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PROSPECTS OF THE DIGITAL ECONOMY: AI, CONNECTIVITY, AND LONG-TERM EFFICIENCY

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ABSTRACT

This study aims to explore the prospects of the digital economy amid global technological transformations by examining three main pillars: specialized artificial intelligence, the expansion of global connectivity, and the promotion of a sustainable digital economy. Drawing on international reports, academic studies, and practical experiences, the study finds that specialized artificial intelligence constitutes a strategic driver for developing solutions tailored to local needs, thereby enhancing service efficiency and strengthening the competitiveness of emerging economies. Furthermore, the expansion of high-speed connectivity is identified as a prerequisite for integrating economies into global value chains and fostering collaborative innovation. In parallel, supporting a sustainable digital economy represents a strategic framework that aligns digital transformation with the Sustainable Development Goals through the integration of renewable energy, green computing, and responsible digital governance mechanisms. Overall, the findings indicate that building a balanced digital economy requires the integration of technological innovation with sound policies, strengthened international partnerships, sustained investment in digital infrastructure and skills development, and the adoption of data transparency and disclosure policies to ensure long-term sustainability.

1 INTRODUCTION

During the last twenty years, the global economy has undergone notable changes resulting from the rapid spread of digital technologies, the development of artificial intelligence, and improvements in communication systems. These changes have not only raised efficiency and productivity but have also influenced the way production is organized, trade is conducted, and consumer preferences are shaped, while affecting how value creation is distributed within and across national economies. Against this background, the digital economy is increasingly viewed as a central

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force behind innovation and economic growth, and a key source of competitiveness, particularly for emerging economies striving to overcome traditional development gaps.

Despite the enormous potential of the digital economy, maximizing its benefits requires the establishment of an integrated digital environment that combines advanced technological infrastructure, flexible regulatory frameworks, and the adoption of innovative solutions applicable across various sectors. Its key pillars are embodied in specialized artificial intelligence as a tool for developing locally oriented solutions, the expansion of global connectivity as a prerequisite for integration into the global economy, and the promotion of a sustainable digital economy that balances the imperatives of digital transformation with the objectives of sustainable development.

Based on these considerations, the present study aims to explore the prospects of the digital economy within the context of global technological change, with particular attention to three essential dimensions, drawing on the latest international reports, academic studies, and leading practical experiences. The aim is to provide a comprehensive perspective that contributes to shaping effective strategies for accelerating digital transformation and enhancing its positive impact on economic and social development.

- Deployment of specialized, accessible, and localized artificial intelligence.
- Expansion of global connectivity.
- Support for a sustainable digital economy.

2 DEPLOYMENT OF SPECIALIZED, ACCESSIBLE, AND LOCALIZED ARTIFICIAL INTELLIGENCE

In this study, a clear distinction is made between specialized, accessible, and localized artificial intelligence. Specialized artificial intelligence refers to AI systems designed to perform specific tasks within well-defined domains, such as healthcare, agriculture, finance, or manufacturing, enabling higher accuracy and efficiency compared to general-purpose models (Damar et al., 2024, pp. 85-87). Accessible artificial intelligence emphasizes the widespread availability of AI tools and platforms to diverse users and organizations through affordable, user-friendly, and open solutions, with the aim of reducing digital divides and fostering inclusive digital transformation (Morris, 2020, pp. 35-37). Localized artificial intelligence, in turn, denotes AI systems that are developed or adapted to reflect the linguistic, cultural, economic, and regulatory contexts of specific countries or regions, thereby enhancing relevance, usability, and digital sovereignty (El-Mhamdi et al., 2025).

Artificial intelligence (AI) applications are witnessing a growing shift toward greater specialization, localization, and inclusivity. Prominent examples include disease-specific diagnostic systems, crop management tools tailored to the needs of local farmers, and learning platforms adapted to different languages and cultural contexts. This development illustrates a shift away from the exclusive use of Large Language Models (LLMs) towards the growing adoption of Small Language Models (SLMs). The change is largely motivated by the rising interest in open-source AI systems that can be tailored to the requirements of particular industries while remaining consistent with existing regulatory frameworks (Singla et al., 2024).

There is a growing acknowledgment among organizations that general-purpose AI models cannot adequately respond to the specific challenges faced by different industries. Each sector operates under its own regulatory conditions, data protection requirements, and operational constraints, which calls for the development of tailored solutions. Recent studies suggest that almost half of the documented applications of generative AI are already based on specialized models—either adapted from proprietary datasets or purpose-built to address concrete business needs (Singla et. al, 2024) .

Figure 1 illustrates the rapid expansion of artificial intelligence models, both in scale and in variety. Although text-oriented models remain predominant, there has been a noticeable acceleration in areas such as speech recognition, image analysis, and feature extraction. This development signals a growing movement toward multimodal AI applications that are increasingly tailored to specific functions, better adapted to sector-specific needs, and designed to meet their regulatory compliance requirements.

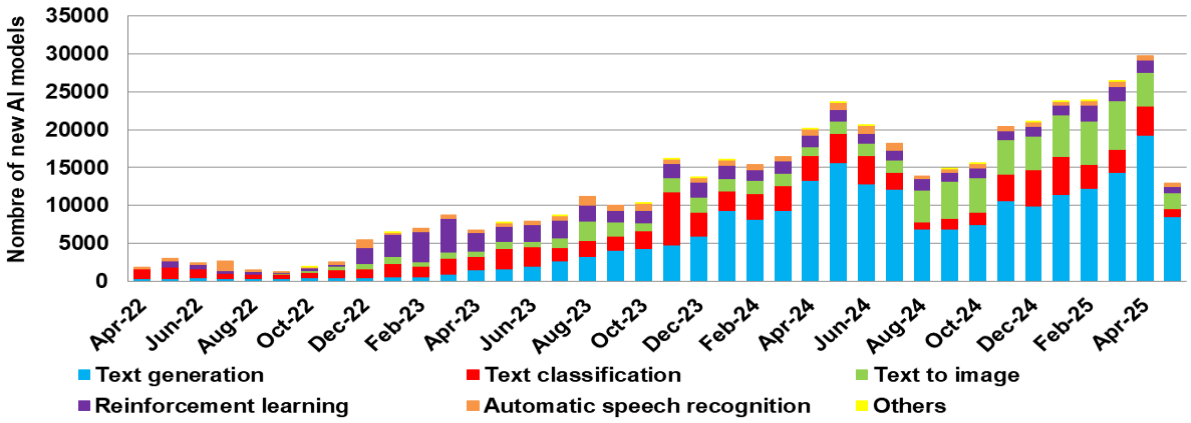

Figure 1. *Evolution of new AI models from Hugging Face, per intended use in 2022-2025*
Source: Prepared by the authors based on (OECD, OECD.AI, 2025)

The next major transformation in AI lies in localization. Although edge AI—where models are executed directly on local devices—remains in its early stages, forecasts indicate that its market size will grow from USD 19 billion in 2023 to nearly USD 140 billion by 2032 (wevolver, 2024, p. 9). This expansion is driven by advances in Internet of Things (IoT) technologies and fifth-generation (5G) networks, enabling the integration of AI into devices such as smartphones, computers, and cars to perform a wide range of tasks, from image generation to language translation. Localized processing is expected to deliver more personalized services, reduce latency, and mitigate risks associated with data privacy violations (Cloud, 2024, p. 5).

Accessibility has also emerged as a critical factor in reshaping artificial intelligence. This transformation is supported by the wider availability of open-source models, publicly accessible datasets, and software development tools, which extend opportunities beyond major technology companies. Furthermore, low-code and no-code platforms allow smaller organizations and local communities to create tailored solutions for their specific needs. A notable example is Meta's LLaMA model, an open-source AI system that has been widely adopted across diverse sectors (Michu, 2024).

The United States leads the global landscape in AI investments, with cumulative investments reaching approximately USD 335 billion since 2013, far surpassing China (USD 104 billion) and the United Kingdom (USD 22.3 billion). This gap continues to widen, as U.S. investments are projected to grow by 22% starting in 2022, while investments in China are expected to decline by 44%, and in the European Union and the United Kingdom by 14% (Artificial Intelligence, 2024, pp. 242-248).

The 2024 Stanford AI Index Report revealed that private investment in generative AI increased ninefold between 2022 and 2023, accompanied by a 40% growth in the number of AI startups securing new funding (Artificial Intelligence, 2024, pp. 242-248).

Sovereign AI Initiatives. National initiatives in the field of artificial intelligence reflect the growing momentum toward achieving technological autonomy and competitive advantage at the state level (Alduhishy, 2024). These efforts enable governments to develop AI technologies that respect cultural specificities and foster local innovation, while at the same time maintaining control over critical systems within their sovereign boundaries (Jilany, 2024). While such initiatives create opportunities to strengthen security and support economic growth, they also require carefully planned investments in infrastructure, human capital development, and governance frameworks that ensure compliance with the principles of responsible and ethical AI development (Kerner, 2025).

A joint report by Imperial College London and the Trusted AI Alliance further explored the concept of 'sovereign AI,' highlighting national efforts to reduce reliance on major technology companies and build independent capabilities. The report emphasized the importance of these efforts in achieving strategic autonomy, enhancing cultural alignment, and stimulating economic growth, while also tackling key challenges such as

cybersecurity, combating disinformation, and strengthening competitiveness in global markets (Shrier et al., 2024).

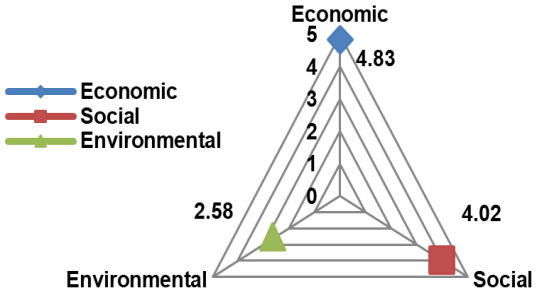

Figure 2. *Impact of Specialized AI on Economic, Social, and Environmental Dimensions in 2024*
Source: Authors, based on (DCO, 2024)

Based on the data presented in Figure 2, the deployment of specialized, accessible, and localized AI models is among the trends showing the highest potential for generating a positive economic impact, with an average rating of 4.83—the highest compared to other dimensions. A relatively positive assessment was also recorded for the social impact, with an average score of 4.02, indicating a growing recognition of AI's potential to enhance societal outcomes when adapted to local contexts. By contrast, the environmental impact received a relatively low rating (2.58), which likely reflects persistent concerns over the increased energy consumption associated with the expansion of AI model deployment.

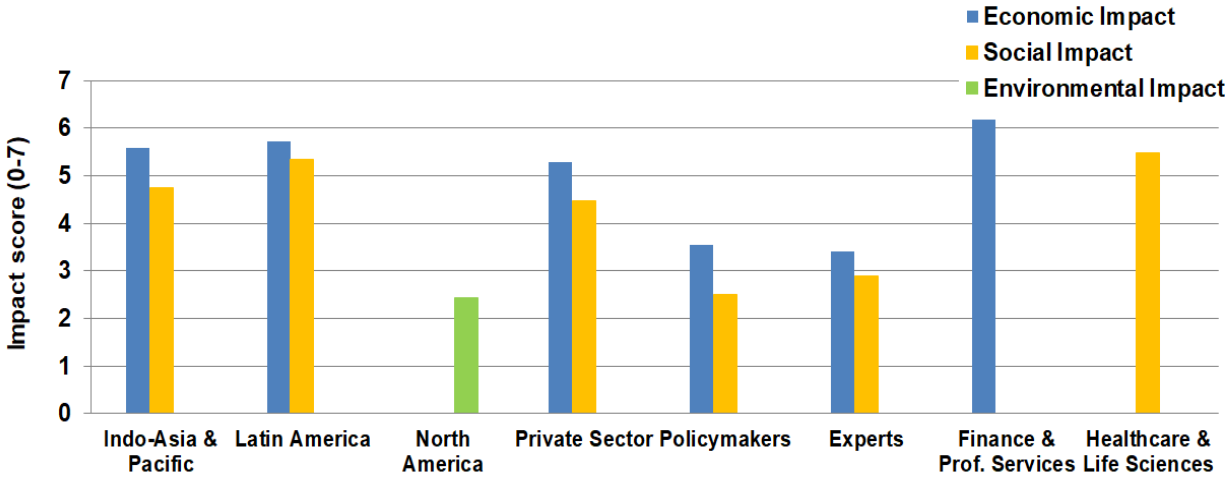

Figure 3. *Perceived impacts of AI deployment by region, sector and group in 2024*
Source: Authors, based on (DCO, 2025, p. 45)

Figure 3 illustrates the variation in economic, social, and environmental impact assessments of deploying specialized AI across geographical regions, economic sectors, and stakeholder groups. The data indicate that the Asia-Pacific and Latin America regions demonstrate the highest levels of economic and social optimism, whereas North America shows the greatest degree of environmental pessimism (2.43). Furthermore, the financial sector emerges as the most economically optimistic (6.17), while the healthcare and life sciences sector places greater emphasis on positive social impact (5.47).

Table 1. *Pace of Change in Adopting Localized and Specialized AI by Region in 2024*

Region	Decelerate	About the same	Accelerate	Strongly accelerate
North America	1	29.4	34.3	35.3
Europe	1	40.6	29.2	29.2
Indo-Asia & Pacific	-	26.3	28.4	45.3
Latin America	-	30.8	26.9	42.3
Middle East & Africa	-	19.6	45.6	34.8

Note: The sum of percentages may not always be 100 due to rounding.
Source: Authors, based on (DCO, 2025, p. 45)

Table 1 shows that the pace of transition toward adopting localized and specialized AI is expected to accelerate during 2024**.** The Asia-Pacific region recorded the highest levels of acceleration at 45.3%, reflecting strong dynamism in AI investment and clear government support. Latin America ranked second with 42.3%, driven by a growing interest in localizing digital technologies to enhance productivity despite prevailing economic challenges. In the Middle East and Africa, a moderate acceleration rate of 45.6% was recorded, reflecting the ongoing wave of digital transformation, particularly in the Gulf countries, which are heavily investing in AI initiatives. By contrast, expectations in Europe appear more conservative, with 40.6% indicating no significant change in pace, partly due to strict regulatory frameworks and privacy concerns.

Based on the above data, it can be inferred that the widespread adoption of specialized and localized AI solutions relies on three key enabling factors:

- *Digital infrastructure***:** Ensuring widespread, high-speed connectivity, with priority given to expanding fifth- and sixth-generation networks in underserved regions.
- *Sectoral digital transformation:* Implementing joint financing mechanisms between the public and private sectors, with a focus on developing AI applications tailored to the specific needs of each sector rather than relying solely on general-purpose solutions.
- *Digital capabilities:* Launching comprehensive initiatives for digital literacy and skills development, including training programs and career pathways that provide specialized AI certifications.

3 EXPANDING GLOBAL CONNECTIVITY

The spread of advanced communication technologies, such as satellites and 5G networks, represents an opportunity for a transformative shift, particularly in the field of edge AI. Yet, this potential remains unevenly distributed, as the persistence of the digital divide—driven by high costs, regulatory constraints, and weak economic viability—continues to pose significant challenges and tensions (Bank, 2023).

Market dynamics that concentrate on densely populated areas make cities and commercial hubs the main beneficiaries of advanced 5G networks and private wireless systems, while rural and remote areas face greater difficulties in accessing these services (Bank, 2023).

Although hybrid satellite–terrestrial solutions could help expand coverage, internet access remains expensive in many low- and middle-income countries. In 2023, the cost of a basic 1 GB data package exceeded 2% of average monthly income in 37% of these countries, while in Sub-Saharan Africa, 20 GB consumed about 15% of monthly income (DCO, 2025, p. 45).

It is estimated that by 2030, the number of 5G connections will reach about 5.5 billion, compared to only 1.6 billion in 2024. This expansion is expected to generate a global economic impact of around USD 930 billion, within the total economic contribution of the mobile sector, which amounts to nearly USD 6.4 trillion. This rapid growth highlights the pivotal role of 5G in advancing the digital economy and fostering innovation across sectors (GSMA, 2024, pp. 6-20).

Despite the continued decline in connectivity costs, the pace of reduction has slowed compared to previous years. Between 2019 and 2022, the price of 100 Gbps wavelength capacity on major international routes dropped by around 13%, compared to a sharper decline of 23% in the previous three years (2016–2019). This slowdown is linked to several factors, notably supply constraints and geopolitical challenges that affect regions differently. For example, the route between the United States and Latin America recorded a sharper price decline compared to other routes such as Marseille–Singapore and Hong Kong–Singapore (TeleGeography, 2024).

Figure 4 illustrates the widening digital divide in AI adoption readiness across countries. The data shows a significant decline in digital infrastructure, human capital, and institutional capacity indicators as income levels decrease, reflecting the scale of challenges faced by low- and middle-income economies in adopting and benefiting from AI technologies compared to their high-income counterparts.

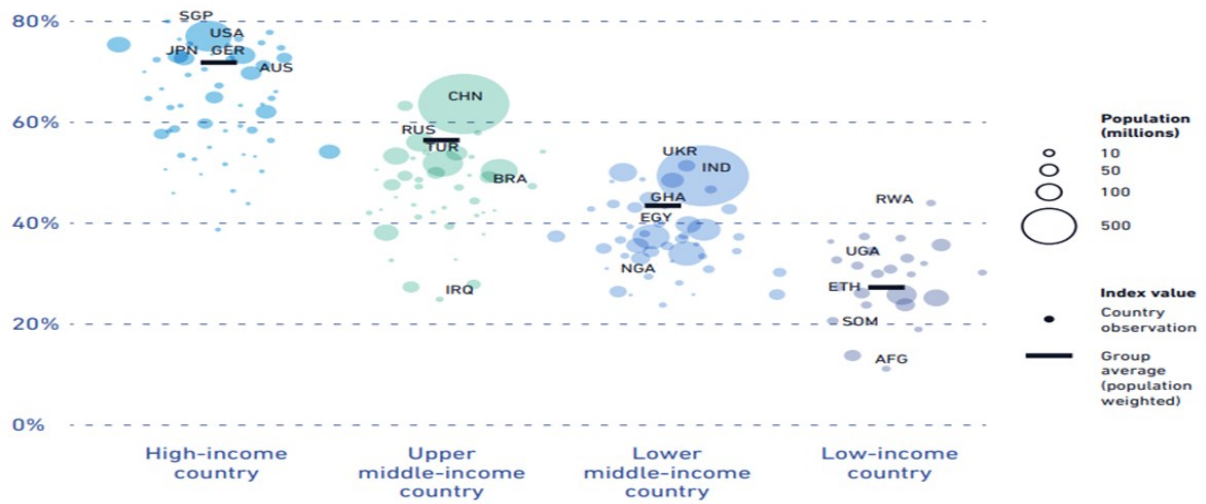

Figure 4. *AI Readiness Across Income Groups in 2024*
Source: (Philip Schellekens, 2024)

Governments are increasingly recognizing connectivity as a fundamental utility, comparable to electricity and water. This recognition has encouraged them to adopt new models of public–private partnerships aimed at developing comprehensive digital infrastructure that goes beyond connectivity to include digital identity systems, payment networks, cloud computing, and data exchange platforms (Bandura et al., 2024).

Data from the Digital Cooperation Organization (DCO, 2024) show that digital infrastructure is witnessing notable progress globally; however, regional disparities remain evident. While some regions enjoy advanced levels of digital readiness and affordable access to smart devices, others continue to face challenges in both infrastructure development and the affordability of technology. This, in turn, deepens the global digital divide. The following two figures illustrate the distribution of countries by level of digital infrastructure, along with regional disparities in the cost of smartphones relative to monthly income. (DCO, 2024)

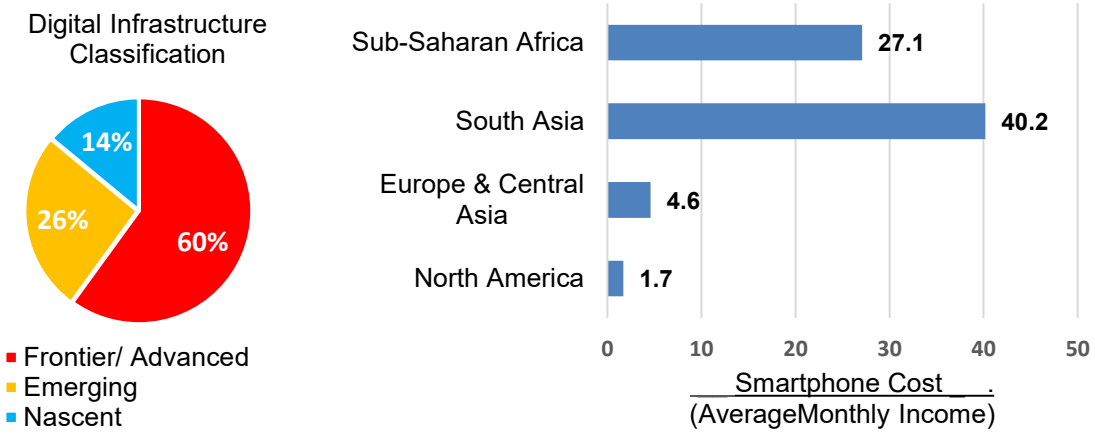

Figure 5. *The Global Digital Divide: Disparities in Digital Infrastructure and Smartphone Costs in 2024*
Source: Authors, based on (DCO, 2025, p. 45)

The figure above (Figure 5) shows that more than half of the world's countries (52%) enjoy advanced digital infrastructure, while a significant share (34%) remains at emerging or rudimentary levels, reflecting a gap in digital infrastructure readiness among nations. The data also reveal substantial disparities in the cost of smartphones as a share of monthly income, amounting to about 1.7% in North America and 4.6% in Europe, but rising sharply to 40.2% in South Asia and 27.1% in Sub-Saharan Africa. This significantly limits individuals' ability to access technology in these regions.

The following data highlight the impact of expanding global connectivity, showing marked variations across regions and sectors in terms of economic, social, and environmental outcomes. These disparities reflect different levels of market saturation in connectivity.

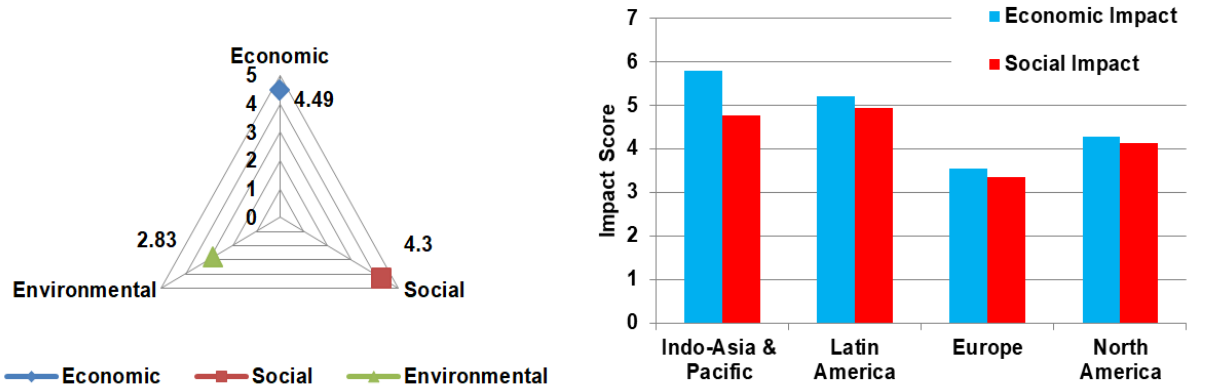

Figure 6. *Anticipated Positive Impacts on Economy, Society, and Environment in 2024*
Source: Authors, based on (DCO, 2024)

Figure 6 shows that expanding global connectivity constitutes an important pillar for promoting social equity, receiving an evaluation score of 4.3, ranking second overall. It also recorded relatively positive outcomes in terms of economic impact (4.5, ranking third) and environmental impact (2.8, ranking fourth).

Regionally, Asia-Pacific–India and Latin America showed the highest optimism about the economic (5.79 and 5.21) and social (4.77 and 4.94) benefits of expanding connectivity. By contrast, Europe and North America reported lower scores in both economic (3.54 and 4.28) and social (3.34 and 4.14) dimensions, reflecting the relative saturation of their connectivity markets in these regions.

Estimates indicate that global connectivity will continue to grow during 2025, albeit at a slower pace compared to most other global trends, placing it ninth in terms of relative priority. The data further reveal that the technology, media, and telecommunications sectors are expected to experience higher acceleration rates compared to other economic sectors.

Table 2. *Regional Variations in Connectivity Growth in 2024(%)*

Region	Decelerate	About the same	Accelerate	Strongly accelerate
North America	1	39	21	29
Europe	2	49	29	20
Indo-Asia & Pacific	0	32	24	44
Latin America	0	27	36	37
Middle East & Africa	2	35	24	39

Note: The sum of percentages may not always be 100 due to rounding.
Source: Authors, based on (DCO, 2025, p. 45)

Based on the table above (Table 2), it is evident at the regional level that the Asia-Pacific region records the highest level of optimism regarding the acceleration of global connectivity, at 44%, followed by the Middle East and Africa (39%) and Latin America (36%). By contrast, Europe leans toward stability, with nearly half (49%) expecting no change and only 2% anticipating a slowdown, likely due to the region's already advanced level of digital connectivity. North America, on the other hand, shows a relative balance in expectations, with 29% anticipating strong acceleration compared to 39% expecting stability.

Accordingly, it can be concluded that expanding modern connectivity technologies calls for a holistic approach—one that develops digital infrastructure, promotes innovative financing, and establishes flexible regulations to support innovation while ensuring fair access.

4 SUPPORTING A SUSTAINABLE DIGITAL ECONOMY

The rapid growth of artificial intelligence (AI) technologies presents a dual challenge, as the expansion of their computational capacities significantly increases energy demand, thereby placing mounting pressure on global energy systems. Projections indicate that the energy consumption of data centers dedicated to operating AI applications may rise by around 160% by 2030, potentially hindering international efforts to reduce carbon emissions (Intelligence, 2024).

One of the biggest challenges to the wider adoption of AI is its rising energy demand—especially in emerging economies where power infrastructure is still fragile. This limitation reduces their ability to develop and scale these technologies, thereby deepening the global digital divide. As a result, the economic and technological benefits are concentrated in countries capable of securing sufficient energy resources, while others remain marginalized in the digital economy (Goldman Sachs, 2024).

The increasing importance of AI in enhancing economic competitiveness implies that countries with underdeveloped energy infrastructures risk falling behind in the digital economy. This may lead to the emergence of a dual digital economy, in which some nations reap direct benefits while others remain on the periphery (Reuters, 2025).

Currently, AI accounts for nearly 2% of the global energy consumption of the technology sector (IEA, 2024a, p. 31). However, the computational power required to operate AI nearly doubles every 100 days (Kemene et al., 2024). Estimates suggest that by 2026, its additional electricity demand could reach approximately 590 terawatt-hours, roughly equivalent to Germany's total annual electricity consumption (IEA, 2024a, p. 31).

By 2026, electricity consumption from data centers, cryptocurrencies, and AI applications is expected to reach between 620 and 1,050 terawatt-hours, with demand likely to exceed 800 terawatt-hours. This would mark a steep jump from about 460 terawatt-hours in 2022, underscoring how rapidly energy requirements in this sector are growing (Zabeu, 2024).

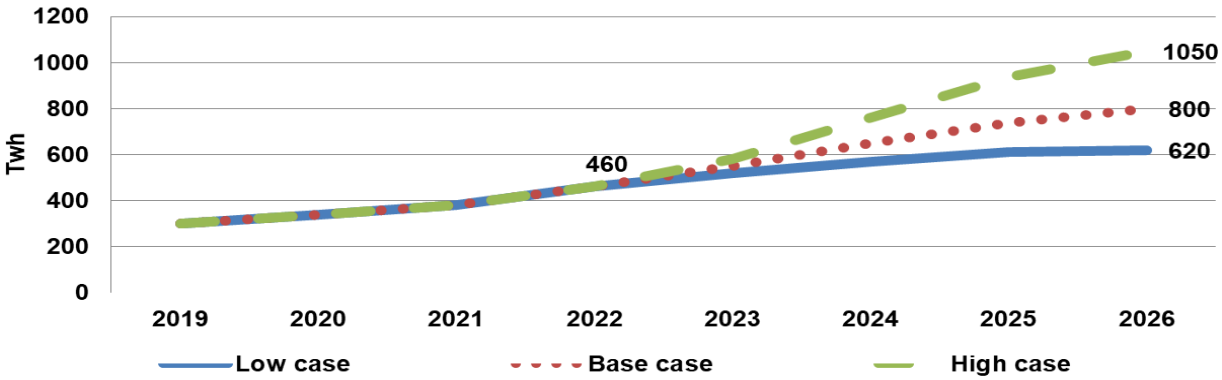

Figure 7. *Global Electricity Consumption Projections for Data Centers, AI, and Cryptocurrencies, 2019–2026*

Source: Authors, based on (IEA, 2024a, p. 31)

Projections indicate that global electricity consumption—driven by data centers, AI applications, and cryptocurrencies—will continue to rise under all scenarios (low, baseline, or high), as shown in Figure 7.

In the baseline scenario, consumption rises from around 300 TWh in 2019 to nearly 800 TWh in 2026, representing an increase of approximately 167% over seven years. The high scenario points to an even sharper rise, with consumption potentially reaching about 1,050 TWh more than three times the level recorded in 2019 highlighting the rapid expansion of computing-intensive applications. Even under the low scenario, growth remains significant, with consumption projected at 620 TWh in 2026, more than double the 2019 baseline.

This upward trajectory clearly reflects the dynamics of global digital transformation. It shows that while technological innovation brings significant economic and developmental opportunities, it also drives a sharp rise in electricity consumption. The findings stress the importance of adopting policies and innovations

that not only support the rapid pace of digital growth but also help minimize its environmental footprint, particularly by improving energy efficiency and expanding the use of renewable sources.

The growing energy demand of AI technologies constitutes a multidimensional challenge that combines financial and ethical considerations (Bourzac, 2024). Although these technologies contribute to improving operational efficiency and fostering sustainability especially in areas such as energy grid management (Ammanath, 2024) their high energy intensity may offset such gains (Mutschler, 2024). Research suggests for illustrative purposes, that training just one large AI model can produce more carbon emissions than the total generated by five cars throughout their entire lifetime (Hao, 2019).

International institutions, including the United Nations and the International Energy Agency, have expressed growing concerns regarding the environmental implications of AI (IEA, 2023), calling for a combination of policies and incentives that promote sustainable practices across design, development, and operational stages (Ecosoc, 2024).

The energy infrastructure dimension adds another layer of challenge to digital inclusion, as access to electricity remains limited in many regions. In 2022, the number of people without electricity increased by 10 million, reaching about 685 million (IEA, 2024b), more than 80% of whom live in Sub-Saharan Africa. According to estimates, nearly 660 million people will remain without electricity by 2030 if current policies remain unchanged (Jacobs & Tasin, 2024).

The energy requirements of AI further deepen this divide, placing additional pressure on countries already facing electricity shortages. In Sub-Saharan Africa, energy import bills may account for up to 5% of GDP, bearing in mind that energy costs represent only one component of the overall expenses involved in establishing and operating the infrastructure needed for AI technologies (Lacey, 2021). As access to AI capabilities increasingly becomes a benchmark for economic competitiveness, rising infrastructure costs risk creating a new form of digital divide among nations (Okolo, 2023).

With the accelerating global transition toward AI-driven modes of production and innovation, less developed countries face a strategic challenge of falling behind in technological advancement, thereby exacerbating existing economic and social divides. Without systematic interventions and coordinated international efforts to close the digital gap, the potential of AI to foster sustainable development and reduce poverty will remain underutilized, leaving large segments of the world's population excluded from the benefits of the fast-evolving technological landscape (Gill & Houngbo, 2024).

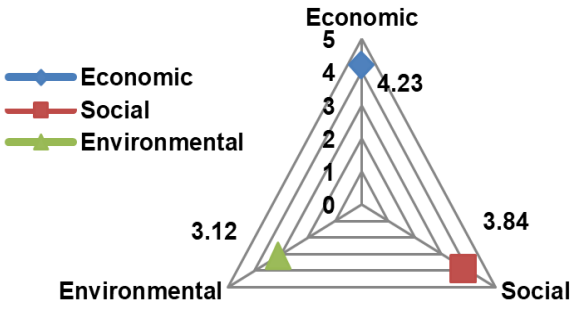

Figure 8. *Implications of a Sustainable Digital Economy on Environmental, Economic, and Social Dimensions in 2024*
Source: Authors, based on (DCO, 2024)

Based on the data presented in Figure 8, promoting a sustainable digital economy emerges as one of the most significant environmentally relevant trends in 2025, with an average environmental impact score of 3.12, reflecting the considerable potential of this direction in supporting environmental sustainability. Conversely, the values recorded in Europe (2.91) and the Asia-Pacific–Indian region (2.86) indicate a notable level of concern in these areas regarding the environmental consequences of digital expansion (DCO, 2025, p. 45).

From an economic perspective, this trend ranks fifth among 12 major trends, with an average positive impact of 4.23. In terms of the social dimension, however, it stands in tenth place, with an average of 3.84, highlighting the need for greater efforts to address societal challenges and enhance digital inclusion. Economic and social optimism is particularly evident in the Asia-Pacific–Indian region and Latin America, while Europe and North America adopt a more cautious stance (DCO, 2025, p. 45).

At the sectoral level, the agribusiness, food and beverages, and energy and utilities sectors record the highest levels of economic confidence. When it comes to positive environmental contributions, the technology, media, and telecommunications sector (3.77) together with heavy and extractive industries (3.73) rank at the top. By contrast, the automotive and transport sector (2.41) and the construction and real estate sector (2.20) are positioned at the bottom of the scale (DCO, 2025, p. 45).

Table 3. *Pace of Transition Towards a Sustainable Digital Economy by Region in 2024(%)*

Region	Decelerate	About the same	Accelerate	Strongly accelerate
North America	-	32.4	29.4	38.2
Europe	1	53.1	28.1	17.7
Indo-Asia & Pacific	3.2	25.3	28.4	43.2
Latin America	1.9	25	40.1	32.7
Middle East & Africa	-	32.6	32.6	34.8

Note: The sum of percentages may not always be 100 due to rounding.

Source: Authors, based on (DCO, 2025, p. 45)

The table (Table 3) reveals a clear divergence in the pace of transition toward a sustainable digital economy across different geographical regions during 2024, reflecting the varying economic and technological contexts, as well as public policies, in each region.

The data indicate that the Asia-Pacific–Indian region leads in terms of accelerated transition, recording the highest share in the “strongly accelerate” option (44%), followed by “accelerate” (24%). This can be explained by the high levels of investment in digital infrastructure, the adoption of government policies supportive of sustainable digital transformation, and the dynamism of emerging markets in this region.

Latin America has also demonstrated high levels of momentum, with 37% in the “strongly accelerate” category and 36% in “accelerate.” This reflects a growing recognition of sustainable digital transformation as a driver of economic growth and improved public services, despite challenges linked to economic and political instability in some countries.

In contrast, Europe and North America appear more cautious in their transition pace, with the majority leaning toward the “about the same” option (49% and 39%, respectively), and relatively lower shares in the “strongly accelerate” category (20% and 29%). This trend can be attributed to a more prudent approach that seeks to balance digital innovation with environmental and social compliance requirements, in addition to the relative saturation of digital infrastructure in these regions.

Meanwhile, the Middle East and Africa show intermediate results, with 39% in “strongly accelerate” and 24% in “accelerate.” This suggests growing efforts to advance the digital economy, though progress may be affected by uneven technological readiness across countries in the region, as well as infrastructure and investment-related challenges.

Overall, the findings reveal that the pace of transition toward a sustainable digital economy is not globally uniform; rather, it is shaped by local and regional factors, including the level of digital maturity, investment in green technologies, government policies, and the extent to which different economic sectors are aware of the importance of integrating sustainability principles into digital transformation.

5 CONCLUSIONS

Through this study, in which we examined the pillars of the digital economy and its transformations in light of global technological shifts, it has been concluded that the digital economy is no longer a secondary option or an isolated technical pathway. Rather, it has become a strategic axis for reshaping the global economy and redefining the future of economic and social development. The findings show that the three pillars of the digital economy—specialized artificial intelligence, expanded global connectivity, and

support for a sustainable digital economy—operate as an integrated system that can effectively drive digital transformation, provided they are supported by sound policies and long-term strategies.

First, specialized and localized artificial intelligence represents a central tool for enhancing added value across various economic sectors. Data show that models tailored to specific needs generate greater economic impact compared to general-purpose models, while also improving service efficiency and adapting to local specificities. Moreover, localizing these solutions and making them available through open-source models creates opportunities for emerging economies to bridge technological gaps, provided there is adequate investment in digital skills and capacities to ensure the effective use of such technologies.

Second, the analysis of expanded global connectivity highlights its role as a structural pillar for any comprehensive digital transformation. Connectivity enables integration into global value chains and strengthens collaborative innovation. However, the persistence of the digital divide between countries and regions limits some economies from fully reaping these benefits. Indicators show that Asia-Pacific and Latin America are leading the expansion of connectivity, while other regions face challenges related to cost and infrastructure. Addressing these disparities requires hybrid solutions that combine investment in advanced networks with expanded satellite coverage, alongside active public–private partnerships.

Third, the study revealed that supporting a sustainable digital economy is a strategic challenge amid the rapidly rising energy consumption driven by the expansion of artificial intelligence and data centers. While digital transformation offers future opportunities to enhance economic efficiency, it simultaneously poses environmental risks that may hinder international efforts to reduce emissions. In this context, the adoption of green computing practices, the improvement of energy efficiency, and the wider use of renewable energy emerge as essential requirements for establishing a balanced digital economy that reconciles technological innovation with the objectives of sustainable development.

Based on these findings, it can be stated that achieving an effective and inclusive digital economy requires:

- Investment in advanced digital infrastructure to ensure equitable access to services.
- Launching digital skills development programs to keep pace with rapid technological innovation.
- Designing flexible regulatory frameworks that account for privacy, cybersecurity, and data transparency.
- Strengthening international cooperation to ensure a balanced transition toward the digital economy, while avoiding the creation of new divides between nations.
- Adopting sustainability policies that balance the requirements of digital transformation with environmental and societal commitments.

Accordingly, the future of the digital economy will largely depend on countries' capacity to develop unified systems that bring together technology, infrastructure, governance, and human resources—allowing them to fully harness the advantages of global technological changes while ensuring adherence to principles of fairness and sustainability. In this way, the digital economy functions not merely as a driver of growth but also as a strategic instrument for promoting comprehensive and sustainable development.

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