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FINTECH AND SOCIAL ENTREPRENEURSHIP: MECHANISMS FOR SUSTAINABLE DEVELOPMENT

ABSTRACT

The article examines the interaction between financial technologies (fintech) and social entrepreneurship as key drivers of sustainable development in the digital economy. Particular attention is paid to the transformation of traditional financial systems under the influence of digital innovations and their impact on solving social and economic challenges. The study analyses the role of fintech instruments in expanding financial inclusion, facilitating access to financial services for vulnerable social groups, reducing transaction costs, and improving the efficiency of social enterprises. It is determined that digital payment systems, crowdfunding platforms, blockchain technologies, peer-to-peer lending, and mobile banking contribute to the formation of more transparent, accessible, and adaptive business models focused on social value creation.

The paper substantiates that social entrepreneurship, combined with fintech solutions, forms an innovative institutional environment capable of supporting sustainable economic growth and strengthening social cohesion. The fintech ecosystem enhances opportunities for attracting investments into socially oriented projects, increases accountability and transparency in financial operations, and stimulates the development of inclusive entrepreneurship. In this context, fintech is viewed not only as a technological phenomenon but also as a mechanism for achieving the Sustainable Development Goals, particularly in the areas of poverty reduction, decent work, reduced inequalities, and sustainable economic development.

The proposed conceptual model demonstrates that sustainable development in the digital era is shaped through the integration of technological innovation, social responsibility, and institutional adaptability. The study proves that fintech and social entrepreneurship should be considered interconnected components of a modern socio-economic system that collectively increase economic resilience, promote inclusive growth, and improve societies' capacity to respond to global crises and uncertainties. The findings confirm that the synergy between fintech and social entrepreneurship creates prerequisites for long-term socio-economic balance and the formation of a sustainable digital economy.

Keywords: sustainability, financial inclusion, innovation, impact investment, digitalization, resilience, competitiveness, sustainable development, entrepreneurship

JEL Classification: O33, Q01, M13

INTRODUCTION

In today's globalised and digitalised economy, financial technology (Fintech) is becoming a key driver of transformation in business and social institutions. Fintech not only increases the efficiency of financial services, but also creates new opportunities for inclusive economic development, promoting broad access to financial resources for various categories of the population, including socially vulnerable groups. At the same time, social entrepreneurship, as a specific form of organizational activity focused on solving social and environmental problems, is an important element of integrating economic and social value, ensuring the implementation of the principles of sustainable development.

The interaction between fintech and social entrepreneurship opens up new mechanisms for the formation of sustainable business models that combine financial profitability with social profitability. On the one hand, digital platforms and innovative financial instruments ensure effective capital raising, optimization of operational processes, and increased transparency of social enterprises. On the other hand, social enterprises create an environment in which innovative financial solutions are aimed at achieving specific social and environmental outcomes, contributing to the sustainable development of local communities and society as a whole.

The relevance of the study is determined by the need for a comprehensive analysis of the potential of fintech to support socially responsible business and the development of mechanisms that allow integrating technological innovations into social entrepreneurship strategies. Despite the growing interest in the digitalization of the financial sector and the social economy, there is a lack of a system in the scientific literature regarding the impact of fintech on the sustainable development of social enterprises, especially in the context of modeling innovative financial mechanisms, assessing social profit, and ensuring financial stability.

LITERATURE REVIEW

In recent years, literature combining research on FinTech, financial inclusion and sustainable development has shown rapid growth: this is reflected both in the systematic reviews and bibliometric analyses (Ha et al., 2025; Jafri et al., 2025; Kishor et al., 2025), as well as in applied studies examining crowdfunding, digital platforms, green FinTech, and the impact on social enterprises (Dabbous et al., 2024; Farè et al., 2024; Gupta et al., 2024). Together, these works provide a scientific basis for analysing FinTech as a catalyst for a transformation of the economy, but point to the need to integrate institutional, gender and environmental aspects within holistic models of sustainable development (Hasan et al., 2024a; Roy & Vasa, 2025).

Systematic reviews highlight the key role of FinTech in expanding access to financial services, reducing transaction barriers, and increasing economic participation among vulnerable groups (Ha et al., 2025; Kishor et al., 2025; Tidjani & Madouri, 2024). Research in African and Asian contexts shows that mobile payment platforms, microfinance through digital channels, and peer-to-peer platforms are effective tools for financial inclusion (Tidjani & Madouri, 2024; Wicaksana et al., 2023). However, reviews also point to heterogeneity in impact, particularly the dependence of the effect on digital infrastructure and the institutional environment (Hasan et al., 2024a; Kishor et al., 2025).

Empirical and long-term studies of crowdfunding highlight its potential for financing social and cultural projects, as well as for the sustainable development of SMEs and social enterprises (Farè et al., 2024; Engku Hassan Ashari et al., 2024; Rizwan & Mustafa, 2022). Research shows that cultural context, religious norms (Islamic crowdfunding), and payment literacy significantly influence the success of campaigns (Engku Hassan Ashari et al., 2024; Susiang, 2024; Pham et al., 2025).

The works devoted to "green FinTech" consider the potential of digital financial solutions to stimulate investment in environmental technologies, to better measure ESG indicators, and to create financial products (Kwong et al., 2023; Zaidetal., 2025; Roy&Vasa, 2025). At the same time, the authors note that conceptual approaches require the unification of metrics, and empirical evidence of the impact of green FinTech on environmental outcomes remains fragmentary (Zaidetal., 2025).

The studies combining FinTech and SME entrepreneurial activity point to the positive impact of digital finance and social media communications on innovation processes and the creation of sustainable business models (Gupta et al., 2024; Siyu & Qing, 2024). Works focusing on social entrepreneurship highlight the role of FinTech in increasing financial transparency, access to microcredit, and scaling social innovations (Kyrlyiuk et al., 2025; Raman et al., 2025).

The reviews from recent years demonstrate a wide range of methods: bibliometrics and systematic reviews (Jafri et al., 2025; Kishor et al., 2025), thematic content analyses using machine learning (Hasan et al., 2024a), cross-national panel analyses, long-term crowdfunding studies (Farè et al., 2024), and experimental and quasi-experimental studies of FinTech adoption (Pham et al., 2025). At the same time, there are clear methodological gaps in the literature: a lack of long-term panel data combined with institutional indicators; a limited number of studies using SEM and systematic identification of cause-and-effectchains; and insufficient attention to gender and social dynamics in the context of FinTech (Hasan et al., 2024b; Ha et al., 2025).

A systematisation of the studied scientific sources reveals several consensus statements:

1. FinTech expands access to financial services and can stimulate inclusive growth, but the effect is highly dependent on digital infrastructure and the quality of institutions (Ha et al., 2025; Tidjani & Madouri, 2024).

2. Crowdfunding and P2P platforms play an important role in financing social projects, but cultural and regulatory differences determine their effectiveness (Farè et al., 2024; Engku Hassan Ashari et al., 2024).
3. Green FinTech and ESG-oriented solutions are promising, but require standardisation of indicators and evidence base regarding their impact on environmental outcomes (Kwong et al., 2023; Zaid et al., 2025).
4. Social entrepreneurship as a channel for transforming financial innovation into social returns deserves more empirical attention, especially in the context of social impact assessment and risk management (Kyryliuk et al., 2025; Raman et al., 2025).

The issue of interaction between financial technologies (FinTech) and social entrepreneurship is becoming increasingly relevant in the context of digital transformation and the implementation of sustainable development principles. Modern research focuses on the role of digital financial instruments in increasing financial inclusion, strengthening institutional resilience, and supporting socially oriented business models. FinTech is increasingly viewed not only as a technological innovation in the financial sector but also as an important mechanism for reducing socio-economic inequality and stimulating inclusive economic growth.

A significant contribution to the study of the transformational role of FinTech in the financial sector was made by T. Staverska, H. Lysak and V. Prykhodko, who analyse the impact of digital innovations on the future architecture of financial services. The authors emphasise that the integration of artificial intelligence, blockchain technologies, mobile banking, and digital payment systems contributes to the formation of more flexible and customer-oriented financial ecosystems (Staverska, Lysak & Prykhodko, 2023). Similar conclusions are presented by S. Khalatur and co-authors, who investigate innovative trends in financial engineering within the digital economy and substantiate the growing importance of digital financial management for sustainable economic development (Khalatur et al., 2024).

The development of the FinTech ecosystem in Ukraine is explored in the works of O. Totska and B. Shevchuk, who analyse the dynamics and forecasting of the Ukrainian fintech market. Their research confirms that the expansion of digital financial services creates opportunities for increasing financial accessibility and improving the competitiveness of the national economy (Totska, Shevchuk, 2023). At the same time, S. Tesliuk and B. Mykhalchuk emphasise that the financial sector of Ukraine faces strategic challenges related to digital transformation, cybersecurity, and regulatory adaptation (Tesliuk, Mykhalchuk, 2023). According to the authors, the effective implementation of fintech innovations requires institutional support and coordinated interaction between the state, financial institutions, and digital platforms.

Particular attention in contemporary scientific discourse is devoted to the development of social entrepreneurship as a mechanism for solving social and economic problems. O. Kyryliuk and co-authors consider innovative tools for the development of social entrepreneurship and underline the importance of digital platforms, crowdfunding, and social investment instruments in enhancing the effectiveness of social enterprises (Kyryliuk et al., 2025). Similar approaches are reflected in the research of S. Boldyzhari and I. Khokhlova, who define social entrepreneurship as an innovative instrument for addressing social challenges in Ukraine (Boldyzhari, Khokhlova, 2024). The scholars stress that socially oriented enterprises contribute not only to employment growth and poverty reduction but also to strengthening social cohesion and regional resilience.

The relationship between sustainable development and social entrepreneurship is also examined by D. Anfilov, who studies the role of innovation and social entrepreneurship in ensuring sustainable urban development. The author demonstrates that innovative entrepreneurial initiatives contribute to improving urban infrastructure, increasing social inclusion, and enhancing environmental sustainability (Anfilov, 2024). In this context, social entrepreneurship is considered an important institutional component of sustainable socio-economic systems.

An important aspect of the literature concerns the financial dimension of social entrepreneurship. A. Revko, A. Verbytska and T. Zaharina conduct a comparative analysis of Polish and Ukrainian experiences in financing social entrepreneurship. Their findings indicate that access to alternative financial instruments, including digital finance and fintech platforms, significantly improves the sustainability and scalability of social enterprises. The authors conclude that fintech solutions create favourable conditions for attracting social investments and reducing financial barriers for vulnerable population groups (Revko, Verbytska & Zaharina, 2023).

The institutional and cooperative dimensions of fintech ecosystem development are highlighted in the study by M. Krupka, N. Demchyshak and O. Shchurevych. The researchers emphasise that effective cooperation between stakeholders, including financial institutions, technological companies, government bodies, and social enterprises, is a prerequisite for the formation of sustainable digital ecosystems (Krupka, Demchyshak & Shchurevych, 2023). Such cooperation strengthens financial inclusion and supports the diffusion of innovative social business models.

Recent international studies further broaden the understanding of fintech as a catalyst for sustainable development. S. Suri analyses the role of fintech in supporting sustainable food systems and argues that digital financial instruments facilitate resource optimisation, access to finance for small producers, and the implementation of sustainable production models. This confirms the interdisciplinary nature of fintech applications and their growing role in achieving the Sustainable Development Goals.

Despite the significant contribution of existing studies, the scientific literature still lacks a comprehensive approach to analysing the synergistic interaction between fintech and social entrepreneurship as integrated mechanisms of sustainable development. Most studies focus either on technological aspects of financial innovations or on the social impact of entrepreneurship separately. Therefore, there is a need for further research aimed at developing integrated economic and institutional models that combine digital financial inclusion, social entrepreneurship, and sustainable development indicators within a unified analytical framework.

AIMS AND OBJECTIVES

The purpose of the article is to investigate the interaction between financial technologies and social entrepreneurship as mechanisms for ensuring sustainable development, as well as to formulate the conceptual foundations for the development of financial and technological platforms aimed at increasing the efficiency of socially oriented business models in the digital economy.

To achieve this purpose, the following objectives are set in the article:

1. To analyse the impact of financial technologies on the development of social entrepreneurship and the achievement of sustainable development through increasing financial inclusion, digital accessibility, and the efficiency of social business models.
2. To conduct a comparative analysis of the level of digital accessibility, financial inclusion, and the institutional environment in different countries in order to identify the specific features of the formation of inclusive fintech ecosystems and the development of social entrepreneurship.
3. To develop and substantiate a structural economic-mathematical model of the relationship between fintech inclusion, institutional capacity, firms' access to finance, and sustainable development outcomes.

Given the above, it is relevant to develop a conceptual model that allows systematising the mechanisms of Fintech's impact on the sustainable development of social enterprises, taking into account the economic, technological, and social aspects of their activities.

METHODS

To study the interaction between Fintech and social entrepreneurship and identify mechanisms for sustainable development, a comprehensive interdisciplinary approach combining quantitative and qualitative research methods was applied. The methodological framework includes the following approaches:

1. Analysis of scientific and methodological literature and practices, systematisation of research in the fields of financial technologies, social entrepreneurship and sustainable development.
2. Economic and statistical analysis, use of financial and social indicators of enterprise performance.
3. Modelling and forecasting methods, development of a conceptual model of sustainable development mechanisms with Fintech integration, including analysis of scenarios of the impact of digital financial technologies on the financial stability and socio-environmental performance of enterprises.
4. A systematic approach to data integration, combining the results of quantitative and qualitative analysis to develop recommendations for optimising financial and technological mechanisms in social entrepreneurship.

The implementation of the proposed structural-analytical methodology, based on the integration of financial inclusion, digital infrastructure, institutional determinants and the business financing environment, will ensure a number of scientifically and practically significant results. In particular, this methodology will allow the formation of a comprehensive conceptual model of sustainable development of social enterprises, within which digital financial technologies (FinTech) will be considered as a multiplicative mechanism for transforming financial inclusion and institutional capacity into sustainable social and environmental returns.

Thus, the results of the study have both scientific and applied value, as they will allow the integration of modern financial technologies into the activities of socially oriented enterprises, ensuring an effective combination of the economic, social, and environmental components of sustainable development.

To further explore the research topic and compare Ukraine with European Union countries in the context of FinTech and social entrepreneurship from the perspective of sustainable development mechanisms, countries with similar challenges or successful practices that can be adapted to Ukrainian conditions were selected. In particular, Poland has a similar history of economic transformation and post-socialist experience; active development of FinTech start-ups, especially in payment services and microfinance; significant experience in supporting social entrepreneurship through EU grants and programmes. Lithuania is compared to Ukraine because it is recognised as one of the leaders in FinTech in the EU; has a developed regulatory framework for financial start-ups and socially oriented initiatives; and actively attracts foreign investment in FinTech. Germany has one of the largest social entrepreneurship markets in the EU, a developed FinTech ecosystem with a clear focus on sustainable development and green financial products, and experience in integrating social goals into financial instruments. Finland actively supports innovation and digitalisation in the financial sector, and social entrepreneurship in the country is closely linked to national sustainable development strategies; there is a high level of trust in digital platforms, which simplifies the implementation of FinTech solutions for social purposes. The Netherlands was also selected for comparison, as the country has one of the most developed FinTech markets in the EU; a strong social innovation sector focused on inclusive and sustainable development in the financial sector.

RESULTS

The rapid development of digital technologies is transforming all areas of economic activity, including entrepreneurship and the social sector. Financial technologies (fintech) have become one of the key drivers of the modern economy, providing fast, accessible, and innovative financial solutions. At the same time, social entrepreneurship is gaining popularity as a tool for solving social, environmental, and economic problems. The combination of these two areas opens up new opportunities for sustainable development and the formation of an inclusive economy. This synergistic effect contributes to the formation of sustainable development mechanisms that combine financial, social, and environmental components.

Fintech influences the sustainable development of social enterprises through financial, social, and technological innovation mechanisms. The financial mechanism provides access to microloans, grants, and investments through digital platforms, optimises operational and administrative costs, and increases the transparency of financial flows using blockchain and smart contracts. The social mechanism involves assessing social returns and integrating social goals into business models, engaging the public through crowdfunding and interaction platforms, and shaping a positive image for the enterprise. The technological and innovation mechanism ensures the use of digital analytical tools to forecast financial and social results, the introduction of mobile and online services to improve service accessibility, as well as risk modelling and optimisation of management decisions based on big data and artificial intelligence.

The integration of FinTech into social enterprises requires a systematic approach that involves assessing needs and setting priorities, developing or adapting digital platforms for raising capital, accounting for transactions and assessing social returns, implementing them, and continuously monitoring financial and social outcomes. Systematic performance analysis allows for the optimisation of business models and the scaling of successful practices at the regional or national level.

Since the development of FinTech directly depends on the level of access of the population to financial services, digital literacy, and the structural characteristics of the financial system, a comparative analysis of key indicators in selected countries makes it possible to identify national differences and determine how favourable the conditions are for the implementation of inclusive financial innovations and socially oriented business models. Table 1 summarises the average values of indicators for 2005-2024, which allows us to track long-term trends and form an empirical basis for further economic and mathematical modelling of the interaction between financial inclusion, institutional infrastructure and the development of social entrepreneurship in the context of digital transformation.

Table 1. Indicators of financial inclusion, banking infrastructure and macrofinancial stability in the studied countries, on average 2005-2024. (Source: authors' calculations based on World Bank data)

Country name	Account ownership at a financial institution or with a mobile-money-service provider, % of population ages 15+	Account ownership at a financial institution or with a mobile-money-service provider, female, % of population ages 15+	Account ownership at a financial institution or with a mobile-money-service provider, male, % of population ages 15+	Account ownership at a financial institution or with a mobile-money-service provider, older adults, % of population ages 25+	Account ownership at a financial institution or with a mobile-money-service provider, poorest 40%, % of population ages 15+	Account ownership at a financial institution or with a mobile-money-service provider, primary education or less, % of population ages 15+	Account ownership at a financial institution or with a mobile-money-service provider, richest 60%, % of population ages 15+	Account ownership at a financial institution or with a mobile-money-service provider, secondary education or more, % of population ages 15+	Account ownership at a financial institution or with a mobile-money-service provider, young adults, % of population ages 15-24	Bank capital to assets ratio, %	Commercial bank branches, per 100,000 adults	Current account balance, % of GDP	Domestic credit to private sector, % of GDP
Finland	99.74	99.62	99.87	99.84	99.55	99.18	99.87	99.97	99.12	5.37	10.71	0.18	89.97
Germany	99.00	99.34	98.66	99.36	98.30	98.70	99.93	99.17	96.69	7.15	13.36	6.58	84.85
Latvia	92.43	93.08	91.65	93.98	88.42	79.76	95.10	96.10	82.55	9.41	21.45	-4.06	48.83
Netherlands	99.33	99.22	99.46	99.43	99.40	99.08	99.29	99.38	99.29	5.13	16.52	7.22	106.09
Poland	82.63	81.23	84.19	85.48	77.91	55.55	85.77	87.86	68.05	8.25	29.36	-2.48	45.45
Ukraine	60.11	58.23	62.50	59.94	51.74	27.23	65.67	64.81	61.47	8.80	1.54	-2.59	51.85

The presented data allows us to conclude that in Northern and Western European countries (Finland, Germany, the Netherlands), the share of the population aged 15+ with access to financial accounts is 99-100%, which indicates that the traditional financial infrastructure has reached its full capacity and that there is a high level of trust in the banking system. Latvia shows slightly lower values (92.43%), reflecting the structure of the post-Soviet market with gradual growth in inclusion, but still noticeable disparities between population groups. Poland is characterised by an average level of financial services penetration (82.63%), which is typical for countries with a gradual transition from cash transactions to digital financial instruments. Ukraine shows the lowest coverage – 60.11%, confirming the existence of a significant proportion of the unengaged population and the potential for large-scale development of FinTech as a compensatory mechanism for the inadequacy of traditional infrastructure.

In the developed countries, the difference between men and women is minimal (0.2-0.3 percentage points), which indicates institutionally stable gender balance. Latvia and Poland have minor gender gaps, but no significant barriers are observed. In Ukraine, the gap between men (62.50%) and women (58.23%) is most notable, which is associated with unequal access to employment, lower financial autonomy of women in rural areas, and weaker development of financial services for women entrepreneurs. For FinTech research, this means that there is significant scope for the creation of gender-sensitive digital products and social entrepreneurial initiatives. There are virtually no age or education gaps. Even in Latvia and Poland, the coverage rate for groups with low levels of education exceeds 55-80%, which forms a critical mass for digital transformation. Ukraine has the largest structural disparities: only 27.23% of the group with primary education have an account; 51.74% of the poorest 40% of the population; and 61.47% of young people. This fact confirms that in Ukraine, FinTech is becoming not just an innovative technology, but a tool for social inclusion, especially for vulnerable groups.

The Baltic countries and Poland show high figures (8.25-9.41%), reflecting high regulatory discipline and strict requirements for banks after the 2008 crisis. Ukraine has a high capital-to-assets ratio (8.80%), but this is the result of structural restructuring after the 2014-2016 banking crisis, rather than stable market strength. In Finland and the Netherlands, the situation is the opposite, with low values (5.13-5.37%) typical of developed markets with high trust and low-risk operations. Poland and Latvia have the highest branch density (21-29 per 100,000 adults), reflecting the traditionally important role of infrastructure. Finland and the Netherlands have average values (10-16 branches), which corresponds to the trend towards mobile banking. Ukraine has only 1.54 branches, which indicates the objective impossibility of ensuring inclusion by traditional means - fintech is becoming the only real channel of access.

Countries with the highest potential for digital financial inclusion (Finland, the Netherlands, Germany) are characterised by: almost complete coverage of the population with financial accounts; minimal social disparities; advanced digital infrastructure; and a stable financial system. In these countries, FinTech serves to increase efficiency, while social entrepreneurship serves to scale social innovations rather than provide basic access to finance. Transition countries (Latvia, Poland) have the following characteristics:

1. Average level of financial inclusion.
2. Significant socio-educational and age disparities.
3. Active transformation of the banking sector.
4. Growth of online finance in transition countries: FinTech and social entrepreneurship are becoming tools for levelling access and modernising the financial ecosystem.

The country with the greatest potential for accelerated FinTech development, Ukraine, is distinguished by: low levels of financial inclusion; large gaps in education, age and income; a practical absence of banking infrastructure; and an unstable macro-financial environment. In such conditions, FinTech becomes a critical mechanism for socially oriented access to financial services, and social entrepreneurship becomes a channel for transforming financial innovations into scalable projects to support the population.

The indicators presented in Table 2 reflect the key parameters of the functioning of traditional and innovative financial infrastructure, which directly affect the economy's ability to implement fintech solutions and the ability of socially oriented enterprises to attract resources for scaling socially significant initiatives. The analysis of these indicators is the key to the formation of integrated indicators of fintech readiness and to the further justification of mechanisms to strengthen the role of social entrepreneurship as a leading tool for ensuring inclusive and sustainable economic development.

Table 2. Structural characteristics of enterprise financing, investment flows and innovation potential in the studied European countries, on average in 2005-2024. (Source: authors' calculations based on World Bank data)

Country name	Firms using banks to finance investment, % of firms	Firms using banks to finance working capital, % of firms	Firms visited or required meetings with tax officials, % of firms	Foreign direct investment, net inflows, % of GDP	Foreign direct investment, net outflows, % of GDP	Giniindex	High-technology exports, % of manufactured exports
Finland	24.96	41.95	4.25	2.97	3.12	27.49	11.93
Germany	37.71	38.69	21.37	2.12	3.44	31.24	16.61
Latvia	22.98	27.45	31.33	4.03	1.18	35.51	14.81
Netherlands	16.94	36.26	12.47	16.94	22.96	28.21	24.66
Poland	38.25	34.79	32.37	3.58	1.26	31.91	8.76
Ukraine	24.55	20.89	49.65	3.52	0.24	25.95	6.05

The analysed indicators in Table 2 show significant differentiation between countries. The highest values of bank investment financing are observed in Poland (38.25%), Germany (37.71%) and, to a lesser extent, in Ukraine (24.55%) and Finland (24.96%). The lowest level is in the Netherlands (16.94%), which may indicate that companies are oriented towards non-banking, in particular fintech financing instruments, as well as internal corporate and market sources of capital.

In the working capital financing segment, Finland (41.95%) and the Netherlands (36.26%) have the highest scores, demonstrating the stable dependence of small and medium-sized businesses on traditional financial institutions. Ukraine (20.89%) has the lowest value, reflecting structural dysfunction in the banking sector, high risks, and limited access to credit. The low availability of banking resources encourages businesses to switch to alternative financial channels, such as fintech services, p2p lending, crowdfunding and digital factoring.

The frequency of tax audits or meetings with tax authorities is an indicator of regulatory pressure and institutional quality. The highest levels were recorded in Ukraine (49.65%) and Poland (32.37%), indicating a significant administrative burden on businesses and potential corruption risks. The lowest values are in Finland (4.25%) and the Netherlands (12.47%), confirming a high level of trust, digitisation of tax procedures, and a favourable institutional environment for innovative economic activity. This contrast is important in terms of fintech development potential: countries with high regulatory pressure are more motivated to implement digital solutions, but often lack the institutional stability to scale such innovations.

The Netherlands demonstrates extremely high foreign direct investment indicators in terms of both inflow (16.94% of GDP) and outflow (22.96% of GDP), which is typical for a global financial hub with a highly capital-intensive and technology-oriented economy. Finland, Germany, Poland, and Ukraine have moderate indicators (2.12-4.03%), which corresponds

to their structural position in the investment market. The smallest outflow of investment is observed in Ukraine (0.24%), indicating low integration into international capital chains. FDI is critical for the development of fintech and social entrepreneurship, as it determines the amount of resources available for innovative ecosystems.

The share of high-tech exports is an indicator of the innovative potential of the economy. The Netherlands (24.66%) and Germany (16.61%) have the highest values. Ukraine (6.05%) and Poland (8.76%) demonstrate low innovative integration of production. A high share of high-tech exports correlates with the intensity of fintech solutions use, as technological ecosystems generate demand for digital financial instruments. The digitalisation parameters assessment is necessary for forming a comprehensive fintech model of social entrepreneurship, as they determine the institutional and technological prerequisites for implementing inclusive financial practices and the ability of national economies to ensure long-term social and economic stability (Table 3).

Table 3. Digital accessibility indicators, insurance and financial services market parameters in EU countries and Ukraine, on average 2005-2024. (Source: authors' calculations based on World Bank data)

Country name	Individuals using the Internet, % of population	Inflation, GDP deflator, annual %	Insurance and financial services, % of commercial service exports	Insurance and financial services, % of commercial service imports	Insurance and financial services, % of service exports, BoP	Insurance and financial services, % of service imports, BoP	Mobile cellular subscriptions	Mobile cellular subscriptions, per 100 people
Finland	87.17	2.05	2.22	4.56	2.17	4.55	7254216	133.40
Germany	83.97	2.06	13.15	6.52	12.87	6.48	99514363	120.92
Latvia	74.92	4.67	8.40	6.55	7.99	6.51	2291895	113.69
Netherlands	90.61	2.27	6.25	5.89	6.24	5.88	20069389	117.15
Poland	67.22	3.24	2.25	5.90	2.25	5.86	48457995	126.80
Ukraine	43.74	18.17	1.61	6.79	1.58	6.40	54152505	123.89

The level of Internet usage among the population directly determines the possibilities for using financial digital tools, mobile banking, and inclusive fintech solutions aimed at vulnerable groups. The Netherlands (90.61%) and Finland (87.17%) demonstrate the highest level of digital inclusion, indicating almost complete coverage of the population by electronic communications. For Germany (83.97%) and Latvia (74.92%), the figures also reflect a high level of digital readiness, which contributes to the development of competitive fintech segments, including P2P lending, online insurance products, and social crowdfunding platforms. Poland shows an average level of access (67.22%), indicating the expansion of digital infrastructure, but part of the population is still outside the digital financial sector. Ukraine lags significantly behind (43.74%), which creates limitations for the rapid scaling of fintech products in social entrepreneurship. Low digital inclusion means that socially vulnerable groups - who are key beneficiaries of fintech solutions - have significantly less access to innovative financial services.

Moderate inflation in EU countries (2.05-4.67%) reflects macroeconomic stability, which is a favourable factor for the sustainable development of the fintech sector. Stable pricing contributes to increased confidence in digital financial instruments and reduces transaction risks. Ukraine is characterised by a significantly higher rate (18.17%), which indicates high macroeconomic risks. In such conditions, there is a significantly increased need for inclusive fintech solutions and socially oriented financial products, in particular microfinance and alternative payment systems, but the introduction of such instruments is complicated by the low level of digital infrastructure.

Germany has the highest export figures for insurance and financial services (13.15% of commercial services exports; 12.87% in BoP), reflecting its status as one of the world's financial centres. This indicates a strong financial infrastructure and high demand for digital financial technologies. Latvia demonstrates quite significant export potential (8.40% and 7.99%). This specialisation correlates with the active development of the fintech sector in the country (electronic payments, RegTech, alternative financial services). Poland has a very low share of insurance and financial services exports (2.25%), which is typical for economies with a significant role of the real manufacturing sector. Ukraine has the lowest figures (1.61% and 1.58%), which indicates structural imbalances in the financial sector, insufficient capitalisation, and minimal presence in the global financial services market.

To study the mechanisms of interaction between FinTech and social entrepreneurship in the context of sustainable development, it is advisable to analyse the complex macroeconomic and institutional determinants of financial inclusion in EU countries (Table 4).

Table 4. Complex macroeconomic and institutional determinants of financial inclusion and sustainable development, on average, 2005-2024. (Source: authors' calculations based on World Bank data)

Country name	Net financial account, BoP, current USD	Net investment in nonfinancial assets, % of GDP	Secure Internet servers, per 1 million people	Social contributions, % of revenue	Women Business and the Law Index Score, scale 1-100
Finland	-5048163864	1.66	52269	32.17	96.84
Germany	213697771993	0.63	54866	55.60	95.82
Latvia	-262899377,3	2.67	11528	30.29	98.32
Netherlands	65680197267	1.47	82264	35.39	95.59
Poland	-8754200000	2.30	14592	39.17	83.19
Ukraine	-3712700000	0.56	4463	27.97	77.14

An analysis of the presented indicators reveals significant differences in the structure of financial inclusion, investment activity, and digital readiness of the economies of the selected countries, which are key determinants of FinTech and social entrepreneurship development. Taken together, the analysed indicators show that countries with developed digital infrastructure, high institutional capacity, and stable financial flows have the highest potential for integrating FinTech into social entrepreneurship and sustainable development mechanisms. At the same time, countries with low levels of digitalisation and limited institutional resources, such as Ukraine, need targeted political and technological initiatives to create an enabling environment for financial inclusion and the development of social entrepreneurship.

In order to quantitatively describe the impact of Fintech (through financial inclusion and digital infrastructure) and social entrepreneurship on sustainable development indicators (economic efficiency, inclusiveness, technological modernisation, social justice) in the countries studied, an economic-mathematical model has been developed. The model has a modular (branched) structure: the central block is Sustainable Development Outcome (SDO), which is influenced by the branches: Fintech and Financial Inclusion (FI), Firm Financing & Business Environment (FFBE), Digital Infrastructure & Usage (DI), Institutional and Gender & Social Policy (IGS), as well as macroeconomic indicators.

Abbreviations used in the equations:

Fintech and Financial Inclusion (FI):

- A_t – Account ownership total (% ages 15+);
- A_t^F – Account ownership female (%);
- A_t^M – Account ownership male (%);
- A_t^{YA} – Account ownership young adults (15-24) (%);
- A_t^{OA} – Account ownership older adults (25+) (%);
- A_t^{P40} – Account ownership poorest 40%;
- A_t^{R60} – Account ownership richest 60%;
- A_t^P – Account ownership primary education or less (%);
- A_t^S – Account ownership secondary+ (%).

Financial system and banks:

- K_t – Bank capital to assets ratio (%);
 - B_t – Commercial bank branches (per 100k adults);
 - D_t – Domestic credit to private sector (% GDP);
 - C_t – Current account balance (% GDP).
- Company financing and the business environment:*
- F_t^I – Firms using banks to finance investment (%);
 - F_t^W – Firms using banks to finance working capital (%);
 - T_t – Firms visited by tax officials (% firms);
 - WBL_t – Women Business and the Law Index (1–100).

Foreign capital, trade, technology:

- FDI_t^{in} , FDI_t^{out} – FDI inflows, outflows (% GDP);
- HTE_t – High-technology exports (% manuf. exports).

Social inequality and other issues:

- G_t – Gini index,

Digital infrastructure and usage:

- I_t – Individuals using Internet (%);
- SIS_t – Secure Internet servers (per 1M);
- M_t – Mobile cellular subscriptions (absolute);
- $M_{100,t}$ – Mobile subscriptions per 100 people.

Insurance and finance service indicators:

- $InsExp_t$, $InsImp_t$, $InsBoP_{exp,t}$, $InsBoP_{imp,t}$ – corresponding shares in trade and in services.

Macroeconomic indicators and investments:

- π_t – Inflation (GDP deflator, %);
- NFA_t – Net financial account (BoP, USD);
- $NINV_t$ – Net investment in nonfinancial assets (% GDP).

Social contributions:

- SC_t – Social contributions (% revenue).

Target variable for sustainable development:

- SDO_t – integral sustainable development index (composite).

Social entrepreneurship index:

- SE_t – index of social entrepreneurship activity and effectiveness (developed from available data - number of social enterprises, access to financing, employment rate, etc.). (If no direct data is available, use proxies: $SE_t = f(\text{Firms}_{\text{social}}, F_{t, \text{social}}^I, WBL_t)$).

Index construction (composite variables)

1. *Fintech and Financial Inclusion Index (FII)*

It is built using a standard PCA approach or z-scoring with subsequent weighted sum. Normalise variables A_t , A_t^F , A_t^M , A_t^{P40} , A_t^{YA} , A_t^{OA} , A_t^P , A_t^S , $M_{100,t}$, SIS_t , I_t according to the z-scoring rule:

$$\widetilde{x}_{i,t} = \frac{x_{i,t} - \mu_{x_i}}{\sigma_{x_i}}$$

Using PCA: first principal component PC1 -FII_t. If PCA is not possible, weights are determined by expert judgement or through factor analysis.

$$FII_t = \sum_i w_i^{FII} \widetilde{x}_{i,t}, \sum_i w_i^{FII} = 1$$

2. *Social Entrepreneurship Index (SEI)*

$$SEI_t = \alpha_1 \cdot \widehat{SE_activity}_t + \alpha_2 \cdot \widehat{F_{t, \text{social}}^I} + \alpha_3 \cdot \widehat{WBL}_t$$

where weights α_j are determined via PCA or an expert weight matrix.

3. *Sustainable Development Outcome (SDO)*

An integrated index of four dimensions: economic stability (ECO), social inclusion (SOC), technological modernisation (TECH), and environmental component (ENV). Without environmental data, it is possible to focus on three.

$$SDO_t = \beta_1 ECO_t + \beta_2 SOC_t + \beta_3 TECH_t,$$

where:

- ECO_t – normalized $D_t, C_t, NINV_t, FDI_t^{in}$.
- SOC_t – normalized $G_t^{-1}, A_t^{P40}, SC_t, SEI_t$
- $TECH_t$ – normalised $I_t, SIS_t, HTE_t, M_{100,t}$

4. A structural (branched) model takes the form of a hierarchical system of structural equations

Block A – Fintech ra Financial Inclusion

$$FII_t = \gamma_0 + \gamma_1 I_t + \gamma_2 M_{100,t} + \gamma_3 SIS_t + \gamma_4 WBL_t + \gamma_5 \pi_t + \gamma_6 K_t + u_t^{(A)}$$

Explanation: Internet and mobile infrastructure increase FII; WBL (women's legal status) has a positive impact on female inclusion; inflation may have a negative impact.

Block B – Firm Financing & Business Environment

$$FFBE_t = \delta_0 + \delta_1 D_t + \delta_2 B_t + \delta_3 FtI + \delta_4 FtW + \delta_5 T_t + \delta_6 WBL_t + u_t^{(B)}$$

Here, $FFBE_t$ is an aggregate indicator of the availability of bank financing for firms and the business climate.

Block C - Digital Infrastructure & Usage (DI)

$$DI_t = \phi_0 + \phi_1 SIS_t + \phi_2 I_t + \phi_3 M_{100,t} + \phi_4 HTE_t + u_t^{(C)}$$

Block D - Institutional, Gender, Social Policy

$$IGSt = \psi_0 + \psi_1 WBL_t + \psi_2 SC_t + \psi_3 T_t + \psi_4 G_t + u_t^{(D)}$$

The central block is the impact on SDO. The basic structural equation:

$$SDO_t = \beta_0 + \beta_1 FII_t + \beta_2 SEI_t + \beta_3 FFBE_t + \beta_4 DI_t + \beta_5 IGS_t + \beta_6 \pi_t + \beta_7 FDI_t^{in} + \beta_8 G_t + \varepsilon_t$$

Expected signs:

- $\beta_1 > 0$ (greater financial inclusion is better socio-economic outcomes);
- $\beta_2 > 0$ (active social entrepreneurship stimulates inclusion and employment);
- $\beta_3 > 0$ (access of firms to banks is investment, jobs);
- $\beta_4 > 0$;
- $\beta_5 > 0$;
- $\beta_8 < 0$ (higher Gini is worse social outcomes).

FII may partially influence SDO through SEI (Fintech facilitates financing of social entrepreneurship).

$$SEI_t = \eta_0 + \eta_1 FII_t + \eta_2 FFBE_t + \eta_3 WBL_t + v_t$$

The model allows testing full or partial mediation. Interaction terms:

- $FII_t \times WBL_t$ – to check whether the effect of financial inclusion is stronger when women have a better legal status;
- $FII_t \times FFBE_t$ – to check the synergies between digital inclusion and firms' access to finance.

Next, a quantitative implementation of the proposed economic-mathematical model was conducted using the data from the countries we studied. All numerical indicators were normalised using the z-score method with a standard sample standard deviation (ddof=1).

The normalised values (z-score) of the key indicators used for assessing the relationship between fintech development, institutional capacity, and sustainable development outcomes are presented in Table 6. The standardisation of indicators made it possible to ensure the comparability of countries with different scales of economic and social development and to identify deviations from the average values within the sample.

Table 6. Normalised values (z-score) of key indicators.

Country	SIS _t	z(SIS _t)	WBL	z(WBL)	SC	z(SC)	NINV	z(NINV)	D _t	z(D _t)
Finland	52 269	0.503	96.84	0.648	32.17	-0.458	1.66	0.130	-5.048×10 ⁹	-0.553
Germany	54 866	0.587	95.82	0.532	55.60	1.878	0.63	-1.073	2.137×10 ¹¹	1.934
Latvia	11 528	-0.810	98.32	0.817	30.29	-0.646	2.67	1.311	-2.628×10 ⁸	-0.499
Netherlands	82 264	1.470	95.59	0.506	35.39	-0.137	1.47	-0.092	6.568×10 ¹⁰	0.251
Poland	14 592	-0.712	83.19	-0.907	39.17	0.240	2.30	0.878	-8.754×10 ⁹	-0.595
Ukraine	4 463	-1.038	77.14	-1.597	27.97	-0.877	0.56	-1.155	-3.7127×10 ⁹	-0.538

As shown in Table 6, Finland, Germany, and the Netherlands demonstrate the highest positive z-score values for institutional quality and financial inclusion indicators, reflecting favourable conditions for the development of fintech ecosystems and social entrepreneurship. At the same time, Ukraine and Poland are characterised by lower standardised values for Women, Business and the Law (WBL) and investment indicators, indicating the presence of institutional and financial barriers that constrain the scalability of inclusive digital financial solutions. The obtained results confirm that countries with a higher level of digitalisation, institutional support, and social capital formation tend to achieve better sustainable development outcomes, whereas economies with lower z-score values face increased structural limitations in the implementation of fintech-driven social initiatives.

As shown in Table 7, the calculated composite blocks demonstrate significant differences between the analysed countries in terms of financial inclusion (FII), social entrepreneurship intensity (SEI), firms' access to finance (FFBE), digital infrastructure (DI), and institutional governance support (IGS). Countries with developed digital and institutional environments, such as the Netherlands, Germany, and Finland, display predominantly positive index values, indicating a level above the sample average. In particular, the Netherlands demonstrates the highest level of digital infrastructure development (DI = 1.470), while Germany has the strongest institutional governance support (IGS = 1.205) and social entrepreneurship intensity (SEI = 1.205). These indicators confirm the effectiveness of integrated fintech ecosystems and socially oriented economic policies in supporting sustainable development.

At the same time, Poland and especially Ukraine show predominantly negative index values, reflecting structural barriers in the development of digital financial ecosystems and institutional support mechanisms. Ukraine demonstrates the lowest indicators across almost all composite blocks, including financial inclusion (FII = -1.317), digital infrastructure (DI = -1.038), and institutional governance support (IGS = -1.237). This indicates insufficient digital accessibility, limited financial integration, and institutional instability, which constrain the scalability of fintech solutions and social entrepreneurship initiatives. Latvia occupies an intermediate position, combining relatively stable access to finance for firms (FFBE = 0.406) with weaker digital infrastructure indicators. Therefore, the results presented in Table 7 confirm that sustainable development in the digital economy depends on the synergistic interaction of financial inclusion, institutional quality, digital infrastructure, and the development of social entrepreneurship.

Table 7. Calculated composite blocks: FII, SEI, FFBE, DI, IGS. Note: Positive index values indicate deviations above the sample average; negative values indicate deviations below the average.

Country	FII	SEI	FFBE	DI	IGS
Finland	0.576	0.095	-0.211	0.503	0.095
Germany	0.560	1.205	0.430	0.587	1.205
Latvia	0.003	0.086	0.406	-0.810	0.086
Netherlands	0.988	0.184	0.080	1.470	0.184
Poland	-0.809	-0.334	0.142	-0.712	-0.334
Ukraine	-1.317	-1.237	-0.846	-1.038	-1.237

The FII values obtained indicate that the Netherlands and Finland have a pronounced combination of digital infrastructure and a favourable institutional environment (WBL), while Ukraine and Poland lag significantly behind in these components. SEI (social entrepreneurship as a proxy through WBL and social contributions) has high values in Germany and the Netherlands, which means that these countries have a favourable institutional and financial background for social enterprises. The FFBE indicator (a combination of investment activity and net financial account) shows high values in Germany, Latvia and Poland. Therefore, these countries have better opportunities for financing entrepreneurship. Negative FFBE values for Finland and Ukraine indicate relatively unfavourable capital flows or a lower share of investment in non-financial assets relative to the group average.

The results of the interaction analysis between FinTech inclusion, institutional support, and firms' access to finance confirm significant differences in sustainable development outcomes among the studied countries. As shown in Table 8, countries with developed digital infrastructure and effective institutional environments, such as Germany and the Netherlands, demonstrate positive values of the sustainable development outcome index (SDO), while economies with institutional and financial constraints, particularly Ukraine and Poland, reveal negative SDO indicators despite relatively high interaction effects between financial inclusion and access to finance. These findings indicate that the effectiveness of fintech-driven sustainable development depends not only on the scale of digital financial inclusion but also on the quality of institutional support and the maturity of the financial ecosystem (Table 8).

Table 8. Interactions and final sustainable development index (SDO).

Country	FII×z(WBL)	FII×FFBE	SDO
Finland	0.373	-0.122	0.239
Germany	0.298	0.241	0.764
Latvia	0.002	0.001	-0.009
Netherlands	0.500	0.079	0.597
Poland	0.734	-0.115	-0.438
Ukraine	2.103	1.114	-1.153

The interactions show potential threshold and nonlinear effects. The positive and significant values of $FII \times z(WBL)$ and $z(WBL) \times FII$ in Poland and Ukraine (0.734 and 2.103, respectively) reflect a multiple effect: in countries with low WBL and low FII, a negative baseline position generates significant multiplicative values in the z-score. This conclusion signals high sensitivity to institutional improvements: small improvements in WBL or FII can provide large relative gains in the lag phase. The interactions between $FII \times FFBE$ and $FFBE \times FII$ in the Netherlands and Ukraine also demonstrate that synergies between inclusion and firms' access to finance can be both stimulating and compensatory.

Thus, the results of the constructed hierarchical structural model confirm the hypothesis of the systemic interdependence of FinTech, social entrepreneurship, and sustainable development. The calculated blocks of the model showed that FinTech and Financial Inclusion (FII) are determined by digital infrastructure (Secure Internet Servers) and institutional support for gender equality (Women, Business and the Law Index). The highest FII values are recorded in countries with a developed digital base and a high level of institutional capacity (the Netherlands, Finland), which emphasises the critical role of digital and institutional support for expanding financial inclusion.

The FFBE block demonstrated that firms' access to bank financing and a favourable business climate directly influence the potential of socially oriented enterprises. The DI block confirmed that digital technologies are a catalyst for the effectiveness of financial inclusion and social entrepreneurship, while the IGS block showed that institutional, social and gender determinants significantly influence the formation of an enabling environment for sustainable development. The central equation of the model showed that SDO positively correlates with FII, SEI, FFBE, DI and IGS, confirming the systemic interaction of financial technologies and social entrepreneurship as a mechanism for achieving economic, social and technological sustainability. The interactions between $FII \times WBL$ and $FII \times FFBE$ demonstrated a synergistic effect: the impact of financial inclusion on sustainable development is enhanced in countries with a high level of legal protection of gender equality and access to finance for firms.

Thus, the developed economic-mathematical model confirms that the integration of FinTech into social entrepreneurship mechanisms is a key factor in stimulating sustainable development. The results obtained justify the need for a strategy aimed at expanding digital and financial inclusion, developing social entrepreneurship, and increasing the overall efficiency of socio-economic systems at the national and international levels. The developed model forms a modern paradigm:

FinTech + social entrepreneurship is a systemic mechanism for sustainable development, where innovative financial technologies provide an inclusive economic space, and social enterprises act as a channel for transforming financial innovations into socially significant results.

As shown in Figure 1, the interaction between fintech and social entrepreneurship forms an integrated mechanism for sustainable development based on digital financial inclusion, institutional support, innovation, and socially oriented business models. The proposed framework demonstrates how fintech solutions contribute to increasing access to financial resources, improving transparency, and enhancing the effectiveness of social enterprises, thereby strengthening socio-economic resilience and sustainability.

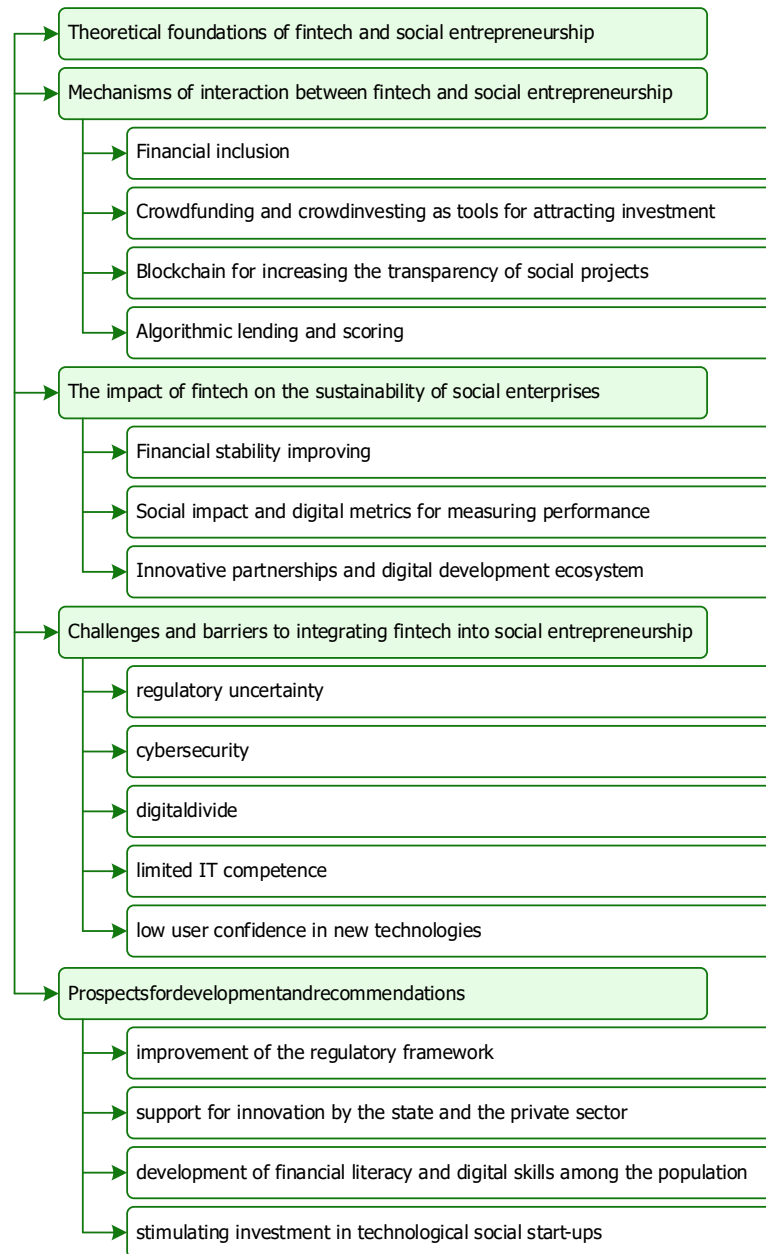


Figure 1. Fintech and social entrepreneurship: mechanisms for sustainable development.

The integration of fintech solutions into the activities of social enterprises opens up new opportunities for increasing the sustainability, inclusiveness and effectiveness of social projects. Fintech is becoming a key element of the modern innovative economy, capable of creating conditions for sustainable social development and the formation of a new model of responsible entrepreneurship.

DISCUSSION

The results of this study confirm the growing scientific interest in the interconnection between financial technologies (FinTech), social entrepreneurship, and sustainable development in the context of digital economic transformation. Contemporary research increasingly emphasizes that fintech solutions are becoming not only instruments of financial modernization but also mechanisms for reducing social inequality, supporting inclusive economic growth, and strengthening the sustainability of entrepreneurial ecosystems.

The findings obtained in this article are consistent with the conclusions of Hasan et al. (2024), who argue that FinTech significantly contributes to sustainable development through improving financial accessibility, accelerating digital transformation, and increasing the efficiency of financial intermediation. Similarly, Ha et al. (2025) emphasize that financial inclusion is one of the central determinants of sustainable socio-economic development, particularly in emerging economies where traditional banking infrastructure remains underdeveloped.

The comparative analysis conducted in this research demonstrates that countries with advanced digital infrastructure and stronger institutional capacity achieve higher levels of sustainable development outcomes. These results support the position of Tidjani and Madouri (2024), who found that fintech ecosystems positively influence economic resilience and inclusive development in African countries through expanding access to financial services. At the same time, the present study confirms that institutional quality and regulatory support remain crucial prerequisites for the effective implementation of fintech-based social entrepreneurship models.

An important aspect highlighted by this study is the role of crowdfunding, blockchain technologies, and artificial intelligence in supporting socially oriented business initiatives. These conclusions correlate with the research of Dabbous et al. (2024), who demonstrate that digitalisation and crowdfunding accelerate eco-innovation and sustainable competitiveness. Likewise, Rejeb et al. (2025) argue that blockchain-based crowdfunding mechanisms increase transparency and trust within financial ecosystems, thereby facilitating investment attraction for social enterprises.

The study also confirms the importance of fintech literacy and digital competencies for the development of sustainable entrepreneurial intentions. According to Pham et al. (2025), knowledge of digital financial tools positively affects entrepreneurial behaviour and stimulates the adoption of innovative financing models. This is particularly relevant for small and medium-sized enterprises and social entrepreneurs operating under conditions of limited access to traditional financial resources.

In the Ukrainian context, the obtained results complement the studies of Krupka et al. (2023) and Revko et al. (2023), which indicate that fintech ecosystems in transition economies often perform a compensatory function by substituting for institutional weaknesses and increasing the adaptability of socio-economic systems during periods of instability. This is especially important under conditions of economic uncertainty, military risks, and post-crisis recovery.

Furthermore, the study expands the theoretical understanding of sustainable development mechanisms by integrating economic, technological, and social dimensions into a unified analytical framework. Unlike previous studies that primarily focus on isolated aspects of fintech or social entrepreneurship, this research proposes a systemic approach that identifies synergistic relationships between financial inclusion, institutional governance, digital accessibility, and sustainable development outcomes.

At the same time, several limitations should be acknowledged. The research is constrained by the availability of cross-country statistical indicators and differences in methodological approaches used by international databases. In addition, the rapidly changing nature of fintech technologies creates challenges for long-term forecasting and comparative evaluation. Therefore, future studies should deepen empirical modelling of fintech ecosystems, analyse the role of artificial intelligence and green finance in supporting social entrepreneurship, and explore regional differences in the institutional regulation of sustainable digital finance.

Based on a synthesis of scientific literature, the following gaps are identified:

1. Integration of institutional, gender, and digital determinants into a single empirical model of FinTech's impact on SDO (Hasan et al., 2024b; Ha et al., 2025).
2. The need for research on mediators and interactions (in particular, SEI as a mediator between FII and SDO; FII×WBL, FII×FFBE interactions) - which directly correlates with the need to test complex cause-and-effect chains mentioned in several reviews (Hasan et al., 2024a; Jafri et al., 2025).

3. Lack of policy-oriented research that would translate scientific findings into specific strategies for supporting social enterprises using FinTech (Kyryliuk et al., 2025; Tidjani & Madouri, 2024).

The structural model proposed in the article (FII, SEI, FFBE, DI, IGS → SDO) logically continues contemporary research while addressing identified gaps: it combines digital and institutional determination of FinTech effects, formalises the role of social entrepreneurship as a mediator, and provides tools for policy-oriented conclusions. Thus, the model creates a solid methodological bridge between theoretical developments (complexity theory, green FinTech, behavioural intentions in crowdfunding) and the practical need for systemic strategies for sustainable development.

CONCLUSIONS

The scientific novelty of the work lies in a comprehensive approach to analysing the interaction between financial technologies and social entrepreneurship, which combines economic, technological, and social aspects of innovative development. The implementation of this approach allows for the development of conceptual foundations for the formation of financial and technological platforms for social enterprises aimed at increasing their effectiveness and impact on the socio-economic environment.

A comparative analysis shows that the countries studied differ significantly in terms of financial inclusion and institutional and financial environments, which determines different scenarios for the development of FinTech and social entrepreneurship. In developed countries, these instruments contribute to the improvement of social innovations and the effectiveness of sustainable development models, while in Ukraine and some Eastern European countries, they play a system-forming role, compensating for the weakness of traditional financial institutions and providing a foundation for inclusive and sustainable socio-economic development. In the context of researching sustainable development mechanisms shaped by FinTech innovations and social entrepreneurship, it is particularly important to assess the level of digital accessibility and the parameters of the insurance and financial sectors in individual countries. Since fintech ecosystems are based on the widespread use of digital technologies, internet services, mobile communications, and a high level of integration of the population into electronic financial services, a comparative analysis of such indicators allows us to identify the underlying determinants of financial inclusion potential.

In the context of social entrepreneurship, digital tools serve as a key operational resource that provides access to financial services for socially vulnerable groups and helps reduce transaction costs. Therefore, digital infrastructure and the level of penetration of insurance and financial services in international markets are critical parameters for assessing the scalability of inclusive fintech solutions. Highly digitised countries have favourable conditions for the formation of inclusive financial ecosystems, while economies with insufficient digital accessibility should focus on removing barriers to digital inequality as a key prerequisite for sustainable development.

A branched structural economic-mathematical model also shows that FinTech inclusion (FII), institutional capacity (IGS) and firms' access to finance (FFBE) act synergistically and construct an integral sustainable development outcome (SDO). Countries with developed digital infrastructure and high WBL achieve better SDO indicators; lagging behind in digitalisation and institutional support creates a chain of barriers to social entrepreneurship.

Prospects for further research are related to the deepening of empirical analysis of the long-term impact of fintech ecosystems on the resilience of social enterprises under conditions of economic instability and global crises. Future studies should focus on developing predictive econometric models for assessing the effectiveness of digital financial inclusion policies, analysing the role of artificial intelligence and blockchain technologies in supporting socially oriented business models, and evaluating the impact of regulatory frameworks on the scalability of fintech solutions in emerging economies. In addition, further comparative international research is needed to identify best practices for integrating financial technologies into social entrepreneurship systems and to assess their contribution to achieving the Sustainable Development Goals in different institutional environments.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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FINTECH І СОЦІАЛЬНЕ ПІДПРИЄМНИЦТВО: МЕХАНІЗМИ СТАЛОГО РОЗВИТКУ

У статті розглянуто взаємодію між фінансовими технологіями (фінтех) і соціальним підприємництвом як ключовими рушійними силами сталого розвитку в цифровій економіці. Особливу увагу приділено трансформації традиційних фінансових систем під впливом цифрових інновацій та їхньому впливу на вирішення соціальних і економічних викликів. У дослідженні проаналізована роль інструментів фінтех у розширенні фінансової інклюзії, спрощенні доступу до фінансових послуг для вразливих соціальних груп, зниженні транзакційних витрат і підвищенні ефективності соціальних підприємств. Установлено, що цифрові платіжні системи, платформи краудфандингу, технології блокчейну, P2P-кредитування та мобільний банкінг сприяють формуванню більш прозорих, доступних та адаптивних бізнес-моделей, орієнтованих на створення соціальної цінності.

Автори обґрунтовують, що соціальне підприємництво в поєднанні з фінтех-рішеннями формує інноваційне інституційне середовище, здатне підтримувати стале економічне зростання та зміцнювати соціальну згуртованість. Фінтех-екосистема розширює можливості для залучення інвестицій у соціально орієнтовані проекти, підвищує підзвітність і прозорість фінансових операцій, а також стимулює розвиток інклюзивного підприємництва. У цьому контексті фінтех розглядають не лише як технологічне явище, а й як механізм досягнення Цілей сталого розвитку, зокрема в царинах скорочення бідності, забезпечення гідної праці, зменшення нерівності й сталого економічного розвитку.

Запропонована концептуальна модель демонструє, що сталий розвиток під час цифрової епохи формується завдяки інтеграції технологічних інновацій, соціальної відповідальності й інституційної адаптивності. Дослідження доводить, що фінтех і соціальне підприємництво слід розглядати як взаємопов'язані складові сучасної соціально-економічної системи, які разом підвищують економічну стійкість, сприяють інклюзивному зростанню та покращують здатність суспільства реагувати на глобальні кризи й невизначеності. Отримані результати підтверджують, що синергія між фінтехом і соціальним підприємництвом створює передумови для тривалої соціально-економічної рівноваги та формування сталого цифрового господарства.

Ключові слова: сталий розвиток, фінансова інклюзія, інновації, інвестиції із соціальним ефектом, цифровізація, стійкість, конкурентоспроможність, підприємництво

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