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EUROPEAN UNION'S GREEN DIGITAL TRANSFORMATION POLICY IMPACT ON GEORGIA'S DIGITAL TRANSFORMATION PROCESS

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Abstract: *In modern era, people's lives are being altered to digital technologies. The EU's main role in this process is introducing those industrial and digital initiatives that should be beneficial for both individuals and companies. Green Digital Transformation (GDT), the initiative which is underscored by the European Green Deal and Digital Strategy, is one of the tools for integrating digital technologies for achieving environmental sustainability, addressing climate change, resource depletion and pollution. As the world faces pressing environmental challenges like climate change, resource depletion, and pollution, technology has emerged as a vital tool for addressing these issues. However, the digital sector itself has a significant environmental impact, contributing to e-waste generation, data center energy consumption, and a growing carbon footprint. GDT offers a potential pathway to sustainability but requires mindful implementation for avoiding unintended consequences and ensure a positive impact on the environment.*

Georgia, as the part of Eastern Partnership and the candidate country, is striving for achieving its digital transformation and sustainable growth. The role of European Union in this process is helping Georgia aligning its environmental laws with EU standards, supporting the development of natural parks, improving air quality, promoting greener growth and helping with waste management and water

infrastructure. The EU funds various projects in water supply, sanitation, waste management, and eco-friendly transport, which also help reduce greenhouse gas emissions and combat climate change. One of the most important directions, where Georgia can play an important role is the European Union's Global Gateway Strategy, which aims creating reliable and sustainable connections around the world by focusing on infrastructure, digital growth and energy security. Due to its location, Georgia plays a key role in energy supply to Europe, making its involvement in the Global Gateway essential for regional stability and economic growth as well as for stronger ties between Europe and Asia.

Keywords: *Digital transformation; Green Deal; Green Digital Transformation; European Union; Digital Single Market.*

Introduction

In an era where digital technologies are rapidly reshaping economies and societies worldwide, the European Union recognizes the urgent need for digital transformation. This transformation is not merely about adopting new technologies but fundamentally rethinking how businesses, governments, and citizens interact. The EU aims creating a digital society that is human-centric, sustainable, and prosperous, ensuring that digital technologies serve the interests of all Europeans. The EU's vision involves addressing these challenges and leveraging its strengths for achieving digital sovereignty and technological leadership on the global stage. Achieving this vision requires overcoming significant obstacles, such as fragmented markets that hinder the scalability of digital businesses. The EU must also address the skills gap, which prevents many Europeans from fully participating in the digital economy. Furthermore, it is essential to mitigate cybersecurity threats that undermine trust in digital technologies and navigate complex regulatory environments that can stifle innovation. By confronting these challenges head-on, the EU can unlock the full potential of digital transformation and secure its place as a global digital leader.

On the other hand, European Union's ambitious goals for achieving environmental sustainability, reducing gas emissions and achieving climate-neutral Europe are intertwined with digital strategy,

which can be served as an enabler for achieving environmental goals with a held digital technologies. The last one plays a crucial role in optimizing resource usage, reducing emissions and promoting sustainable practices. The European Union’s policy framework includes regulations, directives and funding mechanisms designed for supporting this transformation, creating a cohesive approach for achieving both digital and environmental objectives.

The interrelation between the European Green Deal and the Digital Strategy is evident in several key areas. Digital technologies are being leveraged for monitoring and managing environmental impacts, improving energy efficiency, and promoting circular economy practices. For instance, smart grids and intelligent transport systems rely on digital infrastructure for optimizing resource allocation and reduce waste. The convergence of these two frameworks is driving innovation and creating new opportunities for sustainable development across various sectors.

Economic and institutional aspects of European Union’s Global Gateway Strategy

In 2021 European Union have launched the Global Gateway Initiative as a strategic response to the evolving geopolitical landscape, primarily as an alternative to China's Belt and Road Initiative (BRI). The BRI, launched in 2013, had rapidly expanded China's influence through large-scale infrastructure projects across Asia, Africa, and Latin America. Recognizing the need to provide a competing model, the EU conceived the Global Gateway as a values-driven and sustainable approach to infrastructure development. Furthermore, the Global Gateway aligns with the broader G7 infrastructure investment counterproposal, which seeks to address the global infrastructure gap with high-standard and transparent projects. This initiative is not solely an economic endeavor but also a geopolitical strategy aimed at enhancing the EU's global influence and strengthening its relationships with partner countries. The EU aims to offer a more sustainable and equitable model, emphasizing democratic values, good governance, and environmental

protection, which sets it apart from other infrastructure initiatives. The strategy underscores the EU's commitment to fostering resilience and strategic autonomy for its partner countries by diversifying their economic and political relationships.

The Global Gateway Strategy is anchored in several core objectives and principles designed to ensure its effectiveness and sustainability. Foremost among these is the commitment to sustainable infrastructure development, which focuses on projects that are environmentally sound, socially responsible, and economically viable over the long term. This approach contrasts with infrastructure projects that may offer short-term gains but lead to environmental degradation or unsustainable debt burdens.

The strategy prioritizes investments in the digital, energy, and transport sectors, recognizing their critical role in fostering economic growth and connectivity. In this case we make accents on European Unions digital transformation and on green energy transformation, that uses digital technologies. Digital connectivity infrastructure aims to bridge the digital divide, providing access to information and communication technologies that can drive innovation and development. Investments in green energy and climate transition are geared towards reducing carbon emissions and promoting renewable energy sources, aligning with the EU's climate goals. Transport network development focuses on creating efficient and sustainable transportation systems that facilitate trade and mobility. The Global Gateway seeks to promote EU values and standards globally, emphasizing democratic governance, human rights, and the rule of law. This values-driven approach is integral to ensuring that investments contribute to inclusive and equitable development outcomes. The strategy focuses on quality over quantity of investments, ensuring that projects are well-planned, effectively implemented, and deliver lasting benefits to partner countries.

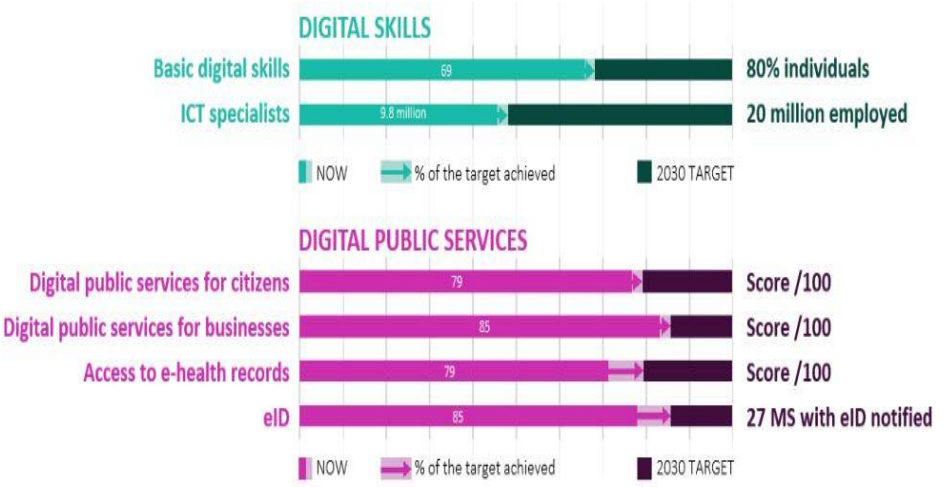
The Global Gateway Strategy prioritizes investments across several key sectors, each is critical to fostering sustainable and inclusive development. Digital connectivity infrastructure is a central focus, aiming to bridge the digital divide and promote access to high-speed

internet and digital services. This includes investments in fiber optic networks, satellite communications, and other technologies that can connect remote and underserved areas. Digital connectivity infrastructure is supported and interrelated to the European Unions Digital Decade visions. Launched in 2021, the Digital Decade Policy Programme sets out a clear vision for a human-centered and sustainable digital transition across the European Union. This initiative addresses the critical need for enhancing Europe's global technological competitiveness while safeguarding its digital sovereignty. The Digital Decade aims to ensure that technological advancements benefit all citizens and businesses, promoting a fair and inclusive digital society. At its core, the vision emphasizes the ethical using of technology and the protection of fundamental rights in the digital space. By fostering innovation and building robust digital infrastructure, the EU seeks creating a resilient and competitive digital economy that drives economic growth and improves the quality of life for all Europeans. This involves not only deploying advanced technologies but also ensuring that the workforce is equipped with the necessary skills to thrive in the digital age.

Moreover, the digital decade seeks establishing the EU as a global leader in digital technologies, setting standards and promoting its values on the international stage. This includes collaborating with partner countries for advancing shared digital goals and address global challenges through technology. The program's holistic approach ensures that digital transformation is aligned with the EU's broader sustainability and social inclusion objectives.

A central pillar within the Digital Decade is the enhancement of digital skills and education among EU citizens. The initiative sets an ambitious target to ensure that at least 80% of adults possess basic digital competencies by 2030 [The European Pillar of Social Rights Action Plan; adopted in 2021]. Recent surveys show, that in 2024, the digital competences of adults are about 69%.

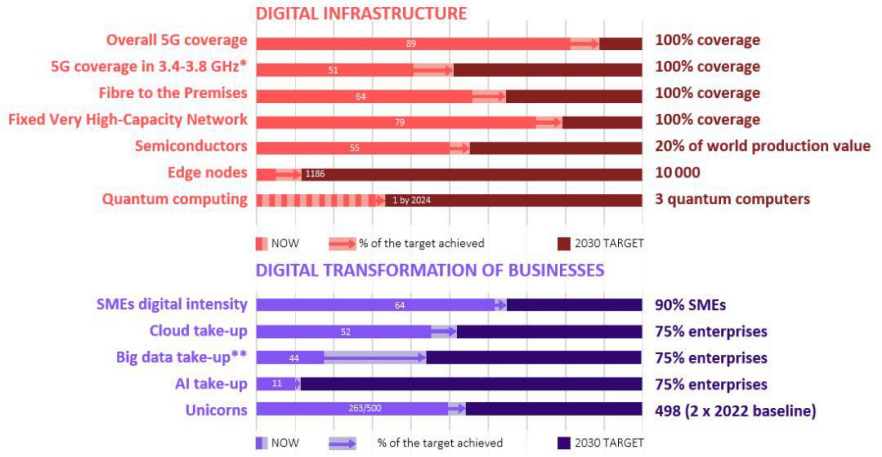
Figure 1: A digital policy for people and society: Digital skills and public services [State of the Digital Decade 2024 report: https://digital-strategy.ec.europa.eu/en/node/12810/printable/pdf]



The digital decade emphasizes the critical importance of robust digital infrastructure and connectivity for achieving its broader goals. One of the key targets is to ensure gigabit connectivity for all EU citizens, enabling high-speed internet access across the Union. This involves deploying advanced network technologies and upgrading existing infrastructure for meeting the growing demands of the digital economy. The initiative also prioritizes the rollout of 5G and future network technologies, recognizing their potential to transform industries and enable new applications such as smart cities, autonomous vehicles, and connected healthcare. Investments in these technologies are essential for fostering innovation and driving economic growth. Furthermore, the Digital Decade aims to establish 10,000 climate-neutral, secure edge nodes across the EU, providing distributed computing resources and enhancing data processing capabilities. The submarine cables play an important role in this process, because it allows transferring data over

long distances, keeping internet traffic stable even in those situations when data usage is increased.

Figure 2: A competitive, sovereign, and resilient EU: Digital infrastructure and businesses [State of the Digital Decade 2024 report: https://digital-strategy.ec.europa.eu/en/node/12810/printable/pdf]



The digital decade places a strong emphasis on accelerating the digital transformation of EU businesses, particularly small and medium-sized enterprises (SMEs). The initiative aims to have 75% of EU companies using Cloud computing, Artificial Intelligence (AI), or Big Data technologies by 2030. This target recognizes the potential of these technologies to enhance productivity, improve decision-making, and drive innovation across various sectors. To support this transformation, the EU is implementing programs to promote the adoption of digital technologies among SMEs, providing them with access to funding, training, and expert advice. These programs are designed to help businesses overcome barriers to digital adoption, such as lack of awareness, skills gaps, and financial constraints. The Digital Decade also aims to double the number of EU tech unicorns, fostering a vibrant ecosystem of high-growth companies that are at the forefront of digital innovation. The SME digital intensity improvement program is a key component of this effort, focusing on helping SMEs integrate digital

technologies into their business processes and operations. This includes promoting the use of e-commerce, digital marketing, and other tools to expand their reach and improve their competitiveness. By supporting the digital transformation of businesses, the Digital Decade aims to create a more dynamic and resilient European economy.

The Digital Decade aims to revolutionize public services by making them fully accessible online. A key objective is to ensure that 100% of key public services are available online by 2030, providing citizens with convenient and efficient access to government services. This includes services such as applying for permits, accessing educational resources, and managing healthcare information. To facilitate this digital transformation, the initiative promotes the development of a universal digital identity for EU citizens. This digital identity would enable secure and seamless access to public services across member states, simplifying administrative processes and reducing bureaucracy. The Digital Decade also prioritizes the digitalization of healthcare, with a goal of 100% access to medical records for citizens. This would empower patients to manage their health information and improve the coordination of care among healthcare providers.

Streamlining digital government services is another key focus, with efforts to simplify processes, reduce paperwork, and improve the user experience. This involves redesigning public services around the needs of citizens and businesses, making them more intuitive and user-friendly. By digitalizing public services, the Digital Decade aims to improve efficiency, reduce costs, and enhance the quality of life for all Europeans. Ensuring cybersecurity and protecting digital rights are fundamental to the Digital Decade's vision. The initiative emphasizes the importance of robust data protection frameworks to safeguard citizens' personal information and ensure compliance with privacy regulations. This includes strengthening enforcement mechanisms and promoting best practices for data security among businesses and public sector organizations.

The Digital Decade also addresses the emerging challenges posed by quantum computing, with initiatives focused on developing quantum-

resistant security solutions. These initiatives aim to protect critical infrastructure and sensitive data from potential cyber threats in the quantum era. Protecting citizen privacy in digital spaces is a core principle, with efforts to promote transparency and empower individuals to control their personal data. Furthermore, the Digital Decade promotes the development of ethical AI guidelines, ensuring that AI technologies are developed and used in a responsible and trustworthy manner. These guidelines aim to address potential biases, prevent discrimination, and promote fairness in AI systems. By prioritizing cybersecurity and digital rights, the Digital Decade seeks to create a safe and inclusive digital environment for all Europeans.

Developing the European technology ecosystem is another important objective, with efforts to support startups, scale-ups, and venture capital investments. This includes creating a more favorable regulatory environment, providing access to talent and expertise, and fostering collaboration between industry, academia, and government. By promoting innovation and technology leadership, the Digital Decade aims to position the EU as a global hub for digital technologies.

How European Union can use digital technologies for creating resilient, resource-efficient and competitive economy? We must seek the answer to this question in a green digital transformation strategy, integrating digital innovation with climate neutrality goals. With an €8.1 billion investment from the Digital Europe Programme, the EU is targeting net-zero greenhouse gas emissions by 2050. This initiative aims to revolutionize various sectors through digital technologies, fostering a sustainable and competitive economy.

The EU's Green Digital Vision is built upon a dual transition strategy, intertwining digital and environmental sustainability. This "twin transition" approach connects technology and climate action, recognizing that digital advancements can significantly contribute for achieving environmental objectives. The EU aims to lead the global green digital transformation by fostering innovative solutions and setting ambitious targets for sustainable development. This involves integrating digital technologies into various sectors to reduce carbon emissions, promote

resource efficiency, and drive circular economy practices. By aligning digital policies with environmental goals, the EU seeks to create a resilient and environmentally responsible economy.

Digital technologies play a crucial role in enabling the EU to achieve its Green Deal objectives. The Internet of Things (IoT) can optimize resource management in agriculture, industry, and energy production. Artificial intelligence (AI) can analyze vast datasets to improve energy efficiency, predict environmental risks, and develop sustainable solutions. Cloud computing provides the infrastructure for processing and storing data, enabling real-time monitoring and decision-making. Blockchain technology can enhance transparency and traceability in supply chains, promoting sustainable consumption and combating illegal logging. Digital platforms facilitate the sharing of knowledge, best practices, and innovative solutions, accelerating the green transition across various sectors. These technologies are not merely tools but integral components of a new, sustainable economic model.

The EU's Green Digital Transformation strategy targets numerous key sectors, recognizing the interconnectedness of the economy and the need for a holistic approach. Energy is a primary focus, with smart grids, renewable energy management systems, and energy-efficient buildings. Under energy sector, the European Union is trying to reach climate neutrality target. One goal of reaching this is to decarbonize their energy system by aiming achieving net-zero greenhouse gas emissions by 2050. Their relevant energy directive is intended to be looked over and adjusted if problem areas arise. In 2023 member states updated their climate and national energy plans for adhering European Union 2030 climate goals. From these point of view, the main key principles include: Priority of the Energy Efficiency; Developing a power sector which are based on renewable resources; Securing energy supply; And having a “fully integrating, interconnected digitalized EU energy market” [European Commission: Clean Energy: December 11, 2020].

In 2020, the European Commission unveiled its strategy for greener, cleaner energy future. The EU strategy for Energy System Integration was one of the frameworks for energy transition, which

comprises measures for reaching a more circular system and measures implementing direct electrification as well as developing clean fuels, including hydrogen. By 2023, Greentech was one of the few sectors in the European Union where venture capital investments matched those in the United States, highlighting the impact of the European Union's ambitious climate goals and government subsidies. The European Green Deal and accompanying government policies have driven substantial investment in Greentech particularly in areas like energy storage, circular economy initiative s and agricultural technology. This focus enabled the European Union closing existing investment gap with the United States in these strategic sectors [European Investment Bank, 2024 p 28].

Transport is being transformed through electric vehicles, smart mobility solutions, and optimized logistics. Agriculture benefits from precision farming, smart irrigation, and optimized crop management. Manufacturing is becoming more sustainable through circular economy practices, resource-efficient production processes, and waste reduction technologies. Cities are evolving into smart, sustainable urban centers with optimized resource consumption, smart infrastructure, and citizen engagement platforms. Each sector presents unique opportunities for leveraging digital technologies to achieve specific green goals.

The EU employs a range of policies and regulations to drive the Green Digital Transformation. The European Green Deal Investment Plan mobilizes public and private funding to support green projects. The Digital Europe Programme invests in digital infrastructure, skills, and technologies. The Innovation Fund supports innovative clean technologies. The Emissions Trading System (ETS) incentivizes emission reductions. The Energy Efficiency Directive sets targets for energy savings. The Renewable Energy Directive promotes the deployment of renewable energy sources. The Circular Economy Action Plan promotes waste reduction, reuse, and recycling. These policies and regulations create a clear framework for businesses and individuals to adopt sustainable practices and invest in green technologies.

The EU offers a variety of funding mechanisms to support Green Digital projects. The Horizon Europe programme provides funding for

research and innovation in sustainable technologies. The European Regional Development Fund (ERDF) supports regional projects that promote green growth and digital transformation. The Cohesion Fund invests in infrastructure projects that contribute to environmental protection and climate action. The Just Transition Fund supports regions that are heavily reliant on fossil fuels. The Recovery and Resilience Facility (RRF) provides funding for investments that promote economic recovery and green transformation. These funding mechanisms provide critical financial support for businesses, research institutions, and public authorities to implement innovative green digital projects. Despite the numerous opportunities, the EU's Green Digital Transformation faces several challenges and barriers to implementation. Data privacy and security concerns can hinder the adoption of digital technologies in sensitive sectors. The digital skills gap can limit the ability of businesses and individuals to effectively use and implement green digital solutions. Lack of interoperability between different digital systems can impede the integration of various sectors. Resistance to change from established industries can slow down the transition to a green digital economy. Insufficient investment in digital infrastructure and green technologies can limit the scale and scope of the transformation. Addressing these challenges requires a multi-faceted approach involving policy interventions, skills development initiatives, and public-private partnerships.

The future of the EU's Green Digital landscape is characterized by emerging trends and innovations. The increasing adoption of edge computing enables real-time data processing and analysis closer to the source, improving efficiency and reducing latency. The rise of digital twins allows for virtual simulations of physical assets and systems, facilitating optimized design and operation. The development of advanced materials enables the creation of more sustainable and resource-efficient products. The integration of blockchain technology into supply chains enhances transparency and traceability, promoting sustainable consumption. The growing use of artificial intelligence in environmental monitoring and prediction improves the ability to

anticipate and mitigate environmental risks. These trends and innovations promise to further accelerate the green digital transition and create a more sustainable and resilient Europe.

Georgia's Perspective under European Union Green Digital Transformation Process

Climate change and environmental degradation represent significant global risks, with profound economic implications. The European Union (EU) promotes the European Green Deal, aiming for a transition to sustainable, resource-efficient, and climate-neutral economies, which could generate new economic opportunities through green technologies and job creation. As a leader in climate policy, the EU's goal of climate neutrality by 2050 could stimulate investment in low-carbon sectors, fostering innovation and driving economic growth.

In Georgia, the EU supports climate mitigation and adaptation efforts, such as EU4Climate, which finances infrastructure projects that not only reduce greenhouse gas emissions but also create employment opportunities and stimulate economic development in green industries. The EU's support for energy efficiency and renewable energy in Georgia contributes to the long-term reduction in energy costs, enhancing energy security and fostering a competitive green economy. The rehabilitation of public buildings is expected to generate substantial economic returns through increased energy savings and the creation of jobs in the construction and energy sectors.

The EU's promotion of natural resource management and the circular economy in Georgia drives efficiencies in waste management and resource use, leading to reduced operational costs for businesses. Policies like Extended Producer Responsibility incentivize sustainable production practices, which can enhance the competitiveness of Georgian industries in global markets. The development of sustainable packaging industries further contributes to economic growth by fostering innovation and creating new business opportunities.

Finally, the EU's support for sustainable food systems through the ENPARD programme in Georgia promotes agricultural innovation, improves food security, and enhances rural economic development. By supporting environmentally sustainable agricultural practices, the EU contributes to long-term economic stability in the region, ensuring both economic growth and environmental resilience.

As an Eastern Partnership country and an EU candidate state, Georgia is aligning its national development strategy with the European Union's Green Digital Transformation (GDT) framework, which integrates environmental sustainability with digital innovation. The EU's GDT process, underpinned by initiatives like the European Green Deal and the Digital Decade, drives the dual transitions towards a climate-neutral, digitally empowered society. Georgia's commitment to aligning with EU standards in digital infrastructure, green energy, and e-governance is expected to generate long-term economic benefits, including enhanced productivity, sustainable growth, and the creation of green jobs.

Strategic investments facilitated through EU4Digital, the Global Gateway, and other bilateral programs are enhancing Georgia's broadband connectivity and promoting the adoption of digital technologies in rural areas. This digital expansion is expected to reduce the economic divide between urban and rural regions, fostering innovation, improving access to markets, and enhancing the competitiveness of small and medium-sized enterprises (SMEs). Additionally, digital upskilling initiatives are expected to boost human capital and productivity, which are critical for economic resilience in the long run.

In the energy sector, the EU's support under initiatives like EU4Energy and the Global Gateway Strategy has enabled Georgia to improve energy efficiency, deploy smart grid technologies, and expand the use of renewable energy sources. These advancements are anticipated to lower energy costs, reduce dependence on imported energy, and support the creation of a competitive, low-carbon economy. Digital tools introduced for monitoring and managing energy consumption will further

enhance efficiency, contributing to decarbonization targets and improving overall economic performance through energy savings and cost reductions.

The transportation sector is undergoing gradual digital modernization, with the implementation of smart mobility solutions, electronic logistics systems, and the digitalization of customs and border procedures. These advancements will reduce operational costs, increase infrastructure efficiency, and enhance Georgia's position as a regional transit hub. This transition could also open new opportunities for regional trade and cross-border cooperation, contributing to economic integration and growth.

In education, the EU-funded digital transformation includes the expansion of e-learning platforms, digital literacy programs, and the integration of green digital content into curricula. Investments in digital infrastructure, particularly in rural areas, aim to bridge existing educational inequalities and enhance the employability of the workforce. By improving access to quality education and digital skills, Georgia is positioning itself for long-term economic development through a more knowledgeable and skilled labor force.

However, challenges persist, particularly regarding the digital divide, the need for institutional capacity building, and the securement of funding for large-scale digital transitions. Despite these obstacles, Georgia's engagement in the EU GDT process is crucial for achieving a low-carbon, digitally inclusive society, which will be vital for long-term socio-economic resilience and sustainable development.

In conclusion, Georgia's alignment with the EU's Green Digital Transformation strategy is expected to generate substantial economic benefits by fostering green innovation, improving productivity, and enhancing access to digital technologies across sectors. While challenges remain, the integration of digital and green technologies offers significant opportunities for Georgia's economic transformation and its integration into the EU's low-carbon, digitally advanced economy.

According to the National Statistics Office of Georgia (Geostat), there has been a consistent increase in ICT adoption across the country.

In 2024, 91.5% of Georgian households had internet access, marking a 2.6 percentage point rise from the previous year. Urban areas saw 94.5% connectivity, while rural regions had 87.5%, indicating ongoing urban-rural digital divides. Regions like Adjara A.R. and Tbilisi reported the highest access rates at 97.8% and 95.8%, respectively.

Among Georgians aged 6 and older, 82.7% used the internet within the last three months in 2023, with higher usage in urban centers compared to rural areas. The primary internet activities include information search, communication, and social networking, with a growing trend in online shopping. Smartphone ownership is prevalent, with 93.5% of individuals aged 6 and above owning one, facilitating mobile internet access. Computer ownership stands at 69.8% of households, and 65.2% of individuals aged 6 and older have used a computer in the past three months. Digital skills are widespread, with 80.1% of individuals aged 16-74 possessing at least basic digital skills, though disparities exist among older adults and rural populations. These statistics underscore the importance of targeted digital literacy programs to bridge existing gaps.

The data reflects Georgia's significant progress in ICT adoption, highlighting the need for policies that address regional disparities and promote digital literacy to ensure equitable access to digital opportunities.

The National Statistics Office of Georgia provides comprehensive data on the adoption and utilization of Information and Communication Technologies (ICT) among Georgian enterprises. This analysis synthesizes the available information to offer insights into the current state of ICT usage within the country's business sector.

*Internet Access and Usage; Prevalence of Internet Access***:** A significant majority of Georgian enterprises have integrated internet connectivity into their operations. The widespread adoption of internet services facilitates efficient communication, access to global markets, and the implementation of various digital business solutions.

*E-commerce Engagement***:** The engagement of Georgian enterprises in e-commerce activities reflects the sector's adaptability to digital

commercial platforms. Participation in e-commerce enables businesses to expand their reach, optimize sales processes, and enhance customer engagement through online channels.

Software Utilization and Technological Integration; *Software Adoption:* The deployment of specialized software solutions across various business functions indicates a strategic approach towards operational efficiency and data management. Utilization of such software supports activities ranging from resource planning to customer relationship management.

Emerging Technologies: The exploration and integration of advanced technologies, including the Internet of Things (IoT) and Artificial Intelligence (AI), suggest a forward-looking stance among Georgian enterprises. Incorporating IoT and AI can lead to enhanced data analytics capabilities, automation of processes, and the development of innovative products and services.

In Georgia, digital transformation is increasingly recognized as a strategic priority within national public policy frameworks, particularly in relation to the development and competitiveness of small and medium-sized enterprises (SMEs). Given that SMEs account for over 99% of all registered businesses and represent a significant share of employment and GDP, their successful digitalization is critical to the country's overall economic modernization. However, structural challenges—such as limited access to financing, inadequate digital infrastructure in rural regions, and insufficient digital literacy—have slowed the integration of advanced technologies into SME operations. In response, Georgian public policy has gradually shifted toward supporting digital innovation, with initiatives aimed at strengthening digital infrastructure, enhancing ICT education, and promoting e-governance and e-commerce. Programs co-funded by international partners, such as the EU's EU4Digital Initiative, have played a pivotal role in aligning Georgia's digital policies with European standards. Nonetheless, a coordinated policy approach is needed that combines regulatory reform, targeted financial incentives, and digital upskilling initiatives to ensure that SMEs are not left behind in the digital transition. Such efforts will not only enhance SME

resilience and productivity but also contribute to more balanced and inclusive economic growth.

In the context of accelerating digitalization, the capacity for effective digital transformation constitutes a pivotal determinant of competitive advantage in contemporary economies. Digital transformation extends beyond the mere adoption of new technologies; it involves the comprehensive integration of digital tools into core business processes, organizational structures, and strategic decision-making. Enterprises that successfully implement such transformation are better positioned to enhance operational efficiency, streamline resource allocation, and improve productivity. Moreover, digital transformation facilitates access to new markets, fosters innovation, and enables data-driven decision-making, thereby generating significant value creation potential. In highly dynamic and competitive environments, this capacity can serve as a key differentiator, strengthening an enterprise's resilience and long-term sustainability. As such, digital transformation should be regarded as a strategic imperative rather than a technological option, particularly in the context of global economic shifts and evolving consumer expectations.

The process of digitalization has emerged as a critical driver of economic modernization in Georgia. Its relevance grew significantly during the COVID-19 pandemic, as businesses were compelled to adapt to social distancing requirements by integrating digital tools into their everyday operations. These adaptations were primarily focused on customer-facing activities, including digital marketing and online sales. However, there is a gradual shift toward incorporating digital technologies into internal operational processes, aiming to enhance overall business efficiency and productivity.

Georgia, as an Eastern Partnership country and an EU candidate state, is aligning its national development agenda with the European Union's Green Digital Transformation (GDT) strategy, which integrates environmental sustainability with digital innovation. The EU's GDT process, supported by initiatives such as the European Green Deal and the Digital Decade, emphasizes the twin transitions toward a climate-

neutral and digitally empowered society. In this context, Georgia has embarked on comprehensive reforms to harmonize its policies with EU standards, particularly in digital infrastructure, green energy, and e-governance. Strategic investments—facilitated through EU4Digital, the Global Gateway, and other bilateral programs—are enhancing Georgia's broadband connectivity, supporting the adoption of digital technologies in rural areas, and fostering innovation among SMEs. Furthermore, Georgia's active participation in green technology adoption and digital upskilling initiatives demonstrates its commitment to advancing a sustainable digital economy. However, challenges remain, especially in addressing the digital divide, improving institutional capacity, and ensuring inclusive access to green-digital tools across sectors. As Georgia progresses on its EU integration path, its ability to effectively integrate green digital principles will be instrumental in achieving long-term socio-economic resilience and environmental sustainability.

Within the framework of the European Union's Green Digital Transformation (GDT) strategy, Georgia is increasingly integrating digital innovation with environmental sustainability in key sectors such as energy, transport, and education. In the energy sector, the EU's support under initiatives like the EU4Energy and the Global Gateway Strategy has enabled Georgia to improve energy efficiency, promote smart grid technologies, and expand the use of renewable energy sources. Digital tools are being introduced to enhance the monitoring and management of energy consumption, contributing to decarbonization goals. The transport sector is undergoing gradual digital modernization, with emphasis on smart mobility solutions, electronic logistics systems, and the digitalization of customs and border procedures. These developments aim to reduce emissions, improve infrastructure efficiency, and strengthen Georgia's role as a regional transit hub. In education, the digital transformation is reflected in the expansion of e-learning platforms, digital literacy programs, and the integration of green digital content into curricula. EU-funded projects support teacher training and digital infrastructure upgrades, especially in rural areas, to bridge existing educational inequalities. However, challenges persist in aligning

institutional capacities with the pace of technological change, securing funding for large-scale digital transitions, and ensuring equitable access to digital tools. Despite these constraints, Georgia's engagement in the EU GDT process demonstrates its strategic intent to build a future-oriented, low-carbon, and digitally inclusive society.

Digital Technology Adoption in Georgian Enterprises: ERP and AI Trends (2020–2024)â

An analysis of digital technology adoption trends in Georgian enterprises from 2020 to 2024 reveals a modest but fluctuating uptake of Enterprise Resource Planning (ERP) systems, alongside consistently low implementation of artificial intelligence (AI). The chart (Figure 1) below illustrates three dimensions: the use of ERP systems, the actual use of AI in enterprises, and the stated purposes and origins of AI application.

ERP System Usage**:** Between 2020 and 2024, the use of ERP packages in enterprises remained relatively stable, ranging from 6.8% to 10.5%. The peak occurred in 2023, suggesting a temporary increase in digital systems integration, possibly driven by post-pandemic restructuring or donor-driven modernization initiatives. Nevertheless, the trend lacks a consistent upward trajectory, indicating a cautious and slow approach to enterprise-level digital transformation.

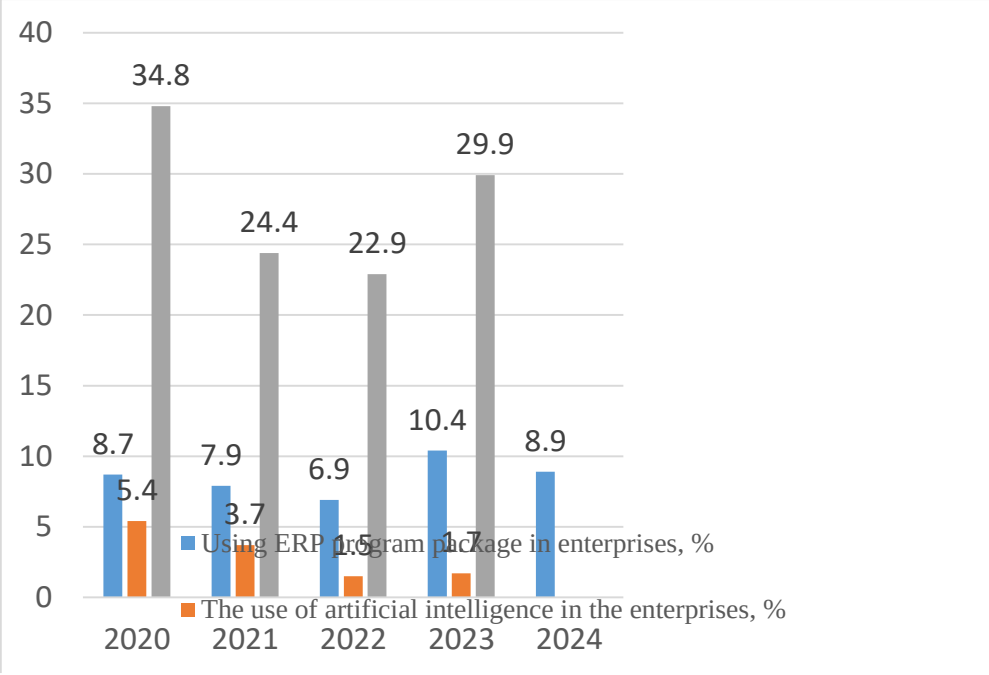
AI Usage in Enterprises**:** The actual implementation of AI within Georgian enterprises has remained strikingly low, with a high of 5.1% in 2020 and a dip to 1.6% in 2022. Although there was a slight rebound in 2023 (2.0%), the levels remain insufficient to suggest mainstream integration. Data for 2024 AI use is unavailable or yet to be reported, leaving the recent trend unclear.

Purposes and Origins of AI Use: Contrasting with actual usage, the percentage of enterprises reporting awareness or planning regarding AI—labeled as "purposes and origins of AI use"—is significantly higher. This indicator peaked at 35.3% in 2020 and remained relatively strong throughout the observed period, with another notable high (29.8%) in 2023. This gap between intention and implementation reflects a

disconnect often observed in emerging markets: while awareness of innovative technologies may grow, practical application lags due to constraints in infrastructure, expertise, or funding.

Implications for Policy and Practice**:** These trends indicate that while Georgian enterprises are increasingly informed about the potential of AI, actual implementation remains limited. The discrepancy between knowledge and action, particularly in the case of AI, suggests the need for strategic interventions—such as capacity-building programs, pilot projects, financial incentives, and public-private partnerships—to bridge the gap between awareness and adoption. Similarly, although ERP systems are more widely used, their adoption has not gained significant momentum, implying that broader digital transformation efforts are still in the early stages.

Figure 3. Information and Communication Technologies Usage in enterprises in Georgia [Geostat: https://www.geostat.ge/en/modules/categories/105/information-and-communication-technologies-usage-in-enterprises**]**



Conclusions

Nowadays the European Union's Global Gateway Initiative and the Digital Decade Policy Programme represent a strategic and values-driven response to the evolving geopolitical landscape, emphasizing sustainable infrastructure development and digital transformation. By prioritizing democratic values, environmental protection, and equitable growth, these initiatives not only aim to enhance the EU's global influence but also foster resilience and innovation among partner countries and within the EU itself. In the case European Union's Green Digital Transformation strategy represents a pivotal initiative that intertwines digital innovation with environmental sustainability, aiming for a resilient and competitive economy by 2050. By leveraging advanced technologies across various sectors, the EU not only seeks to achieve its climate neutrality goals but also to position itself as a global leader in the green digital revolution, fostering sustainable practices and driving significant investment in Greentech.

For Georgia, as the part of Eastern Partnership and as for the candidate country, alignment with the European Union's Green Digital Transformation strategy presents a significant opportunity for economic growth and sustainability by integrating digital innovation with environmental practices across various sectors. While challenges such as the digital divide and institutional capacity remain, the potential for enhanced productivity, job creation, and long-term socio-economic resilience underscores the importance of this strategic partnership. The analysis of digital technology adoption in Georgian enterprises from 2020 to 2024 highlights a cautious approach to digital transformation, characterized by stable but limited use of ERP systems and persistently low implementation of AI. This disconnect between awareness and practical application underscores the necessity for strategic interventions to enhance both the integration of these technologies and the overall digital landscape in the region.

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