

Nicolae Sfetcu

**INFORMATION AND
COMMUNICATIONS TECHNOLOGY
IN ROMANIA**

**Comparative Analysis with the EU, Social Impact,
Challenges and Opportunities, Future Directions**

MultiMedia Publishing

Information and communications technology in Romania

**Comparative analysis with the EU, social impact, challenges
and opportunities, future directions**

BOOK PREVIEW

Nicolae Sfetcu

Published by MultiMedia Publishing

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Published by MultiMedia Publishing, <https://www.telework.ro/en/publishing/>

Email office@multimedia.com.ro

ISBN: 978-606-033-904-5, DOI: 10.58679/MM91317

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5. Challenges and opportunities for Romania

Romania, a country known for its rich cultural history and resilience, is increasingly making its mark on Europe's technology landscape. Positioned as one of the fastest-growing technology hubs in Eastern Europe, Romania boasts a talented developer base, an expanding technology ecosystem, and a budding startup culture. However, technological development in Romania is not without its own specific challenges.

5.1 Challenges

Romania, one of the fastest-growing digital economies in the European Union, faces significant challenges in the technology resources sector. These challenges, while diverse, primarily revolve around the infrastructure disparity between urban and rural areas, issues related to digital literacy, bureaucratic inefficiencies, and the emphasis on outsourcing rather than fostering innovation. Understanding these barriers is essential to create pathways to sustainable technological progress in the country.

According to (Fotache et al. 2020) citing the European Commission, the main challenge for Romania is its low competitiveness and the country's low capacity to commercialize research results and innovation.

5.1.1 Infrastructure disparities between urban and rural areas

Romania has made significant progress in its internet infrastructure over the past decade, boasting some of the fastest internet speeds in Europe (Speedtest 2024). However, the technological infrastructure in rural areas remains underdeveloped, resulting in a digital divide that limits the equitable growth of technology-based opportunities (ITA 2024a). While urban centers such as Bucharest, Cluj-Napoca, and Timisoara enjoy robust infrastructure, many remote areas lack broadband access and the necessary hardware support, hindering the expansion of technological resources beyond large cities (European Commission 2024z).

Rural communities, which account for almost half of Romania's population, often lack the essential technological infrastructure needed for development. According to (Eurostat 2024a), while over 85% of urban households have access to high-speed broadband, this figure drops below 60% in rural areas. This disparity is exacerbated by geographical challenges, insufficient investment and a lack of incentives for telecommunications companies to expand their infrastructure into less densely populated areas. The result is a digital exclusion that hinders the economic potential of these communities and exacerbates the urban-rural gap.

The country's focal point for IT development is the capital region of Bucharest (63% of national revenue), followed by the business centers of the North-West (18%); West (5%); Central (6%); and North-East (5%). (ITA 2024b)

5.1.2 Digital literacy issues

Beyond infrastructure, Romania struggles with a significant digital literacy gap. A European Commission report on the Digital Economy and Society Index (DESI) (Comisia Europeană 2022)

placed Romania near the bottom of the EU rankings in terms of digital skills. Despite Romania's young population and thriving IT workforce, a large part of the population lacks the fundamental digital skills needed to participate in an increasingly digital economy.

This challenge is particularly pronounced in rural areas, where access to education and training opportunities is limited. Many individuals lack the knowledge needed to use basic digital tools, which severely limits their ability to access online services, engage in remote work, or even participate in digital forms of social interaction. The digital literacy gap is a significant barrier not only to individual empowerment, but also to the country's broader economic development.

5.1.3 Bureaucratic barriers

Romania's technological progress is also hampered by bureaucratic obstacles. Romania's regulatory environment can be challenging for technology companies (PricewaterhouseCoopers 2022). Bureaucratic processes, unclear tax laws, and lack of support for startups are often cited as obstacles for companies seeking to establish and expand in the technology sector. The slow adaptation of digital-friendly policies sometimes creates friction for new companies trying to navigate compliance and regulatory requirements (Statista 2024a). The country's public administration systems remain burdened by complex, outdated processes that discourage digital transformation. Romania's bureaucracy has been identified as a critical obstacle to the adoption of new technologies in both the public and private sectors (European Commission 2024l).

Despite efforts to digitize government services, many processes still require in-person visits and physical documents, creating inefficiencies and discouraging the adoption of digital solutions. The slow pace of e-government initiatives is linked to administrative inertia, fragmented coordination between institutions, and a lack of political will. These bureaucratic barriers not only limit the efficiency of the public sector, but also reduce the incentives for private enterprises to innovate and modernize.

5.1.4 Reliance on outsourcing rather than innovation

Romania has emerged as a major player in the global outsourcing market, with a large pool of IT specialists and comparatively lower labor costs to attract foreign companies. The IT outsourcing sector represents a large part of Romania's technological landscape, contributing significantly to GDP growth. However, this reliance on outsourcing poses challenges to innovation and long-term competitiveness.

Instead of investing in research and development or encouraging domestic technological innovation, many Romanian companies focus on outsourcing services to international firms. According to a report by the European Investment Bank (EIB 2023), Romania invests less in research and development compared to other EU countries, and much of the country's technological output is geared towards providing services rather than creating original products or solutions. This outsourcing-dependent model limits Romania's ability to build an innovation-driven economy, as domestic companies miss opportunities to develop proprietary technologies and foster entrepreneurial ecosystems.

5.1.5 Limited access to finance

Romania's startup ecosystem is growing, but access to venture capital and other sources of financing remains limited compared to Western Europe or the United States (Startup Blink 2024). Entrepreneurs often face challenges in securing the financial support needed to develop and scale their ideas. While there are promising incubators and accelerators, the overall funding landscape can be perceived as risk-averse, making it difficult for innovative tech companies to grow (How To Web 2024).

5.1.6 Brain drain and talent retention

Romania has long been a source of high-quality IT talent, with strong engineering programs at its universities (THE 2017). However, a significant challenge lies in retaining this talent. Many skilled professionals choose to move to Western Europe or North America for better wages, career advancement opportunities, and improved quality of life (OECD 2023b). This "brain drain" has left local technology firms struggling to find qualified people, often relying on a smaller pool of talent or facing fierce competition from multinational companies setting up local offices (ELA 2024).

5.1.7 Future approaches

The technology resources sector in Romania is characterized by a mix of progress and persistent challenges. While urban areas have benefited from substantial investments in technology infrastructure, rural regions lag behind, creating significant inequalities. Digital literacy issues, compounded by inadequate education and limited access to resources, further hinder development. Bureaucratic inefficiency slows down technological adoption, and reliance on outsourcing stifles innovation and limits the country's potential for sustainable growth.

Addressing these challenges will require coordinated efforts at both national and EU levels. Investment in rural infrastructure, comprehensive digital literacy programs, streamlined administrative processes, and incentives for research and development and innovation are crucial to unlocking Romania's full potential in the digital age. Without these changes, Romania risks falling behind in the rapidly evolving global technological landscape.

5.2 Growth opportunities

Romania is emerging as a vibrant hub of technological progress in Eastern Europe, with significant growth opportunities in the digital sector. As the country undergoes economic and technological transformation, three key aspects are essential: EU funding and international collaboration, leveraging the country's talent pool to boost digital innovation and the startup ecosystem, and improving integration with the European Union's Digital Single Market (DSM) (European Commission 2019a).

5.2.1 Advantages for Romania's digital economy

Skilled workforce and education

Despite the challenges of brain drain, Romania boasts a highly educated and skilled workforce, particularly in STEM fields (UNESCO 2023). The country has a strong history of technical

education, with numerous technical universities producing talented software engineers, IT specialists, and data scientists. Investments in retaining and retraining this talent locally, such as partnerships between universities and private companies, can help foster a dynamic technology workforce and increase innovation opportunities (European Commission 2024x).

Growing startup ecosystem

Romania's startup ecosystem has gained momentum, with cities such as Cluj-Napoca and Bucharest becoming known as technology hubs (Genome 2024). The government has introduced tax incentives for IT professionals, and initiatives such as Startup Nation and various European Union grants aim to stimulate entrepreneurship (MIPE 2024). The burgeoning startup culture presents significant growth opportunities, particularly in software development, fintech, and artificial intelligence, with companies such as UiPath demonstrating Romania's potential on the global stage (Rogers 2019).

Strategic location and EU membership

Romania's geographical position, situated between Central and Eastern Europe, is an advantage for companies looking to bridge different markets (ITA 2024a). As an EU member, Romania has access to the single market, offering local technology companies' opportunities to expand across Europe with low trade barriers (European Commission 2024x). In addition, Romania's competitive labor costs attract foreign investment, especially for outsourcing and nearshoring, making it an attractive destination for technology service providers (Invest Romania 2024).

Government initiatives and EU funding

Romania has access to significant EU funding for digital transformation projects and technology infrastructure (European Commission 2024x). As the EU strives for digital cohesion and modernization, Romania has the opportunity to mobilize these funds to improve internet connectivity, especially in rural areas, and to invest in next-generation technologies such as 5G, AI and renewable energy solutions for data centers. An increased government focus on digital initiatives can accelerate the country's position as a regional technology leader (MCID 2024b).

Romania's energy objectives are defined in the National Energy Strategy (Ministerul Energiei 2024) and in the National Integrated Energy and Climate Plan 2021-2030 approved by GD 1076/2021 (PNIESC).

Growing IT services exports

Romania has positioned itself as a top destination for IT outsourcing and business process outsourcing (BPO) (Statista 2024b). Romanian IT companies offer high-quality services at competitive costs, serving clients in Western Europe and North America. With the continued expansion of global demand for digital services, Romanian companies have the opportunity to increase their export potential, build stronger international partnerships, and move up the value chain by developing proprietary products, instead of relying exclusively on outsourcing services (IDC 2023).

5.2.2 EU funding and international collaboration opportunities

Romania has access to various European Union funding mechanisms that offer an unparalleled opportunity to boost its technology sector. As an EU member, Romania can access initiatives such as Horizon Europe (European Commission 2024v), the Digital Europe Programme (DEP) (European Commission 2024aa) and the Cohesion Funds that aim to develop digital infrastructure, encourage research and promote digital skills (European Commission 2024w). The Digital Europe Programme, for example, allocates part of its €7.5 billion budget to projects that improve artificial intelligence, cybersecurity and the digital economy – areas that Romania can strategically capitalize on (European Commission 2024aa).

In addition, Romania is well positioned to benefit from cross-border collaboration projects facilitated by EU frameworks. Initiatives such as EUREKA (Eureka 2024) and the European Innovation Council (EIC) (European Commission 2024p) offer technology companies and research institutions opportunities to work with international partners, encouraging technological advances and knowledge exchange. This collaborative potential allows Romania not only to attract foreign investment, but also to establish partnerships that accelerate technology transfer and innovation adoption.

In addition to funding, international collaboration with more established technology players, such as Germany, France and the Nordic countries, can open doors for Romanian startups and research institutions. By joining forces with these countries, Romania can gain valuable expertise, access to larger markets and exposure to advanced technologies.

5.2.3 Harnessing the talent pool for digital innovation and startups

Romania hosts a pool of highly qualified and tech-savvy talent, making it an attractive destination for IT development and digital innovation. The country has a significant number of well-trained engineers, software developers, and IT professionals – a result of strong STEM education in its universities. The growth of local technology clusters, such as those in Bucharest, Cluj-Napoca, and Iasi, are creating ecosystems that attract both domestic and international startups. (European Commission 2024v)

The Romanian government's efforts to foster an entrepreneurial culture, coupled with EU support, have given rise to a growing number of startups and digital initiatives. The IT sector, representing over 6% of the country's GDP, demonstrates Romania's ability to harness this talent pool to create economic value. Local success stories such as UiPath (UiPath 2024), a leader in robotic process automation (RPA), illustrate the potential for innovative startups to achieve global success.

The challenge now lies in retaining this talent and preventing a brain drain. Romania can benefit from implementing initiatives that support new entrepreneurs, improve infrastructure, and encourage collaboration between universities and the private sector. Incubators and accelerators such as Techcelerator (Techcelerator 2024) and SeedBlink (SeedBlink 2024) play a key role in fostering a startup ecosystem, providing funding, mentorship, and a supportive community to help innovative ideas become successful businesses.

5.2.4 Steps towards better integration with the EU's Digital Single Market

A crucial step in advancing Romania's technology sector is deeper integration with the EU's Digital Single Market (DSM) (European Commission 2019a). The DSM seeks to eliminate digital barriers in Europe, creating a unified market of over 500 million consumers. Romania has made significant progress in broadband access – it ranks among the top countries in the EU for internet speed and accessibility – however, further efforts are needed to align with EU digital standards and regulations.

The government should continue its digital transformation efforts by harmonizing its legislation with EU digital regulations, such as the General Data Protection Regulation (GDPR) (EUR-Lex 2016) and the Digital Services Act (DSA) (European Commission 2024ab). Such alignment not only facilitates cross-border e-commerce and data exchange more easily, but also increases consumer and investor confidence.

Another key initiative involves promoting digital skills training to boost the readiness of the workforce for the evolving labor market. The National Digital Agenda for Romania (Guvernul României 2015) aims to align with EU objectives to improve citizens' skills, ensuring that workers are prepared for an increasingly digital economy. Programs that encourage lifelong learning in technology fields can strengthen Romania's competitiveness in the European market and ensure that the workforce meets the demands of a rapidly changing industry.

Romania's opportunities for technological growth are supported by EU funding mechanisms, opportunities for international collaboration, the potential of its talented workforce and efforts to integrate deeper into the Digital Single Market. By leveraging EU funding and collaborations, fostering its thriving talent pool and embracing greater digital integration, Romania has the potential to become a regional leader in technology and innovation. Key steps, such as harmonizing with DSM regulations and investing in digital skills, will be essential to ensure Romania remains competitive in the European technology landscape.

5.3 Overcoming the challenges

The landscape of tech growth in Romania is a mix of significant opportunities and substantial challenges. While infrastructure limitations, talent retention issues, and bureaucratic hurdles present obstacles, Romania's skilled workforce, supportive startup ecosystem, strategic location, and access to EU funding present a promising path. By addressing the challenges and capitalizing on these opportunities, Romania can solidify its position as a major tech hub in Europe, fostering both local innovation and international collaboration.

A focus on education, improving access to finance, and modernizing digital infrastructure will be key to turning these challenges into drivers of growth. As Romania continues to narrow the gap between its urban and rural areas and strengthen its regulatory and funding environment, it is poised to become a more important player on the global tech scene.

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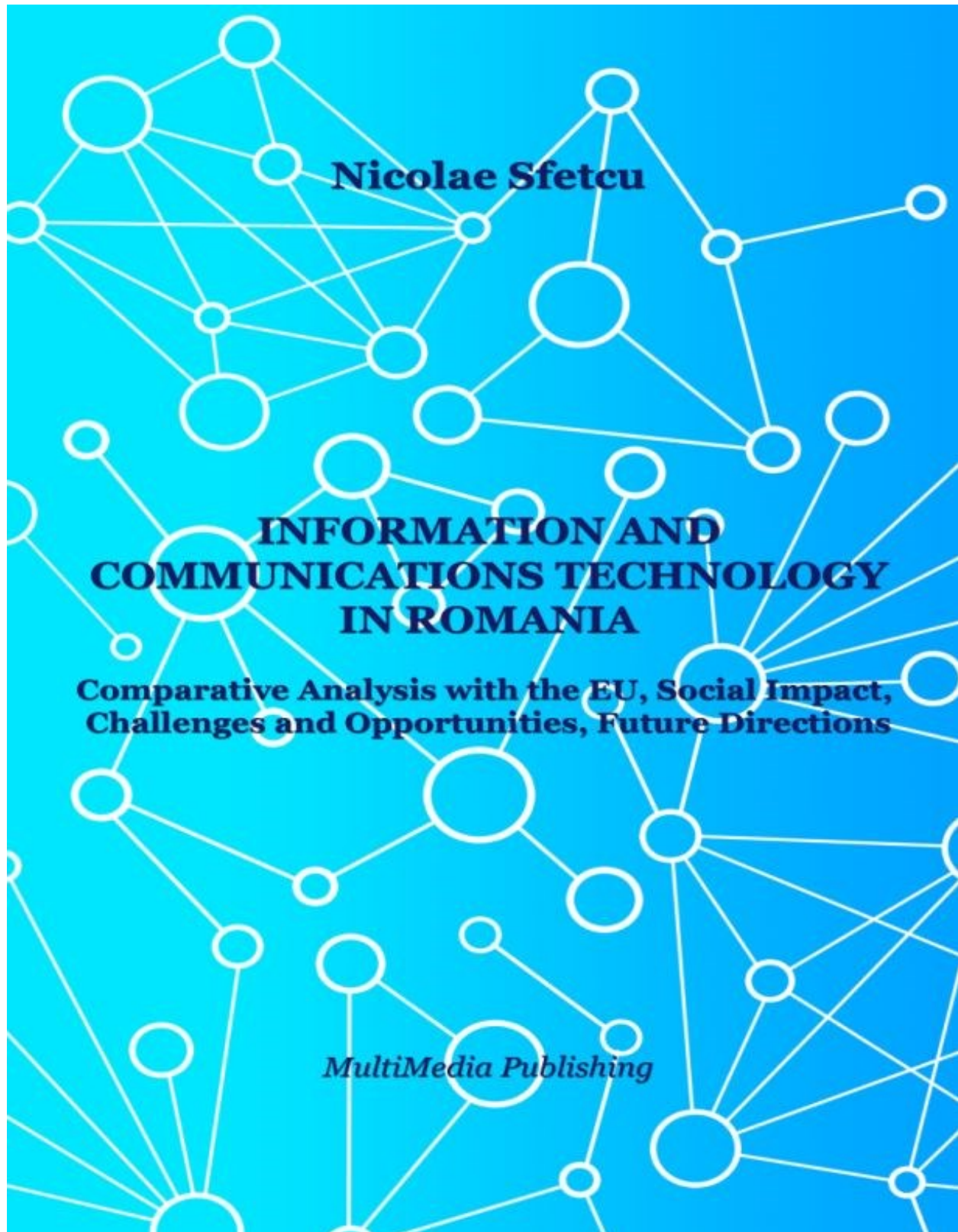
About the author

- Nicolae Sfetcu

About the publishing house

- MultiMedia Publishing

Book



The modern global technological landscape is shaped by rapid advances and interconnectivity, leading to a complex ecosystem of innovation, competition and collaboration. Significant developments are being seen in artificial intelligence, telecommunications, biotechnology and energy technologies. Digitalization is redefining industries such as healthcare, transport and finance, while cross-border data flows and 5G infrastructure are accelerating global connectivity. Key players such as the United States, China and Japan are investing heavily in research and development, pushing the capabilities of AI and quantum computing further. These nations have adopted strategic initiatives to increase their technological self-confidence and ensure that their companies remain at the forefront of innovation.

The European Union is positioned as a distinct player in the global technological landscape, aiming to stimulate innovation while ensuring trust, privacy and sustainability. By leveraging its regulatory power, investing in digital infrastructure and increasing collaboration between Member States, the EU is seeking to increase its strategic autonomy and competitiveness in the face of rapid technological change.

Romania has seen significant development in its technology sector over the past two decades. Driven by a combination of government support, a well-educated workforce and strategic positioning within the European Union, Romania is increasingly making its mark on the technology scene.

This study provides an overview of current global technology trends and the state of technology resources in the European Union and in Romania in particular, analyzing the strengths and weaknesses of the sector and highlighting the opportunities and challenges ahead.

MultiMedia Publishing <https://www.telework.ro/en/e-books/information-and-communications-technology-in-romania/>

Digital: EPUB (ISBN 978-606-033-902-1), Kindle (ISBN 978-606-033-903-8) PDF (ISBN 978-606-033-904-5)

[DOI: 10.58679/MM91317](https://doi.org/10.58679/MM91317)

Date de publication: 21.11.2024

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About the author

Nicolae Sfetcu

Associate and manager of MultiMedia SRL and MultiMedia Publishing.

Partner with MultiMedia in several research and development projects at national and European level

Project coordinator European Teleworking Development Romania (ETD)

Member of the Bucharest Atheneum Rotary Club

Co-founder and former president of the Mehedinti Branch of the Romanian Association for Electronics and Software Industry Oltenia

Initiator, co-founder and president of the Romanian Association for Teleworking and Teleactivities

Member of the Internet Society (ISOC) and co-founder of ISOC Romania

Co-founder and former president of the Mehedinti Branch of the General Association of Engineers of Romania (AGIR)

Physical engineer - Bachelor of Science, specialty Nuclear Physics. Master of Philosophy.

Member of the History of Science Division, Romanian Committee for the History and Philosophy of Science and Technology (CRIFST) of the Romanian Academy

ORCID ID: <https://orcid.org/0000-0002-0162-9973>

Contact:

Tel./ WhatsApp: +40 745 526 896

Email: nicolae@sfetcu.com

ResearchGate: https://www.researchgate.net/profile/Nicolae_Sfetcu

PhilPapers: <https://philpeople.org/profiles/nicolae-sfetcu>

Academia.edu: <https://nicolaesfetcu.academia.edu/>

Google Scholar: <https://scholar.google.com/citations?user=vAfoBIYAAAAJ>

ORCID ID: <https://orcid.org/0000-0002-0162-9973>

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Contact:

Email: office@multimedia.com.ro

Website: <https://www.telework.ro>

Facebook: <https://www.facebook.com/multimedia.srl>

Twitter: <https://twitter.com/multimedia>

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