Smart Security in the Smart City

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Abstract: This article is focused on whether and to what extent the measures taken by cities’ shape their creative and intelligent space safety. For this purpose, research was carried out among medium and large cities in Poland. The analysis of the obtained results showed that, although projects shaping the creative and intelligent space of medium and large cities are undertaken in order to increase the broadly understood security, they are not treated as a priority. Subsequently, security projects implemented in the selected cities were presented.

Keywords: smart security; smart city; intelligent city space; ICT technologies

1. Introduction

Cities play a huge role in social and economic life. Currently, about 7.7 billion people live around the world [1], with an urban population of approx. 53%. According to estimates, by 2030, the population will increase to 8.5 billion [2] and, by 2050, to 9.7 billion [1]. The percentage of people living in cities will also increase to 60% in 2030 (of which 2/3 are in cities with a population of over half a million) [3], by 2050 to approx. 70% of the total population [4], and by 2075 up to 75% of the population [5]. In the developed countries of Western Europe, the Americas, Australia, Japan, and the Middle East, more than 80% of the population lives in urban areas. Middle-income countries in Eastern Europe, South America, North and South Africa have 50–80% of their populations in cities, while in underdeveloped and poor countries, the majority of people still live in the countryside. As the world entered the 20th century, 371 cities had a population of 1 million or more, while in 2018, this figure had grown to 548 [3]. The five largest cities in the world include Tokyo (population: 37,435,191), Delhi (population: 29,399,141), Shanghai (population: 26,317,104), Sao Paulo (population: 21,846,507), and Mexico City (population: 21,671,908) [6]. It should be noted, however, that urbanization is not always an organic phenomenon. For example, China has launched the “Four Modernizations” campaign, which aims to resettle 250 million people from the countryside in the city by 2025. Thus, the number of people living in cities in China would increase to 900 million [7].

Regardless of the reasons, progressing urbanization leads not only to an increase in the demand for energy, water, gas, transport services, housing, and the limitation of urban space, but also to uncontrolled development outside the city, the formation of slums, scattered jobs, and an aging urban infrastructure. As a result, this process leads to a decrease in efficiency, especially in areas related to energy consumption, traffic, waste management, and pollution [8]. Therefore, it is necessary to implement highly effective solutions in cities that will not only enable sustainable economic development, but also social welfare, which will be reflected in the improvement of city dwellers’ quality of life [9]. Cities are thus becoming increasingly complex, complicated, and multidimensional “organisms” [10,11]. In order to meet the emerging challenges in the economic and social areas, as well as the requirements of environmental protection, cities are more often using modern information...
and telecommunications technologies. In this way, the idea of a smart city is gradually being implemented in cities.

The concept of smart city first appeared in 1992. At that time, it was referred to as an urban development that is heading towards technology, innovation, and globalization [12]. Since that time, its meaning has evolved and currently, according to the EIP-SC European Innovation Partnership on Smart Cities and Communities, smart cities can be defined “[... as systems of people who interact and use flows of energy, materials, services and financing to catalyse sustainable economic development, resilience, and a high quality of life; these flows and interactions are ‘smart’ through the strategic use of ICT infrastructure and services within a transparent urban planning and management process that responds to the social and economic needs of the society” [13]. It is “a city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based partnership” [10]. In addition to city authorities, stakeholders, such as residents, entrepreneurs, and non-profit organizations, are involved in the process of a smart city’s creation and development.

It is assumed that a smart city is characterized by a competitive economy, intelligent transport networks, sustainable use of resources, high-quality social capital, high quality of life, and intelligent public management [14]. It is “envisioned as creating a better, more sustainable city, in which people’s quality of life is higher, their environment more livable and their economic prospects stronger” [14]. One of the most serious challenges facing a smart city is ensuring security, as the city authorities must take not only the general safety of the city and its inhabitants (in a physical sense) into account, but also emerging new threats, such as cyber security, that were not faced by “traditional” cities.

The aim of this article is to present the extent to which undertakings initiated by cities shape their creative and intelligent space in terms of security.

2. A Literature Review and Applied Research Methodology

2.1. Traditional City, Sustainable City, and Smart City

Urbanization is currently one of the modern world’s major megatrends. It is an unstoppable and irreversible process [15]. Contemporary cities are centers for a network of economic connections. However, they not only create a space for living or working, but they also gain an interactive and global dimension [16]. We can now observe progress towards sustainable urban development, which is not only due to progressive urbanization, but also due to emerging crises in many areas of life. In practice, these activities often target a circular economy, green growth, or smart growth.

The term smart city is widely used today. However, the literature on the subject lacks a uniform and coherent definition. As a result, there are many definitions of smart city. Selected definitions are presented in Table 1.

| Author  | Definition |
|---------|------------|
| [17] (2012) | A city that uses information and communications technology to make its critical infrastructure, components, and utilities more interactive and efficient, thereby making citizens more aware of them. |
| [18] (2009) | A city is smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with wise management of natural resources through participatory governance. |
| [19] (2011) | A city may be called “smart” when investments in human and social capital and traditional and modern communication infrastructure fuel sustainable economic growth and a high quality of life, with wise management of natural resources through participatory governance. |
Systems of systems, and the existence of emerging opportunities to introduce digital nervous systems, intelligent responsiveness, and optimization at every level of system integration.

A city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based partnership.

A smart city uses information and communications technology to enhance its livability, workability, and sustainability.

Smart cities combine diverse technologies to reduce their environmental impact and offer citizens better lives. This is not, however, simply a technical challenge. Organizational change in governments—and indeed society at large—is just as essential. Making a city smart is therefore a very multi-disciplinary challenge, bringing together city officials, innovative suppliers, national and EU policymakers, academics, and civil society.

In the past, the development of smart cities was driven by the idea of the broadest possible access to information about the city and its development plans, as well as creating favorable conditions for investment, developing effective communication, caring for the environment, creating opportunities to spend free time in an attractive way, and ensuring the safety of residents. Currently, thanks to the continuous development of technology, such as geospatial information systems, artificial intelligence, and augmented reality, it is possible to accurately analyze exactly where it is necessary to take action or implement investments, and thus better plan the city’s development.

The implementation of the idea of a smart city is aimed at improving the inhabitants’ quality of life, increasing the efficiency of city management, increasing the quality of the provided city services, and increasing the city’s competitiveness. For this to happen, cities must change their model of functioning from traditional to intelligent. The comparison of the traditional and smart city is presented in Table 2.

Table 2. Traditional city and smart city.

| Category             | Traditional City                                      | Smart City                                                  |
|----------------------|-------------------------------------------------------|-------------------------------------------------------------|
| City organization    | No integration between city cells                      | Cooperation between individual cells in the city, including residents and entrepreneurs |
| City and inhabitants | Little focus on inhabitants’ needs                     | Focus on inhabitants’ needs and quality of life             |
| Implementation of tasks | Implementation of the statutory tasks in the easiest way | Permanent improvement of the quality of task implementation |
| Provision of services | Providing services in such a way that it is convenient for the service provider, rather than the highest quality and convenience for residents | Management of services, day-to-day operations, technology, and digital assets are integrated |
| Interoperability of systems and services | Low | High |
| Collaboration of individuals | Little | Permanent |
| Openness to innovation | Closed | Open |

Source: Own work.
The above shows that the implementation of the smart city model enables increased cooperation between the administration and citizens, entrepreneurs, or NGOs. Openness to innovation and continuous improvement of the quality of services provided increases the inhabitant’s quality of life.

Often, smart cities have goals similar to those of sustainable cities. The city can be considered sustainable, “if its conditions of production do not destroy over time the conditions of its reproduction” [23]. Sustainable urban development means “achieving a balance between the development of the urban areas and protection of the environment with an eye to equity in income, employment, shelter, basic services, social infrastructure and transportation in the urban areas” [24]. Although in practice there are many indicators for monitoring or assessing a city’s sustainable development, significant limitations are indicated. They do not reflect the interactions between the various systems functioning in the city. Moreover, they do not provide guidance as to the directions for further action [25]. The literature also indicates that, although the concepts of sustainable city development take into account social, economic, and environmental factors, only the latter is treated as a priority [26,27]; therefore, the concept is often criticized for only focusing on reducing the negative impact of undertaken activities on the natural environment [28,29]. Meanwhile, planning city development requires a systemic approach that takes all aspects of its functioning into account to an equal extent [30]. Such possibilities are offered by the smart city concept. In the literature on the subject, even the concept of linking smart cities with sustainable ones has developed. It is expressed in the concept of smart sustainable cities, which means a “city that meets the needs of its present inhabitants, without compromising the ability for other people or future generations to meet their needs, and thus, does not exceed local or planetary environmental limitations, and where this is supported by ICT” [31].

To sum up, it should be stated that a smart city is a city that is characterized by a competitive economy (smart economy), smart transport networks (smart mobility), sustainable use of resources (smart environment), high-quality social capital (smart people), high quality of life (smart living), and intelligent public management (smart governance) [32].

Today, urban planning and safety work have become closely intertwined [33]. It is not surprising then that in the literature on the subject one can encounter the concept of a safe city. However, this concept is not analyzed as often as the smart city concept. Some publications treat the safe city concept as one of the smart city systems [34,35]. Some of the researchers concluded, however, that this is a narrowing of the problem and it is necessary to extend it, and the concept of a safe city itself should be treated as an equivalent of the concept of a smart city, with both concepts interpenetrating. While the subject of interest of a smart city is the issue of using modern technologies in order to improve the quality of life of its inhabitants, increase the efficiency of city management, improve the quality of provided city services, and increase the city’s competitiveness [17–19,22], the safe city concept, in their opinion, covers issues related to ensuring protection of people, property, environment, and infrastructure. Often, a safe city only addresses the issue of reducing crime, such as reducing the number of murders or rapes [36–38]. Meanwhile, today urban safety is a result of many complex factors. These include: Lack of opportunity, widening inequity, territorial segregation, economic polarization, poor urban planning, and social exclusion. Likewise, drugs, guns, organized crime, and poor crime prevention [39]. As Gaspar Viegas, a senior director at Alcatel-Lucent specializing in public safety, points out: “If you think about safety only in terms of reducing crime, that doesn’t necessarily mean that the city will be kept safe. For example, you can look at casualties from poor traffic management and auto accidents. It’s also about the level of pollution in a city. This is how a safe city should be analyzed” [40]. The concept of a safe city includes a wide range of aspects and activities linked to public spaces, from crime prevention to physical protection of the environment, accessibility, to institutional and organizational aspects [41].

Ensuring a safe city space is a prerequisite for the life and work of its inhabitants, for the protection of their rights and freedoms, for the effective functioning of the economy, urban space, transport, and communication. Due to the subject of the research undertaken, the concept of creative and intelligent space of the city was also analyzed. Creativity is about being able to generate new
solutions and ideas. According to the original idea of smart cities, the smart space can be understood as space in which information technologies are used as tools to improve their functioning [42].

Creative and intelligent cities are not lifeless spaces, complexes of buildings, physical infrastructures, and electronic components and digital applications. On the contrary, they correspond to vivid human communities, which creatively deploy the skills, learning ability and innovation, and physico-digital infrastructure for communication and cooperation [43]. Creative usage of the city scene is effectively made up of two principles: Urban and designers "draft and the participant" goals [44].

The literature on the subject provides an interpretation of the concept of creative and intelligent space of the city, but mainly in terms of solutions for the needs of culture [45]. Meanwhile, the use of modern communication and information technologies provides solutions in many other areas that shape urban space, including security solutions. Recognizing this fact, the subject of research was a creative and intelligent urban space from the point of view of solutions for security.

2.2. Methodology and Limitations of Research

The subject scope of the study concerned projects shaping the creative and intelligent space of the city, especially with regard to security issues. The study covered large and medium-sized cities in Poland. As of 31 December 2018, Poland contained 218 medium and large cities, which was where 47.1% of the population lived (Table 3). Eighty cities agreed to participate in the study, which constitutes 36.7% of all the small and medium-sized cities in Poland. The target group of respondents were people performing specific functions in city offices: Executive body (mayor, city president, and deputies), treasurer, secretary, or manager or functional manager. On the other hand, the answers were provided from the city’s point of view and concerned the intelligent solutions introduced in them.

| Population         | City Class | Number of Cities | Population in Cities (in Thous.) | % of the Total Population |
|--------------------|------------|------------------|----------------------------------|---------------------------|
| 20,000–49,999      | IV         | 134              | 4246.6                           | 11.1                      |
| 50,000–99,999      | V          | 46               | 3116.4                           | 8.1                       |
| 100,000–199,999    | VI         | 22               | 3057.4                           | 8.0                       |
| 200,000 and more   | VII        | 16               | 7648.1                           | 19.9                      |

Source: Own work, based on [46].

At the preliminary stage of the research, the main research problem was formulated in the form of the following question: Whether and to what extent the actions undertaken by cities shape their creative and intelligent space in terms of security? In order to answer the above question, a number of detailed problems were formulated: (1) What is a smart city and what factors distinguish it from a traditional city and a sustainable city? (2) What actions do cities undertake in the process of shaping urban space to increase the level of security? (3) What are the security benefits of creating creative and smart cities?

At the preliminary stage of the research, a working hypothesis was formulated in the form of a supposition that cities, when shaping creative and intelligent space, undertake a number of activities in the field of broadly understood security, especially in the field of environmental protection, transport, and public safety.

The research was carried out using quantitative and qualitative research methods. The data for analysis was obtained using the diagnostic survey method (CATI method) using the questionnaire study technique. The research was carried out in July 2019. The obtained data was processed. For this purpose, both Statistica [47] and Microsoft Excel software were used. These tools were used, among others, to calculate both a correlation percentage and numerical indications responses, as well as to perform other statistical calculations, which are presented in this paper in the section containing the
results of the conducted examining. Correlations were calculated based on the Pearson chi squared coefficient.

Theoretical research methods were also used to achieve the aim of the research and to provide answers to the research problems posed. The methods of analysis and synthesis were mainly used during the critical analysis of the literature on the subject. Thanks to its application, regularities were determined in the scope of the undertaken projects that shape the city’s creative and intelligent space in relation to security. On the one hand, abstraction made it possible to eliminate less important features and dependencies in the scope of the studied problem but, on the other, it also enabled the authors to perceive certain dependencies and to recognize certain features as important. The generalization methods allowed the features and effects of a repetitive and general characteristic to be disclosed, as well as to formulate conclusions.

The conducted study should also indicate limitations. The study provided only general knowledge on whether cities, while creating a creative and intelligent space, also take security issues into account. Despite the fact that they had the opportunity to provide their own answer, in the vast majority of cases, they limited themselves to only choosing from the proposed answers.

The research assumption was to conduct the study in medium-sized and large cities located in all voivodships in Poland, which ultimately failed, as none of the cities located in the Lubuskie voivodship agreed to participate in the study.

2.3. Characteristic of the Respondents

Eighty representatives of medium and large cities in Poland participated in the survey, of which 42 are 4th class cities (20,000–49,999 inhabitants), 21 are 5th class cities (50,000–99,999 inhabitants), 11 are 6th class cities (100,000. inhabitants), and 6 are 7th class cities (200,000 or more inhabitants). The dominant group were therefore representatives of medium-sized cities. The list of cities participating in the study is included in Table 4.

| Voivodships       | Population | Population | Population | Population |
|-------------------|------------|------------|------------|------------|
| Dolnośląskie      | Dzierżoniów, Jelenia Góra | Glogów | Legnica | Wrocław |
| Kujawsko-Pomorskie| Tuchola | Brodnica | Zamość, Biała | - | - |
| Lubelskie         | Puławy, Łuków | Podlaska, Kraśnik | - | Lublin |
| Lubuskie          | - | - | - | - |
| Łódzkie           | Opoczno, Radomsko, Aleksandrów Łódzki, Kutno | Belchatów, Piotrków Trybunalski | - | - |
| Małopolskie       | Libiąż, Olkusz, Zakopane, Myślenice, Skawina | - | Tarnów | Kraków (powiat), Kraków |
| Mazowieckie       | Żyrardów, Ostrów Mazowiecka, Mińsk Mazowiecki, | Wołomin | - | - |

Table 4. Cities participating in the study (by voivodships and population).
Most of the analyzed cities fulfil an industrial and service function (37 cities). Fifteen cities have an industrial function, while 10 cities have a service function. Nine cities play a recreational and tourist function, while 2 cities play a commercial function. One town is a religious object. The remaining cities serve as health resorts, services and tourism, settlement functions, industry and tourism, trade and services, or agriculture and services (Table 5).

**Table 5. City function: Dominant type of activity.**

| City Function                      | Medium Cities | Large Cities |
|------------------------------------|---------------|--------------|
|                                   | 20,000–49,999 | 50,000–99,999 | 100,000–199,999 | 200,000 and More |
| Industrial                         | 11            | 3            | 1            | 0               |
| Commercial                         | 0             | 2            | 0            | 0               |
| Service                            | 6             | 2            | 1            | 1               |
| Recreational and tourist           | 6             | 2            | 0            | 1               |
| Industrial and service             | 15            | 10           | 8            | 4               |
| Religious object                   | 0             | 1            | 0            | 0               |
| Other                              | 4             | 1            | 1            | 0               |

As previously stated, the survey covered representatives of 80 medium and large cities in Poland (Table 6). Most of the respondents (64) had received higher education. Fifteen people had higher education with the title of doctor, habilitated doctor, or professor. Just one of the respondents only had secondary education. Most people had graduated in management or economics (23). Thirteen people graduated from the field of public administration. None of the respondents graduated in finance or accounting. The remaining respondents graduated in the following fields: Law (6), English philology (3), engineering and production, construction (3), technical studies, spatial management (2), political science (10), international project management, Polish philology (2), environmental engineering (2), journalism (5), IT (2), MBA studies, philosophy, pedagogy (3), agricultural major,
history, machine building and construction, architecture, aviation, geography and tourism, and German philology, where it should be noted that some of the respondents completed more than one field of study.

Table 6. General characteristics of the respondents.

|                              | Medium Cities | Large Cities | Total |
|------------------------------|---------------|--------------|-------|
| **Education**                |               |              |       |
| secondary education          | 1             | 0            | 1     |
| higher education             | 51            | 13           | 64    |
| higher education with the title of (PhD, prof.) | 11           | 4            | 15    |
| **Field of completed studies** |             |              |       |
| public administration        | 11            | 2            | 13    |
| finance, accounting          | 0             | 0            | 0     |
| management, economy          | 17            | 6            | 23    |
| other                        | 38            | 9            | 47    |
| **Position held**            |               |              |       |
| executive body (mayor, city president, and deputies) | 2       | 0           | 2     |
| treasurer                    | 0             | 0            | 0     |
| secretary                    | 3             | 0            | 3     |
| manager or functional manager| 58            | 17           | 75    |
| **Areas of professional development** |           |              |       |
| knowledge of the problems of the city’s functioning | 39       | 7           | 46    |
| knowledge in the field of management or finance | 32       | 8           | 40    |
| knowledge of regulations and laws, including those related to the EU | 28       | 3           | 31    |
| knowledge related to obtaining European funds | 32       | 6           | 38    |
| knowledge in the field of marketing | 22       | 8           | 30    |
| knowledge in the field of economics | 15       | 8           | 23    |
| knowledge of foreign languages | 37       | 10          | 47    |
| knowledge related to human team management | 33       | 8           | 41    |
| interpersonal skills         | 28            | 9            | 37    |
| the ability to make decisions quickly and accurately | 27       | 9           | 36    |
| the ability to delegate tasks to subordinates | 26       | 6           | 32    |
| knowledge about the possibility of implementing intelligent solutions in the city | 46       | 11          | 57    |
| information technologies    | 33            | 12           | 45    |
| other                        | 5             | 0            | 5     |

Source: Own work.

The vast majority of respondents held the position of manager or functional manager (75 people). Two representatives of the city’s executive body and 3 secretaries (all were representatives of a medium-sized city) also participated in the study. None of the respondents acted as a treasurer.

The respondents were also asked which areas they would like to supplement their knowledge and/or skills. More than one answer could be given to this question. The largest number of respondents (57 people) indicated that they would like to expand their knowledge on the possibility of implementing intelligent solutions in the city. Subsequently, the most frequently indicated areas
of knowledge or skills that the respondents would like to supplement were knowledge of foreign languages (47 people), knowledge of the city’s functioning problems (46 people), information technologies (45 people), knowledge related to human resource management (41 people), and knowledge in the field of management or finance (40 people). Three respondents stated that there was no need to supplement their knowledge and/or skills.

3. Results

Creativity and innovation are distinctive features of smart cities, which affect their attractiveness, development, and competitiveness. Innovations generate opportunities to expand the public space, in which modern, creative, and innovative solutions will be visible. Creativity is the highest and almost unlimited economic capital [48]. Cities, on the other hand, are places where problems arise, as well as their solutions; therefore, urban space is a fertile ground for the development of science and technology, culture and innovation, and individual and collective creativity [16].

In 2014, the International standard ISO 37120:2014 “Sustainable development of communities—Indicators for city services and quality of life” was issued. Its primary goal was to define and establish a methodology for a separate set of indicators for controlling and measuring the effects of activities in the field of city services and quality of life. Therefore, it established a common basis for reporting, comparisons, and benchmarking. The standard was improved in 2018 by the International standard ISO 37120: 2018 “Sustainable cities and communities—Indicators for city services and quality of life”. Among the specified indicators were the following: Economy, education, energy, environment and climate change, finance, fire and emergency response, governance, health, housing, population and social conditions, recreation, safety, solid waste, sports and culture, telecommunications, urban planning, transportation, urban/local agriculture and food security, urban planning, wastewater, and water [34].

During the study, representatives of medium and large cities in Poland were asked to what extent the implemented projects shape the creative and intelligent city space (Table 7).

Table 7. The scope of implemented projects that shape the creative and intelligent space of the city (n = 80).

| Projects                          | Implemented Projects [%] | Medium Cities | Large Cities |
|-----------------------------------|--------------------------|---------------|--------------|
|                                   | Total                    | IV     | V    | VI    | VII   |
| Economy                           | 60                       | 52     | 91   | 52    | 83    |
| Environment                       | 76                       | 76     | 91   | 71    | 67    |
| Poverty minimalization            | 60                       | 57     | 82   | 48    | 83    |
| Health                            | 42                       | 33     | 73   | 43    | 50    |
| Wastewater                        | 66                       | 76     | 55   | 57    | 50    |
| Education                         | 94                       | 93     | 91   | 100   | 83    |
| Recreation                        | 79                       | 79     | 82   | 76    | 83    |
| Solid waste                       | 60                       | 64     | 45   | 62    | 50    |
| Fire and emergency response       | 75                       | 74     | 82   | 67    | 100   |
| Transportation                    | 74                       | 76     | 91   | 57    | 83    |
| Water                             | 67                       | 71     | 64   | 62    | 67    |
| Energy                            | 54                       | 62     | 55   | 38    | 50    |
| Safety                            | 66                       | 64     | 55   | 67    | 100   |
| Management                        | 65                       | 64     | 82   | 52    | 83    |
| Telecommunication                 | 66                       | 67     | 82   | 57    | 67    |
| Customer service                  | 74                       | 74     | 91   | 57    | 100   |
| Other                             | 1                        | 2      | 0    | 0     | 0     |

Source: Own work.
The most frequently undertaken projects that shape the creative and intelligent space of the city include issues related to education (94%), recreation (79%), and environmental protection (76%). Therefore, most cities undertake activities to protect the environment (ecological safety). Among the other projects for providing security, respondents indicated fire and emergency response (75%), transportation (74%), safety (66%), and health and health security (42%). It should be noted, however, that the issues related to fire and emergency response and safety were indicated by all respondents from large cities with over 200,000 residents.

No significant correlation was found between the city size, voivodship, city function, and the choice of the above answers. However, several significant correlations were found between the selection of security projects and the areas in which respondents would like to supplement their knowledge. A significant correlation was found between the choice of environment and the desire to improve the functioning of problems in the area of the city (\( p = 0.00164, \ fi = 0.3520613 \) — average relationship), choice of environment and the desire to supplement the knowledge in the field of human resources management (\( p = 0.01277, \ fi = 0.02784026 \) — weak dependence), as well as the environment and the indication of the answer “other” (\( p = 0.04916, \ fi = 0.219943 \) — weak correlation). It follows from the above that people who chose the environment more often expressed a desire to improve their knowledge of the problems of the city’s functioning and human resource management than people who did not choose the environment. These people more often indicated another answer.

The studies also found a significant correlation between the choice of safety and the desire to gain knowledge in the field of management and finance (\( p = 0.03334, \ fi = 0.2379155 \) — weak dependence) and the safety and the desire to improve the skills of delegation of tasks to subordinates (\( p = 0.04857, \ fi = 0.2205163 \) — weak correlation). In connection with the above, it should be stated that the respondents who chose safety more often expressed a desire to acquire knowledge in the field of management and finance and to improve skills in delegating tasks to subordinates than people who did not choose safety.

A significant relationship was also found between the choice of transportation and the willingness to increase knowledge about the possibility of implementing intelligent solutions in the city (\( p = 0.02610, \ fi = 0.2487266 \) — weak correlation). This means that respondents who chose transportation were more likely to want to enrich their knowledge of intelligent solutions in the city.

However, no correlation was found between the choice of fire and emergency response and the desire to supplement knowledge or skills.

During the survey, the respondents were asked which areas of activity were most often related to IT technologies implemented in the city in the last 5 years (Table 8).

| Areas of Activity                                                                 | Implemented Projects [%] |
|----------------------------------------------------------------------------------|--------------------------|
|                                                                                 | Total | Medium Cities | Large Cities |
|                                                                                 |       | IV   | V    | VI   | VII  |       |
| Obtaining key data from institutions                                            | 19    | 21   | 36   | 9    | 0    |       |
| Data storage and processing for the city                                        | 34    | 29   | 45   | 33   | 50   |       |
| Managing and sharing key knowledge with employees and customers                 | 57    | 69   | 45   | 38   | 67   |       |
| Planning, forecasting, and scheduling of processes                             | 36    | 38   | 9    | 43   | 50   |       |
| ongoing communication inside the office                                         | 77    | 81   | 73   | 71   | 83   |       |
| Promoting the city’s own image and brand                                        | 67    | 67   | 55   | 76   | 67   |       |
| Implementation of intelligent solutions in urban space                          | 54    | 48   | 91   | 43   | 67   |       |
| Construction and development of urban infrastructure                           | 49    | 52   | 64   | 29   | 67   |       |
| Construction and dissemination of ICT infrastructure for the community         | 49    | 52   | 64   | 43   | 17   |       |
| (wi-fi access, hot spot, optical fibers, etc.)                                  |       |      |      |      |      | 39    |
| Customer service and safety                                                     | 39    | 36   | 64   | 33   | 33   |       |
Based on the results of the conducted research, it should be stated that IT technologies implemented in medium and large cities in the last 5 years were most often concerned with areas, such as ongoing communication inside the office (77%), promoting the city’s own image and brand (67%), and managing and sharing key knowledge with employees and customers (57%). Technologies in the field of customer service and safety, and supporting administrative processes and building public safety, have been implemented in the last 5 years by 39% and 12% of medium and large cities, respectively.

No significant correlation was found between the city size, voivodship, city function, and the choice of the above answers.

A significant relationship was found between the implementation of ICT technologies in medium and large cities in the last 5 years in the field of supporting administrative processes and building public safety and the respondents’ willingness to increase knowledge in the area of management and finance \( (p = 0.04252, \text{Fi} = 0.226779—\text{poor dependence}) \), the desire to improve the skills of quick and accurate decision-making \( (p = 0.01739, \text{Fi} = 0.265908—\text{weak correlation}) \), and the desire to increase knowledge in the field of ICT \( (p = 0.02145, \text{Fi} = 0.2571429—\text{weak dependence}) \). This means that respondents from medium and large cities, where ICT technologies have been used in the last 5 years in the field of supporting administrative processes and building public safety, more often show a desire to improve their knowledge and skills in the field of management and finance, and to make quick and accurate decisions and ICT technologies than respondents from cities where solutions for supporting administrative processes and building public safety have not been implemented in the last 5 years.

However, no significant correlation was found between respondents from medium and large cities, where projects for customer service and safety had been implemented in the last 5 years to improve their knowledge and skills.

4. Discussion

Summarizing the research carried out, it should be stated that, although the projects undertaken in medium and large cities shaping the creative and intelligent space of the city are implemented to increase the broadly understood security, they are not treated as a priority, as evidenced by the degree of their implementation over the last five years. In Europe, only 12% of projects undertaken to create creative and intelligent urban spaces are implemented for security. Meanwhile, in Canada and the United States, it is already 30% of implemented projects [49] (Table 9).

Table 9. Objectives of European, Canadian, and US Smart Cities Projects (in %; the sum of the percentage is more than 100% due to multi-objectives projects).

| Objectives             | Europe | Canada | United States |
|------------------------|--------|--------|---------------|
| Transportation         | 52     | 38     | 60            |
| Energy                 | 68     | 42     | 44            |
| Buildings              | 56     | 20     | 20            |
| CO2 Emissions          | 68     | 33     | 52            |
| Water                  | 8      | 22     | 24            |
| Security               | 12     | 33     | 36            |
| E-Governance           | 24     | 27     | 24            |
It should also be noted that, while many activities are undertaken for the sake of technical and technological safety, public or personal safety seems to be underestimated. The reasons for this state of affairs include the lack of awareness, as well as the demand and initiative on the part of the authorities [50]. The most common reasons for this state of affairs are a lack of convergence of activities between agencies, a lack of public awareness and demand, a lack of interest from the state, a lack of advanced technologies for new security challenges, under-financing, and an insufficient number of experts [50]. As a result of this state of affairs, cities do not see real threats, which mean that, while digital security is at a high level, the situation is worse in the case of personal safety. Cities such as Los Angeles and San Francisco can be mentioned as examples. In The Economist's rankings from 2019, these cities are ex aequo in 5th place (out of 60 classified cities) in terms of digital security. In terms of personal safety, San Francisco is at 23rd place and Los Angeles is 32nd [51].

The use of new technologies in the city can help improve safety. Smart city systems monitor many phenomena taking place in urban space. These systems include ones that measure the level of traffic volume, energy consumption, and pollution in the water and the air. At the same time, systems, such as GPS, record the location and movement of people and things. Going even further, we can imagine that security protocols, such as facial recognition technology, could help to make buildings more secure in cities.

There are many examples proving that the use of modern technologies in cities improves their safety. One of the most widespread intelligent systems in cities is intelligent lighting systems. These solutions not only improve energy saving, but also make the streets safer. At the same time, the smart city of the future may be safer thanks to street lamp networks that use built-in sensors to detect gunshots or flash their lights in an emergency [52]. For example, in Chicago, there is a streetlight modernization program, which plans to replace over 270,000 lanterns with energy-saving LED bulbs. It is predicted that such action will not only contribute to significant savings and have a positive impact on the condition of the natural environment, but will also increase the safety of the city's inhabitants. LED lamps provide bright and clear light, which improves visibility at night. In addition, the program prioritizes areas where there is an increased risk from the point of view of public safety [53].

One of the most important smart solutions used in cities to increase safety are intelligent transport systems. These include not only autonomous cars, but also intelligent traffic signaling systems. Thanks to their use, it is possible to monitor road traffic, reduce traffic jams, and improve traffic management or minimize its negative impact on the natural environment. Many cities use combined traffic light systems and cameras. This action is aimed at increasing pedestrian safety. It is worth mentioning here, for example, the solutions applied in Boston, which is the leader in the global Vision Zero initiative, whose aim is to reduce fatal and serious road accidents [54]. For this purpose, the data necessary to determine how people behave on the roads are collected. The collected information helps to better design the streets, thereby contributing to increased safety. The Traffic Management System was also installed, among others in Bucharest at 103 junctions [55].

A commonly used solution in cities is an intelligent city monitoring system. Traditional monitoring records the situation, sends the image to the dispatcher, who in turn independently analyzes the recordings from the cameras. Doing so increases the risk of missing certain events, which ultimately reduces the effectiveness of threat detection and neutralization. Intelligent monitoring systems have video detection systems, which means that, thanks to the algorithms used, they are able to detect a fight or a suspicious package at the station, for example, and then inform the dispatcher about this fact, who can then take the necessary measures to ensure safety. This decision to use intelligent monitoring solutions was undertaken by Bucharest, among others.

There are still many solutions adopted in smart cities to improve safety. For example, in Sao Paulo, Brazil, where the population is growing rapidly, many steps have been taken in recent years to make the city safer, more livable, and smarter. The implemented tasks are aimed at: Improving housing conditions, reducing the risk of slum formation, improving the operation of health and

| Social Innovation | 32 | 38 | 36 |
|-------------------|----|----|----|
| Multi-Objectives  | 92 | 64 | 68 |

Source: Own work, based on [34].
education services, modernizing transport, sewage, and waste treatment, energy systems and water systems, as well as reducing air pollution. All of these actions are taken to make the city safer.

A safe city is a new urban opportunity to ensure greater public safety with the specific goal of better quality of life [56]. However, it is important that, along with the development of smart cities, the authorities take both the general safety of the city and cyber security into account. The use of modern ICT technologies in the city does not only generate opportunities, but also new, unprecedented threats. The smart city is also more vulnerable to cyber threats.

Smart city security must be provided intelligently. For this purpose, it is necessary to take measures to protect smart city systems against external threats, as well as to ensure that the technology is used only for a purpose that is legal and socially acceptable. It is also worth ensuring that city residents understand what the technology is used for and what benefits it brings. For this purpose, it is necessary to recognize their needs [57]. Meanwhile, citizens expect that the implementation of projects aimed at creating creative and smart cities will improve their quality of life and have a positive impact on their safety [58]. Finally, it is also because people do not look at the city’s policies and politics, but at the results. Informing citizens and increasing their involvement in the construction of a smart city will not only contribute to the acceptance of the adopted solutions, but also increase social participation in the improvement of smart solutions in the city, including those implemented to improve the safety of both the city and its inhabitants. With engaged citizens, governments and businesses can make more informed decisions about investing in technology that society wants and will use.

Based on the conducted research, the best recommendations were formulated:

- It is necessary to change the understanding of security by people occupying managerial positions in cities—people who indicated that new security technologies are being implemented in their cities expressed a greater willingness to gain knowledge in the field of management and finance, which may suggest that they see it in this sector as the highest vulnerability;
- when designing intelligent solutions in creating intelligent and creative city spaces, they should take into account projects aimed at ensuring safety, not only public safety, but also its other dimensions, such as ecological, information, and other safety;
- the participation of city dwellers in designing and implementing new solutions with the use of communication and information technologies should be increased—they expect that the city’s development will not only improve their quality of life, but also increase their safety level;
- the awareness of city dwellers on new projects being implemented in the city should be increased;
- cities should take measures to protect the implemented intelligent systems against external threats, such as a cyber-attack.

5. Conclusions

Smart cities are widely described as using ICT to solve problems in many areas of public policy. ICT systems can collect, send, and aggregate data from the environment, thereby allowing this data to be analyzed and used [59]. ICT systems can also enable objects and environments to discover, communicate, network, and produce information, creating the Internet of Things (IoT).

A smart city is an effect of city management that, above all, provides universal access to information, efficient handling of matters in municipal institutions, favorable conditions for investment, efficient communication, effective activities of municipal services, care for the natural environment, many different ways of spending free time, active participation of residents in improving the city through cooperation with the administration, and also the safety of residents.

Remember that “the city is safe if it is designed to enhance urban security and public safety as well as protect critical infrastructure” [55]. It is essential that local governments, in cooperation with national and regional authorities, fully integrate and mainstream safety and security in their strategic urban planning, decision-making processes, and service delivery. It is also necessary to increase the involvement of citizens in these processes. This requires establishing cooperation at different levels of government and between NGOs, entrepreneurs, and residents.
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