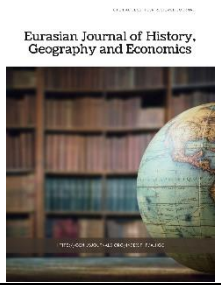

EU digital economy: features of formation and development prospects

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ABSTRACT

The European Union (EU) has been at the forefront of the digital transformation, significantly reshaping its economic landscape. This article explores the key features and development prospects of the EU digital economy. Initially, it defines the concept and structure of the digital economy, highlighting its core components such as e-commerce, digital services, and information and communication technologies (ICT). The article addresses the importance of digital skills and education in preparing the workforce for a digital future, as well as the issue of digital inequality.

Keywords: EU digital economy, Digital transformation, Information and communication technologies (ICT), E-commerce, Digital services, Digital Agenda, Digital Single Market, Data protection, Cybersecurity, Digital innovation, Digital startups, Economic impact, Digitalisation of industries, Digital markets

Introduction. The digital economy, a term that has gained prominence in recent decades, refers to an economy that is based on digital computing technologies, encompassing a wide array of economic activities that use digital information and knowledge as key factors of production. This includes digital infrastructure, e-commerce, online services, and the use of digital platforms for various business operations. The digital economy is characterized by the ubiquitous presence of the internet, the proliferation of mobile devices, the extensive use of data and analytics, and the integration of digital technologies across all sectors of the economy. The digital economy can be broadly defined as the economic activity that results from billions of everyday online connections among people, businesses, devices, data, and processes. It is underpinned by the use of digital technologies, including the internet, mobile technology, cloud computing, and big data analytics, which facilitate the creation, storage, processing, and exchange of digital information.

The historical evolution of the digital economy within the EU is examined, tracing its growth from the early adoption of ICT to current initiatives like the Digital Agenda and the Digital Single Market. The study delves into the political and legislative framework governing the digital economy in the EU, with a focus on data protection, cybersecurity regulations, and policies supporting digital innovation and startups. Economic aspects are analyzed, including the impact on GDP, employment, and the transformation of traditional industries through digitalization. The development of digital markets and platforms is also discussed, illustrating their role in the EU economy. Social and cultural dimensions are considered, particularly the changes in societal structures and labor markets brought about by digitalization.

The formation of the digital economy within the European Union (EU) is marked by a strategic

and multifaceted approach. This process is characterized by the implementation of comprehensive policies, investments in digital infrastructure, regulatory frameworks, and collaborative efforts among member states. The key features of this formation include:

Strategic Policy Initiatives:

Digital Agenda for Europe (2010): This initiative aimed to maximize the growth potential of the digital economy by promoting digital skills, ICT adoption, and high-speed internet access across the EU. It set out specific goals and actions to enhance digital literacy, e-government, and digital inclusion.

Digital Single Market (DSM) Strategy (2015): The DSM strategy seeks to create a unified digital market by removing regulatory barriers, ensuring the free flow of digital goods and services, and harmonizing digital regulations across member states. It focuses on improving access to digital products, creating a level playing field for digital networks, and maximizing the growth potential of the European digital economy.

Regulatory Frameworks:

General Data Protection Regulation (GDPR): Implemented in 2018, GDPR provides a robust framework for data protection and privacy, ensuring that personal data is handled transparently and securely. This regulation has set a global standard for data privacy and has reinforced consumer trust in digital services.

eIDAS Regulation: The Electronic Identification, Authentication and Trust Services (eIDAS) Regulation establishes a pan-European framework for electronic identification and trust services, facilitating secure and seamless electronic transactions across the EU.

Investment in Digital Infrastructure:

The EU has made significant investments in digital infrastructure, including broadband networks, 5G technology, and data centers. Initiatives like the Connecting Europe Facility (CEF) and Horizon 2020 have provided substantial funding to enhance digital connectivity and support cutting-edge research and innovation.

Support for Digital Innovation and Entrepreneurship:

Programs such as the Startup Europe initiative and the European Innovation Council (EIC) aim to nurture a vibrant ecosystem for digital startups and scale-ups. These programs provide funding, mentorship, and networking opportunities to foster innovation and entrepreneurship in the digital space.

Public-Private Partnerships:

The EU has fostered collaboration between the public and private sectors to drive digital transformation. These partnerships focus on areas such as smart cities, digital health, and Industry 4.0, leveraging the strengths of both sectors to promote innovation and improve public services.

Literature review. The digital economy has become a significant area of research due to its substantial impact on socio-economic development, innovation, and the competitiveness of countries. In recent decades, the European Union (EU) has been taking active steps to develop the digital economy, attracting the attention of researchers and policymakers. This literature review examines the key aspects of the EU digital economy, including strategic initiatives, regulatory frameworks, infrastructure investments, support for innovation, and public-private partnerships.

One of the earliest and most important documents forming the basis for the development of the digital economy in the EU is the "Digital Agenda for Europe," introduced in 2010. This strategy aimed to promote the use of digital technologies and ICT to stimulate economic growth and job creation. Later, in 2015, the "Digital Single Market (DSM)" strategy was launched, aiming to remove regulatory barriers and create a single digital market. According to researchers such as Prado and Riederer (2018), these initiatives play a key role in integrating digital services and products, fostering economic growth and innovation.

Regulatory frameworks, such as the General Data Protection Regulation (GDPR), introduced in 2018, and the eIDAS regulation, establishing standards for electronic identification and trust services, ensure security and trust in the digital economy. Studies show that GDPR has significantly enhanced data protection and privacy, which is a crucial factor for users of

digital services (Voigt & Von dem Bussche, 2017). These measures also encourage businesses to handle data more responsibly, contributing to a more transparent and reliable digital environment.

Investments in digital infrastructure are a vital component of the digital economy's development. Programs such as Connecting Europe Facility (CEF) and Horizon 2020 aim to support innovation and create high-quality digital infrastructure. Research indicates that substantial investments in broadband networks, 5G technology, and data centers contribute to the expansion of digital services and their accessibility (Nishal & Mueller, 2019). This forms the basis for further development and increased efficiency of the digital economy.

Supporting digital innovation and entrepreneurship is also a crucial aspect. Programs such as Startup Europe and the European Innovation Council (EIC) facilitate the development of startups and the scaling of innovative projects. Studies highlight that these initiatives provide significant financial and advisory support to young companies, promoting the adoption of new technologies and solutions (Autio & Rannikko, 2016).

Public-private partnerships play a key role in promoting digital transformation. Successful examples of such cooperation include projects in smart cities, digital healthcare, and ICT infrastructure development. As noted by Franks and Meyer (2017), these partnerships facilitate knowledge and resource exchange between the public and private sectors, accelerating the implementation of digital technologies and enhancing their efficiency.

The prospects for the development of the EU digital economy include further integration of the digital market, development of digital skills and education, adoption of advanced technologies, and strengthening of cybersecurity. Investments in digital education and training programs, such as the Digital Education Action Plan, contribute to the preparation of qualified specialists capable of working in the digital economy. The development and adoption of advanced technologies, such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT), open new opportunities for economic growth and innovation (Brynjolfsson & McAfee, 2014).

Strengthening cybersecurity frameworks, such as the EU Cybersecurity Act, aims to protect digital infrastructure and data, which is a vital condition for trust and security in the digital economy. Promoting sustainable digital transformation, including measures from the European Green Deal, allows for the integration of environmental aspects into the digitalization process, contributing to the achievement of sustainable development goals. The development of data governance frameworks, such as the Data Governance Act, promotes effective data usage and supports the development of the data economy (Zuboff, 2019).

In summary, the literature review highlights the comprehensive nature of the EU digital economy's formation, encompassing strategic planning, regulatory measures, infrastructure investments, and support for innovation. The prospects for its development are focused on further integration of the digital market, adoption of advanced technologies, and ensuring sustainability, which strengthens the EU's position in the global digital economy and ensures long-term growth and competitiveness.

Methodology. To study the features of the formation and prospects for the development of the digital economy in the European Union (EU), a mixed methodological approach was used, including both qualitative and quantitative research methods. The methodology consists of several key components: literature review, data collection, data analysis, and case studies to provide a comprehensive and comprehensive analysis of the topic at hand. First, an extensive literature review was carried out, which included a systematic analysis of academic articles, books, EU policy documents, industry reports and publications. The purpose of this stage was to create a theoretical basis for the study, identifying key themes and areas such as digital infrastructure, regulatory frameworks, digital skills, advanced technologies and public-private partnerships. The literature was carefully selected and analyzed using thematic analysis to identify major trends and gaps in existing research. Secondly, data collection was

carried out using qualitative and quantitative methods. Qualitative data included semi-structured interviews with key stakeholders such as policy makers, industry experts, representatives of digital start-ups and large technology companies. The interviews provided in-depth insights into the challenges and opportunities in the EU digital economy. Additionally, documents such as strategic plans, regulations and policy documents were analyzed to understand the EU's approach to the development of the digital economy. Quantitative data was collected from various sources, including Eurostat (the EU's statistical agency) and through business and consumer surveys. Statistics included indicators such as broadband internet penetration, the contribution of the digital economy to GDP, employment in digital sectors and investment in digital infrastructure. The surveys made it possible to assess the experience and perception of the digital economy among various groups of the population and business. Data analysis included both qualitative and quantitative methods. Qualitative analysis included thematic analysis of interview transcripts and documents to identify recurring themes and patterns, which helped to understand the qualitative aspects of the emergence and development of the digital economy. Content analysis of policy documents and strategies allowed us to assess the compliance of EU policies with the goals of developing the digital economy. The quantitative analysis included descriptive and inferential statistics, which allowed not only to summarize the collected data, but also to explore the relationships between various variables, such as the impact of investments in digital infrastructure on economic growth. The case studies were chosen to provide an in-depth exploration of specific examples of digital economy initiatives in the EU. These cases included digital innovation hubs (DIHs), national digital economy strategies of leading EU member states (e.g. Germany and Estonia), as well as successful public-private partnerships in areas such as smart cities and digital health. Case studies allowed us to analyze specific examples in detail and identify best practices and lessons for the further development of the digital economy in the EU. To ensure the validity and reliability of the study results, data triangulation was used, including cross-checking data from various sources and methods. This included comparing qualitative insights from interviews and document analysis with quantitative data from surveys and statistical sources, obtaining peer review of the study's methodology and results, and iteratively refining the analysis based on new data and insights.

The study strictly adhered to ethical standards, ensuring confidentiality and informed consent of interview participants and survey respondents. All data was processed securely and used solely for the purposes of this study.

The application of this comprehensive methodology made it possible to provide a detailed and comprehensive analysis of the features of the formation and prospects for the development of the digital economy in the EU, make a valuable contribution to the academic and political discourse on digital transformation and offer recommendations for the further development of the digital economy in the region.

Results. The research findings show that the European Union's (EU) digital economy is being shaped by policy initiatives, regulatory frameworks, investments in digital infrastructure and support for innovation. One of the key strategies aimed at developing the digital economy is the "Digital Agenda for Europe", launched in 2010, and the "Digital Single Market (DSM)", initiated in 2015, which seeks to remove regulatory barriers and create a single digital space. Regulatory frameworks such as the General Data Protection Regulation (GDPR), introduced in 2018, and the eIDAS regulation, which sets standards for electronic identification and trust services, play an important role in ensuring security and trust in the digital economy. These measures help protect data and support secure electronic transactions, which are the basis for the development of digital services and technologies.

Investments in digital infrastructure, such as broadband networks, 5G technologies and data

centers, significantly contribute to the development of the digital economy. Programs such as the Connecting Europe Facility (CEF) and Horizon 2020 aim to support innovation and build high-quality digital infrastructure. Significant investments in these areas create the conditions for expanding digital services and increasing their accessibility for citizens and businesses.

Table 1.

Main features and prospects for the development of the EU digital economy[1]

Parameter	Description	Programs	Development Prospects
Strategic Initiatives	Aimed at creating a single digital market and increasing competitiveness.	Digital Agenda for Europe, Digital Single Market (DSM)	Continued regulatory harmonization, barrier removal
Regulatory Framework	Ensuring security and trust in the digital economy.	GDPR, eIDAS	Strengthening cybersecurity frameworks
Infrastructure Investments	Investments in developing digital infrastructure to enhance the availability of digital services.	Connecting Europe Facility (CEF), Horizon 2020	Development of broadband networks, 5G technology
Support for Innovation	Promoting the development of startups and the implementation of innovative projects.	Startup Europe, European Innovation Council (EIC)	Adoption of advanced technologies (AI, blockchain, IoT)
Public-Private Partnerships	Collaboration to promote digital transformation in various sectors.	Projects in smart cities, digital healthcare	Strengthening partnerships for knowledge and resource sharing
Digital Skills and Education	Training qualified professionals for the digital economy.	Digital Education Action Plan	Investments in digital education and training programs
Sustainable Development	Integrating environmental aspects into the digitalization process.	European Green Deal	Promoting sustainable digital transformation
Data Governance	Effective use of data to support the data economy.	Data Governance Act	Development and implementation of data governance frameworks
Digital Innovation Hubs (DIH)	Supporting SMEs in adopting digital technologies.	Digital Innovation Hubs	Supporting SMEs in digital transformation

The table 1 summarises the key features of the EU digital economy, current initiatives and programs, and development prospects, highlighting the main directions and measures

[1] compiled by the author

that contribute to the sustainable growth and competitiveness of the region in the global digital economy.

Supporting digital innovation and entrepreneurship is another important aspect of the EU's digital economy. Programs such as Startup Europe and the European Innovation Council (EIC) promote the development of startups and the scaling of innovative projects. These initiatives provide financial and advisory support to young companies, which facilitates the adoption of new technologies and solutions in various industries.

Public-private partnerships play a key role in driving digital transformation. Successful examples of such cooperation include projects in the field of smart cities, digital health and ICT infrastructure development. These partnerships facilitate the exchange of knowledge and resources between the public and private sectors, which accelerates the adoption of digital technologies and improves their effectiveness.

Prospects for the development of the EU digital economy include further integration of the digital market, development of digital skills and education, introduction of advanced technologies and strengthening of cybersecurity. Continued efforts to harmonize regulations and remove barriers to creating a single digital market are key areas. Investments in digital education and training programs, such as the Digital Education Action Plan, help develop skilled professionals capable of working in the digital economy. The development and adoption of advanced technologies such as artificial intelligence (AI), blockchain and the Internet of Things (IoT) are opening up new opportunities for economic growth and innovation.

Strengthening cybersecurity frameworks, such as the EU Cybersecurity Act, aims to protect digital infrastructure and data, which is essential for trust and security in the digital economy. Promoting sustainable digital transformation, including the European Green Deal measures, enables the integration of environmental aspects into the digitalization process and contributes to the achievement of sustainable development goals. The development of data governance frameworks, such as the Data Governance Act, promotes the effective use of data and supports the development of the data economy. Strengthening Digital Innovation Hubs (DIHs) provides support for SMEs to adopt digital technologies that contribute to their growth and competitiveness.

Overall, the study's findings highlight that the EU's digital economy is developing through an integrated approach, including strategic planning, infrastructure investment, support for innovation and public-private partnerships. Development prospects include further integration of the digital market, development of advanced technologies and sustainability, which strengthens the EU's position in the global digital economy and ensures long-term growth and competitiveness.

Conclusion. The digital economy in the European Union (EU) represents a crucial driver of economic growth, innovation, and competitiveness. Through a comprehensive and multi-faceted approach, the EU has laid a robust foundation for the development of its digital economy, characterized by strategic initiatives, regulatory frameworks, substantial investments in digital infrastructure, support for innovation, and effective public-private partnerships.

The strategic initiatives, such as the "Digital Agenda for Europe" and the "Digital Single Market (DSM)," have been pivotal in shaping the digital landscape of the EU. These initiatives aim to remove regulatory barriers, create a unified digital market, and foster an environment conducive to digital innovation and economic growth. The regulatory frameworks, including the General Data Protection Regulation (GDPR) and the eIDAS regulation, ensure a secure and trustworthy digital environment, which is essential for the widespread adoption of digital services.

Investments in digital infrastructure, supported by programs like the Connecting Europe Facility (CEF) and Horizon 2020, have significantly enhanced the availability and quality of digital services. These investments are vital for the continued expansion and efficiency of the digital

economy, providing the necessary foundation for advanced digital services and technologies.

The EU's commitment to supporting innovation is evident in initiatives such as Startup Europe and the European Innovation Council (EIC). These programs provide crucial financial and advisory support to startups and innovative projects, promoting the development and scaling of new technologies and solutions. Public-private partnerships further amplify these efforts by facilitating the exchange of knowledge and resources, accelerating digital transformation across various sectors, including smart cities and digital healthcare.

The development prospects of the EU digital economy are promising, focusing on further integration of the digital market, enhancement of digital skills and education, adoption of advanced technologies like artificial intelligence (AI), blockchain, and the Internet of Things (IoT), and strengthening of cybersecurity frameworks. The EU's strategic focus on sustainable digital transformation, as part of the European Green Deal, underscores the importance of integrating environmental considerations into digitalization efforts, ensuring that economic growth is aligned with sustainability goals.

The comprehensive regulatory and strategic measures taken by the EU are instrumental in creating a conducive environment for the digital economy to thrive. The development of data governance frameworks, such as the Data Governance Act, promotes effective data use and supports the growth of the data economy. Additionally, initiatives aimed at enhancing digital skills and education ensure that the workforce is equipped to meet the demands of the evolving digital landscape.

In conclusion, the EU's digital economy is on a path of sustained growth and development, driven by strategic initiatives, regulatory measures, and robust support for innovation and infrastructure. The continued focus on integrating advanced technologies, enhancing cybersecurity, and promoting sustainable digital transformation will ensure that the EU remains competitive in the global digital economy. The EU's comprehensive approach to developing its digital economy not only fosters economic growth and innovation but also ensures that the benefits of digitalization are widely shared, contributing to the overall socio-economic development of the region.

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