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**Modeling Growth – between
Public Policy and Entrepreneurship**

**The Tensions Between Notions of “Physical” and “Digital” Space
In Regional Development**

Gabriela Marchis¹

Abstract: In this increasingly interconnected world, online and offline spaces interact and influence each other, creating new economic geographies and affecting the balance of socio-economic development of different regions. The interaction between physical and digital environments has significant implications for regional growth, social equity and environmental sustainability. This article outlines a theoretical framework and discusses the economic impacts, social equity and community dynamics, environmental impacts of the twin transitions and governance and policy challenges. The findings of this study reveal the need for a balanced development strategy that uses both physical and digital spaces to achieve equitable and sustainable regional development and concludes with several policy recommendations for an integrative approach, including investing in digital infrastructure while promoting digital literacy, supporting local identities in adopting green technologies and encouraging collaboration among stakeholders to modernize regional development, by building inclusive ecosystems that promote sustainable development.

Keywords: smart territorial development; innovation ecosystems; digital divide; new economic geographies

JEL Classification: R58; R11; O38.

1. Introduction

Recent advancements in technology have transformed the way we perceive and interact with space.

The digital age, characterized by the rise of the internet, smart technologies and mobile connectivity has changed the way individuals and communities interact, conduct business, and access services, blurring the boundaries between *physical* and *digital* spaces.

Traditional notions of *physical space*, defined by geographical boundaries and tangible infrastructure, are now intertwined with *digital spaces*, characterized by virtual environments and online interactions.

¹Associate Professor, PhD., Danubius International University, Galati, Romania, +40744540993, Corresponding author: gabrielamarchis@univ-danubius.ro.



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The ways in which digital technologies reshape human understanding and experience of physical space generate a dynamic tension between physical and digital space, particularly in the context of sustainable regional development. This tension manifests itself in several key domains (such as: economic, social, political, cultural, and ecological), challenging regional dynamics at multiple scales.

This paper aims to enlighten policymakers, planners and regional stakeholders, by explaining the significant implications for regional development of the most profound processes and pressing challenges of our times and by exploring the interface between territory, politics, economy, identity and the organization of political space.

Analyzing the benefits and drawbacks of digital integration and the role of various institutional configurations, this paper highlights certain strategic interventions, offering some recommendations for balancing the coexistence of physical and digital spaces in regional planning.

2. Theoretical Framework

2.1. Understanding Physical and Digital Spaces

Physical space refers to *the tangible environments* in which individuals live, work, and interact. This includes geographic locations, infrastructure, and the built environment.

Digital space encompasses *the virtual environments* facilitated by technology, including the internet, social media, and digital communication platforms.

Historically, these two dimensions were thought to operate independently. However, contemporary dynamics demonstrate their *interdependence*.

Digital technologies facilitate new forms of interaction, circumventing traditional geographic constraints. In turn, physical spaces influence how digital spaces are experienced and utilized. Understanding this *duality* is essential for addressing the emerging tensions in regional development.

2.2. Literature Review

The development of theory and research in territorial politics and spatial governance stimulates new thinking and new approaches to address the big intellectual questions, problems and challenges in regional studies, such as **increasing economic growth** and **accelerating socio-economic convergence**.

A breakdown of key focus areas of the relevant academic research is presented in figure 1.

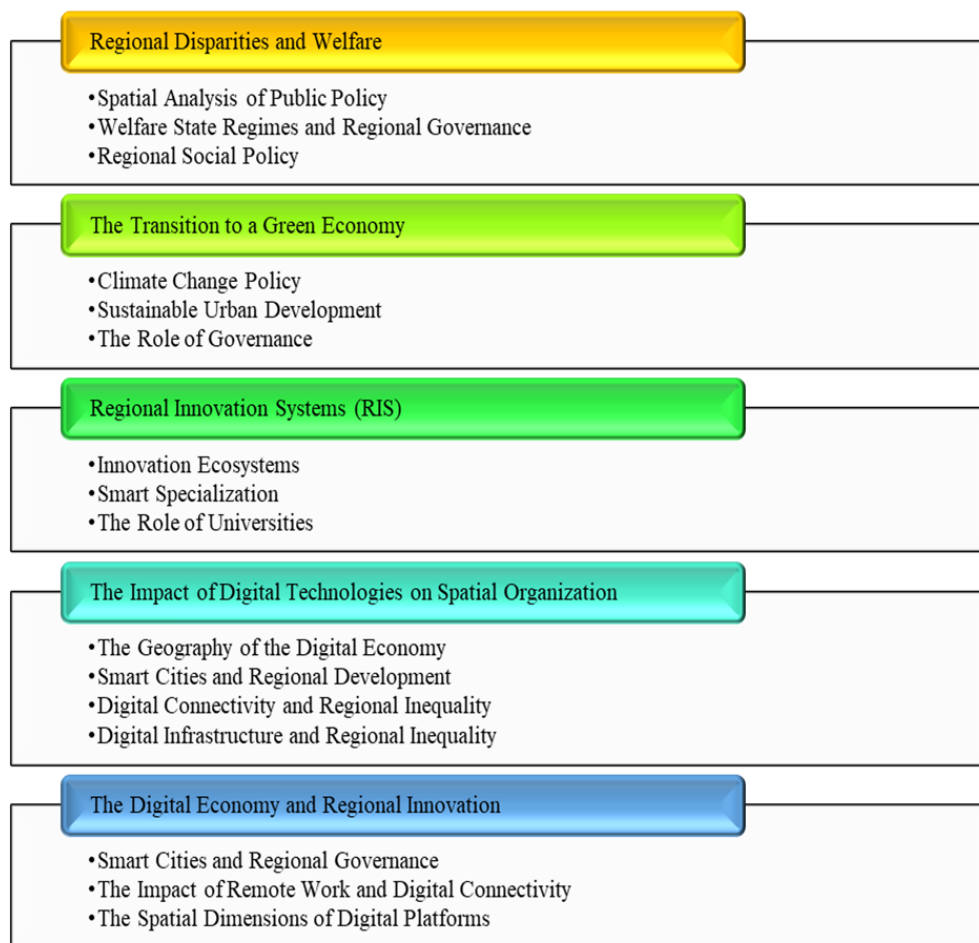


Figure 1. Key Themes and Concepts of Relevant Academic Research

Considering the physical and digital configuration of space, with a focus on new forms of governance and administration (Fallström et al., 2009; Jacquet et al., 2011; Zamyatina et al., 2020; Kourtiti, Nijkamp, & Suzuki, 2021; Chen et al., 2024), the main key areas that academic literature in regional science has recently addressed can be grouped into 3 categories:

- ☑ public policy and welfare state regimes (Esping-Andersen, 1990; Christiansen, 2006; Rostila, 2015; Orosz, 2019; Neuhuber, 2025; the 15 transnational projects under aegis of NORFACE Welfare State Futures Programme);
- ☑ sustainable economic development and public policy models (Adam, 2018; Jackson and Victor, 2020 and 2021; Ozili, 2022; Shimizu, 2023; Mishra et al., 2024);
- ☑ regional innovation ecosystems (Glaeser et al., 2010; Barca, McCann & Rodríguez-Pose, 2012; Camagni & Capello, 2013; Katz & Wagner, 2014; Carayannis et al., 2017; Lopes, Farinha & Ferreira, 2020; López-Rubio et al., 2020; Clark, 2020; Crescenzi et al., 2023).

The complex relationship between regional science, public policies and welfare state regimes has been investigated from the perspective of physical infrastructure (Timilsina et al., 2020; Foster et al., 2023), economic policies and strategies (Jackson et al., 2019; Popescu et al., 2016) and social factors (Ciccarelli et al., 2022).

The increasing influence of digital technologies has required a reassessment of traditional approaches, and recent studies have begun to explore the role of digital spaces in shaping regional development,

while emphasizing the need for an **integrated perspective** that considers both the physical and digital dimensions. (Ahmed & O'Connor, 2022; Brunori, Rolandi, & Arcuri, 2022; Samara et al., 2023).

The tensions that arise from the coexistence of physical and digital spaces lead us to analyze how these tensions shape *economic strategies*, influence *social dynamics*, and affect *environmental outcomes*.

3. Exploration of Economic Implications

The emergence of information and communication technologies opens new avenues for growth and innovation, but also creates significant challenges that need to be addressed in regional development.

The digital economy offers significant opportunities for regional growth, such as virtual marketplaces, e-commerce and digital labour markets. This digital transformation encourages economic diversification, reduces transaction costs and transforms regional growth patterns.

If, traditionally, regional development strategies were based on the dynamics of geographically defined “physical” spaces, and factors such as: infrastructure, resource availability, workforce, were considered in terms of proximity to industries, today these factors are borderless, thanks to the rise of the internet and associated digital technologies that have introduced the new dimension of “digital” space.

This “digital” space, characterized by interconnected networks and virtual platforms, transcends geographical limitations and reshapes the way regions operate and compete. The digital economy has transformed regional growth patterns, prioritizing areas with robust digital infrastructure and innovation ecosystems. These intangible spaces are technological hubs that attract investment and talent. This concentration exacerbates economic disparities, leaving regions with limited digital access marginalized. In this context, digital infrastructure, including broadband networks, cloud computing and smart city technologies, are becoming vital for modernizing regional development.

Digital transformation is a complex process that occurs and affects different areas, with different degrees of intensity and at different stages of their development, exacerbating existing inequalities, creating a *digital disparity* between digitally advanced regions and those lagging behind.

Regions with limited broadband access struggle to participate in the digital economy and to capitalize on digital opportunities, resulting in a digital divide that prevents them from reaching their economic potential. As a result, disparities between digitally connected and unconnected regions are increasing, requiring policymakers to rethink investment priorities to mitigate the shift from physical to digital business models. Policymakers need to review traditional urban planning frameworks, investing in digital infrastructure in disadvantaged regions to stimulate equitable growth.

4. Analysis of Social Equity and Community Dynamics

The dual nature of regional development in the information age should be explored from the perspective of the socio-cultural impact of digital spaces on community dynamics.

The interaction between physical and digital spaces is leading to *profound changes in industries and workforce transformations*.

Traditional industries are facing disruption as digital alternatives gain prominence, leading to job losses in traditional sectors and a growing demand for digital skills, creating the need for a workforce capable of thriving in a digitally-oriented economy. Reconciling these changes requires a focus on reskilling

programs, facilitating transitions for affected workers, and promoting inclusive economic policies that bridge the gap between traditional industries and emerging digital sectors.

Another aspect to consider is the extent to which the integration of digital spaces *alters social interactions* and *community structures*. (Chen et al., 2024)

Digital spaces introduce innovative ways to stimulate social interaction and strengthen regional cohesion, but they also have the potential to foster social fragmentation and polarization. The anonymity of online spaces can exacerbate existing social divisions and facilitate the spread of disinformation. In addition, increased reliance on digital communication can weaken face-to-face interaction, potentially eroding community bonds and reducing civic engagement in physical spaces. Efforts to mitigate these challenges should prioritize promoting balanced interactions between digital and physical spaces to preserve community cohesion.

In terms of *cultural identity*, digital spaces play a dual role. On one hand, digital spaces can be used to promote and preserve local cultures and traditions, and on the other hand, addressing a global audience implies succumbing to the homogenization imposed by the hegemony of specific languages and online cultural norms, which can marginalize and damage local languages and cultural expressions.

Thus, integrating digital spaces into regional development brings both opportunities and challenges for social and cultural dynamics. Digital connectivity improves access to a global audience, providing opportunities to promote and preserve local cultures and traditions, but at the same time, it can also lead to the disintegration of physical communities as interactions shift online. As globalization and digital content dominate, local cultures and traditions may struggle to maintain their relevance. The rise of digital nomadism further complicates regional identity, as transient populations interact digitally with regions while remaining physically detached. These social transformations require policies that strike a balance between promoting digital innovation and preserving local cultural heritage.

Finding a balance between promoting digital spaces and protecting cultural heritage requires a collaborative framework involving policy makers, cultural organisations and local stakeholders, which honors local identities while encouraging innovation to ensure sustainable and inclusive development. This requires a strong engagement of all actors involved to ensure that regional development initiatives reflect and enhance community values.

In terms of *social equity*, digital spaces can be a challenge for vulnerable populations, such as low-income individuals, the elderly, and rural residents. These people often lack the necessary digital resources and skills, which limits their participation in societal and economic opportunities.

Inequitable access to technology exacerbates social exclusion and undermines community engagement and cohesion. Addressing these issues requires a multifaceted approach, including targeted investments in digital literacy programs and community-centered initiatives that prioritize inclusion.

5. Examination of Environmental Sustainability

The environmental impact of the *digital space* should be taken into account by decision-makers in the development of regional strategies in order to align these strategies with wider environmental goals and support long-term sustainability.

Digital technologies offer significant potential for promoting sustainability, such as minimizing transport emissions through remote working arrangements. But, at the same time, they also introduce

substantial environmental challenges, the lifecycle of digital infrastructure being associated with significant energy consumption and the growing problem of electronic waste (e-waste).

Thus, incorporating environmental considerations into the development of digital infrastructure is essential.

Policymakers should focus on adopting green technologies and sustainable practices to mitigate the ecological footprint of digital spaces, ensuring that regional development aligns with environmental sustainability goals.

6. Governance and Policy Challenges

Regional development policies must evolve to address the complexities of governing both physical and digital spaces. While traditional governance mechanisms manage land use, infrastructure, and economic policies at national and local levels, the borderless nature of digital spaces introduces complex challenges.

Digital platforms often operate beyond the scope of regional jurisdictions, complicating issues such as taxation, labor rights, and regulatory compliance. In addition, smart city initiatives and digital governance tools offer potential for greater efficiency, but also, require well-defined frameworks to ensure equity, data privacy, and cybersecurity.

Digital technologies offer opportunities for more efficient and participatory decision-making.

E-government platforms, for example, can streamline access to public services and empower citizens to actively engage in governance processes. However, these innovations come with significant challenges. Issues such as data privacy breaches, cybersecurity threats, and the risk of digital surveillance require close monitoring. Additionally, the digital divide, which stems from unequal access to technology, can exclude marginalized groups, such as rural populations and low-income communities, from fully benefiting from digital governance initiatives, exacerbating existing inequalities.

To ensure inclusion, governance strategies must prioritize bridging the digital divide, through targeted investments in infrastructure, education, and accessibility. In doing so, they can maximize the benefits of digital technologies while protecting vulnerable populations from exclusion.

In other words, policymakers must create hybrid governance models that harmonize digital and physical regulatory approaches, fostering balanced and inclusive regional development.

7. Policy Recommendations – Integrative Approaches to Regional Development

This study reveals several key tensions between physical and digital spaces in regional development, which present both opportunities and challenges. [figure 2]

To effectively harmonize physical and digital development, policymakers and stakeholders should adopt holistic and integrated strategies for sustainable spatial planning. Smart cities, for example, can leverage data-driven insights to enhance infrastructure efficiency, optimize resource management, and improve community well-being. [figure 3]

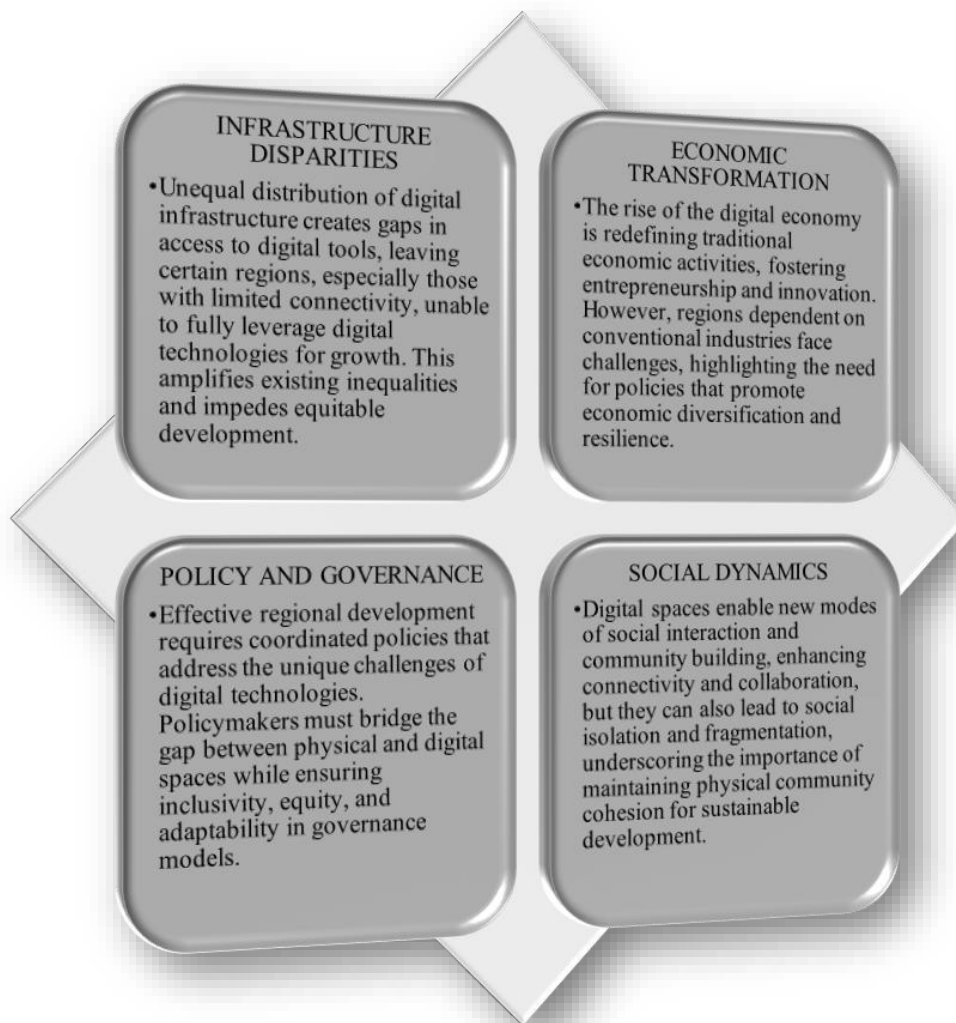


Figure 2. Key Tensions between Physical and Digital Spaces in Regional Development

The successful implementation of smart technologies depends on addressing the diverse needs of all communities. An inclusive approach to regional development necessitates the active engagement of local stakeholders in decision-making processes, effectively addressing potential inequalities and fostering a sense of ownership among residents. By prioritizing collaboration and carefully balancing technological advancement with community needs, we can pave the way for truly sustainable regional development.

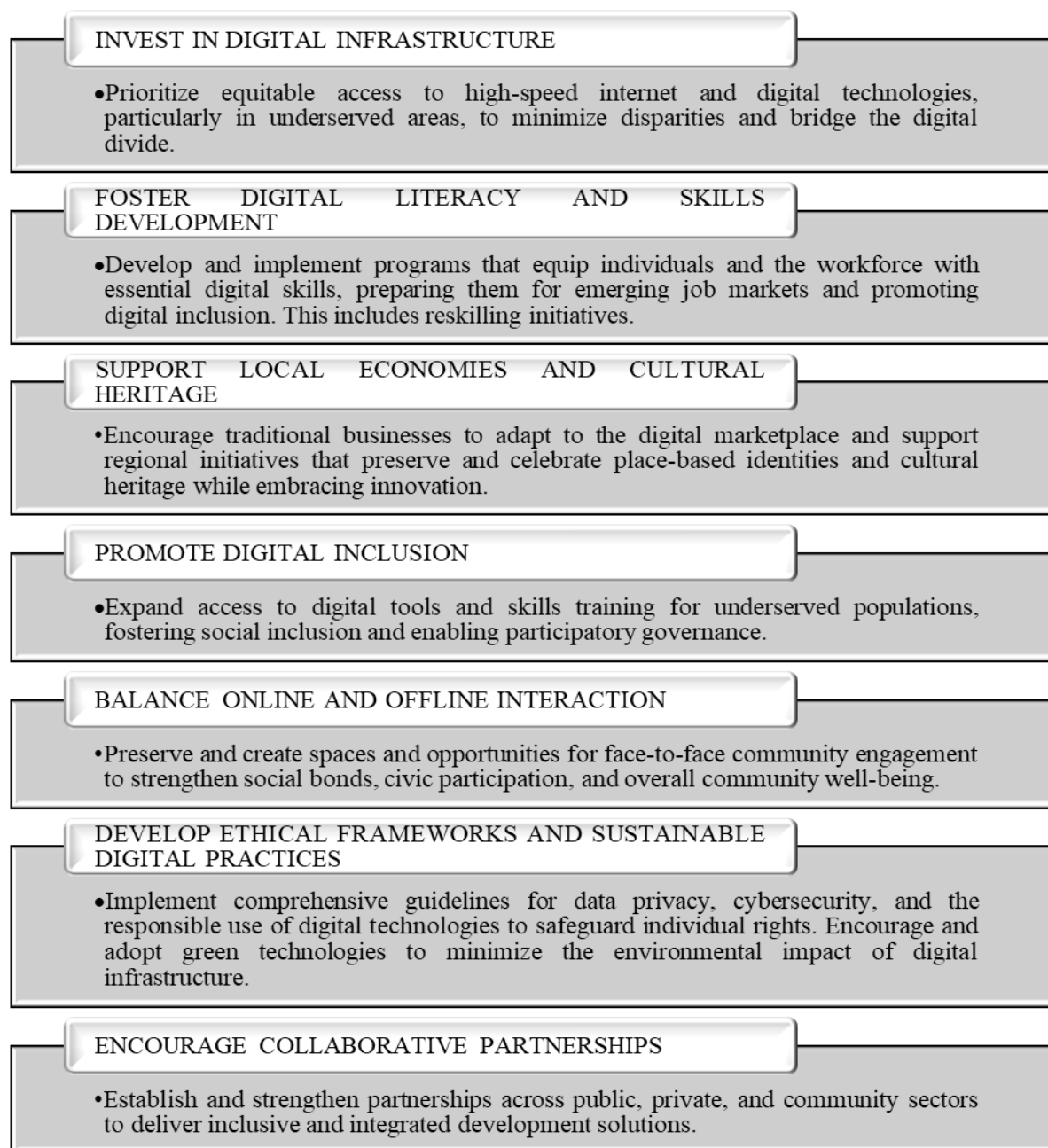


Figure 3. Strategies and Policy Recommendations

8. Conclusion

As the digital age continues to evolve and new technologies continue to reshape economic, social, and environmental landscapes, the tensions between physical and digital spaces will remain a critical factor for contemporary regional development. It is therefore essential that policymakers adopt a holistic and comprehensive approach that embraces the benefits of digital spaces while addressing the associated challenges.

By acknowledging the complexities of the interaction between digital and physical spaces and prioritizing inclusivity, policymakers and practitioners can harness the potential of digital technologies while mitigating their negative consequences, creating regions that are both digitally connected and

socially cohesive. Governments must prioritize equitable digital access, integrate digital governance into regional planning, and protect local cultures in an increasingly virtual world. Strategies such as public-private partnerships for broadband expansion, smart urban planning, and digital literacy initiatives can help bridge the gap between physical and digital spaces.

Ultimately, a hybrid model that leverages both tangible and intangible assets will be essential for sustainable and inclusive regional development in the digital age. Therefore, further research is needed to explore the evolving dynamics of this relationship and to develop effective strategies for managing the complex interaction between physical and digital space in the context of regional development.

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