

## SMART VILLAGES: A GLOBAL PERSPECTIVE ON RURAL DEVELOPMENT

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**Abstract:** *The transformation of rural areas and the broadly understood problems of their development have been the subject of scientific analyses and lively public debate for many years. This paper focuses on the concept of "Smart Villages" and their impact on rural development through digital innovation. Through a comprehensive study, it explores how digital technologies and smart initiatives can transform rural communities, improving the quality of life, access to essential services, and economic opportunities. The abstract underscores the significance of policies and strategies that support these initiatives, emphasizing that digital innovation plays a pivotal role in rural development. It concludes by emphasizing the potential of Smart Villages to drive sustainable rural growth, making them a promising model for connected and prosperous rural communities.*

**Key words:** "Smart Village", rural, development, digital innovation

### INTRODUCTION

The concept of rural development encompasses all actions aimed at improving the quality of life for the population living in rural areas, preserving the natural and cultural landscape, and ensuring the sustainable development of rural spaces according to the conditions and specific characteristics of those regions. The ultimate goal of rural development is for rural spaces to be sustainable and to fulfill the functions assigned to them in society. [3, 6]

In the modern age, achieving sustainable and equitable development in rural areas has become a global priority. Rural regions, however, grapple with numerous challenges such as depopulation, limited access to essential services, and a lower quality of life compared to their urban counterparts. Nevertheless, in recent decades, digital technologies have revolutionized how communication, production, healthcare, and education are managed in rural communities. [3]

Given the current situation, in this digital age, where innovation and technology drive progress at an unprecedented pace, the notion of a "Smart Village" has emerged as a beacon of hope for rural development. These villages represent a powerful vision for harnessing cutting-edge technologies to revolutionize and uplift rural communities, offering them a path to prosperity, sustainability, and improved quality of life. [11]

Over the time on a global scale, the concept has gained increasing prominence, with the goal of fulfilling proposed sustainable development objectives in the near future. The purpose of Smart Village projects is to provide rural residents with the benefits of a higher and more modern standard of living while simultaneously preserving the values, traditions, and customs of rural communities, recognizing the advantages of a sustainable and healthy lifestyle. [12]

### MATERIALS AND METHODS

To study the concept of "Smart Village" and his development, we employed a multidisciplinary approach and gathered relevant data from various sources. The materials used included the identification of the potential of smart villages as the object of study, socioeconomic and demographic data, specialized literature, and analysis of official sources and websites. [3, 6]

## RESEARCH RESULTS

### **Rural Development: An Analysis of Rural Space Reality**

Rural Development has become a priority for European Union programs and is increasingly becoming a key factor in global development. A portion of the available global resources must be directed and channeled towards the realization of rural development and environmental protection. Rural Sustainable Development must ensure the maintenance of cultural identities, energy sources, biodiversity, and landscape. Sustainable development includes the preservation of essential biological and ecological processes and systems that support life, conservation of genetic diversity, utilization of eco-compatibility, and the sustainability of ecosystems that form a biosphere, culture, and civilization. [4]

Sustainable development requires a revision of current lifestyles: economic security, food, education, freedom, political representation, nature contact, without compromising the possibilities of future generations by reducing the depletion and pollution, protecting natural systems. In recent times, public opinion has strongly expressed economic and social needs. Everyone must have access to the things that improve the quality of life, such as economic security, health, education, freedom, and political representation. We are facing economic and social challenges. [3, 1]

In the specialized literature, numerous experts in the field have defined the concepts of rural space and rural development from various perspectives. Many specialists define rural space by contrasting it with urban space as an "area characterized by relatively low population and density and the predominance of agricultural activity. [14]

In Europe, starting from the years 1987-1988, a new and more pronounced appreciation of rural space began. During this period, the European Campaign for the Rural World took place, organized by the Council of Europe. This campaign consisted of a series of events and conferences on various topics, which largely contributed to the publication of the Swiss Charter for the Development of the Rural World. This charter was adopted by the National Committee for Rural Environment on December 16, 1987. [13]

The final form of the Charter was achieved at the Ordinary Session of the Parliamentary Assembly of the Council of Europe on April 23, 1996, under the name Recommendation 1296 (1996) regarding the European Charter of Rural Space. [10]

This Charter was created to establish the guiding principles for the sustainable development of agriculture, forestry, and the European rural space. These principles are intended to serve both member and non-member states as a starting point for preparing reforms in their policies in these areas. [7]

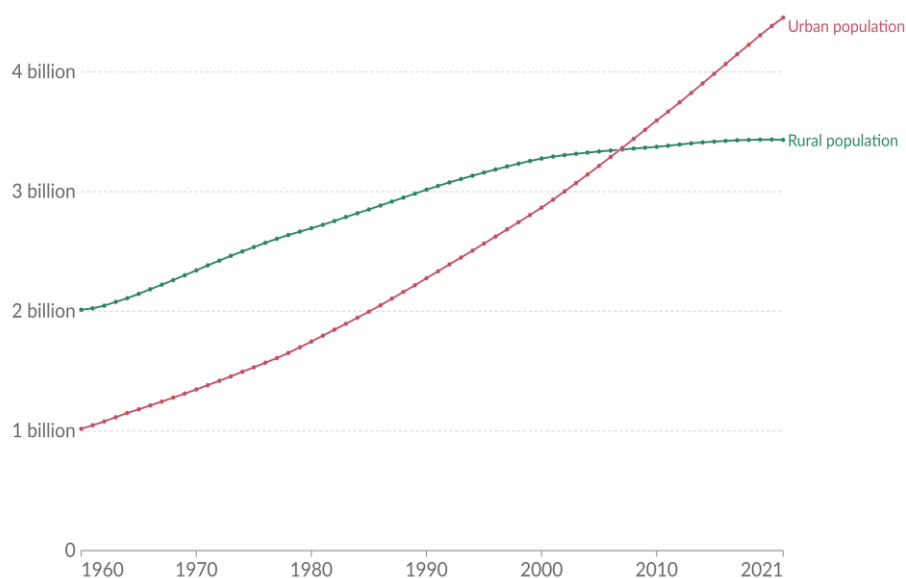
One form of the definition of rural space found in Recommendation No. 1296/1996 of the Parliamentary Assembly of the Council of Europe, regarding the European Charter of Rural Space, is as follows: "Expresses (notion) of rural space including an interurban or mainly consisting of villages and small towns, where most of the land is used for: agriculture, forestry, aquaculture, and livestock; economic and cultural activities of the inhabitants of this area (crafts, industry, services), temporary freedom and recreation (or natural reserves), other uses (with the exception of urban areas)." [8, 1]

The new concept of rural space states that rural space in Europe constitutes a valuable landscape space, the result of a long history, and its preservation is a vital concern for society. Rural space can fulfill its functions of provisioning, recreation, and balance, which are increasingly demanded in society, only if it remains an attractive living space equipped with infrastructure, viable agriculture, and forestry, favorable local conditions for non-agricultural economic activities, an untouched environment, and a well-maintained landscape. [9]

The evolution of society highlight the successive emergence of rural and urban areas, villages and cities, depending on the historical succession of agricultural and industrial revolutions. This implies a dual approach to the origin and evolution of human communities and various social spaces. In this regard, historical analysis is carried out, on the one hand, in terms of the independent emergence and evolution of villages, which are considered specific types of societies with inward-focused development, without external influences. On the other hand, it is analyzed from the perspective of rural-urban relationships and village-city dynamics. [5]

The rural-urban relationship, which represents the social environment and geographic location of human activities, tends towards integration in both directions: rural into urban, or the urbanization of the rural. In recent decades, urbanization has experienced significant growth on a global scale. More than half of the world's population now lives in cities. This migration from rural to urban areas is fueled by economic opportunities, healthcare and education services, and a perceived higher quality of life in cities. A balanced approach to urban-rural development is crucial to ensure sustainability and quality of life. This involves investing in rural infrastructure, supporting sustainable agriculture, and creating economic opportunities in rural areas. [15]

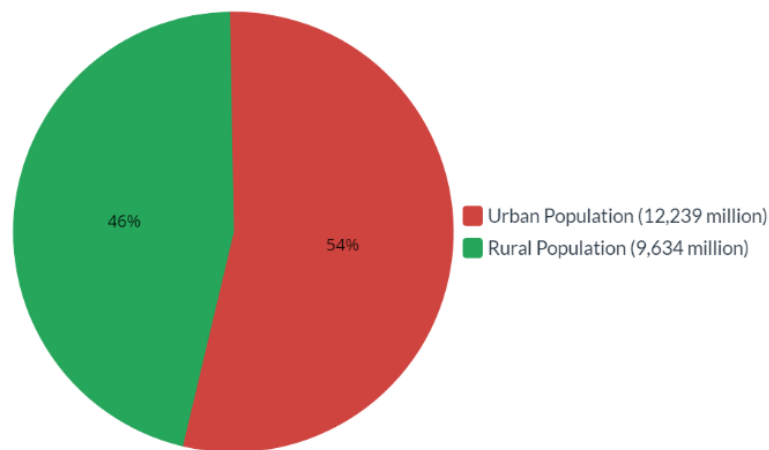
The urban-rural relationship worldwide continues to evolve with social, economic, and technological changes. Finding solutions that ensure sustainable development in both urban and rural environments is essential to create a balance and prosperity for all residents.[17]



**Figure 1. The evolution of urban and rural population worldwide (1960-2021)**

Source: <https://ourworldindata.org/urbanization> [19]

According to the most recent statistical data, a significant portion of the population residing in Romania, approximately 9,634 million people (as per 2023 data from the National Institute of Statistics), lives in rural areas while the urban population is 12,239 million people. The high percentage of Romanian rural residents is much higher than the EU countries' average, which stands at just 15%. [3]



**Figure 2. Number of people living in urban and rural areas, Romania (2023)**

*Source: Own processing after <https://insse.ro/cms/> [18]*

### **Smart villages – from an idea to a rural development instrument**

In a scientific context, a village can be defined as a smaller human settlement characterized by lower population density compared to larger urban areas. These rural communities are typically located in rural areas or on the outskirts of urban centers and are often associated with agricultural, forestry, and other traditional rural activities. [16]

Villages, the historical and cultural heartbeats of societies, have a history spanning thousands of years. Despite technological advancements and increasing urbanization, villages have retained their unique charm, representing an essential part of a nation's cultural identity and traditions. Nevertheless, villages have faced numerous challenges, including depopulation, lack of access to essential services, and rising economic disparities. In this context, the concept has emerged as a response to the needs of rural areas in the digital age. [14]

"Smart Village" represents more than just an evolution of rural environments; it signifies a digital and innovative revolution that breathes new life into villages worldwide. By integrating technology and efficient resource management concepts, "Smart Village" transforms rural communities into hubs of innovation, development, and sustainability. These communities, often marginalized, now emerge as centers of economic growth, attracting investors and offering opportunities for their inhabitants. [17]

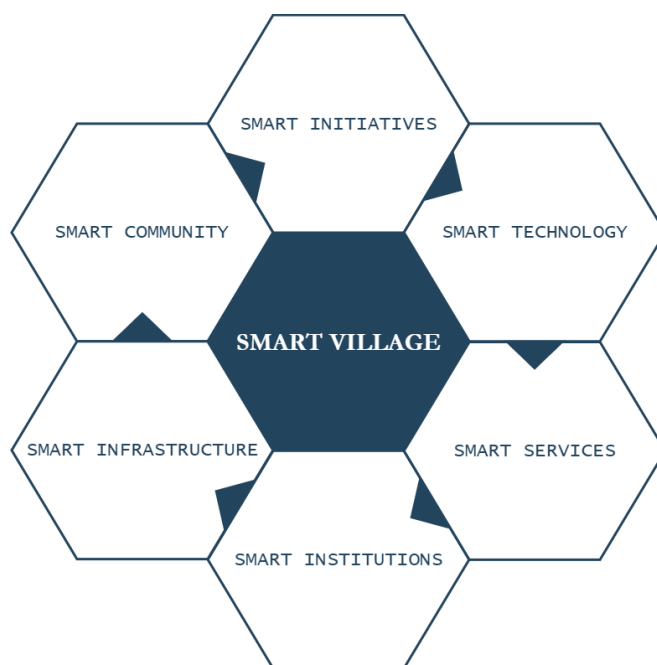
Although it possesses all the attributes of a scientific concept, the idea of a smart village is very often described without any reference to theory, research, or scientific publications. It relies on practical solutions, which leads many scientists to consider it lacking a solid theoretical basis. Bill Slee (2019), among others, has questioned the theoretical aspect of the idea, writing that the evolution of support for local community development and, in general, what is called smart villages, has taken place almost without reference to theory. However, recently, there has been a growing interest among researchers in this concept, resulting in a growing catalog of publications that contain both theoretical and inductive considerations, where "smart villages" have become one of the key terms.[2]

The concept of smart villages has been used only recently, but changes in its application field can be observed. The vision of smart villages was first introduced in 2015 by van Gevelt and Holmes (2015). It primarily focused on aspects related to access to modern energy sources, food security, primary education, and healthcare. An essential moment for the development of smart villages in the European Union was the 2016

declaration "A Better Life in Rural Areas" (EU, 2016) (commonly known as the Cork 2.0 Declaration). The document resulted from a meeting of several hundred participants at the European Conference on Rural Development in Cork, Ireland, during which directions for rural development and agricultural policy were established. One of the points of the declaration highlighted the importance of giving special attention to overcoming the digital divide and developing opportunities for digitalization in rural areas.[2]

In 2017, the European Network for Rural Development (ENRD) proposed the "EU Action for Smart Villages" (ENRD, 2017). The document addresses the discussion process regarding the villages of the future and the need to bring together various programs to build a strategic approach for promoting smart villages, including support for knowledge, investments, and connectivity. The document establishes the initial definition of the concept of smart villages as follows: "Villages (local communities, regions) that use digital technologies and innovations in their daily lives, thereby improving the quality of life, the standard of public services, and making better use of local resources." [2, 15]

The development of the smart village concept is seen as an opportunity for a more comfortable and easier life for rural inhabitants. At the same time, there is a recognized need to address issues related to an aging population and the decline of public services. The indispensable elements of the concept include smart initiatives, smart communities, smart services, smart infrastructure, smart institutions, and smart technology. [8]



**Figure 3. Diagram of key elements of smart villages**

*Source: Own processing*

Smart initiatives should be understood as any local activities aimed at meeting the specific needs of local residents, carried out or initiated by these residents, and supported by new technologies to the greatest extent possible. [11]

For the concept of a smart village, local leadership is of great importance. They should be capable of listening to the residents and representing their voice. Concerning smart services, it's essential to note that these are not just public and social services based on technological innovations but are also services tailored to a specific area's needs. At the local level, local administration is responsible for providing the majority of these services,

but it is desirable for them to cooperate with other local government units, the non-governmental sector, and businesses. Regarding smart institutions, it should be remembered that these are public institutions, such as an office, school, or cultural center, that utilize modern solutions while simultaneously making these tools available to the residents. [2, 16]

Equally important within the smart village concept is smart infrastructure, serving as the necessary material basis for any human activity. In the case of rural areas, this primarily includes transport infrastructure that enables resident mobility, local infrastructure significantly influencing the living conditions of the rural population, and ICT infrastructure that allows residents to address matters more swiftly, use public services conveniently, and communicate with other members of the local community. [2]

### **The Importance of the Smart Village Concept**

In the present, rural areas are undergoing rapid changes. The concept of smart villages is a response to the current challenges in rural development resulting from ongoing demographic changes, primarily the aging of the population and the youth exodus from rural areas, low population density, decreasing job opportunities, an insufficient and declining range of services available in these areas, or a lack of funds for investment. Rural areas need to address these issues comprehensively, considering that they are often intertwined with the need to utilize modern digital technologies (some individuals lacking adequate digital and technological skills may be permanently deprived of the opportunity to meet their needs, and, furthermore, some of them may be socially excluded permanently). [17]

Therefore, identifying the underlying reasons for implementing the concept of a smart village is a starting point for creating such solutions that, on the one hand, would improve the quality of life in rural areas but, on the other hand, would prevent the deprivation of needs for a significant part of society. The ENDR group regarding the Smart Village concept highlights five determinants of smart solutions in rural environments:

- the response to depopulation and demographic changes
- finding local solutions regarding public funds and centralization of public services
- exploiting connections with urban environments
- maximizing the role of rural areas in the transition to a circular economy with reduced carbon emissions
- promoting the digital transformation of rural areas. [12]

The ongoing demographic change is one of the main reasons for the need to introduce smart solutions in rural areas and establish the trend of rural development across Europe. Demographic change is universal, meaning it is observable in every territorial unit, but its impact and intensity depend on the geographical context. On the one hand, the ongoing demographic changes (low fertility rates, high mortality, population migration to cities, the departure of better-educated young individuals to urban areas) present a significant risk and pose an economic and social challenge for those in power. Due to the alteration of the size and structure of the population in the modern world, national economies face the challenge of rationally incorporating this phenomenon into the demographic and economic framework. Nevertheless, demographic changes can have a positive impact on measures aimed at reorganizing rural areas. [2]

Rural depopulation, the migration of young people to cities or more prosperous areas, and consequently, the aging of the rural population, are considered symptoms of rural degradation. These are the primary reasons why it is necessary to introduce solutions that enhance the resilience of rural communities. Creating smart solutions can increase the

vitality of these areas. It is also crucial to find local solutions, especially when public expenditures are limited, to address the challenges that make life in rural environments difficult. This primarily pertains to services such as healthcare, education, commerce, or public transportation, which are often limited in rural areas. [15]

This clearly demonstrates that the strategic goal of authorities should be to build and utilize existing relationships and shape the connections between villages and urban areas. An important aspect indicated by ENRD (2018) is also the increasing role of rural areas in the transition to a low-carbon emissions, circular economy. This economy is a system designed to regenerate itself. Climate change is occurring, while natural resources are limited, and often these resources impact the attractiveness of rural areas. [9]

The last of the reasons mentioned for creating smart areas is to support digital transformation in rural regions. It should be emphasized that rural areas have undergone the process of global technological development in recent years. Adapting to these transformations is a necessity as more and more activities are conducted in the virtual world. The changes observed in people's daily lives since the outbreak of the SARS-CoV-2 coronavirus pandemic have made this challenge even more difficult. By definition, information and communication technologies make it possible to bridge distances (in a geographic sense), thereby increasing access to goods and public services. In this context, they are regarded as an opportunity to overcome development-related difficulties. However, their utility depends on internet access. The absence or limited accessibility of the internet deprives a particular area of opportunities for intelligent development. [2, 17]

Digital transformation is highly necessary when considering the reduction of issues in rural areas. Efficiently integrating technological progress into rural development initiatives can create new opportunities for income growth and the provision of services that enhance the quality of life in rural regions. The introduction of facilities in these areas is particularly important for attracting and retaining what is often referred to as creativity, which contributes to the development of rural communities. When analyzing the reasons for implementing a smart village, the specific characteristics of a given rural area and its spatial location should be taken into account. Therefore, it is necessary to individually seek opportunities to undertake such initiatives that, by using local resources, make a particular area attractive to both residents and potential investors. [2, 6]

### **Approaching the concept of smart village in European Union policies**

The increasing importance of the smart village concept in the European Union has prompted the European Commission to launch "EU Action for Smart Villages." The growing popularity of this concept can also be demonstrated by the fact that, in addition to EU institutions, national governments, local administrations, and various stakeholders in rural areas have become involved in the concept. Support has also been expressed by the European Parliament, the Committee of the Regions, and the European Economic and Social Committee. [2]

The significance of this concept was underscored in the "Bled Declaration" in April 2018. The declaration affirms that the rural digital economy, if developed in an innovative and integrated manner, has the potential to improve the quality of life for rural citizens and, thus, contribute to addressing the current issues of depopulation and rural-to-urban migration. [17]

The "Candás Declaration" of the European Parliament(2019) emphasizes the need to support intelligent initiatives within the EU. Progress in this direction is also recommended by the Organisation for Economic Co-operation and Development (OECD) in its rural policy principles. The importance of digital technologies is also underscored by

Franc Bogovic and Tibor Szanyi (ENRD, 2018), who see an opportunity to ensure a more comfortable and better life for rural residents in the development and practical application of this concept, adding that a response to the challenges posed by an aging population and the disappearance of services is necessary. [2]

The importance of the smart village concept is confirmed by the fact that numerous meetings of the Thematic Group for Smart Villages of the European Network for Rural Development took place between 2017 and 2023. At the same time, groups established by the ministries of rural development in certain EU member states are working on the programming of support for smart villages. Research and development projects, as well as pilot projects, are currently being implemented, such as the pan-European project "Smart Rural 21," "SIMRA," etc. The concept of "smart villages" is appearing in an increasing number of European and national initiatives, implying that it will be an important element of the EU's future action plan in the financial perspective for 2023-2027. Various "places" with different socio-economic and geographical characteristics will benefit from smart solutions. [2, 12]

## CONCLUSIONS

In this comprehensive study of Smart Villages from a global standpoint, our research has shed light on the diverse nature of these rural development initiatives and their potential to transform communities worldwide. We have found that Smart Villages, while a concept with universal appeal, manifest in various forms, addressing unique local challenges and opportunities.

Across different regions and countries, Smart Villages have demonstrated their capacity to enhance rural livelihoods, foster economic growth, and bridge the digital divide. However, the success of these initiatives heavily depends on community engagement, technological infrastructure, and supportive policy frameworks, which vary significantly from one location to another.

Our findings underline the need for adaptive, region-specific approaches to Smart Village development, recognizing that there is no one-size-fits-all solution. Furthermore, we advocate for the establishment of robust policy frameworks that encourage innovation and inclusivity in rural areas, acknowledging the importance of connectivity, education, and economic diversification.

As we look to the future, it is evident that Smart Villages will continue to play a pivotal role in addressing rural development challenges globally. Further research and collaborative efforts are required to harness the full potential of these initiatives, creating a more sustainable and equitable future for rural communities around the world.

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