



## European Digital Transformation Policies in Support of SMEs: from Strategic Planning to Practical Implementation

Sevdalina HRISTOVA<sup>1</sup>

<sup>1</sup> ORCID iD 0000-0001-8762-397X, University of Economics – Varna, Bulgaria, [s.hristova@ue-varna.bg](mailto:s.hristova@ue-varna.bg)

DOI: [doi.org/10.56065/vaqfsw94](https://doi.org/10.56065/vaqfsw94)

### Abstract:

**JEL:** O33;  
L26; O38

The digital transformation of small and medium-sized enterprises is a key factor for maintaining the competitiveness of the European economy in the context of globalization and rapidly developing technologies.

This study provides a systematic analysis of the evolution and effectiveness of European policies and financial instruments for the digital transformation of SMEs, integrating macroeconomic data (DESI), programmatic mechanisms, and institutional solutions. Particular emphasis is placed on the role of European Digital Innovation Hubs as an intermediary mechanism between strategic planning and practical implementation of digital technologies in business.

The main research question that the article addresses is how European digitalization policies materialize into effective financial instruments to support the digital transformation of SMEs and what are the main challenges to this process.

The results show that despite the availability of significant financial resources directed toward digital initiatives within the MFF 2021-2027, SMEs continue to face structural difficulties in accessing new technologies. Through a review of selected indicators, key financial instruments, and the network of European Digital Innovation Hubs, the study highlights the need for better coordination between different levels of governance and for increasing the effectiveness of European investments in digitalization.

### Keywords:

Digital economy, European funds and programmes, Digital innovation hubs (DIHs), Digital economy and society index (DESI), business digitalisation

### Now to cite:

Hristova, S. (2026). European Digital Transformation Policies in Support of SMEs: from Strategic Planning to Practical Implementation. *Stroitelno predpriemachestvo i nedvizhima sobstvenost = Construction Entrepreneurship and Real Property*, 3(1), 45–59. <https://doi.org/10.56065/vaqfsw94>

Copyright © 2026  
by author(s)

## Introduction

The European Union (EU) faces the growing challenge of ensuring a comprehensive and sustainable digital transformation of its economy amid intensified global competition and accelerated technological progress. Digitalization<sup>1</sup> has become established not only as a technological process but also as a key factor for economic growth, competitiveness, and social sustainability. In this context, small and medium-sized enterprises (SMEs), which represent 99.8% of all non-financial enterprises in the EU and provide approximately two-thirds of employment in the private sector, play a central role in the successful digital transition of the European economy.

The construction sector and real estate operations represent particularly important areas where the digital transformation of SMEs has both significant potential and specific challenges. According to Eurostat data, the construction sector accounts for approximately 9% of the EU's GDP and employs around 6% of the total workforce, with SMEs constituting the dominant organizational form. In this sector, characterized by traditional business models, fragmented value chains, and project-based operations, digitalization offers opportunities for substantial improvements in efficiency, sustainability, and competitiveness through technologies such as Building Information Modeling (BIM), digital project management platforms, and IoT-enabled construction monitoring. Similarly, real estate operations, encompassing property development, management, and transactions, stand to benefit significantly from digital tools for property valuation, smart building management, and digital transaction platforms, yet face comparable challenges in terms of SME readiness and capacity for digital transformation.

Despite their strategic significance, numerous empirical studies show that SMEs lag significantly behind in the digital transformation process compared to large enterprises (Dong & Tingting, 2021). These differences are due to a complex of interrelated factors, including limited financial resources, shortage of qualified personnel with digital skills, insufficient awareness of the potential of new technologies, and difficult access to specialized technical and consulting support (Verhoefa et al., 2021; Omrani et al., 2024). As a result, the digitalization of SMEs often proceeds in a fragmented manner, without a clear strategic framework and with limited transformational effect.

In response to these challenges, the EU has developed over the past two decades a comprehensive system of policy initiatives, financial instruments, and institutional mechanisms aimed at accelerating the digital transformation of business. Despite the existence of clearly formulated strategic goals and significant financial resources, the question remains open as to what extent European policies and support instruments succeed in responding to the real needs and capacity of SMEs and generating sustainable results.

The present study aims to analyze this ecosystem from the perspective of its effectiveness, degree of coordination, and ability to respond to the real needs of SMEs. Through a systematic review of strategic documents, European funds and programmes, and one of the institutional mechanisms, the study aims to identify the main achievements, structural limitations, and opportunities for improvement of the European strategy for digitalization of SMEs.

## Methodology

The present study is based on a multidisciplinary approach that combines policy document analysis, institutional analysis, and comparative research of financial instruments. The methodological framework includes three main components:

First, a chronological review of the development of European digitalization policies from 2000 to the present. The analysis is based on official documents of the European Commission (EC), decisions of the European Parliament and the Council of the EU, as well as strategic programmes and action plans.

Second, a systematic analysis of financial instruments for the programming period 2021-2027, including their categorization by objectives, scope, forms of support, and management mechanisms. For the purposes of the analysis, official regulations, programme documents, and data on the allocation of funds were used.

Third, an institutional analysis of European Digital Innovation Hubs as a key mechanism in the support system for SMEs. A review of their functions, geographical distribution, and business models is included.

The study is based on data from official EC sources, including statistics from the DESI (Digital Economy and Society Index), as well as peer-reviewed scientific publications related to digitalization and SME development.

## Evolution of European Digitalization Policies

The development of European digitalization policies over the past two decades outlines a consistent evolution - from technocratic initiatives to comprehensive strategies aimed at digital transformation of the economy. In the initial phase between 2000 and 2005, the emphasis was placed on building technological infrastructure. The eEurope2002 (European Commission, 2000) and eEurope2005 (European Commission, 2002) programmes laid the foundations of the European information society through expanding broadband access, liberalizing telecommunications markets, and creating basic conditions for electronic commerce. At this stage, SMEs were not explicitly covered by policy documents, reflecting the then prevailing perception of digitalization primarily as an infrastructural challenge.

After 2005, a transition toward a more integrated approach began. The i2010 strategy (European Commission, 2005) unified policies in the fields of information technologies and the media environment, and with the adoption of the Digital Agenda for Europe (2010-2020), SMEs were already considered as a key factor for the digital economy (European Commission, 2010). The first targeted measures for financial support and development of digital skills appeared, and attention was directed toward building a digital single market.

The Digital Single Market Strategy of 2015 marked a qualitative leap in the understanding of digitalization as an integrating element of the European economy (European Commission, 2015). For the first time, emphasis was placed on removing regulatory barriers to the free movement of digital services and products.

After 2020, European policy entered a phase of strategic maturity. The documents "Shaping Europe's Digital Future" (European Commission, 2020) and "2030 Digital Compass" (European Commission, 2021) now view digitalization as a complex process of economic and social transformation in which SMEs play a central role.

The "Digital Compass" sets concrete and measurable targets, accompanied by a monitoring mechanism. Among them stand out the development of digital skills—with the goal that at least 80% of the EU's adult population possess basic digital competencies and the number of information and communication technology specialists reach 20 million by 2030; the construction of modern digital infrastructure with full 5G coverage, gigabit connectivity for all households, and a 20% share of Europe in global semiconductor production; business digitalization, whereby 75% of companies use cloud technologies, big data, and artificial intelligence, and over 90% of SMEs reach at least a basic level of digital intensity; as well as the transformation of public services through full online accessibility and widespread use of electronic identification.

The culmination of this evolution is the adoption of the Digital Decade Policy Programme 2030 in 2022, which introduces a mandatory mechanism for achieving digital targets (European Parliament, 2022). For the first time, Member States are required to prepare national roadmaps with specific measures and stages for implementing the targets, introducing a system of annual monitoring and corrective actions in case of deviations. This approach represents a transition from voluntary initiatives to mandatory commitments, supported by financial mechanisms and sanctions for non-compliance. For SMEs, this means greater predictability and stability of the policy environment, creating conditions for long-term planning and stimulating investments in digitalization.

### **State and Dynamics of Digitalization According to the DESI Index**

In 2014, the composite DESI (Digital Economy and Society Index) was introduced as an instrument for measuring and analyzing the progress of Member States in various digital areas. Currently, it is used to assess the state of the digital economy and the development of the information society in EU countries. It helps to manage EU digital strategies more effectively and makes EC digital policy more transparent, measurable, and results-oriented. DESI summarizes 33 indicators of digital performance, divided into four dimensions: (1) human capital; (2) connectivity; (3) integration of digital technology; (4) digital public services, and allows measurement, evaluation, direct comparison, and ranking of EU Member States regarding their development in the field of digital competitiveness (see Table 1). All these areas are taken into account in compiling detailed annual reports that describe the progress of digital transformation in the 27 EU Member States.

While the DESI framework provides a valuable standardized approach to measuring digital transformation across EU member states, a critical examination of its indicator structure reveals several methodological limitations that warrant consideration, particularly when assessing SME digitalization and sectoral dynamics in construction and real estate. First, the “Integration of Digital Technology” dimension, though comprehensive in scope, may not adequately capture sector-specific technological adoption patterns. For instance, indicators such as “SMEs with at least a basic level of digital intensity” and “Use of cloud services” are indeed relevant, but they fail to reflect specialized technologies critical to construction and real estate sectors, such as BIM adoption rates, digital twin implementations, IoT-enabled building management systems, or blockchain-based property transaction platforms. Second, the aggregate nature of DESI indicators may obscure significant intra-sectoral variations. The construction sector’s digital maturity can vary dramatically between large infrastructure contractors and small

residential builders who rely predominantly on traditional methods. Similarly, real estate operations encompass vastly different business models - from property development to facility management and brokerage. Third, certain DESI indicators may have limited applicability to sectors like construction where transactional relationships follow project-based patterns. The indicator “Electronic information sharing” might capture enterprise resource planning (ERP) adoption but may miss collaborative project platforms that are more relevant to construction workflows. Fourth, qualitative measures assessing organizational readiness, change management capacity, and digital culture would complement the predominantly quantitative DESI framework and provide a more holistic assessment of true digital transformation rather than mere technology adoption.

Despite the weaknesses mentioned, DESI data reveal an uneven picture that allows Member States to be grouped into three categories: digital leader countries, countries with progress, and lagging countries. DESI shows significant differences in the development of information societies in EU countries. Finland, Denmark, Sweden, and the Netherlands consistently lead among the 27 states, while Romania, Greece, and Bulgaria are among the laggards.

Positive trends are observed in most EU countries, as index results increase on an annual basis for all Member States, with annual growth ranging from 3.88% to 17.29%. Highly dynamic index growth is recorded in countries with weaker results compared to leaders (Machuga, 2023).

Table 2 presents DESI values for the period 2017-2022 for Bulgaria and the EU average.

The overall picture shows uneven progress in different DESI dimensions, with Bulgaria demonstrating impressive achievements in some areas but continuing to lag significantly in others. In the Human Capital category, it shows moderate growth from 7.49 in 2017 to 8.15 in 2022, representing an increase of 0.66 or approximately 8.8%. For comparison, the EU average increased from 10.38 to 11.44, representing growth of 1.06 or 10.2%. The main problem here is the persistent gap between Bulgaria and the EU, which not only persists but even slightly increases from 2.89 at the beginning of the period to 3.29 in 2022. This shows that despite positive dynamics, the country fails to overcome the lag in the field of digital skills and competencies of the population.

In the Connectivity category, Bulgaria records the greatest progress. From an initial value of 5.53 in 2017, the country reached 12.68 in 2022, representing growth of 7.15 or 129%. The EU average also increased significantly from 6.19 to 14.98. Particularly notable is that the gap between Bulgaria and the EU narrowed substantially from only 0.66 lag in 2017 to 2.30 points in 2022. During the early years of the period, Bulgaria was very close to the European average level in connectivity.

*Table 1. DESI 2022 Structure*

<b>Dimensions</b>	<b>Sub-dimensions</b>	<b>Indicators</b>	
<b>Human Capital</b>	Internet user skills	At least basic digital skills	
		Above basic digital skills	
		At least basic digital content creation skills	
	Advanced skills and development	ICT specialists	
		Female ICT specialists	
		Enterprises providing ICT training	
ICT graduates			
<b>Connectivity</b>	Fixed broadband take-up	Overall fixed broadband take-up	
		At least 100 Mbps fixed broadband take-up	
		At least 1 Gbps broadband take-up	
	Fixed broadband coverage	Fast broadband (NGA) coverage	
		Fixed Very High Capacity Network (VHCN) coverage	
		Fibre to the Premises (FTTP) coverage	
	Mobile broadband	5G spectrum	
		Overall 5G coverage	
		Mobile broadband take-up	
	Broadband prices index	Broadband price index	
	<b>Integration of digital technology</b>	Digital intensity	SMEs with at least a basic level of digital intensity
		Digital technologies for businesses	Electronic information sharing
			Social media
Big data			
Cloud			
Artificial Intelligence			
e-Commerce		ICT for environmental sustainability	
		e-Invoices	
		SMEs selling online	
		e-Commerce turnover	
	Selling online cross-border		
<b>Digital public services</b>	e-Government	e-Government users	
		Pre-filled forms	
		Digital public services for citizens	
		Digital public services for businesses	
		Open data	

*Source: European Commission (2022). Digital Economy and Society Index (DESI) 2022 – Methodological Note, retrieved from <https://ec.europa.eu/newsroom/dae/redirection/document/88557> (21.01.2025).*

Integration of Digital Technology emerges as the most problematic category for Bulgaria, where a worrying trend of widening digital divide compared to the EU is observed. Growth is minimal and slowest among all categories, with values increasing from 2.53 in 2017 to 3.88 in 2022, an increase of only 1.35 or 53%. For comparison, the EU average increased from 5.46 to 9.02. Critically, the gap between Bulgaria and the EU increased from 2.93 in 2017 to 5.14 in 2022. Bulgaria lags with almost twice lower values compared to the EU. This shows a serious structural weakness of the Bulgarian economy and an obstacle to its digital transformation and competitiveness.

**Table 2. Values of the Four Main DESI Categories for Bulgaria and the EU**

DESI dimensions	DESI 2017		DESI 2018		DESI 2019		DESI 2020		DESI 2021		DESI 2022	
	BG	EU	BG	EU	BG	EU	BG	EU	BG	EU	BG	EU
Human Capital	7.49	10.38	7.58	10.45	7.97	10.71	7.85	10.99	7.88	11.16	8.15	11.44
Connectivity	5.53	6.19	6.05	6.65	6.97	7.65	7.59	8.78	9.13	11.07	12.68	14.98
Integration of Digital Technology	2.53	5.46	2.85	6.14	3.02	6.73	3.28	7.32	3.52	8.18	3.88	9.02
Digital Public Services	8.36	11.68	9.30	12.68	10.09	13.55	11.10	14.58	12.12	15.79	12.97	16.84

Source: Digital Economy and Society Index (until 2022), European Commission digital data portal, retrieved from <https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi-2022/> (accessed on 21/01/2026)

In the Digital Public Services category, Bulgaria demonstrates good and steady progress that deserves positive evaluation. Values increased from 8.36 in 2017 to 12.97 in 2022, an increase of 4.61 or 55%. The EU average rose from 11.68 to 16.84 points. The gap between Bulgaria and the EU remained relatively stable in the range between 3.3 and 3.9 throughout the analyzed period. This shows that the efforts of Bulgarian institutions for e-government development, digitalization of administrative services, and improvement of interaction between citizens, business, and the state yield visible and measurable results, although there is still significant potential for further improvement and reaching European standards.

Bulgaria, as one of the lagging countries, demonstrates uneven and asymmetric development in different dimensions of the digital economy during the 2017-2022 period. The country achieves success in building digital infrastructure and connectivity, shows good progress in digitalization of public services, but continues to lag significantly in human capital development and especially in the integration of digital technologies by business.

DESI underwent a fundamental change in measurement methodology that significantly limits the possibilities for direct comparison between values before and after this period. The main reason for the change is the adoption of the Decision on the Digital Decade Policy Programme 2030 by the European Council and Parliament in December 2022, which designates DESI as the official instrument for monitoring progress toward specific quantitative targets by 2030. The structural changes between the two versions of the index are significant and make comparison difficult. Until 2022, DESI was based on a hierarchical structure of four dimensions with equal weights of 25% each, allowing calculation of a single overall score for each country and corresponding ranking.

From 2023, DESI has a completely different philosophy and logic—instead of a composite index, it is a dashboard of 32 indicators directly linked to Digital Decade targets, organized into 4 renamed dimensions: Digital skills, Digital infrastructures, Digital transformation of businesses, and Digitalisation of public services. Each indicator is monitored independently, and 11 of them are designated as Key Performance Indicators (KPIs) of the Digital Decade (see Table 3). The new structure does not allow calculation of a single overall score or ranking between countries in the way it was done until 2022.

Due to these fundamental changes, direct comparison of DESI values before and after 2022 is impossible. At the level of individual indicators, comparison is partially possible. A number of indicators are retained with good comparability,

others have updated definitions, and still others are completely removed. New ones have also been added.

*Table 3. DESI 2023 Dashboard*

Dimensions	Sub-dimensions	Indicators
<b>Digital skills</b>	Internet user skills	Internet use
		At least basic digital skills
		Above basic digital skills
		At least basic digital content creation skills
	Advanced skills and development	Enterprises providing ICT training
		ICT specialists
<b>Digital infrastructures</b>	Fixed broadband	ICT graduates
		At least 100 Mbps broadband take-up
		At least 1 Gbps broadband take-up
		Fixed Very High Capacity Network (VHCN) coverage
	Mobile broadband	Fibre to the Premises (FTTP) coverage
		Mobile broadband take-up
		Overall 5G coverage
		5G spectrum
<b>Digital transformation of businesses</b>	Digital intensity	SMEs with at least a basic level of digital intensity
	Digital technologies for businesses	Electronic information sharing
		Social media
		Big data
		Cloud
		AI
	e-Commerce	e-Invoices
		SMEs selling online
		e-Commerce turnover
		Selling online cross-border
<b>Digitalisation of public services</b>	4a e-Government	e-Government users
		Digital public services for citizens
		Digital public services for businesses
		Pre-filled forms
		Transparency of service delivery, design and personal data
		User support
		Mobile friendliness
	e-Health	Access to e-health records

Source: European Commission (2023). DESI 2023 methodological note. Retrieved from <https://digital-strategy.ec.europa.eu/en/library/desi-methodological-note-digital-decade-report-2023> (21.01.2025).

Given the key importance of SME digitalization for economic competitiveness, the analysis below focuses on indicators from the "Digital intensity" and "Digital technologies for businesses" sub-dimensions (see Table 4).

Based on the data presented in Table 4, an analysis can be made of Bulgaria's development in three key dimensions of business digital transformation compared to the EU in recent years. The overall picture shows that despite positive dynamics in some areas, Bulgaria continues to lag significantly behind EU average values, and the distance to 2030 targets remains extremely large.

For the indicator "SMEs with at least a basic level of digital intensity," contradictory dynamics are observed. Bulgaria started from 47.18%, showed a decline to 28.41%, to recover to 49.93% at the end of the period. This sharp decline is likely related to methodological changes but shows instability in the digital transformation process.

For comparison, the EU demonstrates stable growth from 69.00% to 72.91%. Most worrying is the fact that at the current level of 49.93%, Bulgaria must increase the indicator by over 10 percentage points by 2030 to achieve the national target of 60%, while the EU's overall target of 90% appears extremely ambitious.

*Table 4. Values of selected DESI indicators for Bulgaria and the EU (2023 onwards)*

DESI indicators	Targets 2030		DESI 2023		DESI 2024		DESI 2025	
	BG	EU	BG	EU	BG	EU	BG	EU
SMEs with at least a basic level of digital intensity % SMEs	60%	90%	47.18%	69.00%	28.41%	57.90%	49.93	72.91
Cloud % enterprises	15%	75%	9.90%	34.00%	14.22%	38.97%	-	-
AI % enterprises	11%	75%	3.29%	7.65%	3.62%	8.06%	6.47%	13.48%

*Source: Digital Economy and Society Index (2023 onwards), European Commission digital data portal, Retrieved from <https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi> (accessed on 22/01/2026)*

In the area of cloud technology use, the picture is no less concerning. Bulgaria started from 9.90% and reached 14.22%, but data for the last year are missing. The EU increased from 34.00 to 38.97%. Bulgaria has set a national target of only 15%, which appears achievable but is five times lower than the EU's overall target of 75%. This raises the question of whether Bulgaria has not set excessively modest targets that do not correspond to the actual needs of the European digital economy.

For the indicator of artificial intelligence technology use, Bulgaria demonstrates the most stable positive dynamics. Values increased from 3.29% to 6.47%, which is almost a twofold increase. The EU also shows growth from 7.65 to 13.48%. Bulgaria's national target of 11% appears achievable at the current pace, but the EU's overall target of 75% again appears unrealistic at the current level of 13.48%.

Both Bulgaria and the EU as a whole demonstrate mixed results in business digital transformation, with progress being uneven and insufficient to achieve the ambitious targets set for 2030. For Bulgaria, the greatest concern is the instability in digital intensity, very low values in cloud technologies, and systematic lag compared to the European average. Although the EU shows better absolute values, the huge gap between current achievement levels and set targets shows the need for significant acceleration of digital transformation rates at the pan-European level. In this context, a key role in achieving Digital Decade targets and overcoming identified challenges is played by European Union financial instruments aimed at supporting digital transformation during the 2021-2027 programming period.

## **European Funding for Digital Transformation**

The Multiannual Financial Framework 2021-2027, supplemented by the temporary Next Generation EU instrument, represents the largest budget in EU history with a total volume of €2,017.8 billion. Approximately €177 billion of this amount is directed toward achieving digital decade targets, constituting about 18% of all financial resources. This significant proportion demonstrates the strategic importance the EU places on digital transformation, but simultaneously reveals challenges in coordinating the multiple programmes and mechanisms through which investments are realized. The main part of funds is distributed across directions such as "Single Market, Innovation and Digital" (€161 billion),

"Cohesion, Resilience and Values" (€1,203.2 billion), and "Natural Resources and Environment" (€419.9 billion).

Among instruments with the most direct impact on digitalization, the "Digital Europe" programme stands out—a specialized mechanism with a budget of €7.59 billion, entirely dedicated to digital transformation (Margaras & Széchy, 2023). It focuses on five strategic areas: high-performance computing, artificial intelligence, cybersecurity and trust, development of advanced digital skills, and creation of European Digital Innovation Hubs. Managed directly by the EC, the programme ensures a high degree of strategic coordination and standardization across the entire EU, which is particularly important in areas such as cybersecurity and supercomputing. However, this centralized approach may create difficulties in adapting to specific national and regional needs.

Another key instrument is the Recovery and Resilience Facility, which provides over €144 billion for digital investments—a minimum of 20% of its total budget of €723.82 billion (Papazoglou et al., 2023; Signorelli et al., 2024; Kurshumov, 2024). It introduces a new financing model based on achieving pre-agreed results and milestones, instead of traditional cost reimbursement. This significantly changes the approach to budget planning in the EU, encouraging efficiency and accountability. For SMEs, this model creates opportunities for participation in larger-scale projects but places requirements for better strategic planning and integration into national priorities.

"Horizon Europe" complements the financial framework with a total budget of €93.5 billion, with particular significance for digitalization in its second pillar "Global Challenges and European Industrial Competitiveness." Within the "Digital, Industry and Space" cluster, €15 billion is allocated, of which €5.4 billion is financed by Next Generation EU. The programme is aimed at high-risk and high-tech projects, making it particularly suitable for innovative and start-up enterprises, but may limit participation of more traditional companies just beginning their digital transformation.

The European Regional Development Fund plays a significant role in the digitalization process with a budget of €226.05 billion. Through shared management, the fund allows flexible directing of investments toward regional priorities—from building digital infrastructure to implementing innovations in SMEs. However, this approach carries the risk of fragmentation and different standards between regions, which may hinder achieving European synergy. Added to this instrument is the InvestEU programme with a budget of €10.28 billion, which aims to mobilize additional investments of over €372 billion through guarantees and attracting private capital (European Commission, 2022). InvestEU's leverage effect is particularly valuable for SMEs, as it allows access to more favorable financing, and through the Advisory Hub and InvestEU Portal, technical assistance is provided and connections between business and investors are created.

There are also numerous sectoral and specialized instruments that complement the main programmes. The European Social Fund Plus (€99.26 billion) supports development of digital skills through financing training and lifelong learning initiatives, thus addressing one of the most serious problems for SMEs—the shortage of qualified personnel. The Connecting Europe Facility, with a total budget of €20.73 billion, directs €2.06 billion specifically toward digital infrastructure, including 5G network deployment and high-speed internet connections. Additional

contributions come from sectoral funds for rural development and for maritime affairs, fisheries and aquaculture, which stimulate digitalization in traditional sectors and assist enterprises in rural areas where access to modern technologies is often limited.

Analysis of support forms reveals considerable variability that reflects the different needs of target groups. Grants continue to be the main instrument, applied through cost reimbursement, fixed rates, or funding percentages, making them suitable for projects with high public significance but lower economic return. Financial instruments—loans, guarantees, and equity participations—are gaining increasing popularity, as they allow more efficient use of public resources by mobilizing private investments and sharing risk. Prizes and public procurement fulfill a specific function, stimulating innovations and guaranteeing high quality standards of offered solutions.

Regarding management mechanisms, a combined approach is observed, including direct management by the EC, indirect management through specialized organizations, and shared management with Member States. This multi-layered structure allows combining strategic coordination at the European level with adaptability to national and regional specificities but requires a high degree of administrative capacity and coordination between different participants in the process.

### **Digital Innovation Hubs as an Institutional Mechanism**

Digital Innovation Hubs (DIH) represent a relatively new element in European digitalization policy (Ujwary-Gil & Florek-Paszowska, 2022), introduced in 2016 within the framework of the "Digitising European Industry" initiative (Rissola & Sörvik, 2018). This concept reflects the realization that successful digital transformation requires not only financial resources but also targeted expertise, technical support, and coordination between key stakeholders. The EC's initial goal was to ensure at least one hub in every NUTS 2 level region, guaranteeing all SMEs access to specialized services (Czyżewska-Misztal, 2024). By 2018, 386 hubs in 27 Member States were already registered in the official online catalogue (European Investment Bank, 2020), with their distribution revealing certain regional imbalances—in some regions one hub serves about 10,000 enterprises, while in more advanced regions this number is significantly lower (about 3,500 enterprises).

During the 2021-2027 programming period, the DIH network underwent institutional strengthening through creation of European Digital Innovation Hubs (EDIH), financed by the "Digital Europe" programme on the principle of shared co-financing - 50% European and 50% national (Kalpaka et al., 2020). As a result, a network of 227 hubs was established, covering over 85% of European regions and reaching nearly 90% of the EU's employed population. This network is distinguished by strong technological profiling—most commonly in areas such as artificial intelligence, cybersecurity, and high-performance computing - as well as sectoral coverage including manufacturing, healthcare, and the public sector (De Nigris et al., 2023).

The organizational structure of a typical EDIH represents a consortium of approximately 11 organizations, usually including universities, research institutes, private companies, regional development agencies, and public authorities. This diversity ensures a rich set of expertise and resources and allows hubs to operate

simultaneously at regional and supra-regional levels. Most hubs cover the territory of several neighboring regions, allowing them to combine knowledge of local specificities with sufficient scale for efficiency. They typically offer services in several technological directions - on average nine - with the most common being solutions based on artificial intelligence, Internet of Things, and cybersecurity, and their sectoral orientation includes approximately seven economic sectors (De Nigris et al., 2023).

The hubs' service portfolio is designed to cover all key stages of the digital transformation process. A special place is occupied by the possibility of testing technologies before investment - through access to demonstration laboratories, pilot projects, and experimental environments, which reduces risk for enterprises. Alongside this, hubs offer training and skills development - from short-term courses to longer-term qualification programmes, including consulting on strategic digitalization planning. An important element is support in raising investments, which includes preparation of project proposals, directing toward suitable financing sources, and assistance in application. A substantial role is played by activities for building an innovation ecosystem, through which platforms for interaction between enterprises, researchers, investors, and public authorities are created, stimulating knowledge exchange and partnerships.

The financial and organizational models of DIHs are hybrid and include a combination of public, private, and project financing. Public resources - European, national, and regional—ensure free or subsidized access to basic services, while private financing through membership fees, charges, and sponsorships contributes to achieving financial sustainability and market orientation. Additionally, income from participation in research and consulting projects allows hubs to expand their expertise and follow new technological trends. The most successful hubs apply a model where basic services necessary for entering the digitalization process are available free of charge, while more specialized consultations and individual solutions are offered on a market principle.

## **Challenges and Opportunities**

Analysis of European digitalization policies and their materialization into concrete financial instruments reveals a complex picture of achievements and challenges. On one hand, the EU succeeds in building a comprehensive ecosystem of policies, strategies, and financial mechanisms that address different aspects of digital transformation. The evolution from the first information society initiatives to contemporary integrated approaches to digital transition demonstrates the ability of European institutions to adapt to changing technological and economic realities.

The MFF 2021-2027, supplemented by the NextGenerationEU instrument, provides a serious volume of resources to support digitalization. The diversity of programmes and funds, different forms of support, and management mechanisms create opportunities for addressing the specific needs of different categories of beneficiaries, including SMEs.

EDIHs represent a particularly interesting example of how strategic visions are transformed into concrete instruments for support at local and regional levels. Their network structure and holistic approach to digital transformation create bridges between European policies and the real needs of business, especially SMEs, which often face resource and knowledge limitations in their digitalization attempts.

On the other hand, the study reveals a number of challenges that continue to prevent full utilization of the potential of European digitalization policies. A significant portion of SMEs are still at an early stage of adopting contemporary digital technologies.

Regional differences in access to digitalization support remain significant despite efforts to achieve more even distribution of digital innovation hubs and other support instruments. Some regions continue to be underserved, which may deepen existing differences.

Coordination between different programmes and instruments represents another challenge. Although at the strategic level good coherence between policy documents is observed, at the practical level gaps or overlaps in provided support often arise. This creates difficulties for potential beneficiaries in navigating the complex system of financing opportunities.

Sustainability of support represents a long-term challenge. Many of the instruments and mechanisms are designed as temporary or depend on continued political and financial commitment at European and national levels. This raises questions about the long-term effectiveness of investments and their ability to generate sustainable changes in business behavior and competitiveness.

Measuring impact and effectiveness of different instruments remains a complex task. Despite the availability of DESI and various monitoring mechanisms, it remains difficult to establish a direct link between specific policy interventions and achieved results in SME digitalization.

## Conclusions

The EU has built a large-scale and multi-level system for supporting digital transformation that encompasses strategic planning, significant financial resources, and specialized institutional mechanisms. Analysis of European policy evolution shows a consistent transition from infrastructure-oriented initiatives to an integrated approach in which digitalization is viewed as a key factor for economic competitiveness and sustainability. In this process, SMEs gradually establish themselves as a central object of policy intervention, especially within initiatives related to the Digital Decade by 2030.

Results from DESI data analysis reveal that despite clear progress in building digital infrastructure and developing electronic public services, business digital transformation - and SMEs in particular - remains the weakest link in EU digital development, and for lagging countries like Bulgaria this challenge is even more pronounced. Systematic lag in digital technology integration, low levels of digital intensity, and limited use of cloud solutions and artificial intelligence show that the existence of strategy and financing is not a sufficient condition for real transformation of business models.

In this context, the study confirms that the effectiveness of European policies depends decisively on their ability to be converted into practically applicable solutions tailored to the specific needs and capacity of SMEs. Financial instruments for the 2021-2027 period, including the Recovery and Resilience Facility, the "Digital Europe," "Horizon Europe," and ERDF programmes, provide unprecedented resource potential, but the complex architecture of financing and fragmentation of instruments often hinder access and effective use by business.

European Digital Innovation Hubs emerge as a key institutional mechanism for bridging this gap between strategic goals and practical reality. Their holistic support model - combining technology testing, skills development, consulting, and assistance for access to financing - positions them as a "bridge" of European policies to SMEs.

Nevertheless, substantial challenges remain related to regional imbalances in access to support, coordination between different programmes, and long-term sustainability of institutional mechanisms. A discrepancy is also observed between ambitious targets at the European level and more moderate national targets, which questions the extent to which policies reflect real transformational needs of the economy.

In conclusion, the study shows that the EU possesses a well-developed and conceptually consistent framework for supporting SME digital transformation, but its effectiveness depends on better coordination between instruments, strengthening non-financial support, and adapting policies to different levels of digital maturity of enterprises and regions. For future research, particularly important are empirical assessments of the impact of specific instruments and institutional mechanisms, as well as development of broader methodologies for measuring digital transformation that account not only for quantitative indicators but also for deep organizational and structural changes in SMEs.

## Notes

1. The article examines the evolution of digitalization rather than digitization, though these terms are frequently conflated in both academic literature and policy discourse. Digitization refers to the technical process of converting analog information into digital format. Digitalization encompasses a broader transformation: it involves leveraging digital technologies to fundamentally change. While digitization serves as a technical prerequisite, digitalization represents the strategic transformation of business models and processes through digital technologies. The European policies and instruments analyzed herein are primarily concerned with fostering this deeper, strategic transformation.

## References

- Czyżewska-Misztal, D. (2024). The European Union's Approach to Artificial Intelligence from a Territorial Perspective: The Case of DIHs and EDIHs Programmes. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 68(2), 1–11.
- De Nigris, S., Kalpaka, A. & Nepelski, D. (2023). Characteristics and regional coverage of the European Digital Innovation Hubs network, Publications Office of the European Union.
- Dong, H. & Tingting, M. (2021). The European Union Supports the Digital Transformation Development of SMEs Policy Propositions and Enlightenment. *International Core Journal of Engineering*, 7(10), 338–344.
- European Commission. (2000). eEurope 2002. An Information Society For All. Draft Action Plan prepared by the European Commission for the European Council in Feira 19–20 June 2000 (COM (2000) 330 final, 24.05.2000).
- European Commission. (2002). eEurope2005: An information society for all. An Action Plan to be presented in the view of the Sevilla European Council, 21–22 June 2002 (COM(2002) 263 final, 28.05.2002).

- European Commission. (2005). i2010, A European Information Society for Growth and Employment. Communication from the Commission to the Council, the European parliament, the European Economic and Social Committee and the Committee of the Regions (COM(2005) 229 final, 01.06.2005).
- European Commission. (2010). A Digital Agenda for Europe (COM(2010) 245 final, 19 May 2010).
- European Commission. (2015). A Digital Single Market Strategy for Europe (COM(2015) 192 final, 6 May 2015).
- European Commission. (2020). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Shaping Europe's digital future (COM(2020) 67 final).
- European Commission. (2021). 2030 Digital Compass: The European Way for the digital decade (COM(2021) 118 final, 9 March 2021).
- European Commission. (2022). Digital transformation of businesses: A guide to EU funding opportunities, Publications Office of the European Union.
- European Investment Bank. (2020). Financing the digitalisation of small and medium-sized enterprises. The enabling role of digital innovation hubs. European Investment Bank.
- European Parliament and the Council of the European Union. (2022). Decision (EU) 2022/2481 of 14 December 2022 establishing the Digital Decade Policy Programme 2030. Official Journal of the European Union, L 323/5, 19 December 2022.
- Kalpaka, A., Sörvik, J. & Tasigiorgou, A. (2020). Digital Innovation Hubs as policy instruments to boost digitalization of SMEs. Publications Office of the European Union.
- Kurshumov, V. (2024). Trends and challenges in the implementation of the National Recovery and Resilience Plan in Bulgaria. *Izvestia Journal of the Union of Scientists - Varna. Economic Sciences Series*, 13(1), 131–138.
- Machuga, R. (2023). GDP Impact on the Digital Economy in European Union Countries. *Olsztyn Economic Journal*, 18(2), 127–140.
- Margaras, V. & Széchy, B. (2023). *Guids to EU Funding – 2023 edition*. European Parliamentary Research Service.
- Omrani, N. et al. (2024). Drivers of Digital Transformation in SMEs. *IEEE Transactions on Engineering Management*, 51, 5030–5043.
- Papazoglou, M. et al. (2023). Mapping EU level funding instruments to Digital Decade targets. Publications Office of the European Union.
- Rissola, G. & Sörvik, J. (2018). Digital Innovation Hubs in Smart Specialisation Strategies. Publications Office of the European Union.
- Signorelli, S., Torrecillas Jódar, J., Papazoglou, M. & López Cobo, M. (2024). Mapping EU level funding instruments 2021 – 2027 to Digital Decade targets. Publications Office of the European Union.
- Ujwary-Gil, A. & Florek-Paszkowska, A. (2022). A network approach to the digital innovation hub as an ecosystem supporting the digital transformation of enterprises in a region. *Academic Conferences International Limited Reading*, 557–566.
- Verhoefa, P. C. et al. (2021). Digital Transformation: A Multidisciplinary Reflection and Research Agenda. *Journal of Business Research*, 122, 889–901.