

DIGITALIZATION, INNOVATION AND ARTIFICIAL INTELLIGENCE AS FACTORS OF COMPETITIVENESS: THE CASE OF BULGARIA

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Abstract

The study examines the interrelationship between digitalization, innovation, and artificial intelligence (AI) as strategic determinants of competitiveness in the context of accelerated technological transformation. The analysis demonstrates that AI is not merely a tool for automation but a catalyst for comprehensive economic reconfiguration, shaping the capacity of enterprises – and national economies as a whole – to adapt to global competition. At the same time, specific characteristics are observed in Bulgaria concerning the pace and depth of digital transformation. The country exhibits both technological and entrepreneurial potential, yet lags behind in key indicators such as digital skills, innovation capacity, and institutional coordination. The analysis underscores the need for an integrated strategy focused on education, human capital development, and investment in AI, in order to achieve genuine economic resilience and enhanced competitiveness within the European Union.

Keywords: digitalization, innovation, Artificial Intelligence, competitiveness, Bulgaria

JEL: O33, O38, L25, F63

Introduction

In recent decades, the world has undergone profound economic, political, and technological transformations that have posed new challenges to economies at both national and global levels. The COVID-19 pandemic, geopolitical crises such as the war between Russia and Ukraine, as well as globalisation, have shaped new economic realities in which digitalization, innovation, and the implementation of artificial intelligence play a central role. Technological change and the integration of AI into economic processes have led to the creation of new models of development and the reorganisation of businesses and production systems. These trends not only transform the competitive environment but also shape the economic strategies of countries within the global context.

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Until the mid-20th century, the view that markets adjust automatically through free competition and the interaction between supply and demand held strong dominance. Following the Great Depression (1929 – 1933) and the publication of “*The General Theory of Employment, Interest and Money*“ (Keynes, 1936), the idea began to take hold that government intervention is necessary to stabilise economic cycles and maintain employment. However, this classical model underwent significant evolution after the crises of the 1970s, including the energy crisis of 1973 – 1975, when state intervention acquired a new dimension – aimed at restructuring economies and promoting innovation in energy- and resource-saving technologies. These processes led to greater efficiency and an expansion in the demand for technological solutions capable of ensuring stable economic growth.

During the 1990s, economic policy began to focus on stimulating supply by creating conditions conducive to innovation and the development of high-technology sectors such as information and communication technologies (ICT), nano- and biotechnologies. Progress in microprocessor technologies led to a qualitative change in production processes, laying the foundations of the digital economy, characterised by the integration of intelligent products and solutions, including artificial intelligence. This marked the beginning of the economic transformation in which the electronics industry played a key role through the production of components that reduced the cost of technology and facilitated its implementation within economic processes.

In this context, three key factors shape the contemporary economic paradigm: globalisation, digitalization and artificial intelligence, and connectivity through digital networks. Globalisation accelerates the integration of resources and capital, leading to cross-border business models and intensified competition for technological leadership. Digitalization and AI, in turn, increase productivity, reduce costs, and enhance product quality, while simultaneously creating new economic opportunities.

In the context of the intensive development of digitalization processes, the European Union faces difficulties in competing with other global players such as the United States and China. The European Commission points out that the EU must accelerate and scale up the use of artificial intelligence in order not to fall behind in its competitiveness (European Commission, 2024). Countries that take advantage of innovation and the integration of AI manage to improve their economic development and standard of living. Bulgaria, as part of the EU, continues to face serious challenges in this field, since the digitalization of the public sector and businesses remains limited. This places the country in a disadvantaged position within global economic competition.

All of this is indicative of the exceptional relevance of the topic. Alongside the points already mentioned, it may be noted that digitalization, innovation, and artificial intelligence have become fundamental to the success of modern economies. The ability to implement these technologies is crucial for the competitiveness of firms and for the economic development of nations. In the contemporary global context, countries that do not actively invest in innovation and digitalization risk falling behind the economic leaders, which may have negative consequences for their competitiveness and sustainable development.

The aim of the study is to analyse the opportunities, challenges, and strategies for integrating innovation and artificial intelligence into economic systems – both at the firm and national levels – with the objective of enhancing competitiveness.

The object of the present study is the role of these technologies in the process of digitalizing business and economic systems.

The achievement of the main objective of the study is realised through the following research tasks:

First, conducting a theoretical study aimed at identifying the influence of innovation and artificial intelligence on competitiveness at both the firm and national levels.

Second, analysing the impact of artificial intelligence and innovation on the competitiveness of firms.

Third, drawing specific conclusions regarding the strategic importance of AI and innovation for firm competitiveness.

The study seeks to confirm the following research thesis: Artificial intelligence (AI) is a strategic factor with the potential to significantly enhance the competitiveness, efficiency, and innovation capacity of firms, despite the existing challenges associated with its implementation in business processes.

The realisation of the main objective, the implementation of the defined tasks, and the validation of the research thesis are carried out through the application of a systematic theoretical and methodological approach, based on the following research methods:

First, a historical and logical analysis of theoretical and empirical perspectives on the role of innovation, digitalization, and artificial intelligence in the process of forming and strengthening firm competitiveness.

Second, analysis and synthesis in the processing of theoretical and empirical material, with the aim of distinguishing the main components of the studied process and subsequently integrating them into a comprehensive conceptual framework.

Third, induction and deduction in the analysis of empirical data.

Fourth, descriptive analysis in examining the various dimensions of AI's impact on competitiveness.

The study is structured into several parts. The first part encompasses the main theoretical aspects related to the processes of digitalization, innovation, and the implementation of artificial intelligence, which are examined as key determinants of competitiveness. The second part of the study is devoted to the analysis of the impact of artificial intelligence on firms' competitiveness, exploring the mechanisms through which intelligent technologies support processes of optimisation, innovation, and strategic positioning within the market environment.

Theoretical aspects of the role of digitalization, innovation, and artificial intelligence in competitiveness and growth

Digitalization is not merely the next stage of technological development but a systemic transformation that changes the logic of economic processes, the models of interaction, and the principles of value creation. It encompasses all phases – from production and logistics to knowledge management and the consumer experience. According to M. Marikina, digital competitiveness is associated with the understanding of how countries, in conditions of technological transition, succeed through their entrepreneurs in creating a sustainable product (Marikina, 2017). This distinction between passive adoption and active value creation is fundamental. While the former implies the mechanical implementation of digital tools, the latter requires an innovation ecosystem, human capital, and institutional support.

In his research, L. Boyanov associates the global digital transformation with the creation of vast and continuously expanding datasets that generate knowledge and benefits for people, improving business and production processes (Boyanov, 2021). This transformation cannot be perceived solely as a technological transition. It is socio-economic in nature, as it alters the structure of the labour market, the modes of interaction between the public and private sectors, and the requirements placed upon the educational system. In this sense, digitalization acts as an instrument of structural transformation and a key factor for the sustainability of modern economies.

The IMD World Digital Competitiveness Ranking and the methodology of the World Digital Competitiveness Center (WDC) define digital competitiveness as the ability of countries “to adopt and transform digital technologies into value-creating solutions that ensure long-term growth” (WDC, 2024). This requires strategic thinking, institutional flexibility, and a digital culture – prerequisites that are still not fully developed in a number of economies, including the Bulgarian one.

According to Porter, competitiveness is determined by the ability of an economy to produce and offer products that are in demand on international markets while maintaining sustainably high levels of income and employment (Porter,

1990). In the digital era, however, this understanding is complemented by new dimensions – the capacity for adaptation, innovation, and the integration of technologies. The World Economic Forum likewise emphasises that competitiveness is now measured not only through productivity but also through digital maturity, research capacity, and effective data management (World Economic Forum, 2023).

In this context, Paul Krugman makes an important distinction between price and non-price competitiveness, emphasising that sustainable advantage in the modern economy is achieved through innovation, digital transformation, and high-quality products rather than low labour costs (Krugman, 1994). The European Commission, in the *Annual Single Market and Competitiveness Report* and other documents – including the reports by Mario Draghi (September 2024) and the *Competitiveness Compass* (January 2025) – considers “price competitiveness” (labour costs, exchange rate) as only one part of the equation. The other – “non-price competitiveness” – encompasses aspects such as R&D (research and development), digitalization, brand image, the regulatory environment, and climate considerations. This perspective is particularly relevant for economies with relatively high labour costs, such as those in the EU, where competitiveness should be achieved through innovation, sustainability, and digital solutions.

Within this broader understanding of competitiveness, digitalization emerges as a new economic paradigm in which data become a primary factor of production and a source of value. It is precisely this transition – from traditional resources to informational and technological assets – that marks the transformation from an industrial to a digital economy, where knowledge, innovation, and information management become key determinants of growth.

The digital economy is based on data as a key productive resource that generates new value through their processing, analysis, and transformation into knowledge. The expression “Data is the new oil”, attributed to Clive Humby, symbolises not so much the intrinsic value of information as the necessity of its processing and interpretation through Big Data and machine learning. Through these technologies, enterprises can identify patterns, anticipate trends, and make real-time decisions.

The main results of empirical research in this field show that digitalization leads to:

- increased productivity through automation and artificial intelligence;
- lower transaction costs;
- access to global markets;
- the stimulation of new business models based on subscription, platforms, and the sharing economy.

According to the IMD Report (2024), Bulgaria is ranked 56th out of 67 countries, which indicates structural deficiencies, particularly in the factor “Knowledge” (59th place) and “Future Readiness” (61st place), while in the area of “Technology” the country occupies a relatively better position (49th place). These results confirm that competitiveness is determined not only by the availability of digital infrastructure but also by the capacity to develop human capital and a culture of innovation.

The accumulation and intelligent processing of data create the foundation upon which new forms of innovation emerge. In the digital economy, it is precisely the interaction between technology, data, and entrepreneurial creativity that transforms information into a source of new value. Thus, digitalization becomes not merely a tool for efficiency but an environment that generates continuous innovation processes and accelerates economic evolution.

Innovation represents the “core” of modern economic dynamics. Joseph Schumpeter (1942) introduced the concept of “creative destruction” (Schumpeter, 1942) as a process through which new technologies displace old structures, creating cycles of economic renewal. In the digital economy, this concept acquires new significance – today, innovation is not an outcome but a continuous process embedded in corporate strategies.

Peter Drucker defines innovation as “the specific instrument of entrepreneurship” and a fundamental source of economic growth (Drucker, 1985). He emphasises that innovations not only expand markets but also redefine business logic and organisational structures. Contemporary research confirms this interrelation. Leão and da Silva demonstrate that innovation capacity acts as a mediator between digitalization and competitiveness (Leão & da Silva, 2021), while Jarzębowski et al. empirically establish that digitalization is statistically associated with higher national competitiveness (Jarzębowski et al., 2024).

Therefore, innovation today is predominantly digital in nature. It encompasses not only new products but also new organisational models, communication channels, and customer experience. Firms that integrate digital technologies into the core of their identity become leaders in sustainable competitiveness.

In the contemporary economy, artificial intelligence (AI) represents the ultimate expression of the innovation process – a tool through which digital technologies acquire autonomy and the capacity for self-improvement. It transforms innovation from a human endeavour into a continuous, algorithmically sustained process of value creation. In this sense, AI constitutes a natural continuation of the evolution of digital innovation and a key stage in the transformation of global competitiveness.

Artificial intelligence represents the quintessence of digital transformation. Its ability to analyse vast volumes of data, learn from them, and make real-time decisions turns AI into a strategic resource for economic development.

AI exerts its influence in three main directions:

1. **Automation** – the elimination of routine processes and the optimisation of resources;
2. **Analysis and prediction** – modelling of market trends and consumer behaviour through Big Data;
3. **Personalisation** – customised products and services based on client data.

According to McKinsey & Company, 92% of companies worldwide plan to increase their investments in AI, yet only 1% have fully integrated it into their processes (McKinsey & Company, 2025). This highlights the existence of technological potential but also of managerial deficiencies. The main barrier is not technological but strategic – the lack of active leadership and a clear vision for digital transformation.

Table 1: Key trends in the integration of artificial intelligence in organizations

Indicator	Result / Observation (2025)	Interpretation
Companies planning to increase AI investments over the next three years	92%	Indicates a broad corporate consensus on the strategic importance of AI.
Organizations identifying themselves as “mature” in AI implementation	1%	Reveals the early stage of organizational transformation – strong investment enthusiasm but low maturity.
Main barriers to AI adoption	Lack of skills, trust issues, unclear leadership responsibility	Confirms that human and cultural factors remain more restrictive than technological ones.
Companies applying AI across multiple business functions	Twice as likely to report productivity growth	Highlights the importance of a holistic approach to digital transformation.
“Superagency” concept	Balance between human autonomy and technological augmentation	Defines the model of the future “intelligent organization”, where AI and humans act as co-pilots.

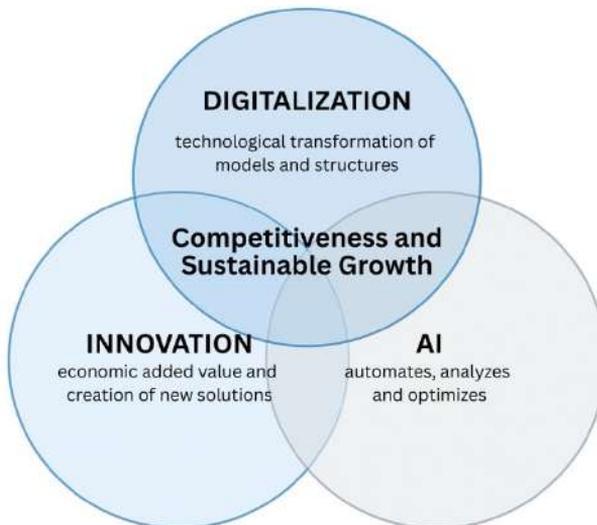
Source: McKinsey & Company (2025).

The data in Table 1 confirm that, despite the high level of corporate commitment to AI, organisational maturity remains low. This underscores the need for policies aimed at developing skills and integrating the human factor into the processes of digital transformation.

Within the European Union, as noted by the European Commission, artificial intelligence represents a central pillar of the *Competitiveness Recovery Compass*, whose objective is for Europe to assume a leading position in the development and production of future technologies (European Commission, 2025a). The document identifies three priority directions: innovation-driven growth, green transformation, and strategic autonomy through the diversification of supply chains.

The report by Mario Draghi complements this framework, noting that the EU suffers from an “innovation gap” compared to the United States and China, caused by low investment efficiency and the limited transformation of scientific potential into economic value (European Commission, 2024). The proposed solution lies in directing public and private resources towards high-risk technologies, including AI and quantum computing, as well as in stimulating entrepreneurial innovation.

In this context, artificial intelligence is not merely a technological tool but a structural factor of competitiveness. It transforms the way decisions are made, creates new business models, and optimises value chains. Companies that strategically integrate AI achieve higher productivity, flexibility, and resilience.



Source: Author’s creation

Figure 1: The interrelationship between digitalization, innovation, and artificial intelligence as a triad of competitiveness

Digitalization provides the technological foundation, innovation creates economic value, and artificial intelligence optimises processes through automation and analysis. Their intersection forms the contemporary model of competitiveness and sustainable growth in the digital economy (see Figure 1).

Digital competitiveness of Bulgaria

The digital competitiveness of the European Union (EU) Member States has, in recent years, become a decisive factor for their economic resilience. It is founded upon three dimensions: human capital and knowledge, technological infrastructure, and future readiness for adaptation to technological change.

The latest data from the *IMD World Digital Competitiveness Ranking (2024)* reveal a clear stratification between high-tech and less digitalised economies. In the global ranking of 67 countries, Bulgaria occupies the 56th position, marking a decline compared to 2023. This placement in the lower part of the ranking is indicative of systemic deficiencies in key areas of digital development and confirms the need for targeted and sustainable policies aimed at accelerating digital transformation. In contrast, the top three positions are held by highly technological and competitive economies such as Singapore, Switzerland, and Denmark, which demonstrate consistent investment in digital infrastructure, human capital, and innovation.

Across the three main factors shaping the country's digital competitiveness – knowledge, technology, and future readiness – Bulgaria demonstrates uneven and overall unsatisfactory performance. In the “Knowledge” factor, which encompasses subfactors such as talent, education, and scientific concentration, Bulgaria ranks 59th out of 67 countries, marking a decline of six positions compared to 2023. In the “Technology” factor, which measures the economy's capacity to support technological development through infrastructure, investment, and regulation, Bulgaria is positioned 49th, showing an improvement of seven positions over the previous year. The third factor – “Future Readiness” – reflects the ability of society, business, and institutions to adapt to the dynamics of technological change. In 2024, Bulgaria ranks 61st out of 67 countries, registering a decline of three positions compared to the previous year (see Table 2).

Table 2: Overall digital competitiveness ranking by factors in Bulgaria (2020 – 2024)

OVERALL & FACTORS – 5 years	2020	2021	2022	2023	2024
OVERALL	45	52	48	55	56
Knowledge	47	53	48	53	59
Technology	45	51	51	56	49
Future readiness	44	55	50	58	61

Source: IMD World Competitiveness Center (2024).

The data in Table 3 clearly confirm that Bulgaria lags behind not so much in terms of technological infrastructure, but rather due to human and organisational factors – educational inadequacy, low adaptability, and weaknesses in innovation management.

The index shows that the country has fallen by six positions in the “Knowledge” factor, with the most pronounced decline observed in the subfactor “Education and Training” (–8 positions). This confirms the deepening deficit of digital competences and the insufficient preparation of the workforce for high-technology sectors.

At the same time, the indicators for “Technology” show improvement, particularly in the “Capital” subfactor (+17 positions), reflecting increased access to financing and more active participation of the private sector in technological investments.

The most serious challenge remains the “Future Readiness” factor, where Bulgaria ranks only 61st out of 67 countries, lagging behind in adaptive attitudes and IT integration. This indicates that even with a basic infrastructure and capital in place, there is a lack of sufficiently flexible organisational models and managerial practices capable of transforming technological potential into sustainable competitiveness.

Table 3: Digital competitiveness of Bulgaria (IMD 2023 – 2024)

FACTOR / SUBFACTOR	2023	2024	CHANGE	RANK (OUT OF 67)
KNOWLEDGE	53	59	▼ 6	59
– Talent	58	61	▼ 3	61
– Education and Training	46	54	▼ 8	54
– Scientific Concentration	44	47	▼ 3	47
TECHNOLOGY	56	49	▲ 7	49
– Regulatory Framework	60	61	▼ 1	61
– Capital	54	37	▲ 17	37
– Technological Infrastructure	50	49	▲ 1	49
FUTURE READINESS	58	61	▼ 3	61
– Adaptive Attitudes	62	64	▼ 2	64
– Business Agility	59	58	▲ 1	58
– IT Integration	58	61	▼ 3	61

Source: IMD World Competitiveness Center (2024).

At the EU level, the *Digital Economy and Society Index* (DESI) reflects analogous trends. According to the European Commission, Europe's digital leaders – Finland, Denmark, and the Netherlands – are also among the most competitive economies, whereas Bulgaria, Greece, and Romania occupy the lowest positions in terms of digital skills, technology integration, and e-governance (European Commission, 2024).

Digitally advanced countries demonstrate higher productivity and innovation activity, combined with stronger connectivity between business, universities, and public institutions. They are also characterised by the active integration of technologies such as artificial intelligence and Big Data in both the public and private sectors, leading to more efficient resource management, accelerated innovation deployment, and more sustainable economic growth.

For Bulgaria, this indicates the presence of digital potential without realisation. The country possesses a well-developed IT industry and entrepreneurial capacity but fails to translate them into a national competitive advantage. The main reasons for Bulgaria's lag in the process of digital transformation lie in the fragmented implementation of digital policy and insufficient inter-institutional coordination. The absence of a unified strategic framework leads to overlapping initiatives and inefficient use of available financial resources. Weakly expressed mechanisms for supporting small and medium-sized enterprises (SMEs) also limit the adoption of innovation and digital technologies – according to the European Commission, only 49.9% of SMEs in Bulgaria reach a basic level of digital intensity, compared to the EU average of 72.9% (European Commission, 2025b).

Additionally, the lag in STEM education and professional reskilling continues to hinder the development of a qualified workforce. According to IMD (2024), Bulgaria ranks 49th out of 67 countries in the subfactor *Training & Education*, confirming the structural shortage of digital and technological competences. An equally significant challenge is the low digital maturity of the public administration – the share of citizens using e-government services stands at only 68%, compared to an EU average of 82.3% (European Commission, 2025). This shows that despite progress in building e-infrastructure, institutional digitalization remains incomplete and still fails to ensure a sufficiently high level of interoperability and efficiency.

Thus, while the European Union strives for “digital sovereignty”, Bulgaria is still struggling with the basic prerequisites – education, regulation, and institutional capacity.

Digitalization and artificial intelligence are transforming the very nature of economic activity, shifting the focus from production resources to knowledge, data, and innovation. This transformation creates not only new opportunities for growth but also significant structural challenges.

The main challenges facing Bulgaria and similar economies can be systematised into three key directions:

1. Deficit of human capital and digital skills.

One of the most serious structural constraints to accelerated digital transformation in Bulgaria is the shortage of human capital with adequate digital competences. According to data from the *IMD World Digital Competitiveness Ranking*(2024), Bulgaria ranks 49th in the indicator “employee training” and 59th in the “knowledge” factor among 67 countries, highlighting the weak link between the educational system and the needs of the digital economy.

A detailed analysis of the “Knowledge” factor – which measures an economy’s ability to develop, educate, and retain skilled personnel – reveals an overall deterioration in Bulgaria’s performance compared to 2023. In the “Talent” subfactor, the country falls from 58th to 61st place, with the weakest results in the areas of “digital and technological skills” and “city management” (both around 60th place). This indicates a lack of a systematic policy for attracting and developing highly qualified specialists, as well as limited mobility of human capital.

In the “Training and Education” subfactor, there is a sharp decline from 46th to 54th place, with the most concerning result in the indicator “employee training”, where Bulgaria is ranked last – 67th place. This outcome demonstrates a structural deficit in both corporate and governmental policies for lifelong learning, creating a risk of persistent lag in the digital readiness of the workforce.

Despite this, within the factor there are also positive achievements that reveal a latent potential for growth. Bulgaria ranks 14th in the ratio of students to academic staff in higher education, which implies improved teaching quality and greater accessibility of the academic environment. In the indicator “Women researchers”, the country holds the 12th position – one of the best results in the region – reflecting strong female participation in research activity and in the field of science and innovation.

In the “Scientific Concentration” subfactor, Bulgaria is placed 47th, showing a slight deterioration compared to 2023 (44th place). Although the share of R&D expenditure (around 0.9% of GDP) remains below the EU average (2.22%), there has been positive progress in high-technology patents (19th place) and in female participation in research. This confirms the presence of scientific capacity which, however, remains weakly integrated into industrial and economic processes.

According to the *Digital Decade Country Report* (2025), only 35.5% of the Bulgarian population possess at least basic digital skills, compared with 52% for the European Union. This gap of more than 16 percentage points indicates that the deficit is not only quantitative but also qualitative – linked to the absence of critical thinking, analytical, and entrepreneurial competences. This lag hinders

the effective implementation of artificial intelligence and other advanced technologies, even when the technical infrastructure is already in place.

In this context, Bulgaria requires an integrated national strategy for education, qualification, and requalification, oriented towards STEM disciplines, analytical thinking, and entrepreneurial skills. Educational institutions should become active agents of the digital economy by developing partnerships with business and creating applied programmes in artificial intelligence, robotics, and data analysis. Programmes for digital literacy should not be viewed as social policy but as a strategic instrument for enhancing economic competitiveness and building a sustainable, knowledge-based economy.

Table 4: Bulgaria’s performance in the “Knowledge” factor (IMD World Digital Competitiveness Ranking 2020 – 2024)

Subfactor	2020	2021	2022	2023	2024
– Talent	48	54	56	58	61
– Education and Training	50	53	52	46	54
– Scientific Concentration	42	46	40	44	47

Talent	Rank	Talent	Rank	Talent	Rank
Educational assessment PISA – Math	45	Employee training	67	Total expenditure on R&D (%)	44
International experience	55	Total public expenditure on education	44	Total R&D personnel per capita	41
Foreign highly skilled personnel	60	Higher education achievement	48	Female researchers	12
Management of cities	60	Pupil-teacher ratio (tertiary education)	14	R&D productivity by publication	43
Digital/Technological skills	49	Graduates in Sciences	46	Scientific and technical employment	39
Net flow of international students	45	Women with degrees	34	High-tech patent grants	19
		Computer science education index	54	Robots in Education and R&D	48
				AI articles	49

Source: IMD World Competitiveness Center (2024).

As the data show, Bulgaria demonstrates a consistent lag across all subfactors related to human capital, with the most significant deficit observed in the

indicator “Employee training”, while the only relatively strong areas are female participation in research activity and the student–teacher ratio.

2. Institutional and regulatory fragmentation.

The second structural problem arises from the lack of coordination among the institutions responsible for digital transformation. Sectoral policies often develop autonomously, without interconnection between education, industrial strategy, and digital investments. This results in low efficiency of public programmes and weak absorption of funds from European sources.

The solution requires the establishment of a unified digital coordination mechanism that brings together ministries, businesses, and research organisations in the pursuit of common objectives. European experience demonstrates that it is precisely this form of integration which underlies the success of countries such as Estonia and Finland.

3. Innovation and Entrepreneurship Culture.

The third challenge is related to organisational culture and the entrepreneurial ecosystem, which remain fragmented and weakly institutionalised. Although entrepreneurs in the country display high risk tolerance and adaptability, innovation is still rarely regarded as a strategic resource capable of ensuring long-term competitive advantage. In many firms, there is a lack of a comprehensive vision for the integration of new technologies and for the systematic management of knowledge.

Change requires a clear policy aimed at stimulating private investment in research and development, as well as support for the formation of innovation ecosystems – technology clusters, laboratories, university entrepreneurship, and start-up communities. These structures act as catalysts for knowledge transfer between science and business, transforming digitalization into tangible economic value.

In the context of the *Competitiveness Compass (2025)* and the Mario Draghi Report (2024), several key policies can be identified for enhancing competitiveness through AI and digitalization:

- **Investments in artificial intelligence infrastructure and open data** – aimed at stimulating public–private partnerships and fostering the development of intelligent applications in industry, services, and the public sector. Such investments create the foundation for the implementation of solutions based on machine learning and automation, which enhance efficiency and productivity.
- **Reforms in education and vocational training**, including the integration of disciplines related to artificial intelligence, automation, and the ethics of technology. The objective is to cultivate a generation of specialists with

digital and analytical skills, capable of applying new technologies in real business and social environments.

- **Financial incentives for small and medium-sized enterprises (SMEs)** that implement digital solutions – through facilitated access to financing, innovation voucher schemes, and tax reliefs. Such instruments encourage technological modernisation and enable enterprises to increase their productivity and innovation capacity.
- **Development of e-governance**, which not only reduces administrative burden and bureaucracy but also serves as a model for digital culture and transparency within society. Effective e-governance is an indicator of the maturity of the digital state and of its capacity to implement intelligent solutions for the benefit of citizens and businesses.
- **Integration of artificial intelligence into public services** – through systems for predictive analysis, intelligent planning, and resource optimisation. This includes the application of AI in healthcare, transport, education, and public administration to enhance the efficiency and quality of the services provided.

The implementation of these policies would create a comprehensive and sustainable environment in which technological progress becomes a genuine source of economic growth, social inclusion, and the strategic autonomy of the state. In the long term, this would enable Bulgaria – and the European Union as a whole – to transform digitalization and artificial intelligence from technological tools into systemic drivers of competitiveness, innovation, and sustainable development.

Conclusion

The study confirms that digitalization, innovation, and artificial intelligence are among the key drivers of the modern economy and form the new framework of economic competitiveness. Their integration transforms the way in which states and firms create value, optimise processes, and interact with the market. Artificial intelligence is not merely a technological tool but a system of capabilities through which economies can accelerate their growth, increase productivity, and build a sustainable, knowledge-based economic structure.

Digital transformation should not be perceived solely as a process of technological adaptation but as a profound structural change that affects human capital, management models, and the institutional framework. In this context, innovation and AI are not simply outcomes of progress but its catalyst – they determine competitiveness through their impact on productivity, service quality, and the ability to create new markets.

The analysis indicates that Bulgaria possesses potential for digital growth but still suffers from structural constraints – a deficit of digital skills, a weak link

between science and business, and insufficient development of an innovation culture. These challenges can be overcome through an integrated state policy aimed at stimulating investment in R&D, digital infrastructure, and human capital. The creation of innovation ecosystems – technology clusters, laboratories, and university start-ups – is the key to transforming technological potential into real economic value.

From a strategic perspective, firms should build flexible business models in which innovation is a continuous process rather than a one-time action. The implementation of artificial intelligence may be costly, but the long-term effects on efficiency, sustainability, and market positioning justify the investment. Companies that embrace AI as part of their corporate identity, rather than merely as a technology, will be the leaders of the next decade.

At the macro level, Bulgaria should use European and national funds strategically – not only for technology deployment but also for developing human resources and fostering innovation partnerships. Small and medium-sized enterprises should be prioritised, as they represent the backbone of the national economy and the main drivers of flexibility and entrepreneurial initiative.

It is necessary to build synergy between the public sector, academia, and business in order to transform Bulgaria into a regional hub of digital creativity and innovation in South-Eastern Europe. In the long term, this requires a clear vision for skills development, supported by educational reforms oriented towards STEM disciplines, analytical thinking, and the ethics of technology.

From the perspective of the global economy, if the European Union – and Bulgaria in particular – succeed in accelerating the adoption of artificial intelligence and innovation, this will lead to significant progress in economic prosperity and the long-term sustainability of national economies. In this process, Europe must build upon its model of digital autonomy by directing its efforts towards the creation of a competitive, ethical, and inclusive technological environment.

Digital competitiveness is not built solely upon technology but upon people, knowledge, and an innovation culture. Bulgaria has all the prerequisites to become an example of a “smart small economy” if it places human capital and artificial intelligence at the centre of its national strategy. Only through sustainable investment in knowledge, innovation, and leadership can digital transformation evolve from a political priority into an economic reality.

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