

## TRANSITION POSSIBILITIES OF DUMBRAVIȚA LOCATION IN TIMIȘ COUNTY TOWARDS SMART VILLAGE

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***Abstract:** The article analyzes the potential and opportunities for the transition of Dumbrăvița commune, Timiș county, towards the smart village model, by capitalizing on available digital solutions and technologies. Digitalization is a key element of sustainable development in rural areas, contributing to the modernization of infrastructure, increasing the quality of life of residents and reducing the discrepancies between urban and rural space. The study highlights the main characteristics of Dumbrăvița commune that support this transition process, a major role being played by its positioning in an area with high potential, in the proximity of Timișoara municipality. Digital solutions already existing or currently being implemented are integrated in both the private sector and the public administration, with the objective of outlining a plan for the economic, social and sustainable development of the community. The research includes detailed case studies, based on data from public institutions and other relevant sources, to assess the sustainable development opportunities of Dumbrăvița commune. The transition to the smart village offers the possibility of redefining rural life by harmonizing tradition with innovation, and Dumbrăvița, by implementing the proposed projects, can become a model of good practices and a source of inspiration for other communes in Romania.*

***Key words:** Sustainable rural development, Smart Village, Rural mobility, Sustainable rural tourism, Smart governance.*

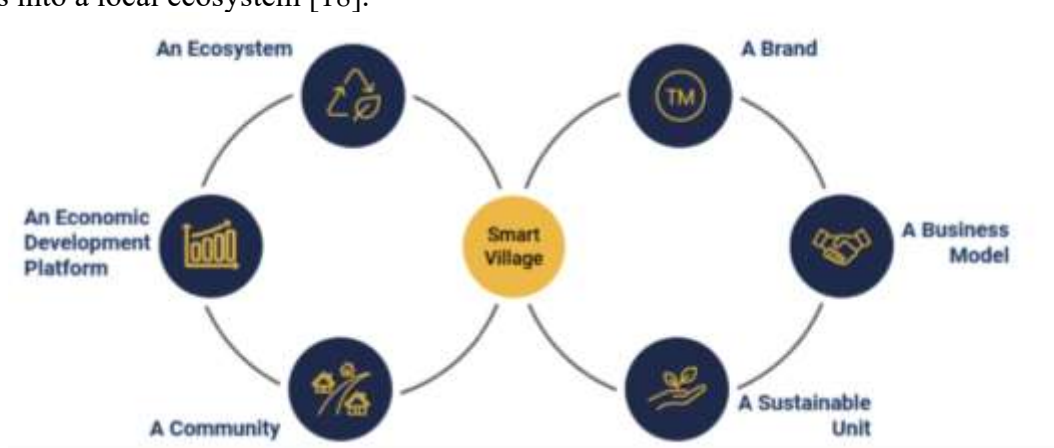
### INTRODUCTION

Currently, rural areas are undergoing rapid changes, and in order not to create a very big difference compared to the urban environment, the transition to smart villages is a response to the current problems we encounter in rural areas. Demographic changes based on the aging population and an exodus of young people to urban areas or to other countries, fewer and fewer jobs and an insufficient and decreasing range of services in rural areas are just some of the problems we encounter in Romanian villages [1].

The transition to smart villages is both a solution and a fundamental approach for the sustainable development of rural communities, involving the adoption of digital and innovative technologies to increase the quality of life and boost economic development in rural areas. In Romania, there are over 140 communes that are currently implementing more than 220 smart village initiatives, including schools with distance learning systems, digitalized town halls, public transport and selective waste collection, according to information from the Romanian Association for Smart Cities (RASC) [16].

Romania also has the potential to become one of the most digitalized countries in the region, with 50% of villages expected to become smart by 2030, according to estimates by the Romanian Association for Smart Cities (RASC). However, the rate of digitalization depends on several factors, such as the degree of involvement of local authorities, access to financing and the degree of technology adoption in rural areas, including the development of the necessary digital skills [15].

Smart Village is an innovative approach to rural community development that involves the use of technology and smart solutions to improve the quality of life. This concept focuses on sustainable development by integrating a variety of technologies and services into a local ecosystem [18].



**Picture 1 – Diagram of key elements of the smart village concept**

Source: <https://citymanager.online/de-ce-un-sat-inteligent>

One of the key objectives of a smart village is to provide access to quality services and facilities for its residents. In addition, smart villages can be used to develop a smart infrastructure that helps improve access to the internet and other facilities necessary for economic development and attract new investors to create new jobs. Another important feature of this concept is economic development through innovation. This can be achieved by attracting investment to rural areas and creating new business opportunities [14].

The commune of Dumbrăvița has significant potential to make the transition to a smart village, having the advantage of a strategic location, developing infrastructure and an expanding population. The implementation of digital solutions in areas such as internet connectivity, public administration, smart agriculture, ecological mobility and energy sustainability contributes to improving the quality of life of residents and stimulates local economic development. Although there are challenges to overcome, such as the need for initial investments and the preparation of citizens, solutions can be adopted and thus Dumbrăvița can become a successful example and a model to follow in the implementation of the smart village concept in the western part of the country and in Romania [17].

## MATERIALS AND METHODS

To carry out the scientific work, we conducted several case studies that involve a detailed research of information regarding the identification of the possibilities of transition of the Dumbravita locality in Timiș County to a smart village.

The research includes data from several technical studies that we took from the Dumbravita City Hall and based on which we performed their analysis and interpretation by presenting the results.

The working methods consist of identifying potential technical solutions for the commune's infrastructure that will contribute to the process of evolution to a smart village.

## RESEARCH RESULTS

The concept of smart villages offers the possibility of strengthening rural areas and the communities that form them, based on a participatory approach in the development and implementation of strategies aimed at improving economic, social and environmental

conditions, especially by capitalizing on the flexible solutions provided by digital technologies.

Regarding the identification of the potential and possibilities for the transition of Dumbravița, Timiș County, to a smart village, I propose the implementation of several projects for: digital infrastructure, digital education and training, green energy and sustainability, access to health services, public transport mobility, promotion of tourism and local folklore, transition to smart agriculture, water management, video surveillance and digital security, smart governance [5].



**Picture 2 – Proposed projects contributing to the transition to a smart village of Dumbravița, Timiș County**

*Source: Own contributions*

A smart village is based on a solid digital infrastructure, and Dumbrăvița, through projects to expand high-speed internet networks, ensures equal access for all residents and also helps implement IoT (Internet of Things) solutions for monitoring local infrastructure, such as smart public lighting or automated video security systems. Projects will be developed that increase the safety and security of citizens by implementing AI video monitoring systems and smart security solutions to prevent crimes, and projects to develop digital connectivity by expanding the telecommunications infrastructure throughout the Dumbrăvița commune, offering all residents access to 5G internet for fast and efficient connectivity [2].

Carrying out projects to develop digital education, by creating online platforms that integrate training and courses adapted to the needs of residents and access to training and continuing education for students and adults. The emphasis on digital education helps to reduce the differences between generations and adapt citizens to new trends.

Carrying out green energy development projects and the concept of sustainability, by installing solar panels on public buildings such as city hall, schools, community centers and creating a smart waste management system, with selective collection and recycling and developing micro-wind energy parks to support local consumption and become energy independent [13].

Carrying out projects that contribute to expanding access to health services by implementing telemedicine for online medical consultations, thus stabilizing urgent situations until doctors arrive.

Online medical consultations reduce travel time to urban centers in Timisoara and facilitate the creation of an easy-to-manage digital system for monitoring the health status of elderly or vulnerable people [3].

Implementing smart mobility projects by developing and transforming public transport into an electric one that has integrated digital ticketing platforms and applications that present the status of public transport in real time, investments in infrastructure for cyclists, promoting alternative transport, digital solutions for organizing school or community transport and creating as many charging stations for electric vehicles as possible [11].

Carrying out projects to promote local tourism by developing an online platform that highlights the tourist, folklore and traditions of Dumbrăvița and using augmented reality technologies for 360 virtual tours of the historical and natural sites in the commune.

Carrying out development projects for the transition to smart agriculture (Smart Farming) by supporting topography and agricultural companies in the commune, which help farmers achieve the best results through the use of drones, IoT systems for soil monitoring and crop management that streamline processes [12].

Supporting young farmers by organizing information events regarding sessions on accessing European funds for the technologization and digitalization of agricultural businesses and events attended by representatives of companies in the field of agricultural machinery and beyond, which will present the latest functionalities in the field that are or will be integrated [10].



**Picture 3 – Dumbrăvița City App**

Source: <https://primaria-dumbravita.ro>

Realization of projects for smart governance (Smart Governance) by integrating new functionalities within the Dumbrăvița City App, such as reporting community issues, initiatives and civic involvement and transparency in local authority decisions. All these aspects being transparent through digital big data solutions, performance analyses can be made based on which optimization solutions are found that lead to progress and evolution in the community [6].

These proposed projects are part of the solutions in which digital technologies and smart concepts can be implemented to transform the commune into a sustainable, connected and prosperous one. Adaptation to the specifics of the community and local needs is essential for the success of the implementation [9].

By implementing the proposed projects, the potential for transition to a smart village of Dumbrăvița commune is highlighted, they radically transform the community, offering modern solutions to traditional problems. The development of a solid digital

infrastructure, the promotion of sustainability and access to modern services can contribute to increasing the quality of life for all residents and attracting as many young people as possible to the commune [4].

Dumbrăvița can be an example of a rural community that promotes innovation, managing to combine traditions with technology. Its transformation into a smart village shows that sustainable rural development is possible when there is vision, collaboration and strategic investments. By implementing all the proposed projects, Dumbrăvița commune can become a source of inspiration for other communes in Romania and beyond [8].

## CONCLUSIONS

Smart villages offer the chance to transform rural life by developing communities that combine traditional values with innovative solutions. With the support of technology and European funding, villages become hubs of sustainable development, offering a better life for their inhabitants and a model of success for the future.

Building a local digital ecosystem conducive to innovation, digital development and collaboration between citizens, through the use of smart technologies will lead to the diversification and increase in the quality of public services. By increasing the quality and number of electronic public services in rural localities, an improvement in the efficiency of the administration is achieved, an improvement in the quality of life and new economic opportunities for citizens, this being a vision adapted to local needs.

The proposed projects represent solutions that highlight the potential for the transition of the Dumbrăvița commune to a smart village, these being the intelligent concepts that can be implemented to transform the locality into a sustainable, connected and prosperous one.

The benefits of transforming the commune into a smart village are primarily, a better quality of life through access to essential services and modern facilities, the development of the local economy by stimulating small businesses and creating jobs, a friendly environment by reducing carbon emissions and protecting biodiversity, digital integration through increased connectivity and equal access to resources and social inclusion by reducing the gap between rural and urban areas.

Smart villages must be built through collaboration between public institutions, the private sector, residents and academia. This approach, known as the Quadruple Helix, ensures the integration of resources and expertise to develop tailored solutions

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