# Smart Cities and the rural-urban divide in Moldova: Balancing innovation and tradition

Mariana ROSCA,
*MSU, Chisinau, Moldova*
roshcam@yahoo.com

Rodica CIOBANU,
*MSU, Chisinau, Moldova*
rod.ciobanu@gmail.com

## Abstract
As Moldova advances its smart city initiatives, supported by the EU4Moldova: Focal Regions programme, the country faces both opportunities and challenges in balancing urban innovation with rural traditions. This article explores the impact of digital transformation on Moldova's urban-rural divide, focusing on the smart city projects in Cahul and Ungheni. These projects, financed by the European Union and implemented by UNDP and UNICEF, include upgrading water supply and waste disposal systems, streamlining public transport, and introducing intelligent public lighting and resource management systems. While these advancements bring significant benefits to urban areas—enhanced governance, improved services, and sustainable infrastructure—rural regions risk being left behind due to limited access to these digital resources. Thus, the digital divide remains a pressing issue as Moldova works to ensure that rural populations also benefit from technological progress. This article critically examines how smart initiatives can bridge the rural-urban divide, integrating rural communities into the digital transformation while preserving cultural traditions. It highlights the importance of public-private partnerships, community involvement, and inclusive policy-making to ensure that Moldova's digital future benefits all citizens, both urban and rural. This research serves as a foundation for future empirical studies to deepen understanding of these dynamics and guide policymakers in designing effective, inclusive smart city and smart village strategies.

**Keywords:** Smart Villages, Republic of Moldova, urban-rural divide.

## 1. Introduction
The Republic of Moldova is gradually embracing the concept of Smart Cities, particularly in its capital, Chisinau, and some other regional centers. The country's efforts align with global trends toward digital transformation, sustainability, and the integration of innovative technologies to improve the people's life. Several projects identified, and implemented by local, regional, and national authorities in the Republic of Moldova aim to bring about smart modernization, though progress has been uneven, especially when considering the stark disparity between urban and rural areas.

A significant initiative in this context is the Strategy "Chisinau – Smart City" 2030, a roadmap introduced in 2021 with the goal of transforming Chisinau into a digitally modern city by 2030. In addition to Chisinau's ambitions, other notable projects such as the UNDP Moldova's Sustainable Green Cities (2018-2022) initiative also showcase Moldova's commitment to low-carbon urban development. This project aimed to position Chisinau, and potentially other cities in Moldova, as green, smart European cities with enhanced quality of life and sustainable economic growth. Furthermore, the EU4Moldova - Key Regions project, targeting municipalities such as Cahul and Ungheni, represents an effort

to address regional inequalities in Moldova. While not explicitly centered on the smart city development model, the program's principles align with the goals of smart urban planning by promoting inclusive economic growth, enhancing public services, and fostering civic participation.

However, despite these efforts, the integration of smart concepts has been largely concentrated in urban centers, leaving rural areas underdeveloped in terms of access to digital services and technological innovations. This urban-rural divide underlines the need for a more inclusive approach to smart development in Moldova and developing smart villages models as well.

## 2. Literature review

The literature review's main aim is to clarify the consequent use of the two main concepts: smart cities and smart villages. The literature review was framed by books, journals, previous studies related to the smart city and smart village concepts.

### *2.1. Smart city*

As many terms in academia, the concept of "smart city" lacks a universally accepted definition. This fact has led to confusions as well as the need for a shared understanding of its features and performance metrics. Trying to address this gap, Albino et al. [1] argue that the concept is far from being limited to the application of technologies to cities and that the use of the term is currently used in many sectors where there isn't any agreed upon definition. Thus, the authors challenge the first use of the concept in the 1990s, where the focus was mainly on the new ICT with regard to modern infrastructures, and that was the main framework used to elaborate different definitions and meanings given to the concept of "smart city" [2]. However, Albino et al. [1]argues that the smart city concept is no longer limited to the diffusion of ICT, but it primarily looks at people and community needs. In order to advance state-of-the-art on what a smart city is, Albino et al. brings evidence upon some key dimensions of a smart city, and go even further in underlying how its performance can be assessed. For this purpose, the authors identified a range of conceptual variants used in replacing "smart" with some alternative terms, as for example, "intelligent" city or "digital" city [1]. In addition, the authors underline that there is a persistent confusion with other similar terms, besides digital and intelligent, also used terms of virtual, or ubiquitous city. They conclude that these concepts are more specific and are less inclusive, than the concept of smart cities. Therefore, apart from the novelty to broaden the understanding of the concept, Albino et al. focus on the fact that the modern cities are diverse and this requires the smart cities to be inclusive, in order to accommodate all needs.

Similar to Albino et al., other researchers such as Neirotti et al. [3] also emphasized the need to reconsider the definition of the concept, considering the modern needs.. Therefore Neirotti et al. argue that the smart city concept should be seen as a means to enhance the life quality of its citizens. Therefore, the authors [3] contributed to a comprehensive understanding of the notion of smart city through the elaboration of a taxonomy of pertinent application domains, among which: natural resources and energy, transport and mobility, buildings, living, government, economy and people. However, differently than Albino et al. [1], by focusing on potential dimensions of smart city, Neirotti et al. focus mainly on

the domains where the smart city concept could be applied. To this end, the authors argue that a smart city should be able to optimize the use and exploitation of "both tangible (e.g. transport infrastructures, energy distribution networks, natural resources) and intangible assets (e.g. human capital, intellectual capital of companies, and organizational capital in public administration bodies)" [3]. According to the authors, the way in which cities steer to achieve the efficiency goal and of the optimization of its domains (classified in hard and soft) defines best the concept of smart cities. "Specifically, hard domains refer to office and residential buildings, energy grids, natural resources, energy and water management, waste management, environment, transport, mobility and logistics. […] By contrast, soft domains include areas such as education, culture, policies that foster entrepreneurship, innovation and social inclusion, as well as communication between local public administrations and the citizens (e-government)" [3].

The consequent researchers broadened even more the definition of the concept, and focused on local infrastructure to be environmentally friendly as well as local production-consumption and cyber resilience. This is the result of the research on the Web of Science database on the most recent publications (2023-2025) on smart cities, that reveal that the recent definitions of smart cities in academic literature emphasize the integration of "multi-source data fusion", "advanced sensor technologies", and "sustainable urban practices". These themes or topic map (Figure 1) highlight the complexity of the concept and the broadening trend in the literature to apply and define the concept according to the development needs of the cities.

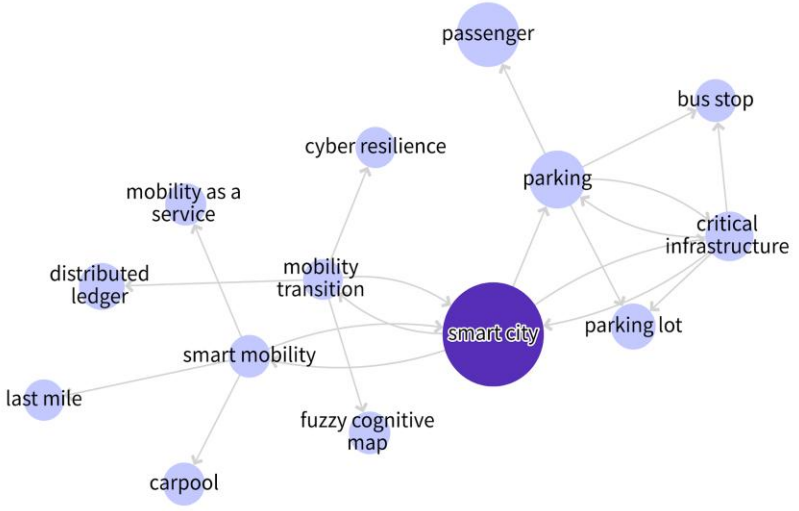


Fig. 1. Smart City topic map.
*Source: Created by Web of Science Research Assistant.*

The *multi-source data fusion* represents a critical pillar in understanding the urban environments and creating knowledge that can support the smart cities initiatives [4]. Peng et al. argue that effective integration of data from various sources can improve the reliability of knowledge used for downstream tasks and policies in smart city applications. This data could include data on critical infrastructure (parkings, bus stops, passenger

information) as well as smart mobility opportunities such as carpooling and carsharing. With the advancement of digitalization and artificial intelligence, the data represents an even more important part of a smart city able to address more effectively the people and city needs, as well as makes the city management more vulnerable to the cybersecurity threats, and requires specific skills and infrastructure.

The *advanced sensor technologies* play a crucial role in real-time monitoring of smart cities, thanks to the advancements made in smart gas sensors as well as their integration with Artificial Intelligence (AI) and Internet of Things (IoT). As Zong et al. argue "the development of sensor technology, wireless communication, smart monitoring terminal, cloud storage/computing technology, and artificial intelligence, smart gas sensors represent the future of gas sensing due to their merits of real-time multifunctional monitoring, early warning function, and intelligent and automated feature" [5]. Specifically, thanks to the sensors´ role in environmental monitoring, healthcare, and public safety, it contributes to the general functioning of smart cities systems. Not least, it could contribute to the cyber resilience of the smart city administration and population.

The last trend in the literature refers to *sustainable urban practices* that are under risks with the increase of informal economic activities, in developing economies, especially Global South, and this can negatively affect both the mobility as well as environmental quality of the city [6]. Generally, there is a critical expectation that cities must become sustainable before being considered smart, nevertheless, many smart city initiatives currently lack a genuine sustainability focus [7]. Yigitcanlar et al. argue that although the smart cities are widely seen as actively embracing new technologies to achieve desired urban outcomes, and despite the fact that sustainability is often claimed to be a desired outcome of smart city initiatives, there is little evidence on how sustainability outcomes are incorporated or achieved within the smart city initiatives. In order to better understand the situation, the authors seek to answer whether cities can become smart without actually being sustainable. The analysis highlights the expectation for cities to become sustainable first in order to be considered truly smart, nevertheless, they argue that there are major challenges in reaching sustainable outcomes, mainly because of heavy technocentricity of the policies; complex practices, and ad-hoc conceptualization of the smart city notions. The authors [7] conclude that the smart city practice fails to incorporate an overarching sustainability goal, and the need for a post-anthropocentric approach in practice and policymaking for the development of truly smart and sustainable cities.

Therefore, this state of the art highlights the evolving understanding of smart city concept, framed by innovation in urban development, and the governance challenges in implementing smart city initiatives. All this taken together, reveals a complex interplay of definitions, innovation strategies, and governance challenges in defining and understanding the concept of smart city.

### *2.2. Smart villages*

The concept of "Smart Villages" has been used later than that of smart cities, and not surprisingly it builds upon the later reflections and definition, and considering the rural specificity. Therefore, it is defined as a rural development practice that leverages

technology and innovation to address local rural challenges and improve quality of life of rural population, applying sustainable and development strategies, and community engagement.

As Zhang and Zhang suggest, the smart village concept represents a "rural development model that fully utilizes the solutions provided by ICT to promote the sustainable development of a village on the basis of clarifying the characteristics and needs of rural development" [8]. In addition, the authors propose to place the focus of smart villages on the advantages/problems/challenges of the different types of villages and provide targeted solutions for them. Later, Zhang and Zhang emphasize two key points in the definition of a smart village:

"(i) Becoming a "smart village" is not an inevitable choice for villages, but it may be the most promising choice. […] For future rural communities, the building and creation of "smart villages" has become the most promising choice under the situation of rapid urbanization and an increasingly severe urban–rural digital divide. This occurs because smart villages are a good opportunity to choose to connect with the current development of smart cities and seize the opportunities brought by the times to solve villages' own problems with the solutions brought by ICT;

(ii) Becoming smart villages is not the ultimate vision of rural areas, but rather it is a model, method and path adopted by villages to realize their own vision. The vision of a village is to realize the sustainable development of the village, which is related to providing villagers with better living conditions, sustainable economic growth, and an improved ecological environment. A "smart village" represents a village that has chosen such a development path to realize its own sustainable development, that is, to make full use of the solutions provided by ICT to solve the problems faced by the rural area and realize the optimized development of the village" [8].

Similar to Zhang & Zhang, Aziiza et al. consider that "Smart Village refers to a concept developed in rural area that provides solutions to problems occurred and improves the quality of life" [9] and that emerged due to some different characteristics between rural and urban areas, and in order to address the main problems faced by rural areas as poverty, low level of education, and limited access to technology. The benefits of developing smart villages, made Aziiza et al. elaborate a smart village model that can be applied for other villages to secure a better future. The proposed model, according to the research evidence of the authors, need to include 6 dimensions: 1) Governance, (2) Technology, (3) Resources, (4) Village Service, (5) Living, and (6) Tourism [9]. These dimensions taken together can improve the quality of life of people from rural areas.

Ilie et al. also tried to define the smart village concept considering the case of the Romanian rural area and highlighted the implications of its implementation, as well as the structural availability of resources required for an optimal fit [10]. With the main goal in preserving the rural identity, the Romanian authors argue that the new challenge of the increase of the living standard in the rural environment is to establish communities that develop through intelligent use of local resources and technology. "In this sense, the ability to meet social,

educational, economic and environmental challenges, using the strengths and opportunities of a community, but also the involvement of local authorities, are an integral part of the new concept of Smart Villages" [10]. Therefore, the construction of smart villages can be seen as a strategic approach to achieving sustainable development in rural areas.

The research on the Web of Science database, indicates that the concept of smart villages received more attention in academic research during the last decade, especially in terms of greening the development. Here, the main themes of the topic map identified include "digital transformation", "climate-smart practices", and "sustainability". These highlight the importance of integrating information and communication technology (ICT) to enhance rural living accessibility to services, rural development and environmental sustainability while considering the unique characteristics of rural areas (Figure 2).

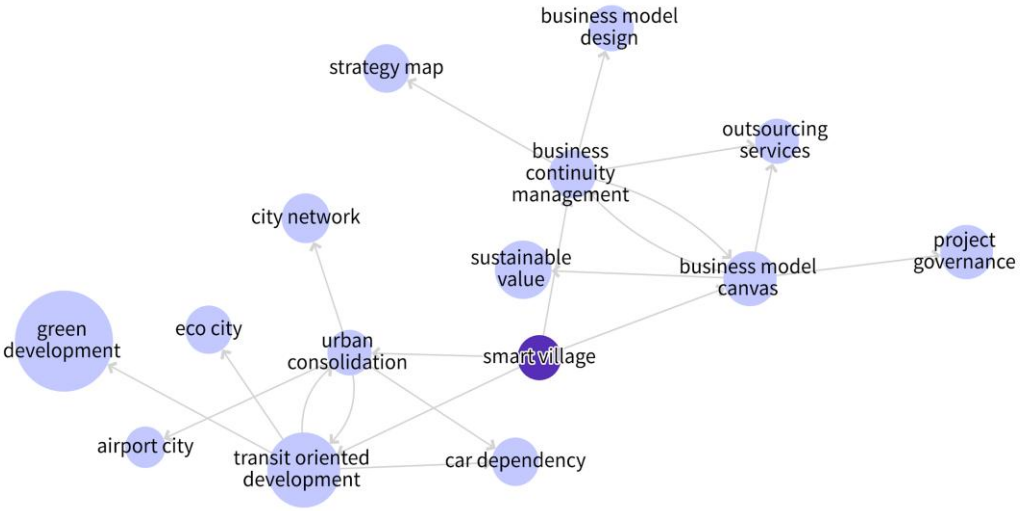


Fig. 2. Smart Village topic map.
*Source: Created by Web of Science Research Assistant.*

## 3. Methodology

The methodology employed in this research was structured in several stages to ensure a comprehensive understanding of the smart city and smart village concepts and their application in the Moldovan context.

First, an in-depth literature review was conducted to define the key concepts of smart cities and smart villages. This involved analyzing scholarly articles, policy documents, and reports from international organizations to understand the theoretical frameworks and practical implementations of these concepts globally. Special attention was given to identifying the core principles, such as the integration of information and communication technologies (ICT), sustainability, inclusivity, and citizen-centric solutions.
Following this conceptual groundwork, the research focused on the case of Moldova, identifying relevant smart city initiatives. The analysis examined official strategies, project reports, and initiatives implemented at the local, regional, and national levels. Specific

attention was paid to projects like the Chisinau – Smart City 2030 Strategy, the UNDP Moldova Sustainable Green Cities project, and the EU4Moldova – Key Regions initiative, among others. These examples provided insights into the progress and challenges of implementing smart solutions in Moldova, particularly in urban settings.

Finally, the research progressed to the analysis of findings, revealing significant gaps between urban and rural areas in terms of access to smart solutions and digital infrastructure. While urban centers like Chisinau have begun adopting smart city strategies, rural areas remain largely excluded from these advancements, exacerbating the rural-urban divide. To address this gap, the research proposed the exploration of smart village concepts as a means to bridge the divide, and maintain the rural tradition while benefiting from innovation.

This mixed-method approach, combining literature review, case study analysis, and comparative evaluation, provided a robust framework for understanding and addressing Moldova's unique challenges in adopting smart solutions.

## 4. Findings & discussions

### *4.1. Emerging experiences of smart cities in Moldova*

Some local, regional, and national governments are engaged in developing and implementing smart initiatives. Below are some examples that may help understand the value of smart initiatives and community development, as well as how public institutions can engage with, to realize the greatest returns for their citizens and governments.

The first example is the Strategy "*Chisinau – Smart City" 2030* [11] that represents an initiative of modernization through digitalization of several components of the Chisinau City Hall activity. Drafted in 2021, the strategy's main goal is to digitally transform the city by 2030, focusing on sustainability and innovative smart solutions.

The strategy underlines few dimensions of the sustainability such as:

- Environmental sustainability – in line with the international, national and local commitments towards the green agenda:
- Financial sustainability - aligned with the multiannual budget plan as agreed by Council and citizens;
- Social sustainability – covering all citizens and ensures an inclusive society.
- Democratic sustainability means the planning, decisions and implementation is made by all stakeholders in a participatory manner [11].

While, innovative smart solutions, inside the strategy refer to the application of sustainable solutions in terms of environment, finances, social and democratic it aims to bring benefits to the overall city area.

The second example is "*UNDP Moldova: Project Moldova Sustainable Green Cities"* [11], for the period 2018-2022. This project [12] was implemented in a joint effort with the Ministry of Environment, the Ministry of Infrastructure and Regional Development, the

Municipality of Chisinau, the Agency for Energy Efficiency, the Technical University of Moldova, the Agency for Electronic Governance. The beneficiary of this project of 2,838,140 dollars was the Chisinau Municipality. It focused on climate change, environment, and energy. The objective of the project was to catalyze investments in low-carbon green urban development, based on an integrated urban planning approach, by encouraging innovation, participatory planning and partnerships between a variety of public and private sector entities. The project supported the design and establishment of the Green City Lab (www.greencity.md) to become the leading knowledge dissemination and communication platform, a funding intermediary, and a source of innovations and expertise to catalyze the sustainable development of the low-carbon green city in Moldova, with the mission to transform Chisinau and other urban centers in Moldova into modern green and smart European cities with improved quality of life for their citizens, while simultaneously showcasing opportunities for sustainable economic growth [11].

The last example is the project *EU4Moldova - Key Regions (municipalities of Cahul and Ungheni)* [13], for the period 2019-2024. The total budget of the initiative is €23 million, main donor being European Union, implemented by UNDP and UNICEF, and covering the Municipalities of Cahul and Ungheni and neighbouring communities, while the final beneficiaries of the initiative are the citizens and communities of Ungheni and Cahul regions, local public authorities and civil society organizations.

The program EU4Moldova: Key Regions focuses on strengthening economic, territorial and social cohesion in the Republic of Moldova by facilitating inclusive, sustainable and integrated local social and economic growth and improving the living standards of citizens in two priority regions: Ungheni and Cahul.

The program supports the two regions targeting the necessary improvements in three areas:

- at the government level - to improve required services and necessary infrastructure;
- at the private sector level - to stimulate private investment, improve the economy and create employment opportunities for men and women;
- at the population level - to strengthen citizens' participation in democratic processes of governance and to strengthen their capacities to claim their rights [13].

The expected results of this initiative represent significant advancements in various areas of local governance, public services, economic development, and social well-being, as visualized in figure 3 below. A key outcome is the strengthened institutional capacity of local public authorities, enabling them to govern more effectively, manage resources efficiently, and respond to community needs with greater transparency and accountability. This enhancement will ensure that decision-making processes are robust and aligned with the principles of good governance.

Another important result is the active involvement of beneficiaries, partners, and experts in both the planning and monitoring stages of the socio-economic development strategy. By fostering inclusive participation, this approach ensures that the strategies are not only well-informed and comprehensive but also reflective of the diverse needs and perspectives

within the community. It also promotes a sense of shared responsibility and ownership over the outcomes [13].

The initiative will also lead to the delivery of accessible, efficient, and high-quality public services and utilities. Citizens across all segments of society, including marginalized groups, will benefit from improvements in services such as water supply, waste management, transportation, and administrative support. This focus on equity and efficiency will address service gaps and create a foundation for sustainable community development.

Favorable conditions for attracting investments will be another vital outcome, achieved through the enhancement of local infrastructure, regulatory frameworks, and administrative processes. These improvements will reduce barriers for investors, stimulate economic activity, and contribute to job creation and regional development. Complementing this, the development of economic clusters will bring businesses, suppliers, and institutions together to foster innovation, improve competitiveness, and maximize regional economic potential.

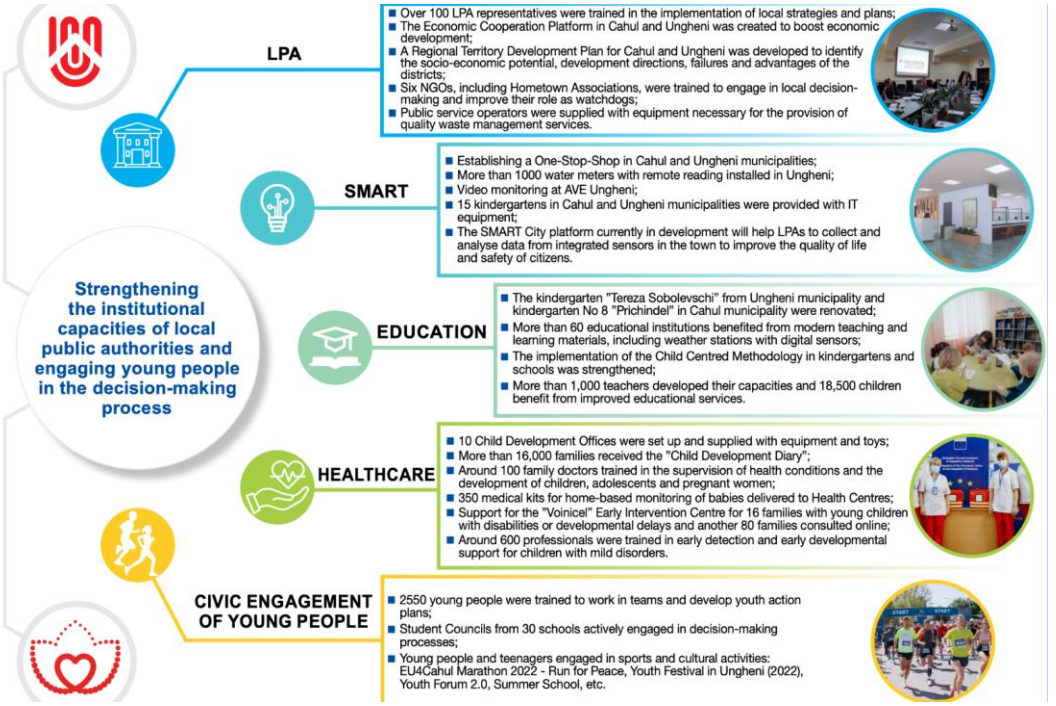


Fig. 3. The program EU4Moldova expected results.
*Source: Project EU4MD leaflet. p.3. (accessed on 22.11.2024)*
*https://www.undp.org/sites/g/files/zskgke326/files/2023-07/Brosura%20EU4MD%20En.pdf*

Social services such as education, healthcare, and youth engagement will also see marked improvements. Investments in educational facilities and healthcare infrastructure will enhance access and quality, ensuring better outcomes for citizens. Programs to promote the

civic involvement of young people will empower the next generation, encouraging active participation in community and decision-making processes [13].

Together, these initiatives will contribute to a more inclusive, prosperous, sustainable and smart environment, addressing critical socio-economic challenges while fostering resilience and growth.

### *4.2. Findings*

The few initiatives identified reveal that Moldova has made limited progress in implementing the smart city concept, with initiatives primarily concentrated in urban centers. In rural areas, where such initiatives are nearly absent, the disparity between urban and rural regions, often referred to as the Rural-Urban Divide, becomes even more pronounced. This divide underlines the need for more efforts to promote equitable access to technological advancements and smart village frameworks across the country.

As could be seen above, some strides have been made by authorities, leveraging smart city benefits and fostering collaboration with communities to enhance public sector capabilities. The Strategy "Chisinau – Smart City" 2030, stands as a central example. This strategy aims to modernize Chisinau through digital transformation, focusing on sustainability and innovative smart solutions. By 2030, the city plans to integrate digital technologies to improve efficiency and foster citizen-centric solutions.

The UNDP Moldova project "Sustainable Green Cities" (2018–2022) aimed to catalyze investments in low-carbon urban development. This effort targeted integrated urban planning, participatory approaches, and partnerships between public and private sectors. While the project primarily focused on Chisinau, it showcased the potential for scaling similar initiatives to other urban areas in Moldova. Most probably thanks to this initiative the Strategy "Chisinau – Smart City" 2030 was drafted and under implementation now.

Similarly, the EU4Moldova – Key Regions project (2019–2024) addresses regional inequalities by targeting municipalities such as Cahul and Ungheni. This program strengthens economic, social, and territorial cohesion, providing infrastructure, enhancing public services, and fostering civic participation. Though not explicitly branded as a smart city initiative, its principles align with smart urban development by leveraging innovation and community involvement for inclusive growth.

Despite these initiatives, the absence of similar efforts in rural areas exacerbates Moldova's Rural-Urban Divide. Rural communities face challenges in accessing quality services, infrastructure, and modern technologies, hindering their socio-economic development. The concentration of smart city projects in Chisinau and select urban centers highlights the disparity, leaving rural areas disconnected from the benefits of digital transformation and sustainability-oriented growth.

Therefore, there is a growing need for a more balanced approach to implementing smart concepts in Moldova, that will help best in balancing innovation and tradition in rural areas.

Expanding these initiatives to rural areas could address critical disparities, fostering more equitable socio-economic development.

### *4.3 Discussions*

To bridge the rural-urban divide and bring the benefits of the smart initiatives to rural areas, the principles from the projects mentioned earlier can be adapted and scaled to address the specific challenges and opportunities in rural contexts.

One crucial adaptation involves leveraging affordable and scalable digital infrastructure. In rural areas, where large-scale, high-cost projects are often unfeasible, the focus should be on cost-efficient technologies such as low-power wide-area networks for IoT connectivity or cloud-based solutions to minimize the need for significant initial investments. Community Wi-Fi hubs and solar-powered cellular networks could serve as modular systems, allowing for gradual expansion based on the community's growth and needs.

Governance models in rural areas must prioritize community engagement. Participatory governance, enabled by digital tools such as mobile apps for citizen feedback or online platforms for transparent decision-making, can ensure local populations feel invested in and benefit from the projects. Training local leaders and authorities to use these tools effectively will further support the alignment of smart solutions with local priorities. Considering the specificity of rural areas in Moldova, with a considerable elderly population, there is a need for digital literacy programs for these groups as well.

Tailoring smart solutions to the rural economy is essential. Agriculture and natural resource management dominate many rural areas in Moldova, making technologies like precision farming, smart irrigation, and real-time monitoring of weather and soil conditions particularly impactful. Small-scale pilot projects can demonstrate their value and, with sufficient community buy-in, gradually expand through collaborations between government and private sector partners.

Digital platforms can improve access to basic services such as healthcare, education, and government administration. In areas where infrastructure is limited, mobile-first designs ensure accessibility and integration with existing government services, providing a sustainable way to enhance quality of life. Similarly, decentralized renewable energy solutions, like solar panels or wind turbines, can supply power to these technologies, reducing dependency on centralized grids and promoting sustainability in rural Moldova.

Innovation hubs can play a transformative role in rural development by fostering creativity, entrepreneurship, and knowledge sharing. Adapting the concept of urban innovation centers to rural contexts, these hubs could focus on areas like agriculture, renewable energy, and small business development. Leveraging existing spaces, such as schools or centers, would keep costs manageable while maximizing their reach and impact in Moldova.

Funding and expertise are critical for scaling smart solutions in Moldovan rural areas. Collaborations with international donors, private investors, and NGOs can provide the resources and knowledge necessary to implement these projects. Establishing dedicated

funding mechanisms, such as a “European Village” [14] but that would have as main focus the smart village development, would help prioritize initiatives that promise the most significant socio-economic benefits for rural villages in Moldova.

Digital literacy and skills development are foundational for the success of these efforts. Equipping rural populations in Moldova with the knowledge to use and maintain smart technologies ensures sustainability and long-term impact. Training programs tailored to local needs should focus on practical applications, enabling communities to fully engage with and benefit from these advancements.

Therefore, the Moldovan policymakers could prioritize smart village initiatives and rural inclusion by:

- Replicating successful urban smart models in rural contexts.
- Increasing funding and resources for rural public authorities to adopt digital technologies.
- Encouraging private sector involvement to stimulate innovation in underserved areas.

Through this exhaustive list of tailored approaches, Moldova can effectively extend smart initiatives to rural areas, fostering inclusivity, sustainability, and socio-economic development. This will not only improve the quality of life in rural regions but also integrate them into the broader framework of national progress.

## 5. Conclusion

This work represents a preliminary contribution to the empirical study of smart cities and smart villages, offering insights into the adoption of the smart concept in Moldova and its potential for addressing broader socio-economic challenges in rural areas. While Moldova has initiated some efforts to implement smart city projects, these initiatives remain largely fragmented and concentrated in urban areas, such as the Chisinau Smart City Strategy and the EU4Moldova program. These projects highlight the promise of technological and sustainable development, but the exclusion of rural areas reveals a critical gap in the national approach.

The lack of rural engagement in smart initiatives not only perpetuates the rural-urban divide but also hinders Moldova's ability to achieve equitable and sustainable development. Rural areas, where significant portions of the Moldovan population reside, face barriers to accessing modern infrastructure, digital services, and opportunities for socio-economic growth and are forced to move to urban areas. Expanding smart initiatives to these areas could have transformative impacts for Moldova, enhancing living standards, fostering inclusive governance, and driving economic and social resilience.

Therefore, Moldova's path forward lies in scaling and tailoring smart city strategies to rural contexts. Doing so would require investments in scalable technologies, participatory governance models, and targeted solutions for agriculture, education, and basic services. Partnerships with international donors, private sector actors, and local organizations will also be essential to mobilize the resources and expertise needed for such an expansion.

By embracing a more inclusive approach to smart development, Moldova has the potential to bridge the rural-urban divide, promote national cohesion, and build a resilient society capable of thriving in the digital age.

In light of these challenges, there is a growing recognition of the need for smart village initiatives in Moldova to bridge the digital divide. Policymakers and stakeholders in Moldova must prioritize these efforts, adapting smart city models to rural contexts. This involves the deployment of affordable, scalable digital infrastructure, community engagement, and the promotion of local innovation hubs that focus on agriculture, renewable energy, and small business development. By integrating rural areas into the broader national smart development strategy, Moldova can ensure that all citizens, regardless of their location, benefit from the opportunities presented by digital transformation, sustainability, and smart solutions.
This research serves as a foundation for future empirical studies to deepen understanding of these dynamics and guide policymakers in designing effective, inclusive smart city and smart village strategies.

**Acknowledgements**
The article has been elaborated with the funding received from the Ministry of Education and Research from the Republic of Moldova in the context of the realization of the projects "Strengthening Socio-Economic and Legal Mechanisms to Ensure the Well-being and Security of the Citizens" (CONSEJ 01.05.02).

**References**

[1] V. Albino, U. Berardi and R. M. Dangelico, "Smart Cities: Definitions, Dimensions, Performance, and Initiatives," *Journal of urban technology*, vol. 22, no. 1, 2015.

[2] S. Alawadhi, A. Aldama-Nalda, H. Chourabi, R. Gil-Garcia, S. Leung, S. Mellouli, T. Nam, T. Pardo, J. S. Hans and S. Walker, "Building Understanding of Smart City Initiatives. Lecture Notes in Computer Science," *Electronic Government*, vol. 7443, pp. 40-53, 2012.

[3] P. Neirotii, A. De Marco, A. C. Cagliano and G. Mangano, "Current trends in Smart City initiatives: Some stylised facts," *Cities*, vol. 38, pp. 25-36, 2014.

[4] H. Peng, W. Zeng, J. Tang, M. Wang, H. Huang and X. Zhao, "Open knowledge graph completion with negative-aware representation learning and multi-source reliability inference," *Information Fusion*, vol. 115, no. 102729, 2024.

[5] B. Zong, S. Wu, Y. Yang and Q. Li, "Smart Gas Sensors: Recent Developments and Future Prospective," *Nano-Micro Letters*, vol. 17, no. 1, 2024.

[6] E. O. Nani, B. Camynta, J. Anbazu, N. S. Antwi, D. Blija and E. Adabor, "A Burgeon in Informal Economic Activities Along Highways in Urbanizing Cities: Implications for Sustainable Development," *Transportation in Developing Economies*, vol. 11, no. 5, 2024.

[7] T. Yigitcanlar, M. Kamruzzaman, M. Foth, J. Sabatini-Marques, E. da Costa and G. Ioppolo, "Can cities become smart without being sustainable? A systematic review of the literature," *Sustainable cities and society*, vol. 45, pp. 348-365, 2019.

[8] X. Zhang and Z. Zhengang, "How Do Smart Villages Become a Way to Achieve Sustainable Development in Rural Areas? Smart Village Planning and Practices in China," *Sustainability*, vol. 12(24), no. 10510, 2020.

[9] A. A. Aziiza and T. D. Susanto, "The Smart Village Model for Rural Area (Case Study: Banyuwangi Regency)," *In IOP Conference Series: Materials Science and Engineering*, vol. 722, no. 1, 2020.

[10] N. Ilie, I. A. Oprea, V. C. Turcea and A. Parnus, "New dimensions of rural communities' development in Romania-smart village concept.," *Scientific Papers. Series "Management, Economic Engineering in Agriculture and rural development*, vol. 22, no. 2, 2022.

[11] 4T Think Tank, "TRANSFORMAREA DIGITALĂ A ORAȘULUI CHIȘINĂU – 2030.," 2021. [Online]. Available: https://proiecte.chisinau.md//images/policies/strategia-chisinau-oras-inteligent20230511115158.pdf. [Accessed 22 11 2024].

[12] UNDP Moldova, "Moldova Sustainable Green Cities.," 2023. [Online]. Available: https://www.undp.org/moldova/projects/moldova-sustainable-green-cities. [Accessed 22 11 2024].

[13] EU4Moldova, "Focal Regions: Cahul and Ungheni," [Online]. Available: https://www.undp.org/sites/g/files/zskgke326/files/2023-07/Brosura%20EU4MD%20En.pdf. [Accessed 22 11 2024].

[14] Satul European Md, [Online]. Available: https://satuleuropean.gov.md/. [Accessed 22 11 2024].