Platform Action. Education:	More than 200 educational series with subtitles in Ukrainian and English have been launched. A separate course on digital accessibility “A State Without Barriers”, “Web Accessibility”, “Barrier-Free Literacy”
		20 educational products dubbed in sign language
		For visually impaired users, all images on the platform have alternative descriptions that can be read using screen readers.
2.	Administrative Service Centers (ASC):	Accessibility of ASC
		Arrangement of premises of ASCs: since the beginning of 2023, taking into account the needs of persons with disabilities, this level has increased by 16%
		The ability to get even more administrative services right from home
3.	Accessibility of websites and mobile applications:	Monitoring the accessibility of government websites
		Trainings on the basics of digital accessibility
		Diia.Accessibility, which is designed to provide all the necessary information for citizens in various life situations
4.	Digital Accessibility Competence Center:	Contributes to increasing the availability of government resources through training, consultations, and audits

Based on⁴¹.

In the banking system, the innovative Savings-and-Credit Contract (SCC) is used during the savings period as a signaling mechanism that allows borrowers with a high level of discipline to prove their solvency⁴². This mechanism is especially important in environments with high information asymmetry, where lenders do not have complete information about the solvency of borrowers. Consorcio participants show lower default rates, even if their observable characteristics (e.g., employment or credit rating) indicate higher risk. This suggests that SCCs effectively screen out unreliable borrowers. Unlike conventional loans, SCCs allow borrowers with limited liquidity to gradually accumulate funds while proving their financial

⁴¹ WINWIN: Україна затвердила Стратегію цифрового розвитку інновацій до 2030 року. URL: <https://thedigital.gov.ua/news/winwin-ukraina-zatverdila-strategiyu-tsifrovogo-rozvitku-innovatsiy-do-2030-roku>; Цифрова держава без перешкод – як Мініцифра впроваджує стратегію безбар'єрності. URL:<https://thedigital.gov.ua>

⁴² Bernardus F Nazar Van Doornik, Armando Gomes, David Schoenherr, Janis Skrastins. Savings-and-credit contracts. BIS Working Papers. 2024. No 1236. P. 13-45.

discipline. This helps to expand access to credit for a wider range of borrowers. Note that default penalties are an important tool to encourage responsible behavior of borrowers during the savings period.

The development of e-commerce in the EU leads to an increase in imports, which requires the introduction of innovations in customs processes to guarantee security aspects. Mariana Mazzucato believes that initially public investment can catalyze innovation and attract private investment in different sectors, which is especially important in countries where companies invest little in scientific research and development⁴³. The integration of innovative technologies and data analysis methods into the work of customs authorities allows them to respond more effectively to new challenges, contributing to increasing security and preserving the economic stability of the EU.

The Community for European Research and Innovation for Security (CERIS) focuses on EU-funded innovations and technologies to combat money laundering, postal smuggling, financial fraud, sanctions evasion and export controls⁴⁴. The area of e-commerce security and combating illicit transactions across EU borders concerns customs and law enforcement authorities (DG HOME), delivery and postal operators, business representatives, industry associations, as well as representatives of relevant European Commission services and EU agencies. In 2023, the EU imported 2.3 billion goods worth up to €150, with a total value of €28 billion. This represents around 1% of the total value of EU imports in 2023, with around 80% of the goods coming from China. It is expected that by the end of 2024, around 4 billion parcels will be imported into the EU⁴⁵. This increase in imports poses challenges for EU customs authorities. We believe that China's dominance as the main source of imports into the EU highlights the importance of adapting customs procedures to the new realities of global supply chains.

The fight against illicit transactions requires enhanced cooperation between EU Member States and other international partners⁴⁶. Initiatives such as CERIS provide a platform for sharing knowledge and innovation,

⁴³ Mariana Mazzucato. Policy with a Purpose. September 2024. URL: <https://www.imf.org/en/Publications/fandd/issues/2024/09/policy-with-a-purpose-mazzucato>

⁴⁴ Alekseyenko Lyudmyla, Tulai Oksana, Babii Stepan. Information support for the recovery of the Ukrainian economy in the context of the New European Consensus on Development. Сучасні проблеми моделювання соціально-економічних систем: Матеріали XV Міжнар. наук.-практ. конф. (м. Харків, 11-12 квітн. 2024 р.). Харків, Conference MPSESM-XV, 2024.

⁴⁵ E-commerce security and countering illicit transactions. 19 July 2024. URL: https://home-affairs.ec.europa.eu/news/e-commerce-security-and-countering-illicit-transactions-2024-07-19_en

⁴⁶ European Research Area Conference 2024: A vision for the future of research and innovation in Europe. URL: <https://vetenskapallmanhet.se/2024/09/european-research-area-conference-2024-a-vision-for-the-future-of-research-and-innovation-in-europe/>

which helps to coordinate security and customs control actions. EU-funded research support contributes to the harmonisation of security standards and innovative approaches among Member States⁴⁷. Such cooperation allows customs authorities to share information more effectively and coordinate their actions in the fight against criminal organisations operating at international level.

Traditional threats such as drug and cigarette smuggling still remain relevant for customs services, but with globalisation and technological developments, new threats are emerging⁴⁸. The scale of the illicit trafficking of archaeological artifacts and the evasion of sanctions have become important challenges for modern customs authorities. Modern detection and monitoring technologies are needed to combat these phenomena. The latest technologies, in particular artificial intelligence and blockchain, can provide better monitoring of transactions and tracking of illegal goods, which will contribute to increasing the efficiency of customs control⁴⁹.

Technological innovations play an important role in the fight against smuggling: The development of big data analytics (Big Data) and artificial intelligence technologies allows customs authorities to more effectively detect anomalies in goods and financial transactions. The use of innovative technologies allows for automation of processes, reducing the risk of human error and speeding up checks⁵⁰. It should be noted that scanners with artificial intelligence can detect hidden objects without delays in customs operations.

⁴⁷ Alekseyenko Lyudmyla, Tulai Oksana, Babii Stepan. Information Support of International Information Support of International Marketing Strategies in the Corporate Segment of Sustainable Development. Сучасні технології маркетингу : Матеріали Всеукр. наук.-практ. конф. [м. Луцьк, 7 бер. 2024 р.] / Відп. ред. проф. В. С. Рейкін. Луцьк : Вежа-друк, 2024. С. 126–128.

⁴⁸ Alekseyenko L., Tulai O., Dmytryshyn M., Stetsko M., Kvasnytsia O., Vilchynskiy V. Information Assistance for Regulation of Financial Market Business Intelligence in the Context of Global Reset. In: Hamdan, A. (eds) Achieving Sustainable Business Through AI, Technology Education and Computer Science. Studies in Big Data. 2024. Vol 163. Springer, Cham. https://doi.org/10.1007/978-3-031-73632-2_58; Alekseyenko L. Solving the insolvency of troubled banks: a theoretical and applied aspect. Ukrainian Journal of Applied Economics and Technology. 2023. Vol. 8 (4). pp. 228–232. DOI: <https://doi.org/10.36887/2415-8453-2023-4-37>

⁴⁹ Алексеенко Л. М., Юркевич О. М. Інформаційно-комунікаційний супровід масштабування фінансових технологій. Модернізація економіки: сучасні реалії, прогностичні сценарії та перспективи розвитку: матеріали VI міжнар. наук.-практ. конф. (м. Херсон – м. Хмельницький, 18-19 квіт. 2024 р.). Херсон: Видавництво ФОП Вишемирський В.С., 2024. С. 328–329.

⁵⁰ Tulai Oksana, Alekseyenko Lyudmyla, Zapolskyi Oleksandr. Political and economic dimensions of cooperation between Ukraine and the European Union in the scaling of technological innovations. Актуальні проблеми та перспективи розвитку обліку, аналізу та контролю в соціально-орієнтованій системі управління підприємством: Матеріали VII Всеукр. наук.-практ. конф. (м. Полтава, 28–29 бер. 2024 р.). Полтава, 2024. С. 574–576.

Modern criminal groups adapt to new conditions by using cryptocurrencies, which makes their activities more hidden and difficult to track. Therefore, investment in innovation and cutting-edge technologies is essential for government regulators to combat illegal activities⁵¹. This includes developing systems to detect financial fraud and hidden goods using advanced data analysis algorithms.

CERIS is an important step in implementing innovative solutions to improve the security of e-commerce and effectively combat illegal transactions in the context of growing import volumes. This is relevant for Ukraine in the context of the formation of a security space and regulatory framework⁵². First, the use of innovative scanners and sensors capable of non-invasively detecting threats is an important step in modernizing customs control and ensuring security in logistics centers and postal services. These technologies allow for the acceleration of the inspection of a large number of cargoes and parcels without stopping work processes, which is critical for maintaining economic efficiency and security.

Secondly, breakthrough data analysis models (artificial intelligence, machine learning algorithms) allow customs and law enforcement agencies to automatically detect suspicious transactions⁵³. This is especially important for combating money laundering and financial fraud, since such models can quickly process large volumes of information, which cannot be done manually.

Third, the transition to digital customs systems (using muons, artificial intelligence) will allow for faster and more accurate control of commodity flows, reducing delays at borders and increasing the effectiveness of the fight against smuggling.

Preferential competencies in the context of global financial inclusion should be considered through the introduction of agricultural notes as an innovative approach to the development of specialized financial instruments aimed at expanding access to financing for the agricultural sector. This can be justified in the context of greater inclusiveness in access to investment

⁵¹ Alekseyenko Lyudmyla, Tulai Oksana. Formation of the EU-Ukraine cross-border cooperation concept for the implementation of flagship projects. Підприємництво, торгівля, маркетинг: стратегії, технології та інновації [Електронний ресурс] : тези доп. VII Міжнар. наук.-практ. інтернет-конф. (м. Київ, 15 травн. 2024 р.) / відп. ред. В. А. Осика. Київ: Держ. торг.-екон. ун-т, 2024. С. 293–295.

⁵² Specific support for Ukrainian research and innovation. URL: <https://horizon-europe.org.ua/en/about-he/support-for-ukraine/>

⁵³ Jennifer Baker. Tech and the new mandate, Europe's AI opportunities and challenges. 08-10-2024. URL: <https://www.euractiv.com/section/artificial-intelligence/news/tech-and-the-new-mandate-europes-ai-opportunities-and-challenges/>

resources, which contributes to increasing the economic sustainability and competitiveness of the industry⁵⁴.

Since the beginning of 2025, Ukraine has been introducing a new financial instrument to attract investments in agriculture – agrarian notes⁵⁵. Agriculture plays a significant role in the structure of Ukraine's GDP, especially due to its high export dependence. Earlier harvest dates and higher volumes of grown products directly affect economic dynamics in the short term. In accordance with the Law of Ukraine "On Agrarian Notes" dated February 22, 2024, a special Register of Agrarian Notes will be created, which will serve as a platform for reflecting transactions with this type of securities, including their registration, changes in details, encumbrance, termination and mechanisms for the forced execution of obligations. The NSSMC has already developed the necessary regulatory framework, including amendments to the Regulation on Depository Activities, as well as new acts regulating the circulation of agrarian notes in the Central Depository system. This tool was created taking into account market demands, which ensures its prospects in stimulating agricultural production.

The introduction of agricultural notes can be viewed through the prism of the theory of financial inclusion, which focuses on the creation of accessible, industry-specific instruments aimed at reducing information asymmetry and transaction costs. In the context of global financial inclusion, agricultural notes represent an innovative approach to capital mobilization for small and medium-sized agricultural enterprises, which often face limited access to traditional sources of financing. The implementation of this tool creates the prerequisites for capital market diversification.

CONCLUSIONS

First, in the context of global financial security, digital technologies require regulatory reform to ensure their wider adoption, and modern structural reforms should be focused on increasing labor productivity, innovative development, and environmental sustainability. This will facilitate the transition to an “ecologically transparent” economy, which is crucial in the context of modern climate challenges.

Secondly, the sustainable and secure development of society requires the regulation of debt obligations from traditional to innovative, and this

⁵⁴ Алексеенко Л. М., Тулай О. І. Роль фінансових інновацій в протидії передчасній деіндустріалізації в світовій економіці. Управління розвитком соціально-економічних систем: Матеріали VIII Міжнар. наук.-практ. конф. (м. Харків, 21–22 бер. 2024 р.). Харків: ДБТУ. Ч. 1. 2024. С. 398–399.

⁵⁵ Новий фінансовий інструмент готовий до запуску: Комісія завершила підготовку нормативної бази для аграрних нот в Україні. URL: <https://www.nssmc.gov.ua/novyi-finansovyi-instrument-hotovy-do-zapusku-komisii-zavershylo-pidhotovku-normatyvnoi-bazy-dlia-ahrarykh-not-v-ukraini/>

contributes to adaptation to modern global challenges and technological trends. Uncontrolled sovereign borrowing can worsen the situation of citizens, increasing volatility and reducing investment, which will not contribute to the scaling of digital transformation. The use of blockchain can ensure transparency and security of transactions, reducing the risks of manipulation and fraud.

Third, in the security segment of the increase in the volume of imported goods, it is important to optimize data processing and analysis processes. Information support for the integration of solutions such as automated risk management systems will speed up the verification process and reduce the risks of illegal transactions. Innovative solutions will contribute not only to increasing security, but also to maintaining the competitiveness of the European market in the context of globalization. The implementation of the Digital Innovation Strategy by 2030 will enable Ukraine to make an economic leap by creating innovative products, goods and services and become a driver of innovation in the EU.

Fourth, SCCs are an effective tool for expanding access to credit, reducing default risks and addressing information asymmetry. Their implementation can significantly improve the functioning of credit markets, especially in countries with high levels of financial inequality. The integration of non-bank lenders into national credit registers increases discipline among consumers and provides better control over credit risks, which is especially important in the context of the growing popularity of BNPL.

Fifth, the digitalization and implementation of agricultural notes can be viewed through the prism of the theory of financial inclusion, which focuses on the creation of accessible, industry-specific instruments aimed at reducing information asymmetry and transaction costs. In the context of global financial inclusion, agricultural notes represent an innovative approach to capital mobilization for small and medium-sized agricultural enterprises, which often face limited access to traditional sources of financing. The implementation of this tool creates the prerequisites for capital market diversification.

SUMMARY

Financial inclusion contributes to the transformation of the global security system and the development of digital technologies. Security aspects are aimed at the stability of the financial system by attracting a balanced client base, reducing the risks of debt dependence due to greater uniformity of income and diversification of financial transactions. In the context of Ukraine's accession to the EU internal market in 2025, investment demand, which is a driver of economic dynamics, has continued to recover. This will allow citizens to maintain access to financial services, microfinance and other financial instruments even during a prolonged material law.

The scientific discourse of the vision of regulatory measures in supporting the global financial security system and mechanisms for ensuring trust in financial inclusion, which is the basis for expanding access to financial services, has been updated. Digital transformation within the framework of UNDP and Ministry of Digital Transformation of Ukraine projects will contribute to the implementation of digital education programs, the accessibility of government websites and the implementation of flagship projects aimed at creating an inclusive environment in the country. Given the rapid technological changes and global financial trends, innovative strategies can become crucial for ensuring the stability and reliability of the financial system.

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