# SMART CITIES THROUGH THE EYES OF THE YOUNG: PERSPECTIVES AND CHALLENGES

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## Abstract

This research delves into the attitudes and perceptions of adolescents aged 15-19 regarding smart cities, uncovering the principal challenges and opportunities they perceive. A mixed-methods strategy was employed, involving a survey of one hundred individuals to evaluate their comprehension and opinions on smart city initiatives, technological breakthroughs, and enhancements in urban life quality. Results indicate a prevalent, albeit partial, awareness of smart city principles among the youth; however, a notable understanding and engagement deficit remains. About 68% of respondents recognize the potential of smart cities to improve quality of life yet concerns about data privacy and the efficacy of these cities in addressing urban issues remain. The study emphasizes the critical roles of accessibility, security, and innovation, particularly highlighting the significance of artificial intelligence and smart mobility solutions for the future of urban areas. Despite prevailing doubts, many young people show a readiness to inhabit and contribute to the development of smart cities. The findings stress the imperative for specialized educational initiatives and urban planning approaches that are inclusive, aimed at diminishing informational voids and encouraging active involvement of the youth in smart city evolution.

**Keywords:** *Smart cities, Adolescents, Technological breakthroughs, Privacy concerns, Urban enhancement, Youth involvement.*

## Introduction

In the last few decades, the rapid development of technology has dramatically altered the landscape of urban life. The emergence of smart cities represents one of the most prominent trends in this evolution, offering promises of more efficient, sustainable, and accessible urban environments. At the heart of this promise lies the application of advanced technologies such as the Internet of Things (IoT), artificial intelligence (AI),

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and federated learning (FL), which enable smarter resource management, improved mobility, and enhanced quality of life for citizens. As smart cities become more prevalent, the question arises as to how the younger generations, who are the most digitally connected and technologically savvy, perceive and participate in these new urban ecosystems.

This paper explores precisely that dynamic, focusing on the perspectives and challenges faced by youth in smart cities. Specifically, it analyzes how innovations in smart cities impact education, employment, social interaction, and youth participation in the creation of urban policies. Considering the global trend of urbanization and digitalization, the paper draws on a wide range of literary sources, including studies on smart city components, applications of IoT in urban settings, as well as technological innovations like FL and AI that contribute to the development of smart urban infrastructures. [1], [2], [3]

Through the analysis of responses from young individuals to an online questionnaire conducted in a technical high school, this paper aims to gain a deeper understanding of how digital-native generations are adapting, utilizing, and shaping technologically advanced urban spaces. This provides insights into potential pathways for the future development of smart cities that are inclusive, sustainable, and tailored to the needs and expectations of younger generations.

## Smart city technologies

Smart cities employ advanced technologies such as the Internet of Things (IoT), artificial intelligence (AI), and federated learning (FL) to enhance urban efficiency, reduce environmental footprint, and improve residents' quality of life. IoT technologies allow cities to become "smarter" through connected devices and sensors that collect data on everything from traffic to energy consumption [1]. AI and FL provide the capability to analyze vast amounts of data in real time, thereby enabling more efficient management of city resources and better responses to incidents [3].

Youth Involvement in Smart Cities Young generations, as digitally savvy and active technology users, play a crucial role in shaping and exploiting the opportunities offered by smart cities. Their involvement in the planning and development of smart cities can bring new perspectives and innovations, especially in areas such as education, mobility, and social inclusion. Works like those exploring AI perspectives in smart cities and communities emphasize the need to create interactive and accessible urban environments that support automation and smart traffic control, directly impacting young people and their daily activities [2].

Privacy and Security Challenges While technologies like IoT and AI offer numerous benefits, they also pose significant challenges to data privacy and security. The collection and analysis of vast amounts of data can compromise individual privacy if not properly protected. Federated learning, for example, represents an approach that can help mitigate some of these challenges through decentralized data processing, allowing data to be analyzed without the need for centralized storage [3]. This is particularly relevant for young people, who are often more exposed to risks associated with online privacy and security.

Conclusion The literature review indicates that technological advancements in the context of smart cities offer numerous opportunities to improve urban living, but they also carry challenges, particularly regarding data privacy and security. Actively involving young people in the development and implementation of smart city technologies can not only contribute to the creation of innovative solutions that meet their needs and

expectations but can also help identify and address potential risks and challenges. Through this process, smart cities can become more dynamic, inclusive, and safer places for all their inhabitants.

*Main objective*

To explore the perceptions, attitudes, and interactions of young generations (aged 15-19) with the concept of smart cities, as well as to identify the key challenges and opportunities these generations recognize in the context of modern technologies and urban development. Secondary Objectives:

1. Perception analysis: To thoroughly understand how young generations perceive smart cities and which aspects of smart cities they consider the most beneficial or appealing. This includes examining technological innovations such as IoT, AI, and FL within the context of their daily lives.

2. Understanding interaction: To examine the ways in which young people interact with smart city technologies, including the use of public transportation, digital services for education, and access to public information.

3. Challenge identification: To identify specific challenges faced by young generations in smart cities, particularly regarding privacy, data security, and digital inclusion.

4. Opportunity recognition: To discover opportunities for enhancing young people's participation in the development of smart cities, including the development of educational programs that promote digital literacy and critical thinking about technology.

5. Improvement suggestions: Based on the findings, to formulate recommendations for local authorities, educational institutions, and technology companies to improve the inclusion of young people in the planning, development, and evaluation of smart cities.

## Methodological approach

The planned research will use a mixed-methodological approach, combining quantitative and qualitative methods for data collection, including online questionnaires. This will allow for a deeper understanding of the attitudes and perceptions of the youth, as well as enable detailed analysis of their responses. By achieving these goals, the research aims to contribute to the broader discussion on the future of smart cities and the role that young generations can play in shaping sustainable, inclusive, and technologically advanced urban environments.

## Description of the technical school and sample

The research was conducted at the selected JU SŠC "Mihajlo Pupin", Derventa, Bosnia and Herzegovina, which specializes in education in fields such as electrical engineering, mechatronics, and information technology. The school is located in an urban environment and has about 400 students. For the purposes of this research, the sample included 100 students, selected through random stratified sampling to ensure

representativeness of different educational programs and years of schooling. The demographic characteristics of the sample included a gender balance, with an average age of 16 years.

Data collection methodology

Data were collected using an online questionnaire created with Google Forms. The questionnaire was available to students over a two-week period. It contained a mix of closed and open-ended questions to collect both quantitative and qualitative data. The closed-ended questions included multiple choices, allowing participants to express their views and perceptions of smart cities. Open-ended questions allowed participants to describe in more detail their opinions and experiences related to smart cities.

Data analysis methods

Quantitative data collected from the closed-ended questions were analyzed using statistical software, such as SPSS and Microsoft Excel. Descriptive statistics, including frequencies, averages, and standard deviations, were performed to describe the basic characteristics of the data. Qualitative responses collected from the open-ended questions were analyzed using thematic analysis methods, where responses were categorized and analyzed to identify common themes and patterns. This combined methodology provided a comprehensive understanding of young people's perspectives on smart cities, integrating quantitative indicators with qualitative insights.

## Results

Demographic characteristics:

The survey was conducted among students of a technical school, where 41.7% of participants were 16 years old, representing the largest age group among the respondents. The survey did not delve into other demographic variables such as gender or specific educational programs in detail.

Familiarity with the concept of smart cities :

Regarding the understanding of the smart city concept, 54.2% of respondents stated they were partially familiar, 29.2% were not familiar, while 16.7% were well acquainted with the concept. This indicates a moderate level of awareness of smart cities among the youth.

Perceptions of the impact of smart cities:

The majority of respondents (68.1%) believe that smart cities can improve the quality of life, while 31.9% are unsure of their potential. This suggests a generally positive attitude towards the possibilities offered by smart cities.

Priorities in smart city development:

When it comes to aspects of smart cities, 44.9% of respondents believe that technology accessibility is the most important, followed by 38.8% highlighting security, and 16.3% energy efficiency. This indicates that young people value access to and security of technology as key factors.

Most important innovations in smart cities:

In terms of innovations, 40.8% of participants consider artificial intelligence to be the most important, followed by smart transportation systems (38.8%), the Internet of Things (IoT) (10.2%), and energy solutions (8.2%).

Attitudes towards solving urban problems:

About 51% of respondents are unsure whether smart cities can solve current urban problems, while 40.8% believe they can, and 8.2% think they cannot.

The role of youth in smart cities:

Regarding their own role, 42.9% of respondents see themselves as users of technologies, 30.6% are unsure, 14.3% as advocates, and 12.2% as creators of innovations.

Participation in smart city projects:

As for participation, 38.8% would get involved as volunteers, 28.6% through education and awareness, 16.3% in planning and participation, and 14.3% in technological development.

Challenges in implementing smart cities:

The biggest challenge according to the respondents is data privacy (33.3%), followed by financial costs (29.2%), security (20.8%), and digital divide (12.5%).

Concerns about privacy and security:

Concerns about privacy and data security were expressed by 43.8% of respondents, while 31.3% are unsure, and 25% are not concerned.

Desire to live in a smart city:

Finally, 53.1% of the respondents stated they would like to live in a smart city, while 34.7% are unsure, and 12.2% do not want to. These results indicate cautious optimism among the youth regarding the development and application of smart city technologies, highlighting the importance of accessibility, security, and artificial intelligence, with pronounced concerns for privacy and data security.

## Discussion

The research findings reveal significant insights into the perceptions and attitudes of young generations towards smart cities. 54.2% of participants are partially familiar with the concept of smart cities, suggesting a basic understanding but also highlighting the need for further educational efforts to increase awareness and deeper comprehension. This resonates with the work of Aslam and Ullah (2020) [1], who emphasize the need for broad educational initiatives related to smart technologies and infrastructures.

The majority of respondents (68.1%) believe that smart cities can improve the quality of life, aligning with the positive perceptions described in the literature (Aslam & Ullah, 2020) [1]. However, 31.3% of respondents express uncertainty, indicating existing doubts and the need for more concrete demonstrations of the benefits of smart cities.

Regarding priorities, accessibility to technology and security are highlighted as the most important aspects, reflecting global trends in smart city development where security and ease of access are key factors [2]. Interestingly, while energy efficiency is deemed less important, it remains a significant factor, emphasizing the need for sustainable development as highlighted in the literature.

The majority of respondents (51%) are unsure whether smart cities can solve current urban problems, indicating skepticism and possible shortcomings in current implementations and communications about smart cities. This underscores the need for clearer demonstrations of benefits and successful examples of smart cities in practice.

Although most respondents (42.9%) see themselves as users of technologies, a significant number (14.3%) express interest in the roles of advocates or even creators of innovations, suggesting that young people are not just passive consumers but are interested in actively participating in shaping the future of smart cities.

Data privacy and financial costs stand out as major challenges, aligning with concerns described in the literature [3]. These findings highlight the need for developing security measures that protect individual privacy and affordable solutions that enable widespread application of smart technologies.

Finally, 53.1% of respondents express a desire to live in a smart city, indicating a generally positive attitude towards the concept, but there is also significant uncertainty (34.7%) that needs to be addressed through additional information, education, and demonstrations of effective applications.

## Recommendations for future research

Future research should focus on a deeper understanding of the specific aspects of young people's skepticism towards smart cities, as well as identifying ways to involve young people in the planning, development, and evaluation of smart city projects. Additionally, it would be beneficial to explore differences in perceptions among youth living in different types of urban environments, such as large cities versus smaller towns or rural areas.

## Conclusion

These findings provide deeper insights into young people's perceptions of smart cities and point out key areas for improvement, including education, security, privacy, and accessibility. For local authorities, educational institutions, and technology companies, this represents an opportunity to collaborate in creating inclusive, secure, and accessible urban environments that meet the needs of younger generations.

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