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HUMAN SMART CITIES: SMART CITIES CO-CREATED BY CITIZENS

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Purpose: The main objective of the study is to gain insight into the effectiveness and challenges in the implementation of projects of funded from the "Human Smart Cities. Smart Cities co-created by residents" competition for local government units.
Design/methodology/approach: A survey of all cities participating in the Human Smart City competition was planned and conducted using the CAWI method in September 2024.
Findings: The analysis of the survey data revealed challenges currently faced by Polish cities. Local government officials respond to them by seeking new solutions capable of improving the quality of public services and contributing to sustainable development. The role of local governments is to educate the public and implement solutions that support sustainable development. This publication is intended as a contribution to the public discourse on the state of Polish cities and an inspiration for further research on the development of smart city solutions in Poland. We also hope that it will advance knowledge in this field and encourage the implementation of new initiatives.
Research limitations/implications: The article does not address all issues that are relevant to its topic, but it can certainly serve as a starting point for further research. An interesting continuation of the underlying study would be a survey of residents' opinions on the use of intelligent solutions to turn a city into a livable space, for which the residents are also responsible.
Practical implications: The article is relevant to the development and management of cities, as it enables the creation of more efficient application procedures and better preparation of municipalities to implement innovative city projects.
Social implications: The results of the study can increase residents' participation in decision-making processes, consequently strengthening their social responsibility and improving the quality of life through better alignment of projects with local needs.
Originality/value: The article brings in a new perspective on the challenges and effectiveness of smart city projects implemented in Poland, especially those involving cooperation between municipalities and residents. Its value lies in providing practical conclusions and recommendations that can support public administration and organizations in developing innovative urban solutions.
Keywords: Smart city, Innovative urban solutions, Involvement of citizens, Sustainable urban development, Human Smart Cities competition.
Category of the paper: Research paper.

1. Introduction

The development of smart cities is influenced by global policy trends aimed at balancing socio-economic and environmental goals. The dynamic development of civilization, increasing urbanization, and the growing demands of modern society, make it necessary for Polish municipalities to constantly seek answers to questions about the directions of future urban development. In this context, the interdisciplinary studies of the concept of sustainable cities, considering its various aspects such as ecology, urban mobility and innovative supportive technologies, are conducted (Wieczorek, 2023). Modern theories of urban development emphasize the key role of advanced information and communication technologies (ICT) in building efficient and intelligent urban management systems (Ciupa, Hołubowicz, Orłowski, 2024).

The implementation of the systems is prerequisite to undertaking harmonized activities guided by clearly defined goals, which are part of the assumptions underlying multifaceted and sustainable development. A key element of this process is dialogue and cooperation among various community groups, which allows the creation of solutions capable of responding to the dynamically changing needs. In this article, the term "smart city" is understood as equivalent to "intelligent city". Its ambiguity and broadness results in different social groups having different perceptions of it and expecting different solutions. Some of them see the smart city concept as necessary to find savings in the municipal budget, while others view it in terms of more accessible and better public services, increased resident safety and more efficient and less-pollutant public transport. A common point of reference for all involved parties is the need to build digital society.

Central to the smart city concept seems to be the creation of appropriate financial and intellectual capital. Planning and designing a smart city requires a thorough understanding of the needs of its users and developing effective policies to address them (Januszkiewicz, Cywiński, Chojnacka, 2019). A key role in this process is played by residents, whose daily consumption choices, use of environmental resources and transport, and waste disposal practices are significant for the quality of the environment whose. Equally important is residents' involvement in various forms and procedures of public participation, through which they can co-create the framework and directions of urban policy. All this leads to the conclusion that sustainable urban development is determined by both passive users of urban resources and publicly active citizens, including formal and informal groups, organizations and public institutions (Augustyn, 2020).

By definition, designing and implementing a smart city involves substantial financial investments. Until recently, the prevailing belief in small towns and medium-sized cities, was that investing in smart solutions was not only not a priority but also, in many cases, superfluous. The perception was mainly due to the dominance of traditional forms of financing

the purchases of equipment or advanced software directly from tight local budgets (Jonek-Kowalska, 2018). A much more effective, although still unpopular, approach to financing smart city projects makes use of public-private partnerships (PPPs), which give municipalities access to private capital and expertise without exacerbating local budgets' deficits. An interesting alternative is the contingency funding model, under which municipalities do not pay for a given service becoming available but for pre-agreed outcomes. This solution is essential in the case of projects seeking long-term cost reductions. A case in point is smart lighting systems, which can significantly lower municipal electricity bills (Kowalski, Weresa, 2018). In financing smart city projects, the key role is played by external funds available from several entities, including the Polish Development Fund, the Department of Local Government Investment (DIS) responsible for facilitating local governments' investments in modern technologies (among its programs were Energy from Waste, PPP Consultancy, EPC+, Municipal Technology Exchanges, etc.), and Bank Gospodarstwa Krajowego (the Strategic Investment Program, etc.) (Wieczorek, 2023). An initiative of special importance among projects involving smart cities following the latest trends is the "Human Smart Cities. Smart cities co-created by citizens"[1] competition announced by the Ministry of Funds and Regional Policy and Regional Policy. The competition emphasizes the use of advanced technologies in combination with active public participation. In this way, the Human Smart City (HSC) is not only an opportunity to raise funds but also to help create cities that are friendlier and more responsive to the needs of their inhabitants. In the HSC approach, technology is not an end but a tool to improve the quality of life, involving local communities in the design and implementation of solutions.

The main objective of the paper is to gain an insight into the effectiveness and challenges of projects funded from the "Human Smart Cities. Smart Cities Co-Created by Residents" competition meant for municipalities. Using a questionnaire survey of the competition participants, the authors try to bring a new perspective on the challenges and effectiveness of smart city projects implemented in Poland focusing on the cooperation between municipalities and citizens, and present practical conclusions and recommendations for public authorities and organizations committed to developing innovative urban solutions.

2. Methods and Results

In September 2024, a survey of 24 cities using the CAWI (Computer Assisted Web Interview) technique was conducted to analyze cities' projects implemented within the "Human Smart Cities. Smart Cities Co-Created by Residents" competition. The survey tool was

[1] The then-Ministry of Development, now the Ministry of Funds and Regional Policy, announced on July 18, 2017 a grant competition for local government units to undertake the preparation of cities to implement smart and innovative technological and social solutions in the form of a pilot.

developed using the Microsoft Office 365 Forms application. Requests to complete the online survey were sent electronically with a link through the Electronic Platform for Public Administration Services (ePUAP). Completed surveys were were returned by 16 cities[2] (67% of the survey participants). The survey consisted of 17 closed-ended and semi-open-ended questions, and rating questions provided with a five-point Likert rating scale, on various aspects of the process of preparing, implementing and evaluating smart city projects The survey's main purpose was to gain an understanding of the effectiveness of implementing projects funded by the "Human Smart Cities. Smart Cities co-created by citizens" competition meant for local government units and related challenges.

The respondents represented a variety of local government units. An analysis of their positions and units showed that most of them were employed at municipal offices and departments responsible for urban development and management. In response to the question about how many people were engaged in the preparation of an application, as many as 8 respondents stated that teams consisted of 4 to 8 people, which indicates that half of the projects were carried by medium-sized teams. In several cases, smaller teams consisting of fewer than 3 people were indicated, which was probably associated with smaller projects or municipalities limited interest in them. Two respondents, from Nakło nad Notecią and Żuromin, stated that their teams had between 9 and 12 members.

The majority of the respondents confirmed that the application preparation process involved cooperation with external partners, including public institutions, NGOs, and universities. This approach testifies to local governments' openness to implementing projects through cooperation with others and the integration of available resources and knowledge. As regards the length of time that teams needed to complete an application, most respondents pointed to two months. However, there were also cases of projects requiring more than three months to complete the application, probably because of their greater complexity. It is worth noting that in three cities (Lublin, Ostróda, Siemianowice Śląskie), teams consiting of 4-8 people managed to complete applications just in one month.

Table 1.
Time spent on application preparation

Town/City	One month	Two months	Over three months
Boguchwała		X	
Ełk		X	
Kielce			X
Kołobrzeg			X
Krosno			X
Lublin	X		

[2] The survey required participants to state the date of signing the agreement by each city participating in the project. The first agreement was signed on June 11, 2019 (Boguchwała, Kolobrzeg, Ostroda), and the last one on November 19, 2020 (Rawicz). The value of the projects ranged from PLN 500,000 to over PLN 2,000,000. Most cities implemented projects worth between 1,000,000 and 2,000,000 PLN; there were also several projects (Kielce, Rawicz, Sierpc and Zdunska Wola) that were worth more than PLN 2,000,000.

Cont. table 1.

Naklo nad Notecią			X
Nowa Ruda			X
Ostróda	X		
Rawicz		X	
Siechnice			X
Siemianowice Śląskie	X		
Sierpc		X	
Zakliczyn		X	
Zduńska Wola		X	
Żuromin		X	

Source: elaborated by the authors based on the survey data.

Asked about the complexity of the competition's application process, most survey participants found it to be moderate, and several (from Naklo nad Notecią, Rawicz and Sierpc) described it as complicated. In contrast, respondents from Kolobrzeg, where the application took more than three months to complete and respondents from Lublin and Siemianowice Slaskie (1 month) found that the application process was not very complicated. A respondent from Zduńska Wola, where the application preparation process stretched over two months, saw the process as straightforward. The different perceptions of the complexity of the application process could be related to different experiences of local government units, determined by their different levels of expertise and available resources. This implies indicate that more efforts are necessary to simplify the application process and ensure a level playing field for all applicants.

The eight respondents who found the application process uncomplicated had no comments on it, stated that they did not remember the details, or were unable to provide an unambiguous assessment of it. The other respondents pointed to several problem areas in the application process, such as the detailed application requirements, which required the organization of an informational meeting to clarify the critical aspects of the application process. Also indicated was a need for the competition organizers to provide more precise guidelines on expected output and result indicators, the onerousness of the multi-stage procedure, and tight local budgets hindering project implementation. Other problems included difficulties with predicting expenditures and application forms offering insufficient space given the amount of information required, which also pointed to need to optimize the application process further. Respondents also frequently referred to technological problems arising from implementing new solutions and the insufficiency of human resources given the scale of the project tasks. In five cases, communities' resistance to change was mentioned, clearly pointing to the importance of this problem.

Some respondents indicated obstacles to project implementation other than enumerated in the survey, including numerous challenges posed by the COVID-19 pandemic, such as problems with installing water meter radio modules in residents' homes and carrying out initiatives requiring their participation, which mainly affected the town of Krosno. Zakliczyn

and Lublin particularly suffered from pandemic-related restrictions on residents' mobility, translating into problems with holding public consultations. Respondents also referred to contractors failing to comply with the terms of their contracts and the time-consuming nature of public procurement procedures, delaying the implementation of tasks. In many cases, e.g., in Zdunska Wola, the pandemic had a generally adverse effect on the programs and organization of project activities. All these difficulties point out that in addition to having to overcome epidemiological restrictions, projects implemented during the pandemic were significantly affected by procedural requirements.

Table 2.
Main challenges in project implementation

Town/City	Insufficient financial resources	Insufficient human resources	Public resistance	Technological difficulties	Problems with the coordination and management of the project	Others
Boguchwała				X		
Ełk					X	
Kielce	X	X	X	X	X	
Kołobrzeg		X		X		
Krosno	X			X		X
Lublin						X
Nakło nad Notecią		X	X			
Nowa Ruda	X	X		X		
Ostróda				X		
Rawicz				X	X	
Siechnice		X		X	X	
Siemianowice Śląskie		X	X			
Sierpc	X	X	X			
Zakliczyn						X
Zduńska Wola						X
Żuromin		X	X			

Source: elaborated by the authors based on the survey data.

Public consultations with the residents was viewed positively by respondents, with 63% of them finding this form of communication with the local respondents to be effective. The main problems hindering public consultations were insufficient engagement of the residents, their limited knowledge about smart cities, and the lack of local leaders who could initiate and guide community activities. The respondents also pointed to a problem with encouraging new communities to participate in consultations, which was not included in the available options. Reduced seniors' interest in consultations during the pandemic made it even more challenging to build engagement among the residents.

Table 3.
Problems encountered during public consultations on projects

Town/City	Residents showing no or limited interest in participation	Residents' limited knowledge of smart cities	Lack of local leadership	Distrust in the effectiveness (results) of authorities' actions	None	Others
Boguchwała		X				
Ełk			X			
Kielce				X		
Kołobrzeg	X	X	X			
Krosno	X					
Lublin						X
Nakło nad Notecią	X	X	X	X		
Nowa Ruda		X				
Ostróda	X					
Rawicz				X		
Siechnice			X			
Siemianowice Śląskie			X			
Sierpc	X					
Zakliczyn		X				
Zduńska Wola					X	
Żuromin	X					

Source: elaborated by the authors based on the survey data.

Respondents' answers revealed several forms of communicating consultations' outcomes to the public. In most cases, reports were published on the office's website, which could be accessed through a project-dedicated bookmark. Also used were newspaper articles, social media announcements, mobile apps, and events such as webinars, open days, or forums. Occasionally, additional educational activities were provided or best practice3 manuals were distributed. Some respondents stressed the need to make residents aware of consultations' outcomes.

The experience the respondent gained during the implementation of the projects made it possible for them to identify problems and obstacles, as well as formulate recommendations.

[3] Most of the respondents pointed to the "Handbook of Good Practices" published in 2022.

Table 4.
Recommendations for towns and cities considering similar projects

Town/City	Recommendations
Boguchwała	The schedule of activities should be appropriately planned.
Ełk	The implemented solutions should be evaluated and reserve funds need to be available to modify them as necessary after the end of the project.
Kielce	The rocurement criteria should be used as a source of inspiration; a good approach is to create a network of TSUs that will exchange their experiences and good and bad practices. The use of teamwork is recommended.
Kołobrzeg	The needs of the target group need to be established;the project should take into account all objectives and activities and its budget should be carefully estimated.
Krosno	The partners should be carefully selected and tasks should be assigned based on competencies; regular meetings to monitor progress and identify risks are recommended.
Lublin	Cities' good practice manuals can be a valuable source of useful information. In order to share lessons learnt in the course of project implementation, the Local Government Academy of Strategic Management was established in Lublin to promote participatory management as an effective method of building relationships and making decisions about a smart city.
Naklo nad Notecią	A worthwhile approach is to find and engage active community groups, utilize good practices and organize study visits to places where solutions similar to those planned have already been implemented.
Nowa Ruda	The use of technical support, including engineers, is recommended to ensure an adequate level of expertise for the project .
Ostróda	It is advisable to carefully discern the technological capabilities planned in the project at the application stage to ensure their feasibility and compatibility with the objectives.
Rawicz	Cooperation with other institutions is recommended. For instance, cooperation with the police under the monitored city project resulted in the CCTV cameras being used by the municipality not only for analytical purposes, but also to combat vandalism and crime.
Siechnice	The goals to be achieved by the project should be specifically laid out to ensure its effective implementation and measure progress.
Siemianowice Śląskie	Implementing a project requires “out-of-the-box” thinking, engaging officials, and allowing time to share good practices. It is also important that the project leaders are open-minded and view project activities as a learning and development process and supports them, even if mistakes are made.
Sierpc	None
Zakliczyn	Applications involving innovative projects should be prepared based on expert analysis and public consultations with organizations and groups of residents to benefit from them.
Zduńska Wola	The recommended projects are those that bring the satisfaction of working closely with people, even if they are time-consuming.
Żuromin	Both the assumptions of the project and its intended results need to be carefully considered.

Source: elaborated by the authors based on the survey data.

According to the above, the survey participants found it advisable to prepare a schedule of activities and precisely estimate the budget, taking int account the specific needs of the target group. The implemented solutions should be evaluated and adequate funding should be secured to appropriately adjust them after the end of the project. It is also essential to draw inspiration from existing good practices and to create a network of municipalities to exchange experiences. The respondents also recommended engaging active community groups, making study visits to places where similar solutions were implemented, and ensuring the availability of technical assistance. Creative thinking that encourages innovative solutions was found critical, likewise systematic monitoring of the project progress and close cooperation with other institutions. The initiation of the project was recommended to be preceded by a thorough analysis of available technologies in order to ensure their compatibility and feasibility. The importance of holding extensive consultations with the residents to benefit from the project was also

emphasized as a means of aligning the project with the community's real needs and making its implementation more efficient.

3. Summary and conclusions

Changing political, economic and technological circumstances require a redefined approach to making urban policies, whose main objective is to sustain economic growth and improve the quality of residents' life through activities appropriate to local conditions (Pluta, 2019). This means that regardless of how successful solutions developed in other geographical, natural, political or socioeconomic conditions were, they should not be thoughtlessly copied elsewhere. According to Florida, cities function as a sort of warehouses containing knowledge and ideas and providing conditions and appropriate infrastructure for their efficient dissemination (Florida, 1995). These processes play a crucial role as catalysts for economic growth and provide the basis for innovation and sustainable development.

This article is a response to the need for a new research arising from several challenges faced by modern cities. As the challenges require an approach capable of seamlessly combining socioeconomic and environmental goals and modern technology, an interdisciplinary and multidimensional analysis of urban issues is necessary (Krysiński, 2020). Today's cities increasingly reach for innovative solutions offered by the Smart City concept, which are beneficial for both residents and municipalities, as they make urban life easier and enable more efficient management of towns and cities. It needs to be noticed, however, that implementing Smart City solutions is a complex process that, in addition to being stretched in time, also requires a multifaceted approach and making changes simultaneously at different levels of the urban structure. It is also important to remember that the solutions should consistently improve the quality of residents' lives while ensuring environmental sustainability and respecting the needs of the generations' to come.

The presented research was undertaken to learn more about the effectiveness of Smart City projects and the challenges they face. Its findings will be used to disseminate the results of the Human Smart City competition and promote good practices among all parties interested in building social trust and increasing residents' participation in the activities of local governments. The knowledge of problems that are likely to be encountered in the course of project implementation may improve the process of applying for funds and consequently promote the competition as the method of raising founds for the implementation of Smart City solutions and contribute to its wider use in Poland. The survey results showed differences among local governments regarding the level of their involvement and resources allocated to project implementation (most of them used project teams of 4-8 people). The use of external partners was a common practice, and the average time spent on preparing an application was

two months. Although process of applying for funds was found to be moderately complicated, the need of more precise guidelines and simplification of the process was indicated. The main challenges reported by the survey participants included technological problems, insufficient human resources and public resistance, especially during the pandemic. Public consultations as a form of communication with communities were assessed positively, but the limited participation of the residents and a lack of leaders who could initiate activities were underscored.

The conclusions from the study point to the need to prepare precise plans of activities and budgets, to systematically monitor the project's progress, to engage local communities, and to draw inspiration best practices. While the study does not cover all issues that are relevant given the topic of this article, it can serve as a starting point for further research. A smart city can be seen as an ecosystem of innovations and entrepreneurship, enabling a dynamic exchange of ideas and activities addressing urban needs. The stakeholders' active participation in the process of creating innovative solutions and integrating them with information and communication technologies enhances the potential of the "wisdom of the crowd", which promotes the introduction of social innovation. This leads to bridging the gap between technology and urban communities and offers more space for civic initiatives. Consequently, cities become more open to the needs of their inhabitants and create space for the joint development of solutions that contribute to their sustainable development. Given that, it would be interesting to analyze urban residents' opinions on creating a city as a livable space for which they are also responsible through intelligent solutions.

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