



Digital Governance, Innovation, and Sobriety: A Three-Pronged Approach to Strengthening the Territorial Resilience in Morocco

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ABSTRACT

In a Moroccan context marked by growing environmental, demographic, and institutional crises, territorial resilience has emerged as a strategic priority for ensuring the sustainability of national development. This study examines the capacity of a three-pronged approach — based on digital governance,

innovation, and resource efficiency — to strengthen this resilience. Using a secondary methodology involving documentary analysis and a literature review, the research focuses on the Rabat-Salé-Kenitra (RSK) region as a testing ground. The results demonstrate that the integration of these pillars creates a virtuous synergy. However, the analysis highlights that the success of this integrated model remains contingent on bridging the digital divide and improving

institutional coordination to ensure a just and sustainable territorial transformation.

Keywords: Digital governance, Innovation, Morocco, Territorial resilience, Sobriety.

Terminological clarification:

Throughout this article, the term “sobriety” is used not in its common English sense (abstinence from alcohol), but to denote the rational and voluntary moderation of resource consumption, in line with the French concept of “sobriété” as developed in the sustainability and digital transformation literature.

1. Introduction

Moroccan regions are today increasingly exposed to uncertainty in the face of systemic, multifactorial crises. Beyond the age-old challenge of these regions, economic and social development, a whole series of interconnected risks has the urgency of building resilient regions is no longer a matter of choice but a strategic imperative of national significance, equivalent to a prerequisite for the sustainability of regional development and the country’s social cohesion. It is with this in mind that we propose a strategic three-pronged approach to enhance the resilience of Moroccan regions, with the aim of making it an integrated response to the multidimensional challenges they face, while remaining relevant to current needs in order to build regions that are more resilient, adaptable, and sustainable.

This research has a twofold objective: to examine the extent to which the synergistic interplay of the three dimensions of the three-pronged approach serves as a lever for strengthening territorial resilience in Morocco, and to identify the mechanisms, tools, and public policies already in place — particularly in regions such as Rabat-Salé-Kenitra — and assess their actual contribution to territorial resilience. The value of this research lies in establishing a conceptual and theoretical framework that illustrates the interconnections and synergies between digital governance, innovation, and resource efficiency. The originality of this study lies in its systemic approach: whereas the existing literature treats these three dimensions separately, this research posits that it is their interdependence and circularity that generate resilience effects greater than the sum of their individual contributions.

The central question of this research thus revolves around the relationship between modernization and sustainability: to what extent does the triad of digital governance, innovation, and simplicity ensure territorial resilience in Morocco.

To answer this question, the study adopts a qualitative approach based on secondary literature review, grounded in an interpretivist epistemological framework, drawing on a corpus of national and regional strategic documents, academic publications, and case studies related to initiatives in the RSK region over the 2018–2025 period. This research is structured around four complementary parts: the first part presents a literature review; the second part outlines the methodology adopted; the third part presents the results; and finally, the fourth part discusses these results in light of previous studies and formulates recommendations.

2. Literature Review

2.1. Territorial Resilience: Foundations and Challenges for Morocco

2.1.1. Conceptualization of Territorial Resilience

Territorial resilience is an emerging concept in scientific literature and public policy, particularly since the intensification of contemporary systemic crises. Originally rooted in ecology, the concept has gradually spread to the social sciences and regional planning (Folk, C. et al., 2002). In its classic definition, Folke et al. (2002) define resilience as a system’s capacity to absorb shocks and adapt while preserving its identity and functionality. It reflects a dynamic process of adaptation and transformation within a territory rather than merely the ability to withstand a shock. According to Norris, F.H. et al. (2008), territorial resilience is an attitude that evolves over time as a result of the interaction between individuals and their environment, highlighting factors such as preparedness, cooperation, flexibility, and the capacity to learn.

According to contemporary literature, there are four foundational dimensions of territorial resilience, corresponding to the analytical framework proposed by LHARTI, R. et al. (2024): robustness (the ability to maintain essential functions in the event of disruptions), redundancy (the existence of alternative solutions), ingenuity (the capacity for innovation and creativity), and speed (the speed of response and recovery).

2.1.2. Vulnerabilities and Challenges Facing Moroccan Territories

Morocco has specific territorial characteristics that make it particularly exposed to multiple systemic crises. Moroccan regions face real environmental challenges: water scarcity, desertification, and extreme weather events exacerbated by climate change (Carnegie Endowment, 2025). These vulnerabilities intersect with structural socioeconomic

weaknesses, exacerbating vulnerability to risks. Territorial inequalities constitute a fundamental challenge to resilience (PMC, 2023). This territorial heterogeneity results in unequal capacities to adapt to shocks, which are particularly evident in rural and peripheral areas.

These multiple and converging crises underscore the urgency of diversifying approaches to design appropriate mechanisms for territorial resilience (World Bank, 2023).

2.2. Digital Governance: A Lever for Territorial Modernization

2.2.1. Digital Transition of Local Governments

The digital transition of local governments is emerging as a major strategic issue for the modernization of local public services in Morocco. It is part of a vision aimed at making Morocco a digital nation, where the transformative potential of digital technologies is fully harnessed (Ministry of Digital Transition, 2023). The national digitalization strategy is based on several fundamental pillars: digitized public services accessible online, the Smart Government program focused on modernizing administrative processes, and the sharing of technology platforms (ADD, 2023). The Moroccan public administration has thus undergone a significant digital transformation, which was particularly accelerated during the COVID-19 pandemic (Zaanoun, A., 2023).

2.2.2. Citizen Participation and Digital Democracy

Digital local governance also serves as a vehicle for democratic renewal. Digital tools generate new forms of participation, making citizens more engaged in the management of their local communities. The “Digital Morocco 2030” plan thus calls for the creation of a digital portal designed to facilitate interactions between citizens and local governments. Morocco’s experience with digital citizen participation is exemplified by the Ramuri program, funded by the European Union through an approach focused on innovation and digital tools (EEAS, 2022), demonstrating a commitment to linking digital transformation with the strengthening of local citizen participation.

2.3. Innovation: A Driver of Regional Transformation

2.3.1. Regional Innovation Ecosystems

Regional innovation ecosystems are the cornerstone of the economic transformation of Moroccan regions. The development of innovation clusters in Morocco is part of a strategy aimed at enhancing regional competitiveness; these regionally based networks of interconnected firms and partner

institutions work to boost economic productivity (Cité Innovation UHP, 2024). Entrepreneurial dynamism and innovation primarily from effective ecosystems — clusters, competitiveness hubs, and economic agglomerations — recognized for their role in disseminating knowledge and supporting entrepreneurship (Calenda, 2017).

2.3.2. Technological Innovation and Digitalization

Technological innovation is a powerful driver of resilience, fostering the emergence of new solutions to current and future challenges (LHARTI, R. et al., 2024). Emerging technologies — artificial intelligence, the Internet of Things, and blockchain — tend to improve regional management and services provided to citizens, while opening up new areas of economic opportunity. FabLabs and co-creation spaces are establishing themselves as essential infrastructure for regional innovation, mobilizing local stakeholders to experiment with

and develop solutions tailored to the region’s specific needs. Nevertheless, the risks associated with technological innovation — including ethical concerns, security, and equity of impact — call for the promotion of responsible and inclusive innovation (LHARTI, R. et al., 2024).

2.4. Sobriety as a Lever for Regional Resilience

2.4.1. Conceptual Redefinition of Regional Sobriety

Regional sobriety is defined as the set of measures and practices aimed at reducing a region’s consumption of natural, energy, and material resources, while maintaining or improving the quality of life of its residents (Parrique, T., 2022). It calls for a transformation of production, consumption, and spatial organization systems, rather than mere frugality.

2.4.2. Systemic Impact on Territorial Resilience

Territorial sobriety contributes to territorial resilience through several mechanisms. It reduces dependence on external resources by developing local food systems and local energy supply chains. It diversifies the economy by promoting circular business models (Ellen MacArthur Foundation, 2019) and creates co-benefits for society and the environment by strengthening territorial cohesion. The integration of resource efficiency with the principles of digital governance and technological innovation thus constitutes the central challenge of this research.

2.5. Integration and Synergy: Toward an Integrated Model of a Resilient Territory

The development of an integrated model of a resilient territory through digital governance, innovation, and frugality forms a triangulation toward a new paradigm of territorial development in Morocco. These three dimensions are interconnected within a systemic framework in which each nourishes and reinforces the others. Digital governance creates spaces for co-creation that stimulate the emergence of frugal innovations; innovation improves the efficiency of digital initiatives while reducing their ecological footprint, thereby avoiding the rebound effect (Bordage, F., 2019); and simplicity guides technological choices toward sustainable solutions that strengthen governance and stimulate responsible innovation.

The relationship between the three concepts can be summarized by the following diagram:

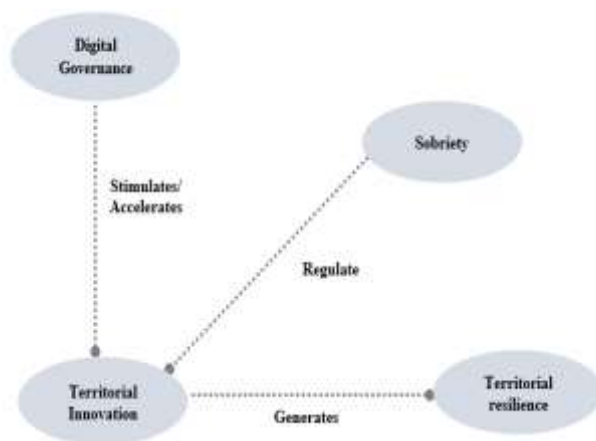


Figure 1. The relationship between the concepts

Source: created by the author

While the literature offers valuable insights into each of the three dimensions, it has significant gaps. Research on territorial resilience in Morocco remains limited and sector-specific, lacking an integrated, multidimensional framework (LHARTI, R. et al., 2024). Studies on territorial digital governance in emerging countries tend to adopt a technology-centered perspective, neglecting social and institutional dimensions (Boutayeb, F. & Aghroum, J., 2021). Sustainability as a driver of territorial development remains largely unexplored in the context of countries in the Global South. It is precisely to address these gaps that this research proposes a joint and systemic analysis of these dimensions.

3. Methodology

To analyze the role of the triad of digital governance, innovation, and sustainability in building territorial resilience — particularly in the Moroccan context and that of the Rabat-Salé-Kenitra (RSK) region — we chose to adopt an exploratory qualitative approach. The exploratory qualitative approach aims to better understand a phenomenon that is still under-documented or emerging — in this case, territorial resilience in Morocco. It is based on an interpretive and descriptive methodology focused on identifying the rationales for action, territorial dynamics, institutional practices, and mechanisms of adaptation or innovation. This approach is particularly relevant in the context of research that focuses on complex and context-specific dynamics (local scales, territorial diversity) and seeks to identify trends or categories of analysis based on qualitative data.

The analysis is based on documentary research and a cross-referenced review of relevant secondary sources, including a review of the academic literature on resilience, territorial innovation, and digital governance (scientific articles, reports from national and international organizations), as well as a study of national and regional strategic documents:

Rabat-Salé-Kenitra Regional Development Plan, Morocco Digital 2020 Strategy, New Development Model (2021), CESE reports, HCP publications, etc. Plus, secondary case studies: concrete examples of digital or low-carbon initiatives in the RSK region (e-services, smart cities, sustainable mobility, waste management, citizen platforms, etc.). Data from scientific conferences (notably the UNA Conference), field observations reported by the specialized press, or regional portals.

This method aims to identify how Moroccan regions—and in particular the RSK region—mobilize or integrate the three key elements under study to strengthen their resilience in the context of digital, ecological, and institutional transitions. It also helps identify obstacles to integrated implementation (digital divides, lack of multi-level coordination, limited social innovation, etc.) and draw lessons that can be applied to other Moroccan regions.

This study relies exclusively on the analysis of available secondary data, without resorting to interviews or direct field observations. As such, it does not aim to draw general conclusions, but rather to open avenues for reflection and identify underlying trends, based on an in-depth qualitative analysis of documents and observable practices.

4. Results

Morocco serves as a testing ground for integrated territorial policies in Africa. The Kingdom is developing its own model that combines digital governance, innovation, and sustainability within territorially resilient areas, based on ambitious national initiatives implemented at the regional level.

4.1. The National Framework: Morocco Digital 2030 and Advanced Regionalization

The Morocco Digital 2030 strategy positions digital technology as a driver of territorial development and resilience, structured around four pillars: digital governance, the digital economy, digital human capital, and digital infrastructure. It allocates 13.5 billion dirhams and aims to increase the digital sector's contribution to GDP to 8% by 2030. This transformation is supported by the advanced regionalization reform, which grants regions significant authority in economic development and land-use planning. The national Smart Territories program is rolling out digital governance platforms across the Kingdom's 12 regions, integrating digital services and citizen participation tools, with a satisfaction rate of 78%.

4.2. The RSK Region: An Integrated Territorial Ecosystem

4.2.1. Regional Digital Governance: The RSK Digital Platform

Launched in 2020, the RSK Digital platform is an integrated digital governance system developed in partnership with Mohammed V University, with funding of 45 million dirhams. It incorporates 180 digital public services and several citizen participation tools. The RSK Participatory Budget enabled more than 150,000 citizens to submit 2,847 project proposals in 2023, of which 156 were selected for a total of 280 million dirhams. The real-time regional monitoring system, powered by IoT sensors distributed throughout the region, has reduced response times to urban incidents by 25%. The interoperability of administrative systems has reduced case processing times by 40% and cut the number of in-person visits by users by 60%.

4.2.2. Frugal Innovation: The Rabat Tech City Ecosystem

Inaugurated in 2022, the Rabat Tech City technology park is home to more than 200 startups and R&D centers, with a focus on frugal innovation and solutions tailored to local challenges. In the field of frugal AgriTech, the startup Smart Farm Maroc has deployed solar-powered, connected irrigation sensors

across 15,000 hectares in the Gharb Plain, resulting in 30% water savings and an 18% increase in crop yields, at a cost 70% lower than that of imported technologies. In sustainable mobility, the Mobility RSK carpooling app, adopted by 80,000 users, has contributed to a 22% reduction in traffic on the RSK corridor and a 15% reduction in CO2 emissions. The network of eight FabLabs coordinated by Mohammed V University has notably developed low-cost medical equipment using 3D printing, equipping 25 rural health centers at a 60% reduction in cost.

4.2.3. Regional Sustainability: The RSK Sustainable 2030 Plan

Adopted in 2022, the RSK Sustainable 2030 Plan integrates digital sustainability, the circular economy, and energy efficiency, with the goal of reducing the region's environmental footprint by 40% by 2030. The consolidation of three regional data centers powered by solar energy has led to a 35% reduction in energy consumption by the regional information system. The Circular RSK platform has identified 67 industrial synergies that will eliminate 25,000 metric tons of waste and save 3.5 million cubic meters of water per year. The deployment of 50,000 connected LED streetlights across 45 municipalities has reduced energy consumption related to public lighting by 45%.

4.3. Quantitative Impact Results

Table 1 summarizes the measurable results achieved in the RSK region after three years of implementing the three-pronged approach:

Table 1. Quantitative impact results of the three-pronged approach in the RSK region (2020–2023)

	Results
Digital Governance	180 digitized public services with a 72% usage rate 150,000 participants in the regional participatory budgeting process (2023) 40% reduction in administrative processing times 78% citizen satisfaction rate (2023 annual survey)
Territorial Innovation	200 active startups in the Rabat Tech City ecosystem 30% water savings in smart agriculture (15,000 hectares) 60% reduction in medical equipment costs (FabLabs) 22% reduction in intercity traffic
Sobriety	35% reduction in the regional digital carbon footprint 25,000 metric tons of waste prevented through the circular economy 45% energy savings on street lighting 40% increase in energy efficiency of public buildings
Regional resilience	32% improvement in the regional resilience index (OECD methodology) 15% reduction in interregional territorial inequalities 28% increase in the capacity to adapt to climate shocks

Source: Compiled by the author

5. Discussion

5.1. Digital Governance: A Catalyst for Modernization and Inclusion

The digital transformation of local governments, through the RSK Digital platform, is profoundly modernizing the relationship between citizens and the institution. The digitization of services and participatory tools not only enhance administrative efficiency but also foster renewed citizen engagement. This renewal of local democracy is underpinned by inclusive digital governance for local resilience, based on access to information, transparency, and the co-creation of public policies. However, the persistence of the digital divide remains a barrier that must be overcome through improved infrastructure and support for the most vulnerable.

5.2. Local Innovation: A Driver of Tailored and Sustainable Solutions

The innovation dynamic embedded in the Rabat Tech City ecosystem plays a major role in enabling frugal and local innovation. Frugal agriTech, sustainable mobility, and the social mission of FabLabs demonstrate a creative response to environmental constraints and economic opportunities. These results confirm the contribution of technological innovation to economic diversification; however, the creation of skilled jobs, the financial sustainability of these innovations, and the need for a more effectively managed contribution of social innovation remain persistent challenges.

5.3. Resource Efficiency in Regions: A Strategic Lever for Sustainability and Autonomy

Resource efficiency is emerging as a strategic lever for optimization rather than merely a constraint. The circular economy, resource sharing, and energy consumption optimization illustrate this reality. These findings confirm the work of Parrique, T. (2022) on frugality as a driver of autonomy and resilience. The RSK Durable 2030 plan represents a promising path toward a regional model combining digital, energy, and material frugality. For these practices to become widespread, a twofold challenge must be addressed: taking into account differences in local contexts and establishing cross-sectoral governance mechanisms across different regional levels.

5.4. Synergy of the Three-Pronged Approach and Contribution to Previous Studies

The strength of this study lies in highlighting the systemic and complementary nature of the triptych under examination. Digital governance supports frugal innovation; innovation improves the efficiency of digital initiatives while reducing their ecological footprint; and frugality guides technological choices toward sustainable solutions. This virtuous cycle confirms the central proposition of the research and goes beyond the sectoral or fragmented approaches that still characterize the majority of the studies reviewed (Boutayeb, F. & Aghroum, J., 2021; Caragliu, A. et al., 2011). The main contribution of this research compared to the previous literature is precisely the empirical demonstration — in an emerging context — that it is the systemic integration of the three dimensions, rather than their sector-specific implementation, that generates the most robust and sustainable resilience effects.

Conclusion

This study aimed to examine the link between digital governance, innovation and digital sustainability to promote territorial resilience in Morocco, through an exploratory methodological approach focused on the Rabat-Salé-Kenitra region. The results confirm the study's central hypothesis: the synergistic interrelationship between digital governance, innovation, and sustainability constitutes an effective lever for strengthening territorial resilience. The Moroccan experience demonstrates that these three dimensions, far from being at odds with one another, reinforce each other to generate a virtuous cycle of sustainable territorial development.

On a theoretical level, this research contributes to the advancement of the literature on smart regions by proposing a model tailored to the specific characteristics of emerging countries, which integrates social, environmental, and institutional dimensions into a systemic approach. It is a conceptual innovation that addresses the challenges of sustainability and territorial justice. Empirically, the experience of the RSK region highlights the factors for success: sustainable political leadership, a participatory multi-stakeholder approach, consideration of local specificities, and multi-level coordination.

Methodologically, this research contributes by proposing a framework for documentary analysis structured around four complementary corpora and three nested levels of analysis, which can be applied to other emerging territorial contexts.

There are four limitations to this research. The first is methodological: relying exclusively on secondary data, it does not capture the perceptions of local actors or informal dynamics. The second concerns generalizability: the results from the RSK region — a metropolitan area with exceptional resources — cannot be directly applied to more peripheral regions. The third relates to the reliability of institutional data, which may be subject to favorable reporting bias. The fourth is temporal: since the initiatives analyzed are recent, their long-term effects remain difficult to assess.

In terms of recommendations, local public stakeholders are encouraged to: create cross-functional, multi-level coordination bodies to prevent the fragmentation of initiatives; make any digital deployment contingent on a prior strategy to bridge the digital divide; systematize the use of frugal innovation in local public procurement; incorporate the principles of the circular economy into regional development plans with quantified targets; and deepen empirical research through qualitative field studies and interregional comparisons.

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