THE ROLE OF DIGITALIZATION IN SHAPING NEW **GENERATION MARKETS**

Monograph

Edited by
Irina Tatomyr
Communal institution «Center for Professional Development of Pedagogical Workers» Boryslav City Council (Ukraine)

Yuri Shulzhik
Precarpathian Institute named of M. Hrushevsky of Interregional Academy
of Personnel Management (Ukraine)

eBook ISBN 978-80-53072-63-2

OKTAN PRINT
PRAHA 2026

Recommended for publication by the Precarpathian Institute named of M.Hrushevsky of Interregional Academy of Personnel Management (Protocol №4 dated 15.04.2026)

Reviewers:
Levan Jakeli Professor, Dean of the Faculty of Law of Batumi State University. Sh. Rustaveli (Georgia)

Justyna Krzywkowska, Doctor of Law, assistant professor Department of Legal Theory and History Faculty of Law and Administration University of Warmia and Mazury in Olsztyn (Poland)

Oksana Vivchar, Doctor of Economic Sciences, Professor of the Security, Law Enforcement Practice and Financial Investigations Department Ternopil National Economic University, Academician of Academy of Economics Sciences of Ukraine (Ukraine)

Editors:
Irina Tatomyr PhD in Economics, Associate Professor
Yuri Shulzhik Ph.D in Economics, Associate Professor

THE ROLE OF DIGITALIZATION IN SHAPING NEW GENERATION MARKETS**:** monograph. Edited by Irina Tatomyr, Yuri Shulzhik. Praha: OKTAN PRINT, 2026, 533 p.

No part of this eBook may be reproduced or transmitted in any form or by any means, electronic, mechanical, recording, or otherwise, without written consent from the Publisher

The publication is assigned with a DOI number: https://doi.org/10.46489/trodisngm-26-08

The publication is available in electronic version on the website: https://www.oktanprint.cz
Cover design: Irina Tatomyr

eBook ISBN 978-80-53072-63-2

OKTAN PRINT s.r.o.
5. května 1323/9, Praha 4, 140 00
www.oktanprint.cz
tel.: +420 770 626 166
© Copyright by OKTAN PRINT s.r.o., 2026

Contents

1. **NON-PROFIT ORGANIZATIONS AS ENTITIES OF SUSTAINABLE DEVELOPMENT MARKETS**
Iryna Bilyk…… 8

2. **THE ROLE OF DIGITAL PLATFORMS IN MARKETING PROCESSES**
Iryna Bilyk…… 19

3. **THEORETICAL AND METHODOLOGICAL FOUNDATIONS OF HYBRID FINANCIAL STABILITY IN THE DIGITAL ECONOMY**
Olena Borzenko, Anna Hlazova…… 29

4. **GREEN DIGITALIZATION: THEORETICAL AND METHODOLOGICAL PRINCIPLES AND APPLIED ASPECTS**
Mykola Budanov, Yuliia Oliinyk, Pavlo Budanov, Kostiantyn Brovko…… 43

5. **THE ROLE OF THE INTERNET OF THINGS IN FORMING SMART MARKETS: ECONOMIC EFFECTS, MARKETING TRANSFORMATIONS AND TECHNOLOGICAL PROSPECTS**
Viktoriia Vasiuta, Vasyl Vasiuta…… 56

6. **DIGITALIZATION AND INVENTORY MANAGEMENT IN SUPPLY CHAINS**
Olha Hirna…… 66

7. **DIGITAL PLATFORMS AND CYBER-PHYSICAL SYSTEMS AS STRUCTURAL DRIVERS OF TRANSFORMATION IN ENGINEERING PRODUCT MARKETS**
Lesia Gnylianska …… 77

8. **EDUCATIONAL AND DIGITAL TOOLS OF HEALTHCARE MANAGEMENT IN THE CONTEXT OF THE DIGITAL TRANSFORMATION OF SERVICE MARKETS**

Serhii Horishchak…… 88

9. **INTEGRATING HUMANITARIAN DATA EXCHANGE OPEN DATA INTO GEOMARKETING SITE SELECTION MODELS**
Svitlana Danshyna, Artem Nechausov…….. 99

10. **PROMISING DIGITALIZATION TOOLS AND LEGAL ASPECTS OF PUBLIC HEALTH IN UKRAINE**
Oleksii Demikhov, Karina Taraniuk, Yulia Matvieieva, Yulia Opanasiuk, Nadiia Demikhova, Iryna Nikitina…….. 110

11. **USING ARTIFICIAL INTELLIGENCE IN THE POST-WAR RECOVERY OF UKRAINIAN AUTOMOTIVE ENTERPRISES**
Andriy Didyk, Anton Lazarev …… 119

12. **MODERN DIGITAL TECHNOLOGIES IN THE LIVESTOCK**
Liudmyla Didkovska…… 131

13. **THE USE OF GEOINFORMATION TECHNOLOGIES IN MODERN UKRAINE AND THE PROSPECTS FOR THEIR DEVELOPMENT IN THE POST-WAR PERIOD**
Yurii Kyselov, Mykhailo Shemiakin, Petro Borovyk, Iryna Udovenko, Oleksandr Balabak…… 141

14. **STRATEGIC ASPECTS OF IMPLEMENTING INNOVATIVE EMPLOYEE MOTIVATION TOOLS IN THE CONTEXT OF DIGITALIZATION**
Zoriana Koval…… 152

15. **THE IMPORTANCE OF DIGITALIZATION IN TRAINING SPECIALISTS IN DISTANCE LEARNING**
Tetiana Kovalchuk, Ivan Maksimov, Halyna Tkachenko…… 163

16. **DIGITALIZATION OF LABOR IN THE CONTEXT OF EFFECTIVE TRANSFORMATION OF HUMAN CAPITAL**
Natalia Kozmuk…… 184

17. **E-COMMERCE IN THE DISTRIBUTION OF GOODS IN THE PET FOOD MARKET**
Nataliia Kuzo, Nataliia Kosar, Nataliia Pytulyak…… 194

18. **TOKENIZATION OF THE HEALTHCARE RESOURCE PROVISION SYSTEM: A PUBLIC ADMINISTRATION ASPECT**
Larysa Kurnosenko…… 205

19. **DIGITAL TECHNOLOGIES AS DRIVERS OF MARKET INTERACTION TRANSFORMATION: VIRTUALIZATION, INTELLECTUALIZATION, AND INSTITUTIONAL MARKET GOVERNANCE**
Oksana Urikova, Yuliana Mysko…… 218

20. **FORMATION OF SECURE DATA-DRIVEN DIGITAL MARKETS THROUGH THE INTEGRATION OF IOT, BIG DATA, AND CYBERSECURITY TECHNOLOGIES**
Ulyana Panovyk…… 261

21. **RECOMMENDATIONS ON THE DEVELOPMENT OF FLEXIBLE PRICING TECHNOLOGY IN E-COMMERCE UNDER CONDITIONS OF FOREIGN ECONOMIC ACTIVITY**
Nataliia Petryshyn, Olha Podra…… 284

22. **DESIGNING NEXT-GENERATION MARKETS: INTEGRATING TRIZ AND DESIGN THINKING**
Kateryna Protsak, Khrystyna Bespalyuk …… 294

23. **PUBLIC FINANCES OF UKRAINE IN THE ERA OF DIGITALIZATION: CHALLENGES AND DEVELOPMENT PROSPECTS**
Yurii Radionov…… 306

24. **TRANSFORMATION OF AGRICULTURAL MARKETS UNDER THE INFLUENCE OF DIGITALIZATION: ECONOMIC AND ENVIRONMENTAL ASPECTS**
Tetiana Ratoshniuk, Viktor Ratoshniuk, Viktor Ratoshniuk, Alla Sokolova, Anna-Mariia Humeniuk…… 319

25. **DIGITIZATION OF HR MARKETING IN THE CONDITIONS OF COMPETITIVE CHANGES IN TARGET MARKETS**
Svitlana Reshmidilova, Pavlo Aleinyk, Denis Bondarenko…… 330

26. **DEVELOPMENT OF TERRITORIAL COMMUNITIES BASED ON THE IMPLEMENTATION OF DIGITAL**

TECHNOLOGIES TO INCREASE THEIR SOCIO-ECONOMIC POTENTIAL
Olha Rudachenko, Troian Vladyslava, Uhodnikova Olena, Milicia Volkova, Roman Viatkin…… 341

27. **DIGITAL TRANSFORMATION AS A DRIVER OF CHANGE MANAGEMENT AND HUMAN CAPITAL COMPETENCY DEVELOPMENT IN NEW-GENERATION MARKETS**
Nataliia Smolinska…… 368

28. **FEATURES OF APPLYING DIGITAL TECHNOLOGIES IN AGRICULTURE**
Svitlana Stender…… 380

29. **FEATURES OF FORMATION OF MODERN QUANTUM BUSINESS MODELS**
Oleksiy Stupnytskyy, Volodymyr Vergun, Dmytro Rasshyvalov, Igor Golubii, German Panikar …… 406

30. **ANALYSIS AND FORECAST OF THE BIG DATA ANALYTICS MARKET**
Svitlana Tiutchenko, Oleksandra Tiutchenko…… 419

31. **DIGITIZATION TRENDS OF THE INVESTMENT CAPITAL MARKET OF THE EU COUNTRIES IN THE CONTEXT OF ATTRACTING VENTURE FINANCING**
Inna Ukhanova, Olena Kretova …… 429

32. **NEURO-MARKETING TOOLS IN DIGITAL TRADE: INFLUENCE ON CONSUMER DECISION-MAKING IN GLOBAL MARKETS**
Iryna Shevchenko, Veronika Furtune …… 441

33. **DIGITAL BRANDING OF THE ENTERPRISE AS A TOOL OF MARKETING COMMUNICATIONS FOR THE PROMOTION OF ECOLOGICAL PRODUCTS ON THE INTERNATIONAL MARKET**
Nadiia Yurkiv, Ivan Didovych, Nataliia Nalyvaiko…… 456

34. **CRITERIA ANALYSIS OF SELECTING THE OPTIMAL CRM TO IMPROVE THE CUSTOMER CAPITAL MANAGEMENT SYSTEM**
Angelika Azarova, Yaroslav Voitsekhivskyi…… 471

35. **RATIONAL CHOICE IN THE ECONOMICS OF CRIME AND PUNISHMENT: INSTITUTIONAL CONSTRAINTS AND THE BEHAVIOR OF ECONOMIC AGENTS**
Valerii Osetskyi, Kateryna Derevianchuk…….. 486

36. **DIGITALISATION OF INFRASTRUCTURE ASSET MANAGEMENT AS AN INTEGRATED ECONOMIC RESOURCE COMPONENT IN BUSINESS PROCESSES**
Yuliia Moroz, Dmytro Beder, Yusef Tsal-Tsalco, Svitlana Chugaievska, Tetiana Sharuk…… 502

31. DIGITIZATION TRENDS OF THE INVESTMENT CAPITAL MARKET OF THE EU COUNTRIES IN THE CONTEXT OF ATTRACTING VENTURE FINANCING

Inna Ukhanova
PhD in Economics, Associate Professor,
Head of the Department of International Economic Relations
Odesa National Economic University
E-mail: inna.uhanova@gmail.com
ORCID: https://orcid.org/0000-0003-3510-382X

Olena Kretova
PhD in Economics,
Associate Professor of the Department of International Economic Relations
Odesa National Economic University
E-mail: mindovaolena@ukr.net
ORCID: 0000-0002-4191-1375

Introduction. The modern architecture of global finance is at the stage of fundamental transformation, where digitalization acts not only as a technological catalyst, but also as a determining factor in the reformatting of the investment capital market. For the countries of the European Union, this process is gaining strategic importance in the context of the development of the Single Digital Market and the desire to ensure the technological sovereignty of the European region. From this point of view, research into the trends of digitalization of the EU investment sector is of significant interest, which are due to the need to overcome market fragmentation and the introduction of innovative tools, such as asset tokenization, smart contracts and algorithmic capital management. The development of this issue in the European space is characterized by the transition from the point implementation of financial technologies to the creation of a comprehensive regulatory ecosystem. At the same time, the dynamic growth of venture capital in the DeepTech sector and the active integration of artificial intelligence into investment analytics create new challenges for the stability of the financial system. Despite intensive technological progress, the mechanisms for adapting traditional investment institutions to the conditions of high volatility of digital assets and the issue of cyber resilience of cross-border capital flows remain insufficiently studied.

The relevance of studying this process in the context of the activation of venture investment is determined by the critical need to overcome the historical fragmentation of European financial platforms, which has long hindered the free movement of capital and the scaling of high-tech startups. The creation of a single digital investment space allows to eliminate cross-border barriers and provide investors with transparent access to real-time data analytics, which fundamentally changes the mechanisms for making investment decisions. Of particular importance is the institutionalization of digital assets, which became possible due to the formation of a clear legal framework for cryptoassets and ensuring the operational

stability of digital finance, which transforms digitalization from a source of systemic risks into a controlled and attractive ecosystem for large institutional investors.

Literature review. The dynamic transformation of the architecture of financial markets under the influence of global digitalization has become the object of close attention of both leading international institutions and representatives of the academic community. The modern scientific discourse around the problems of attracting venture capital in the context of digital convergence of capital is focused on finding a balance between innovative development and regulatory stability. In particular, analytical studies of leading international and European institutions of the financial sector emphasize structural gaps in attracting capital with the dominance of a key trend in the form of increased investment in DeepTech [1]; the role of AI as a central driver of innovation and the shift of investors' focus to digital infrastructure, which is critical for scaling advanced AI systems in the EU, are emphasized [2]. The analytical work also assesses the effectiveness of financing the goals of the EU's "Digital Decade", emphasizing the role of investments in digital transformation, where the priorities are the digitalization of business and the public sector, which creates a favorable macroeconomic environment for venture capital investments in technology companies [3]. The need to accelerate the development of the venture capital ecosystem in the EU by reducing regulatory friction and digitalization within the framework of the Common Capital Market initiatives as a key means of attracting institutional investors has been repeatedly emphasized [4].

The research of representatives of academic schools explores the synergy between the development of the Capital Markets Union (CMU) and the development of financial technologies, emphasizes that digitalization is a key tool to overcome the fragmentation of the European investment space, the use of fintech platforms allows to reduce information asymmetry for venture investors and to finance small and medium-sized enterprises more efficiently in a cross-border context [5]. It emphasizes that today achieving synergy of digital technologies and data elements has significant advantages in increasing the convenience, accessibility and security of cross-border transactions [6]; and also describes how digital finance expands participation through mobile applications, platform-based investing and decentralized financial technologies mainly through technologically structured interaction [7].

Meanwhile, despite the significant interest in the topic under study in previous years, there is a need for further research and substantiation of the theoretical and methodological foundations of the digitalization of the investment market of the EU countries, as well as an assessment of the impact of digitalization on the intensification of venture investment in the EU in the context of global digital competition. The need to study this topic is dictated by the need to develop effective strategies to increase the investment attractiveness of modern economies and minimize systemic risks that arise in the process of global digital convergence of financial markets. Given Ukraine's European integration aspirations, studying the EU experience is critically important for developing domestic strategies for the

digitalization of the financial sector, which will allow attracting European venture capital to the recovery of the Ukrainian economy.

Results. The process of forming a common capital market of the European Union has undergone a long evolution from the classic bureaucratic harmonization of national legislation to the creation of a high-tech digital ecosystem. In the initial stages, covering the end of the 20th and the beginning of the 21st century, the main efforts of regulators were focused on eliminating physical and legal barriers to cross-border capital movements [8]. During this period, digitalization was manifested mainly in the automation of stock exchange transactions and the transition from paper carriers to electronic systems for recording ownership rights to securities, which laid the technical foundation for the future integration of financial infrastructures.

A cardinal turn in the market development strategy occurred after the global financial crisis, when the Common Capital Market initiative was officially announced in 2015. This moment coincided with the rapid development of the financial technology sector, which forced European institutions to reconsider traditional approaches to investment. Digitalisation began to be seen not simply as a technical upgrade but as a tool for the democratisation of capital, allowing retail investors to gain direct access to markets through mobile platforms and digital brokerage apps [5]. This helped to overcome market fragmentation as digital services were more easily scaled across the Community, bypassing outdated national restrictions.

The current stage of development is characterized by the transition to the concept of "digital finance", where a key role is assigned to distributed ledger technology and artificial intelligence [9]. The adoption of innovative regulations, such as MiCA for crypto-assets and DORA for cybersecurity, demonstrated the EU's desire to become the world's first regulated hub for tokenized capital [10]. The introduction of smart contracts and algorithmic asset management has significantly reduced transaction costs and accelerated settlements, making the European market more competitive compared to American or Asian platforms. A systematized chronology of the formation of the EU's common capital market in the context of its digital transformation is presented in Table 1.

If we characterize the identified stages in more detail, it should be noted, firstly, that fragmentation has been overcome through technological convergence. Historically, the EU capital market has remained segmented along national borders, which has hindered the scaling of startups. Digitalization (in particular, the European Single Access Point initiative — ESAP) creates a single transparent environment where company data is available to venture funds in real time [10]. This is critical for activating cross-border investment, as digital tools eliminate geographical barriers and reduce the costs of finding investment objects.

Secondly, the institutionalization of digital assets and investor confidence. The introduction of the MiCA and DORA regulations in 2023–2024 transformed digitalization from a risky area into a regulated ecosystem [11]. This became a powerful signal to large venture funds and institutional investors, who previously avoided digital assets due to legal uncertainty.

Table 1

Stages of formation and digitalization of the EU common capital market

Stage and Timeline	Stage description	Key achievements and digital trends
1. Fundamental Stage (1999–2014)	Creation of the regulatory framework and harmonization of securities trading rules within the FSAP.	Transition of stock exchanges to electronic trading systems. Displacement of "voice" trading by algorithmic systems. Unification of rules for admission of securities to listing.
2. CMU Launch and FinTech Wave (2015–2018)	Official launch of the Capital Markets Union (CMU) to diversify business financing sources and reduce the role of banks.	Adoption of the FinTech Action Plan. Emergence of neobanks (Revolut, N26) and crowdfunding platforms. Democratization of investments through mobile applications.
3. Digital Breakthrough (2019–2022)	Recognition of digitalization as priority No. 1 for the EU's global competitiveness.	Implementation of Open Banking principles. Launch of a pilot regime for DLT infrastructures. Automation of investment portfolio analysis.
4. Regulatory Maturity and AI (2023–2025)	Formation of the world's first holistic regulatory ecosystem for digital assets and cybersecurity.	Entry into force of MiCA and DORA regulations. Active tokenization of assets and issuance of digital bonds. Use of AI for predictive analytics and AML monitoring.

Source: Developed by the authors based on Invest Europe (2025) data, European Commission (2024), Aben and Etti (2022), AFME (2024), European Central Bank (2025)

Third, the dominance of AI and DeepTech in the capital structure. The modern venture capital market is undergoing a transformation: investments are moving from simple software to complex technologies (AI, quantum computing, blockchain) [6]. The digitalization of the common market provides the necessary infrastructure (cloud computing, shared databases) for the development of these projects. Studying this factor allows us to understand how the EU plans to compete with the USA and China for technological leadership by 2030 [11].

Fourth, democratization and liquidity through tokenization. Digitalization allows the use of asset tokenization and secondary markets for shares in startups. This solves the main problem of venture capital - low liquidity and a long waiting period for exit. Research into digital mechanisms for exiting investments is extremely relevant for increasing the overall dynamics of capital circulation in the EU [8].

A comparative analysis of the stages of the formation of the EU capital market and the dynamics of venture investment demonstrates a direct correlation between the level of regulatory maturity and the volume of digital capital raised. Each stage of institutional integration was accompanied by a corresponding technological leap.

At the fundamental stage (1999–2014), when the volume of venture investment was minimal (stable below €10 billion), digitalization was mainly infrastructural in

nature. The introduction of the FSAP plan created a legal opportunity for cross-border operations, and the transition of exchanges to electronic trading prepared the technical ground for future liquidity [1; 4; 8]. Low investor activity during this period was explained by the lack of convenient digital tools for retail capital and high fragmentation of national markets.

The launch of the CMU and the FinTech wave (2015–2018) were a turning point that initiated a steady growth of the market to the level of €20–30 billion. The regulatory recognition of fintech through the FinTech Action Plan coincided with the emergence of the first generation of neobanks. This created a new category of investment assets - digital platforms, which made access to the capital market accessible via smartphones [1; 8]. The period of digital breakthrough (2019–2022) is characterized by an anomalous peak (over €100 billion in 2021) [1; 4]. While much of this growth was due to excess liquidity during the pandemic, the EU's strategic decision to implement the Digital Finance Strategy 2020 and the principles of Open Banking created the conditions for a qualitative transformation [5; 8]. The use of blockchain has begun to transform from an experimental technology into a real market infrastructure tool, attracting institutional investors to digital assets.

The current stage of regulatory maturity (2023–2026) reflects the phase of a sustainable market recovery after the 2023 correction. The introduction of MiCA and DORA regulations has eliminated legal uncertainty, which is critical for long-term capital. Growth is based on the synergy of the legal field and the aggressive implementation of AI. If earlier digitalization was aimed at the "interface" (mobile applications), now it is integrated into the "intelligence" of the market (AI predictive analytics and asset tokenization), which provides a much higher efficiency of investment capital allocation [10].

It should be noted that in 2025, 36% of European venture capital dollars were invested in companies engaged in deep technologies. In 2021, this figure was only 19%. At the same time, the EU still lags behind its competitors on a global scale both in terms of the size of investments in deep technologies and their concentration. If EU investments in the Deep Tech sector, i.e. companies and startups whose solutions are based on fundamental scientific discoveries or complex engineering developments, amounted to 16 billion euros in 2025, then in the USA this figure reaches 130 billion, significantly increasing investment indicators and the Asian region (15 billion euros in 2025) [11; 12].

Overall, the modern architecture of the European investment capital market in the period 2024–2025 shows signs of a deep structural transformation, moving from the recovery stage to the phase of qualitative digital growth. Financial sector statistics support the hypothesis that digitalization has become a key stabilizing factor after the volatility of 2023. In particular, the FinTech sector has shown a 10% increase in investment activity. The dominance of artificial intelligence as the main vector of development is particularly significant: the volume of capital directed to European AI companies has increased by 35%, amounting to about €3 billion [12]. This indicates a change in the investment paradigm, where technological intellectualization is becoming a basic requirement for ensuring the competitiveness of financial institutions.

An important aspect of the relevance of the study is the growing inclusiveness of digital assets among the population of the eurozone. According to the European Central Bank, at the end of 2024, almost one in ten households (9.7%) owned digital assets, and in some jurisdictions this figure exceeded the threshold of 21% [11]. This trend indicates a massive digital transformation of private capital accumulation strategies, which requires the appropriate adaptation of market infrastructure. At the geographical level, not only the leadership of traditional hubs is observed, but also the processes of decentralization of capital. Despite the stable growth of the German and French markets, regional innovation centers, such as Munich in Germany, which has overtaken Berlin, play an increasingly important role. The case of Estonia, where the added value of financial services increased by 7.54% due to blockchain integration, illustrates the effectiveness of the "digital intensity" strategy for small economies [12; 13].

Fundamental changes also cover the technological tools of investment. The high degree of readiness of market participants to implement tokenization indicates an inevitable transition to programmable financial assets. At the same time, there is a rapid scaling of artificial intelligence into the real sector: in one year, the share of EU enterprises that have integrated AI has increased from 8% to 13%, and in large businesses this indicator has reached a critical mass of 41% [11; 14]. This process is accompanied by the formation of a new paradigm of digital resilience, where the entry into full force of the DORA regulation from 2025 creates a rigid regulatory framework for the protection of financial systems. Thus, it can be noted that the EU common capital market is at the point of irreversible transition from traditional models to integrated digital ecosystems, where technological excellence is inseparable from financial resilience.

To identify strategic vectors for the development of the financial system in conditions of high uncertainty and technological turbulence, a predictive model of the digitalization of EU venture capital was built. This approach allowed us to separate short-term market fluctuations from the fundamental patterns of digital transformation in order to objectively assess the real potential of the European capital market and determine its resilience to external macroeconomic shocks. If the previous decade was characterized by the quantitative accumulation of digital services, the next stage is based on a qualitative leap due to the introduction of artificial intelligence and DeepTech. The forecast also serves as an indicator of the extent to which the harmonization of EU digital legislation is able to convert into a real inflow of institutional investments, providing legal certainty for cross-border capital movements. The main stages of the study are outlined in Table 2.

The construction of a predictive model of venture capital attraction in the EU (2010–2030) is based on a combination of retrospective analysis and scenario forecasting methods. The proposed graph clearly reflects three phases: gradual growth (until 2020), an anomalous peak (2021) with a subsequent correction (2023) and an exponential recovery (2024–2030), where AI startups and DeepTech are the main drivers (Fig. 1)

Table 2

Characteristics of the stages and parameters of the predictive model of digitalization of EU venture capital by 2030

Procedure Stage	Content and tools	Key parameters and variables
1. Formation of a retrospective base	Collection of statistical data for 2010–2023 (sources: Invest Europe, Statista, Dealroom).	Investment volume, number of deals, share of digital startups.
2. Filtering of anomalous deviations	Elimination of the "noise" of the post-pandemic peak in 2021 using the exponential smoothing method.	Smoothing factor, which eliminates excess liquidity.
3. Identification of growth drivers	Analysis of the impact of AI and DeepTech on the capital structure (2023–2024).	Weight of AI segment, volume of uninvested capital.
4. Mathematical modeling	Selection of a combined model: linear regression + logistic S-curve.	CAGR, level of market saturation.
5. Scenario forecasting	Calculation of three scenarios (pessimistic, baseline, optimistic) until 2030.	Macroeconomic indicators (ECB rates, MiCA/DORA implementation rate).
6. Verification of results	Comparison of the forecast curve with the targets of the "EU Digital Decade 2030"	Forecast error.

Source: Developed by the authors based on Invest Europe (2025) data, Statista (2025), Atomico (2025), OECD (2026), Gartner (2026)

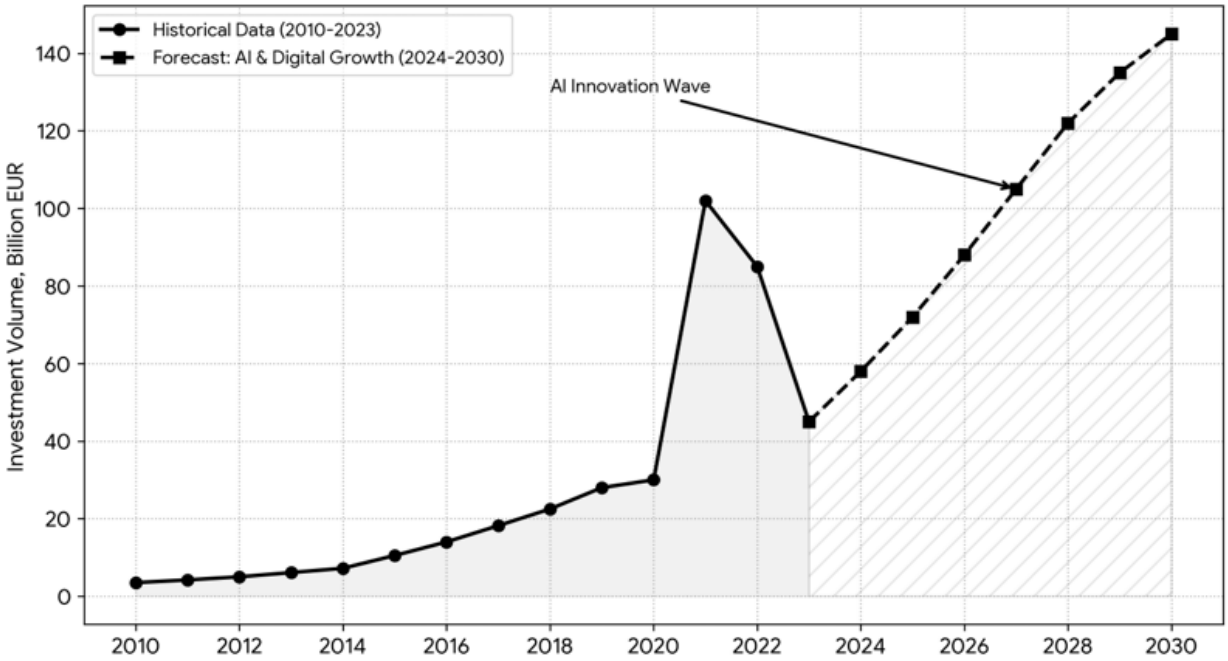


Figure 1. Dynamics of venture capital attraction in the EU (2010–2023) and predictive modeling of market digitalization growth driven by AI and DeepTech sectors until 2030.

Source: Developed by the authors based on Invest Europe (2025) data, Statista (2025), Atomico (2025), OECD (2026), Gartner (2026), European Central Bank (2026)

The modeling results shown in Fig. 1 can be characterized as follows: during the stagnation period (2010–2015), the data record a low base (up to €10 billion), which corresponds to the stage of ecosystem formation. During the period of

digitalization scaling (2016–2020), a steady growth trend is recorded. In the period 2021–2022, the data are adjusted taking into account post-pandemic excess liquidity, and in 2023, a correction point is marked, which is the definition of the real market base after the fall in startup valuations. In order for the anomalous peak of 2021 not to distort the forecast until 2030, the exponential smoothing method is used. This allows us to separate temporary speculative capital from the fundamental trend of digitalization of the EU economy. At the stage of 2024–2030, a phase of rapid growth was established, which is characteristic of the mass implementation of AI. It is important to analyze the share of AI startups in the overall VC structure: if in 2020 it was <10%, then by 2030 it is projected at 40-50%. The resulting model demonstrates a moderately optimistic scenario, which predicts a recovery in growth rates due to DeepTech and AI, reaching €145 billion by 2030. In general, the conclusion of the modeling is that the digitalization of the EU capital market is moving from quantitative accumulation to qualitative transformation through AI.

The prospects for further digitalization of the European Union investment market are likely to be determined by the transition from fragmented technological solutions to the creation of a holistic integrated ecosystem (Fig. 2).

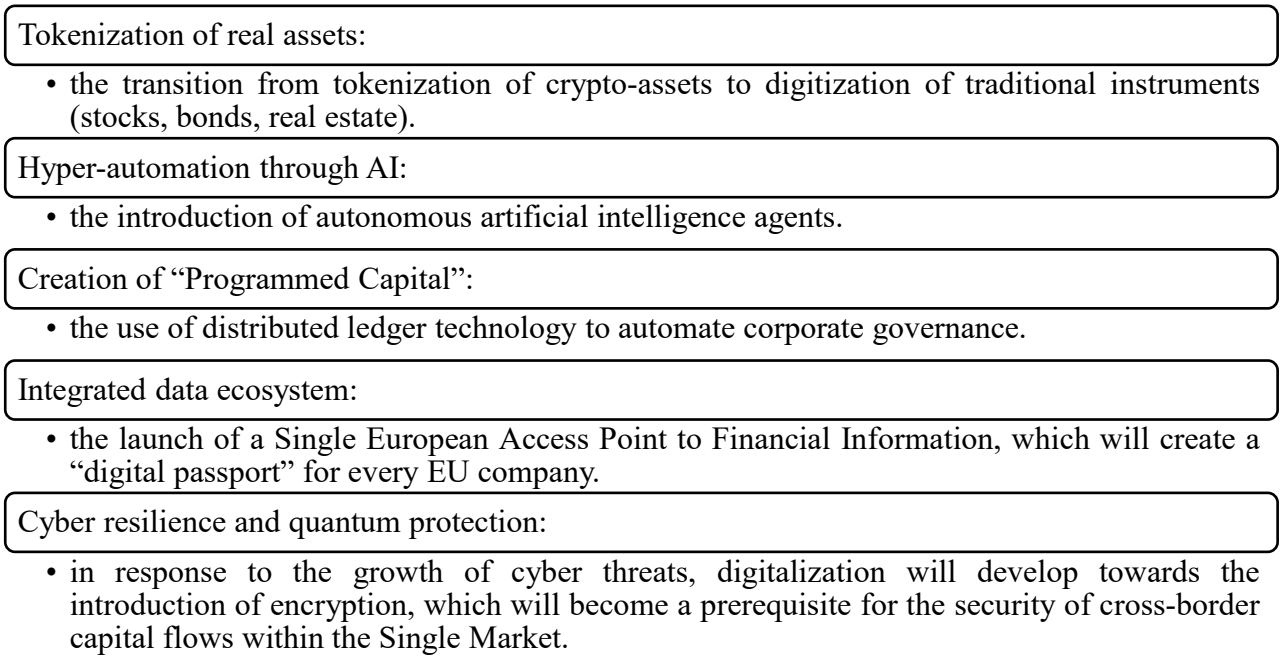


Figure 2. Vectors of further development of digitalization of the EU investment market

Source: Developed by the authors based on OECD (2026) data, Gartner (2026), ESMA (2026), Lastauskaite & Krusinskas (2021), Atomico (2025)

The tokenization of real assets plays a fundamental role in this process. This process involves shifting the emphasis from volatile crypto-assets towards the digitization of traditional financial instruments such as stocks, bonds and real estate. Thanks to fractionation technology, it becomes possible to decompose assets into small parts, which dramatically increases their liquidity and ensures market inclusiveness, opening access to complex investment products to a wide range of retail investors [11; 17].

In parallel with tokenization, a process of hyper-automation based on artificial intelligence systems is taking place, which transforms the analytical component of investing. The introduction of autonomous intelligent agents allows for the automation of startup scoring, high-precision predictive risk analytics and automatic execution of transactions using smart contracts [19]. Such intellectualization of the infrastructure minimizes the impact of the human factor, significantly reduces transaction costs and accelerates capital circulation within the Common Market.

A logical continuation of these processes is the concept of "programmable capital", which is based on the widespread implementation of distributed ledger technology for the automation of corporate governance. In such a model, dividend payments, shareholder voting and profit distribution are implemented through pre-determined algorithms, which eliminates the need for traditional banking intermediaries and increases the transparency of operations. The information integrity of this environment should be ensured by the launch of the Single European Access Point, which will function as a unified "digital passport" for each EU company [20]. This will allow investors to carry out a real-time comparative analysis of indicators of sustainable development, financial stability and innovative potential of business entities regardless of their national jurisdiction.

The final stage of digital transformation will be the development of new generation cyber resilience systems. The development of the investment market is impossible without the implementation of post-quantum encryption methods, which will become a mandatory security standard for cross-border capital flows [21; 22]. Thus, the synergy of tokenization, artificial intelligence and cyber protection forms a new financial architecture of the EU, which is characterized by unprecedented speed, security and openness to global investment resources. Despite the rapid development, the digitalization of the EU venture capital market is accompanied by a number of risks that may slow down the projected growth. The further digital transformation of the venture capital market of the European Union, despite the optimism of predictive models, is associated with a set of systemic challenges that are multifaceted. The regulatory dilemma occupies a central place among them, where the need to create a rigid legal framework conflicts with the need to maintain innovative flexibility. There is a real risk of "overregulation", when excessive requirements for the transparency of algorithms and the issuance of digital instruments can provoke an outflow of intellectual and financial capital to more liberal jurisdictions, which will slow down the pace of the formation of a single investment space [22].

The technological component of risks is concentrated around the vulnerability of algorithmic systems and smart contracts. Hyper-automation of investment processes based on artificial intelligence creates new vectors of cyber threats, including data manipulation and software errors in decentralized protocols, which, given the irreversibility of blockchain transactions, can lead to instant destabilization of large venture portfolios. Moreover, the potential threat from quantum computing calls into question the long-term stability of modern encryption methods on which the entire infrastructure of tokenized assets is based, requiring the EU to make enormous preventive investments in security [21].

The socio-ethical aspect of digitalization is manifested in the threat of algorithmic discrimination during the automated scoring of startups. This, combined with the uneven digital development between EU member states, creates the risk of a deepening of the "digital divide" within the Community, where less technologically adapted economies can become a barrier to the smooth cross-border movement of capital [19]. Finally, a critical challenge is the problem of verification and trust in tokenized real assets. The effective functioning of the digital capital market critically depends on the reliability of the systems that link digital tokens to physical assets [22]. Any systemic error or data falsification at this stage can undermine the trust of institutional investors in the digital toolkit as a whole. Therefore, the success of the further digitalization of the EU venture sector will depend not only on the speed of innovation, but also on the ability of regulators and market participants to build an adaptive system for managing the aforementioned risks.

Conclusion. Thus, the constructed model indicates the transition of the EU venture capital market from the stage of quantitative accumulation (2010–2020) and speculative volatility (2021–2023) to the phase of qualitative technological growth. The forecast figure of €145 billion by 2030 is based on a change in the fundamental driver: if previously growth was provided by the development of digital interfaces and fintech services, then the future trend is due to the integration of generative AI and DeepTech into the structure of real assets. The data obtained allow us to conclude that, in general, the EU investment venture capital market demonstrates resilience to crises, the fall in 2023 is not a systemic collapse, but only a "cooling off" after the overheating of 2021, we can expect that by 2030 the EU market will reach a historical maximum, as digitalization moves from simple software to complex autonomous systems and AI infrastructure. Thanks to regulation, the European market will become more attractive for American and Asian funds, which will provide additional capital inflows. The prospects for further transformation are associated with the creation of a Single European Access Point to Financial Information, which will become an integrated digital database for investors. This will allow for real-time analysis of the activities of companies in all EU countries using Big Data tools, which will actually complete the formation of a transparent and barrier-free investment space. Thus, digitalization is transformed from an auxiliary factor into the main driving force of integration, which will allow European capital to function effectively in the conditions of the global digital economy.

The effectiveness of the further digital transformation of investment capital in the EU critically depends on the ability of regulators to find a balance between institutional security and innovative flexibility. The main systemic risk remains "regulatory overload", which, combined with the technological vulnerabilities of algorithmic systems (AI) and smart contracts, can create barriers to capital inflows. The key challenge for the 2030 perspective is to overcome the "digital divide" between member states and ensure the cyber resilience of infrastructure against the threat of quantum computing. Thus, the success of the predictive market growth model is possible only if adaptive regulation and proactive management of algorithmic and ethical risks are implemented, which will allow converting digital innovations into real market liquidity and investor confidence.

REFERENCES

1. State of European Tech 2025: A roadmap to unlock further tech growth. *Invest Europe*. 2025. Retrieved from: https://www.investeurope.eu/news/newsroom/state-of-european-tech-2025-a-roadmap-to-unlock-further-tech-growth/ (Last accessed: 25.03.2026)
2. Venture capital investments in artificial intelligence through 2025. *OECD*. Policy Briefs 2026. Retrieved from: https://www.oecd.org/en/publications/venture-capital-investments-in-artificial-intelligence-through-2025_a13752f5-en/full-report.html (Last accessed: 20.03.2026)
3. Funding for Digital Decade targets. *European Commission*. 2024. Retrieved from: https://joint-research-centre.ec.europa.eu/predict/support-digital-decade-shaping-and-monitoring/funding-digital-decade-targets_en (Last accessed: 18.03.2026)
4. *Stepping Up Venture Capital to Finance Innovation in Europe*. International Monetary Fund. 2024. Retrieved from: https://www.imf.org/en/publications/wp/issues/2024/07/10/stepping-up-venture-capital-to-finance-innovation-in-europe-551411 (Last accessed: 12.03.2026)
5. Demertzis M., Merler S., Wolff G. B. (2018). Capital Markets Union and the Fintech Opportunity. *Journal of Financial Regulation*, Volume 4, Issue 1, March 2018, 157–165. DOI: **https://doi.org/10.1093/jfr/fjx012**
6. Meng F., & Xiao Y. (2025). The Impact of Digital Finance on the Development of Cross-Border E-Commerce. *Journal of Theoretical and Applied Electronic Commerce Research*, 20(3), 180. DOI: https://doi.org/10.3390/jtaer20030180
7. Paientko T. & Buriachenko A. (2026). Financial Democracy and Fintech Populism in the Digital Era. *Encyclopedia*, 6(2), 50. DOI: **https://doi.org/10.3390/encyclopedia6020050**
8. Aben J. and Etti P. (2022). Fintech regulation in the European Union: trends and blurred lines. *Revista CIDOB d'Afers Internacionals*, issue 131, 95-116. DOI: doi.org/10.24241/rcai.2022.131.2.95/en
9. Govindan K., Preeti J., Rajesh Kr. S., Ruchi M. (2024). Blockchain technology as a strategic weapon to bring procurement 4.0 truly alive: Literature review and future research agenda. *Transportation Research Part E: Logistics and Transportation Review*, Volume 181. DOI: **https://doi.org/10.1016/j.tre.2023.103352.**
10. Scaling up and integrating EU capital markets. *The Association for Financial Markets in Europe (AFME)*. 2024. Retrieved from: https://www.afme.eu/media/ixehiey0/afmeintegratingeucm1111.pdf (Last accessed: 20.03.2026)
11. Preparation phase of a digital euro - Closing report. European Central Bank. 2025. Retrieved from: https://www.ecb.europa.eu/euro/digital_euro/progress/html/ecb.deprp202510.en.html (Last accessed: 18.03.2026)

12. State of European Tech 2025: A roadmap to unlock further tech growth. *State of European Tech*. Retrieved from: https://www.stateofeuropeantech.com/#previous-reports (Last accessed: 17.03.2026)
13. Järv K. (07-09July 2025). *Estonia's blockchain-based E-government and citizen security: balancing data integrity and privacy in the digital state. 1st International Congress on Law and the Future of Global Justice*. Publisher: International Vision University. Gostivar, North Macedonia, P. 170-185. DOI: **https://doi.org/10.55843/ICL2025cong170j**
14. OECD/BCG/INSEAD (2025). *The Adoption of Artificial Intelligence in Firms: New Evidence for Policymaking*. Publisher: OECD Publishing, Paris. DOI: https://doi.org/10.1787/f9ef33c3-en
15. Statistics on Fundraising, Investments, & Divestments. *Invest Europe*. 2025. Retrieved from: https://www.investeurope.eu/ (Last accessed: 19.03.2026)
16. Venture capital in Europe - statistics & facts. *Statista.* Retrieved from: https://www.statista.com/ (Last accessed: 18.03.2026)
17. 2025 State of European Tech. *Atomico*. Retrieved from: https://atomico.com/ (Last accessed: 18.03.2026)
18. The OECD Start-ups Database. *OECD*. Retrieved from: https://www.oecd.org/ (Last accessed: 18.03.2026)
19. European Central Bank. ECB staff macroeconomic projections for the euro area, March 2026. Retrieved from: https://www.ecb.europa.eu/ (Last accessed: 18.03.2026)
20. What Generative AI Means for Business. Gartner. 2026. Retrieved from: https://www.gartner.com/ (Last accessed: 19.03.2026)
21. Lastauskaite A. & Krusinskas R. (2024). The Impact of Production Digitalization Investments on European Companies' Financial Performance. *Economies*, 12(6), 138. **DOI: https://doi.org/10.3390/economies12060138**
22. ESMA Digital Strategy 2026-2028. *ESMA*. 2026. Retrieved from: https://www.esma.europa.eu/sites/default/files/2026-01/ESMA65-955014868-12887_ESMA_Digital_Strategy_2026_-_2028.pdf (Last accessed: 25.03.2026)