

EVALUATING THE SMART CITY AND SMART VILLAGE CONCEPT IN AZERBAIJAN WITHIN THE FRAMEWORK OF SUSTAINABLE DEVELOPMENT GOAL 11

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ABSTRACT

Smart cities and smart villages in Azerbaijan are explored in the context of the United Nations Sustainable Development Goal 11 – sustainable cities and communities. The primary goal of the study is to investigate how digitalization, new technologies, green energy, post-conflict reconstruction, and regional planning can help achieve sustainable development, both in urban and rural environments. The research uses scientific literature, as well as the approach of comparing the experience of Azerbaijan's smart city and smart village policies in the Karabakh and Eastern Zangezur economic regions with international experience. It is based mainly on empirical data on reconstruction, resettlement, renewable energy, smart infrastructure, and regional development projects in these territories. The results show that the smart city and smart village models are crucial in optimizing the use of resources, expanding infrastructure facilities, enhancing digital services, ensuring environmental sustainability, and establishing safe living conditions during the post-conflict phase. The study also underscores the importance of enhancing inter-institutional coordination and monitoring and evaluation systems, community involvement, waste management systems, and the use of financial resources.

Keywords: smart city, smart village, sustainable development, SDG 11, digitalism

1. INTRODUCTION

The four drivers of rapid urban growth, population growth, growing space demands, and climate change are of central importance for achieving sustainable development in urban and rural areas in the world and are interlinked. Goal 11 of the United Nations' Sustainable Development Goals is focused on inclusive, safe, resilient, and sustainable cities and human settlements. To achieve this objective, urban growth needs to be tackled, as well as a radical paradigm shift in lifestyle behaviour in relation to social, economic, ecological, and institutional determinants. In addition to the concept of smart cities and smart villages, concepts of digital technologies have also become important strategies in modern development models.

The smart city approach seems to be designed to ensure optimal performance of urban services, to optimally integrate transportation and infrastructure systems, and to enhance access to public services. It also aims to improve the quality of life through information and communication technologies (ICT) (Huseynova & Mazanova, 2023). This is because the smart village has been proven to have a significant impact on rural economic development. It enhances access to digital services, fosters regional equity, and supports local communities' participation in sustainable development (Somvanshi et al., 2016, p. 395–408; Aziiza & Susanto, 2020). Smart city and rural policies are among the key priorities of public policies in recent years in Azerbaijan. The battle for reconstruction and restoration, particularly in liberated areas,

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offers an opportunity to implement these concepts. Karabakh and Eastern Zangezur: reconstruction activities are centred around infrastructure reconstruction and regional development, as well as settlement planning, socio-economic reintegration, the provision of safe housing, green energy supply, and digital governance. Moreover, the works of Narmin Ahmadova on reconstruction in the liberated territories highlight the significant relationship between reconstruction in post-conflict Azerbaijan and regional development, sustainable planning, energy transition, and managing infrastructure (Ahmadova, 2025).

The concepts of smart cities and villages in Azerbaijan are a process of modernization (technological) and an essential factor in territorial sustainability management after the conflict. The projects in the liberated territories will play a key role in returning people to their homes, building new buildings, developing and rebuilding the social infrastructure, and reviving the economy in the localities. Assessment of smart city/village models in the context of SDG11 is of scientific and practical interest. Experience from other countries shows that smart city and village solutions can bring value to sustainable development; however, the value of smart city and village solutions is not limited to the use of technology. Social inclusivity, community engagement, institutional cooperation, environmental sustainability, and continuous monitoring can provide a pathway for achieving more lasting results through these models (Zhang & Zhang, 2020; Renukappa et al., 2024, pp. 1386–1407). In addition to the technological aspects, the concept of a smart city/village has other aspects that should not be neglected in studying Azerbaijan's ideas: regional planning, population repatriation, provision of social services, environmental management, participation of citizens, etc. For this study, the use of the principles of smart city/village in Azerbaijan regarding SDG 11 is planned to be studied. It will examine and discuss its connection with post-conflict recovery and regional planning, the current status of benefits and challenges, as well as evidence-based recommendations to strengthen the operationalization and implementation of these plans.

2. METHODOLOGY

In this study, a systematic comparison of the smart city and smart village applications in Azerbaijan was conducted, and they were assessed in the context of Sustainable Development Goal (SDG) 11. The research method employed was a systematic review of scientific publications, strategic document analysis, state-approved program analysis, international experience analysis, and conceptual analysis of cases of local implementation. In the first stage, we looked at the theoretical aspects of the smart city and smart village concepts, their development paths, and their connection to sustainable development based on scientific sources. This study examined the relationship between the smart city model and digital technologies, the impact of the smart village model on rural development, and their socio-economic indicators (Huseynova & Mazanova, 2023; Somwanshi et al., 2016, p. 395-408; Aziiza & Susanto, 2020).

Alongside, the paper examines the evolution of approaches to rural development and the integrated rural development model, which are sensitive to climate (Aggarwal et al., 2018; Majumdar, 2020, pp. 2–17). In the second phase, the researchers studied the projects of smart city and smart village in Azerbaijan. Their efforts were directed towards the economic regions of Karabakh and Eastern Zangezur in terms of restoration and reconstruction. In this context, they focused on the activities of smart villages, construction technologies, new energy sources, digital governance systems, and new residential area development (p. 260-261, Mammadova & Akbarova, 2024). 18–31; Gasanov, 2024, pp. 19–29).

In the framework of the article, the regional planning strategies applied in the liberated territories of Azerbaijan were also taken into account. In this context, the integration of the SDGs in the reconstruction process of a post-conflict area, green energy and smart solutions, the integration of new energy resources in the context of the provision of utility services and equipment, infrastructure management, strengthening community participation, and the establishment of monitoring systems appear to be the priority areas of integration (Ahmadova, 2025).

This is because this approach allowed the article to delve into the idea of smart city and smart village, not only as a technological concept, but as a perception of the reconstruction and integration of regional

reconstruction actions in post-conflict situations. The linkage of the key components of SDG 11 with the smart city and the smart village models was assessed using a conceptual assessment. The following were identified as key criteria for this assessment: Infrastructure accessibility, creating safe and inclusive living environments, environmental sustainability, efficient resource use, access to public services, regional balance, institutional coordination, and monitoring mechanisms.

3. CONCLUSION

The analysis reveals that the smart city and smart village concepts implemented in Azerbaijan are in line with the key components of SDG 11. These models offer many benefits such as access to digital technologies, innovative infrastructure, alternative energy sources, and access to public services. The smart city approach supports the rationalization of urban services and the optimization of the work of institutional management (Huseynova & Mazanova, 2023). The trends of state policy are oriented towards a high level of smart city development and smart village development with the national economic development in Azerbaijan (Gasnov, 2024). 19-29).

The Smart village projects play an important role in rural sustainable development, regional equality, and social well-being. According to the international literature, the smart village model is a combination of technology, local resources, and social services in rural areas (Somvanshi et al., 2016, pp. 395-408; Aziiza & Susanto, 2020). In the liberated territories, these programs might help develop innovative models of settlements and development using innovative construction technologies, digital services, and green energy (Mammadova & Akbarova, 2024, pp.). 18-31).

Such an approach is crucial for the safe return of IDPs and to promote local socio-economic integration. The reconstruction in the liberated territories is not only about the reconstruction of infrastructure, but it is a process of long-term transformation in the region, sustainable planning, and social reintegration (Ahmadova, 2025). Smart City and smart village, in this context, can be the basis for creating a safe space of living in the post-conflict environment socially equitable and environmentally friendly. It has been revealed that such models can only be successfully implemented with the use of technical solutions (Ahmadova, 2025). Thus, the development of institutional coordination, administration, monitoring and evaluation systems, community participation, waste management, and recycling facilities is significant. From the experience of international smart villages, it is necessary to connect with social and environmental aspects to make a smart village more sustainable (Zhang & Zhang, 2020; Renukappa et al., 2024, pp. 1386-1407).

Resource-efficient development, local economic opportunities, and environmental management are other important factors that determine the sustainability of smart village model (Aggarwal et al., 2018; Majumdar, 2020, pp. 2-17). Therefore, the smart city and smart village models can be used as a tool to achieve SDG 11 in Azerbaijan. Technological infrastructure must be developed incrementally, synchronously with the involvement of communities, institutional cooperation, environmental management, and monitoring for the long-term development and maintenance of this potential.

4. RESULTS

It also shows that there are some limitations in the use of the concepts. Some of the most significant factors influencing the success of these projects are incomplete technological infrastructure, lack of financial resources, and institutional coordination. The need of the hour is to address these challenges in a comprehensive and holistic manner.

Some key recommendations are outlined below: Extend the implementation of smart city and smart village projects and strengthen their implementation at the regional level; Digital infrastructure and use of innovative technologies; Boost cooperation between the public and the private sector; Study international experience and adapt it to local contexts; Improve monitoring and evaluation mechanisms of the indicators of SDG 11

In conclusion, the concept of smart city and smart village is one of the key measures to guarantee sustainable development in Azerbaijan. In order to support the country's achievement of long-term socio-economic development, it is important to continuously enhance policy in this area.

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