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Smart Local Communities in Bosnia and Herzegovina

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Editor-in-Chief
Adnan Huskić

Autors
doc. dr. Nasiha Pozder
Vedad Viteškić, MA
Elvedina Omerhodžić, ing. inf. teh.
Andrea Pavlović, dipl. ing. arh.

Translation
Maida Šahinagić

Proofreading and editing
Mr. Amer Tikveša

Layout
Jilduza Pajazetović
Selmir Pajazetović

Cover design
Miomirka Melank

Photos and graphics
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Vedad VITEŠKIĆ, MA, Urban Planning/Architecture

/Analyst and Data Processing Specialist

Assistant Professor Nasiha POZDER, PhD

Team Leader and Coordinator

Elvedina OMERHODŽIĆ, IT Engineer

/Researcher

Andrea PAVLOVIĆ, Architect

/Researcher

"... Therefore, cities, not nations, will be at the forefront of climate change challenges, launching initiatives, setting practical policies and ensuring their monitoring; but individual city authorities will do so only in cooperation with active citizens in the field."
L. Hollis

Contents

Foreword

The Mapping Study before you was produced as part of the Friedrich Naumann Foundation's regional project in the Western Balkans and is the result of several months of work, which included several activities, seminars, and education events discussing smart solutions in urban areas. Meanwhile, "Smart City" has become a widely accepted syntagm, and certainly one of the most important topics for politicians at different levels, public administration, NGOs, the private sector, and the academia.

This study is an attempt to map systematically and scientifically the smart solutions in local communities in BiH. It provides us with a systemic insight into the situation with BiH local communities and as such is an extraordinary base and excellent starting point for future activities, affirmation of smart solutions in local communities, and comprehensive planning and development of local communities.

Adnan Huskić
Friedrich Naumann Foundation for Freedom

"Only the city could cure the city of its own diseases,
but this future could only come from the bottom up"
L. Hollis[1]

1 Introductory notes

1.1 Introduction

The question what a ***smart city***[2] is seems to be so easy to answer at first sight only. In the last ten or more years, this term has become familiar in the literature, practice and everyday communication, mainly in the context of modern technology and smart solutions offered by the IT sector, and as such has become accepted without a generally accepted and unique definition.

Ever since the mid-1970s[3] when ***the smart city*** first appeared as a concept, different authors have set and used different definitions.
The closest definition that this research, "Smart Local Communities in Bosnia and Herzegovina",[4] takes as a starting point is the one that explains it as "a vision of urban development that uses digital and communication technology (ICT[5]) and Internet of Things (IoT), to better meet the needs of citizens and improve the efficiency of city services[6].

Bearing in mind that today's cities are burdened with various problems brought about by decades of continuous urbanization and climate change, which make them less and less functional, healthy, safe, pleasant to live in general, and the obvious need to remedy this situation as soon as possible, it becomes clear that the application of smart systems and smart solutions is necessary. Tools offered by modern technology (ICT and IoT) in combination with rational and efficient use of resources of all kinds, from space and energy to human resources, but also the willingness to accept tools and change the pattern of behaviour by end users - citizens and equally important acceptance by economy and administration, can make cities smart, that is functional and optimized in every aspect.

Guided by these assumptions and the growth of opportunities offered by modern technology, in the mid-1990s Amsterdam created a project that promotes the use of the Internet[7] and since then we have followed the expansion of cities that carry the epithet "smart" or tend to be smart cities.
Such smart cities are resilient and adaptable, they are catalysts for sustainable development and are desirable for life and represent an adequate and logical choice for the necessary urban transformations of local communities in Bosnia and Herzegovina.

Guided by this assumption, under the auspices of the Foundation "Friedrich Naumann Stiftung für die Freiheit", a survey "Smart local communities in Bosnia and Herzegovina" was conducted, which included 143 local self-government units[8] (LSGUs) in Bosnia and Herzegovina (both Entities and the Brčko District. The research arose from the need to map and record the situation in the context of smart solutions and tools with the aim of exchanging experiences and good practices, including the exchange of information and experiences on solutions that did not come to life, in order to ultimately form a database of smart solutions and projects with clear valorisation based on established indicators.

This research coincides with the outbreak of the SARS-COV-2 coronavirus pandemic and as such it partially addressed the sensitivity of cities in the critical period as well as the questions of how and whether local communities reacted in the context of the use of smart solutions during the natural disaster[9] in BiH even during the period following the ***lockdown***.

Also, at the same time in Serbia, within the project "Smart Cities of Serbia - Make them work for people", PALGO smart, with the support of the Foundation "Friedrich Naumann Stiftung für die Freiheit" has been conducting the research "Smart cities of Serbia after the crisis". Since the general goals[10] of the research conducted in both BiH and Serbia respectively is very similar and since both have been conducted with the support of the same Foundation, through this research a comparative analysis of the results is given, which serves to formulate conclusions and recommendations.

1.2 Methodological Framework

In research that, among other things, aims to map and then form databases of smart solutions and projects, the logical choice of methodological approach is one that uses quantitative research methods that can be further classified as partially experimental given that through research (unintentionally) two groups have been established - an experimental one and, within it, a control group.
According to Pavić (2018) "Quantitative research is a systematic empirical research of observable phenomena using statistical, mathematical or computer techniques "and, guided by what has been

said and the specific situation in which the research was created (COVID-19), the following methods have been applied:

- survey
- content analysis
- desk methods

In methodological terms, the applied research design can be classified under pod ***longitudinal***[11] as a combination of its two subtypes: ***panel***[12] and ***cohort***[13] design which involved collecting data at two time points from the same respondents, or at three time points from respondents from the same cohort.[14] (Figure 1)

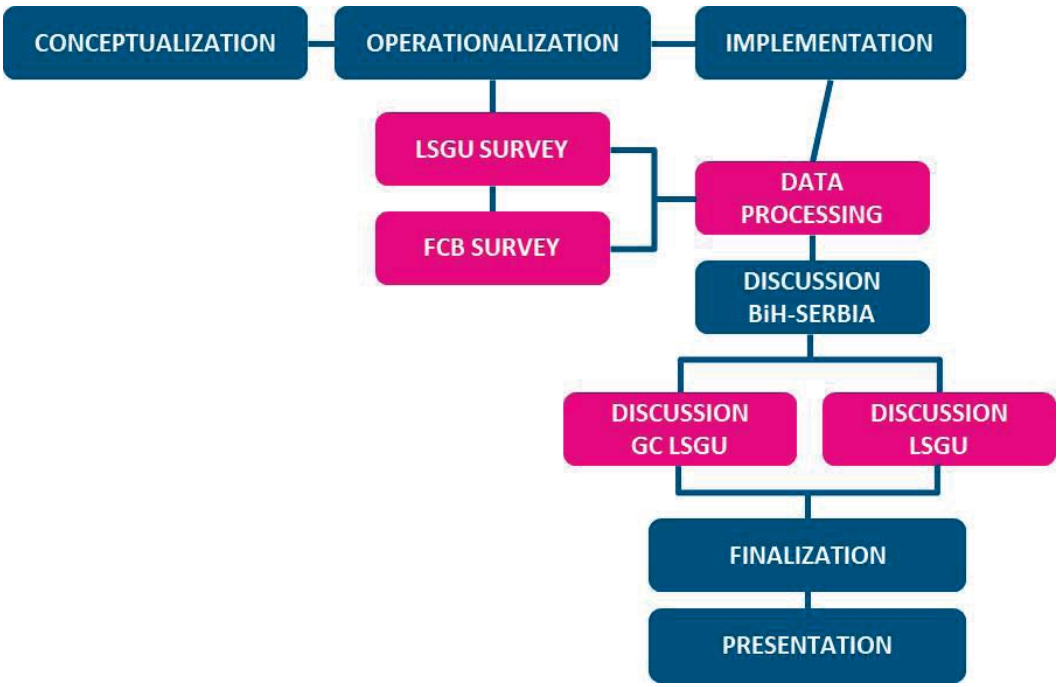

Figure 1 – Schematic overview of applied methodological framework of research

Simply put, as it can be seen from the previous figure, the selected methodological approach using conventional phases of research (conceptualization, operationalization, implementation) had the following phases of data collection:

1. online survey – two time-distance surveys were conducted:
    a. the first one was conducted by using targeted official e-mails and LSGUs' addresses
    b. the second one through a social network (*Facebook*) with sponsored audience targeting

2. online discussion – three time-distance discussions were conducted:
    a. discussion of the comparative analysis of the research results in Bosnia and Herzegovina and Serbia with Palgo smart
    b. discussion of research findings for the main centres of local self-government in BiH - City of Sarajevo, City of Mostar, City of Banja Luka, and the Brčko District
    c. discussion of research findings for selected local self-government units in BiH - City of Tuzla, City of Trebinje, Municipality of Istočna Ilidža, municipalities of Tešanj and Kiseljak

These phases overlap within two processes - operationalization and implementation, where the processed data are discussed and then sublimated into concluding remarks with recommendations.

1.3 Subject of research

As stated in the Introduction, the research emerged from the need to map and record the situation in the context of smart solutions and tools in order to exchange experiences and good practices, including the exchange of information and experiences on solutions that have not taken root within local communities in Bosnia and Herzegovina, both Entities and the Brčko District. This need arose as

a result of previous observations and observations in the field that indicated the conditional uniformity of the problem in a large number of LSGUs and, at the same time, the inequality in the approach to problem solving, but also the selection and use of available tools and solutions recognized by the smart cities of today.

The objectives of the research were established in the conceptualization phase and divided into general and additional, as follows:

General objectives:

1. Mapping and recording the situation in 143 local self-government units (LSGUs) in Bosnia and Herzegovina – in both Entities and the Brčko District in the context of smart solutions and tools (implemented or planned, established tools in use and tools not used, knowledge levels and capabilities , the capacity of the local community in the context of several important issues and themes to be explored)
2. Exchange of experiences and good practices including exchange of information and experiences with regard to solutions that have not taken root.

Additional objectives:

1. Comparative analysis of the results of this research and the research conducted through the project "Smart Cities of Serbia After the Crisis" for the purpose of comparing the situation in BiH and Serbia
2. Good practices of the Sarajevo Canton (measurable results of the Government that understands the benefits of smart solutions / Smart Sarajevo Project and the results of the study Analysis of Current Overall Digital Resources of the Sarajevo Canton with a proposed solution for establishing a digital platform of the Sarajevo Canton)

Special Objectives:

1. Database of smart solutions and projects with clear valorisation based on established indicators (number of users, savings in money and time, improvement of the quality of life in the local community, measurable results…)

The set goals have undergone certain corrections after the completion of the operationalization phase, but we will refer to each of them below.

2

Smart Cities

As already mentioned in the Introduction, there are many definitions of the term ***smart city*** and very often these definitions are the product of beliefs derived from both professional knowledge and affinities and socio-sociological beliefs and reflections of the author. However, if we reach for the smallest common content that we find in the definitions that appear, we may say that a smart city in the broadest sense implies the use of data analysis technology to understand the situation and understand the problem and then use technology to overcome perceived shortcomings to optimize conditions and resources with the ultimate goal of making the city more sustainable, adaptable, efficient and healthier.
Previously, the most precise definition we used in the research was the one used by the European Commission, which explains a ***smart city*** as a vision of urban development that uses digital and communication technology (ICT) and the Internet of Things (IoT), in order to better meet the needs of citizens. and improve the efficiency of city services".

The fact that cities have never been inhabited in the percentage in which they currently are and that it is estimated that this trend will continue and that by 2050 as many as 68%[15] of people will live in cities out of the total human population brings a whole set of burdens on cities and their functionality and the comfort of living in them. Growing population, continuous urbanization combined with climate change and the consequences it brings (fires, floods, earthquakes, pollution...), the occurrence of epidemics and pandemics and the crisis that we have already created by the ruthless exploitation of natural resources (water, forests, ore, land...) and inadequate management of urban construction land, leads to the crisis of modern cities. This crisis is mainly justified by unstoppable and/or necessary economic development, often "forgetting" the basic urban postulates and urban standards, environmental protection and health of the city and its inhabitants, preservation of the common good and ultimately the fact that the city is a human habitat and that man should be the focus of development.
Getting out of the crisis and repairing its consequences lies in bringing cities, urban units in general in a condition that will be optimal in functional terms, but at the same time in restoring basic urban standards that will ensure a healthy and quality life for its inhabitants. This return is possible through an interdisciplinary approach that implies political will and determination, but also the willingness of all actors, government, economy (i.e. public and private sector), academia and the profession and ultimately all citizens to change and adapt in several layers. The World Health Organization (WHO) gave a set of recommendations in the late 1990s that can be sublimated in the aforesaid.[16]

Ultimately, being aware of the moment in which the world found itself, the global health crisis that has brought a number of additional problems and threatened economic, sociological and mental stability on all corners of the planet, now more than ever the imperative is to equate ***healthy*** with ***smart*** city.

Let us recall the five basic indicators of a ***healthy*** city[17] showed in Figure 2, as well:

1. air quality
2. noise pollution
3. natural surrounding
4. physical activity
5. temperature

and the possibility of improving them by applying the WHO guidelines in terms of a set of recommendations for cities, decision-makers and administrations, and by applying modern technologies and solutions that bring with them ICT and IoT, it becomes easy to accept earlier equalization of ***healthy*** and ***smart*** city.

Figure 2 – Healthy city indicators

In this research, as stated in the introduction, a special focus lies on advocating the use of technology as an important tool for faster recovery of urban areas, but also the importance of a systematic approach in the application of these solutions.

Some of today's most successful smart cities have opted for a systems approach and show that as such, a strategically driven approach is the only right one. Copenhagen, Amsterdam, Vienna, Singapore, have all gone through these important six steps:

1. Strategic decision – commitment to the goal
2. Political decision – political decision-making in support of achieving the goal
3. Intersectoral connection - operability in achieving the goal
4. Civic participation - involvement of citizens in the processes
5. Innovation - application in the form of solutions and approach
6. Strategic document – ***Smart City*** Strategy as a set of analytical findings, goals and projects

All steps taken are equally important and the absence of only one of them endangers the implementation and success of the entire initiative.

In particular, it has been shown to date that ***ad-hoc*** individual solutions and/or their sporadic application and dissociation with the system can bring some relief in the functioning of the city or one of its systems, but they do not bring a permanent and comprehensive response to the crisis. The same applies to the implementation of certain projects for which there was no will or understanding, no need expressed among citizens or end users. Such projects, those that did not go through the process of civic participation, became an end in themselves and after their failure resulted in a decrease in trust in implementers, advocates and the very need for innovation, which is a long-term problem. Ultimately, no less problematic is the lack of intersectoral commitment, readiness of different levels of government and / or different services, institutions, public companies to get involved in a joint project where the analysis identified it as important.

For example, electronic payment for tickets in public city transport (PCT) or applications for tracking the arrival of PCT vehicles at stops make it easier to track service charges and affect the better financial structure of the company, i.e. facilitate and improve passenger service, but do not guarantee full service or functionality of the company and ultimately the city's transportation system. A solution in which, for example, public city transport is fully integrated into a system in which the operator receives information about possible traffic jams or vehicle breakdowns, reacts and bridges the problem by redirecting the vehicle to another route or by replacing a vehicle, while citizens receive relevant notifications in real-time (through their smartphones and/or display at PCT standpoint) works much more efficiently and coherently. This kind of public city transport has a larger number of users, which reduces the use of private vehicles and thus traffic jams and finally the pollution that traffic produces in cities, making the urban transport system more efficient and functional and the city healthier at the same time.
Such systemic solutions are possible and desirable in all city systems, from health, administrative, communal to educational, cultural or any other that the city has.

On the basis of all of the aforesaid, one may conclude that it is important for any city to include in its development strategy a systematic approach to the growth of the city as smart and, at the same time, for any city or organization that decides to strategically approach smart city development it is important to accept regulation of their use as one of the important postulates of all plans that may arise from the strategy.

Therefore, we can follow the development of ***smart cities*** 30 years back and just as different definitions refer to this term, we can make differences between ***smart cities*** in terms of technology application model or system approach, citizen involvement or success. We can talk about Copenhagen as a ***smart city*** that after the 2011 floods turned to smart solutions based on ICT and IoT but at the same time in 2014 was declared Green European Capital; or Vienna, which drafted Smart City Wien in 2014, a Framework Strategy document according to which it still implements its plans and projects and in which it states as its main goal by 2050: "(...) find and implement optimum solutions designed for long-term stability in the interests of the whole community." (p. 16) thus showing its determination to create a healthy environment for man in focus (Figure 3).

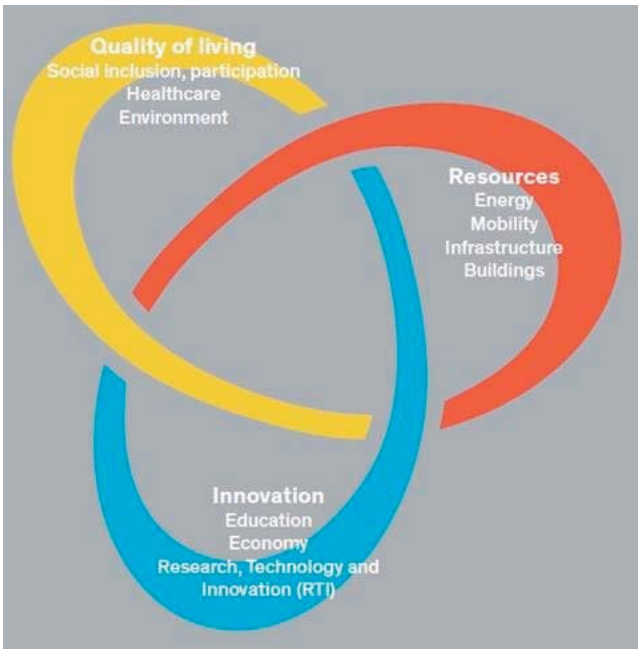

Figure 3 – The Smart City Wien Principle;
Source: Smart City Wien, Framework Strategy 2014, p. 14

As in all other fields, so in this one, it is important to know how to recognize good practices and base your decisions on the experiences that come from them.

3 Results of research

In the previous chapter, the importance of a strategic approach was emphasized, as well as the determination and commitment to a systematic solution to the problem that is recognized by the analysis. Guided by the definition of a smart city that this research takes as a basis and the goals set at the beginning, and following the selected methodology, a research was conducted, the results of which will be presented below.

As a reminder, the research included a survey with local self-government units conducted by e-mail (official e-mail addresses or e-mail contact persons), then a survey through social networks where the respondents were citizens aged 18+ and direct online discussions with representatives of selected local self-government units. The research also included a comparative analysis of the findings of the research "Smart Cities of Serbia After the Crisis", which included a direct online discussion with the leader of the research team on this project and finally a webinar where the results of the research were presented.

3.1 Results of research within LSGU

The results will be presented below were carried out in two phases through longitudinal research system, and in two time points with the same respondents.

The first phase was conducted through a survey of local self-government units, while the second phase involved a direct online discussion with selected respondents from the first phase of surveyed local self-government units.

In terms of data processing, the research also had two phases. In the first phase, the data of all respondents were processed, collected through the survey, while in the second phase, the results of the survey for selected respondents were compared.

3.1.1 LSGU Survey

At the beginning, it is important to point out that the research within the LSGU, due to the specific situation in which it emerged, was done exclusively through online surveys, without going to the field and having live contact with the respondents.

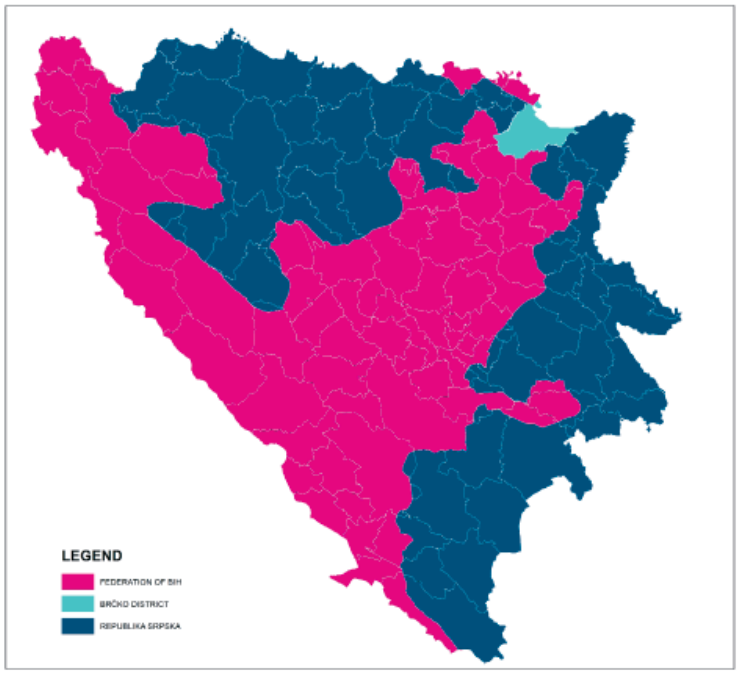

Figure 4 – LSGU overview in BiH

The survey was forwarded to the official e-mail addresses of the local self-government units and was answered by the representatives of the local self-government units delegated by the their

respective management or by contact persons who responded to inquiries that ere received through the official e-mail addresses of the local self-government units and, in the third case, persons recognized as adequate interlocutors based on their previous experiences on projects of a similar nature.

Through the survey, the contact persons introduced themselves by name and surname, their position within the local self-government administration and personal e-mail address, and all data are an integral part of the research.

The administrative structure of Bosnia and Herzegovina is such that within the two Entities and the Brčko District we have the total of 143 units of local self-government (Figure 4).

During the preparation of the survey, it was established that four LGUs did not have an official e-mail address or they were not publicly available on the website.

After preparing the e-mail list, an interactive survey with a total of 23 questions (Figure 5) was forwarded to 139 e-mail addresses.

Responses were collected over a period of 21 days and in some cases, especially in the largest LSGUs or in the case of those that were assessed as particularly interesting for this research, responses were additionally requested by personal, telephone contact to ensure the participation of targeted LSGUs.

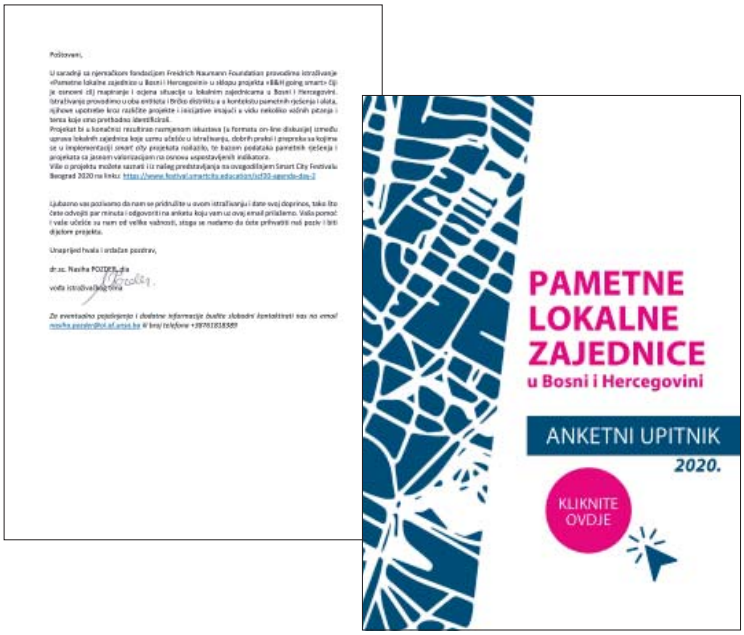

Figure 5 – Survey questionnaire for LSGUs

After the completion of the process of collecting responses from the LSGUs, data processing followed. A total of 28 responses were collected, that is 28 LSGUs responded to the call and joined

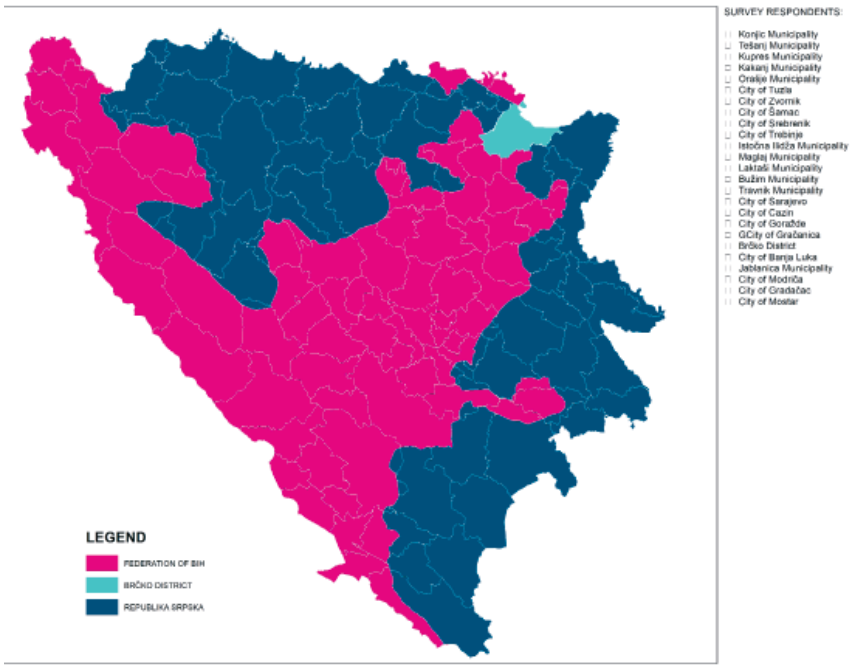

Figure 6 – Overview of LSGUs that responded to the survey questionnaire

the survey and sent their responses within 21 days (Figure 6). The sample of 28 answers represents 36% of the total number of respondents and can be taken as a relatively good percentage and relevant for the research. It is especially significant that the largest urban centres in BiH: the City of Sarajevo, the City of Banja Luka, the City of Mostar, the Brčko District, joined the research and gave their contribution.

The percentage structure of respondents that sent their answers (hereinafter: respondents) according to the Entity to which they administratively belong is shown in Figure 7.

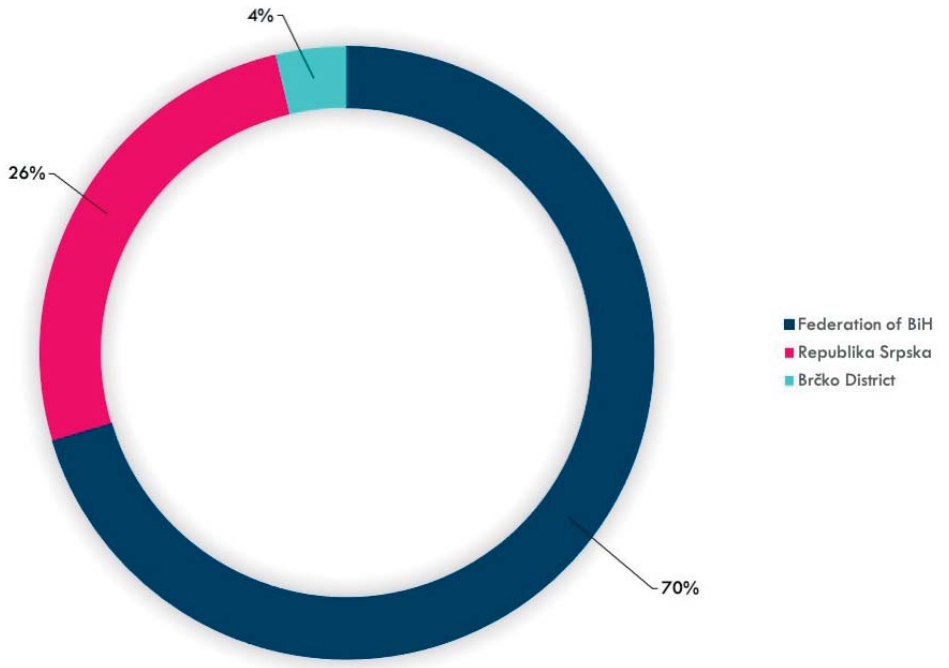

Figure 7 – Entity qualification

3.1.2 Results of the survey conducted within the LSGU

As already mentioned, it is noticeable that most LSGUs in BiH share the same or very similar problems, more or less pronounced, which depend and manifest themselves depending on the number of inhabitants, economic development of LSGUs, geographical position and traffic connections, but also on geomorphological, natural, resource-related characteristics and features and the degree of urbanization and demographic-sociological characteristics. These problems and shortcomings affect the quality of everyday life and the urban standard of local self-government units.

Differences are more noticeable in the approach of solving these problems and eliminating shortcomings, and the readiness of the administration, the political will and determination of the local government also plays this role, and in this segment the inequality is more dominant. Again, depending on the above characteristics, adding to them the aforesaid ones as well, depends on the resilience of local self-government and its adaptability in functional and any other sense, so some are still at an acceptable level of balancing between problems that arise and their solutions or they ignore them, meaning that they still work because there has been no escalation of the problem.
For instance, in smaller local self-government units, the increase in the number of cars per household is noticeable in relation to solving the problem of stationary traffic in the narrower urban zone, especially during working hours or on market days when migrations on the periphery-centre route are larger, but due to small distances in search for a parking space "circling around" does not lead to the collapse of traffic just yet, the appearance of a larger amount of pollution from exhaust gases or a significant loss of time, so the pressure on the local self-government to solve this problem is negligible or bearable.

However, solving some problems, be it the problem of stationary traffic at the moment of "tolerability" would be optimal. Identifying the problem and the moment to solve it is related to the

analysis, data collection process and strategic commitment of the management, which then seeks a solution offered by the profession, either planners or IT experts.

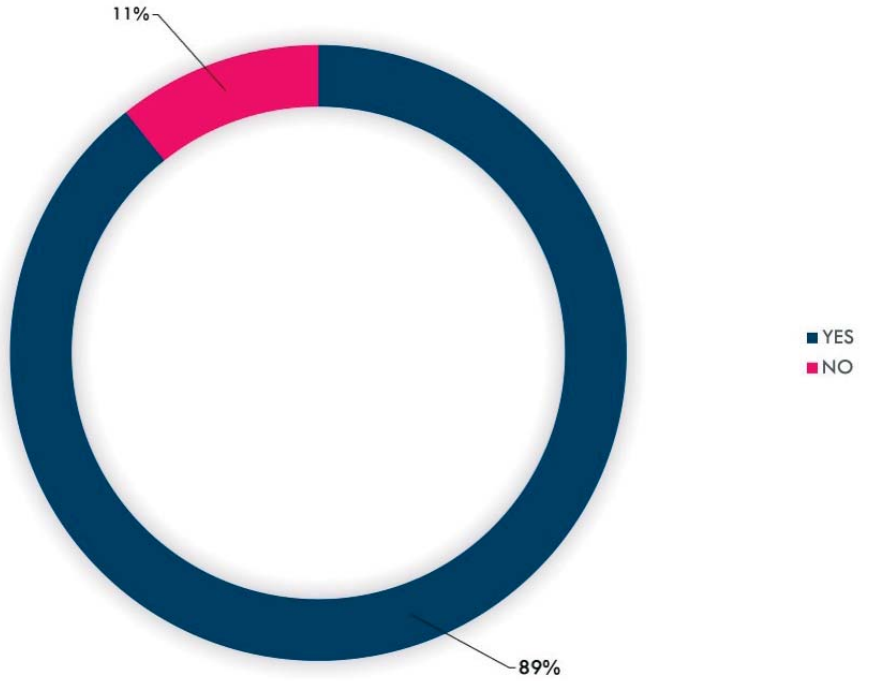

Figure 8 – Knowledge of Smart City terms and concepts

Having in mind all the above, as well as the goals of this research, the question that was very important to ask is how familiar the local self-government units are with the term ***smart city***, i.e. how familiar they are with the version that is often used in Bosnian/Croat/Serbian (BHS) languages ***Smart City*** (Figure 8), and then with examine the respondents with what exactly they connect these terms and concepts (Figure 9).

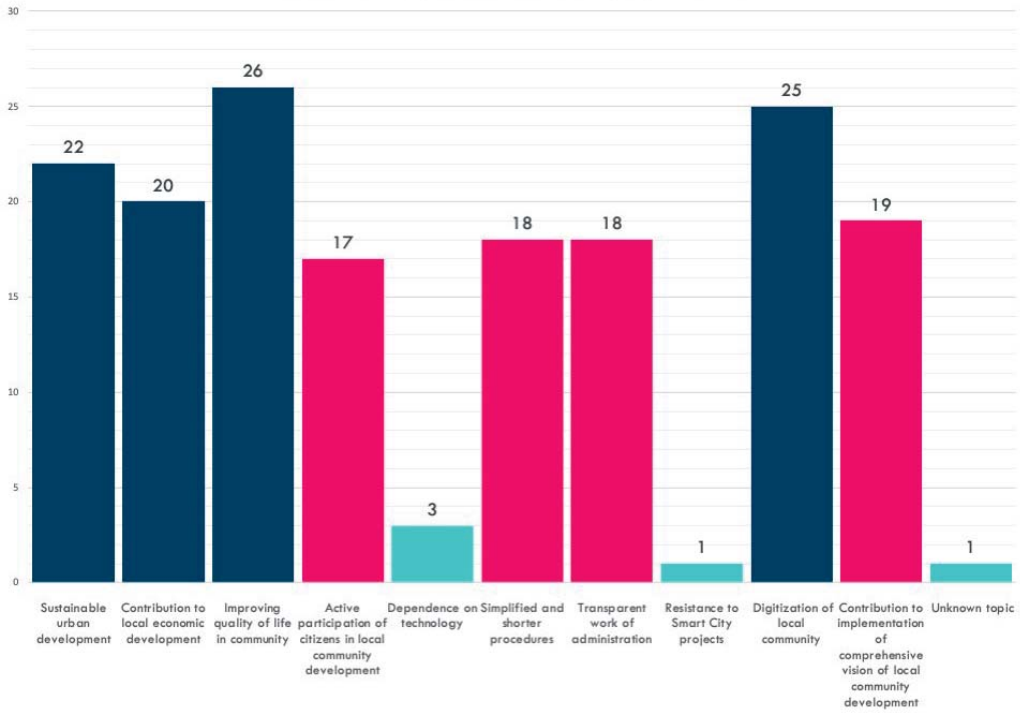

Figure 9 – Understanding Smart City terms and concepts

The survey offered a set of answers and respondents could choose more than one. It turned out that the respondents mostly connect the concepts that appear in the theme with the improvement of the quality of life in the community and the digitalization of the local community. The first answer supports the earlier claim that it is optimal to solve problems before they escalate if we strive to maintain the quality of life in the community, and even more so if improving the quality of life is the goal. Digitalization of local self-government is also related to the quality of life, but also to the simplified and optimal functioning of the administration, therefore, digitalization that facilitates and links work within the administration achieves a better service for citizens but also a more productive working atmosphere and more functional system. What is assessed as positive is that very few respondents chose the answers on the negative scale, i.e. that they associate the term ***smart city*** with resistance to the theme or that they are not familiar with the theme.

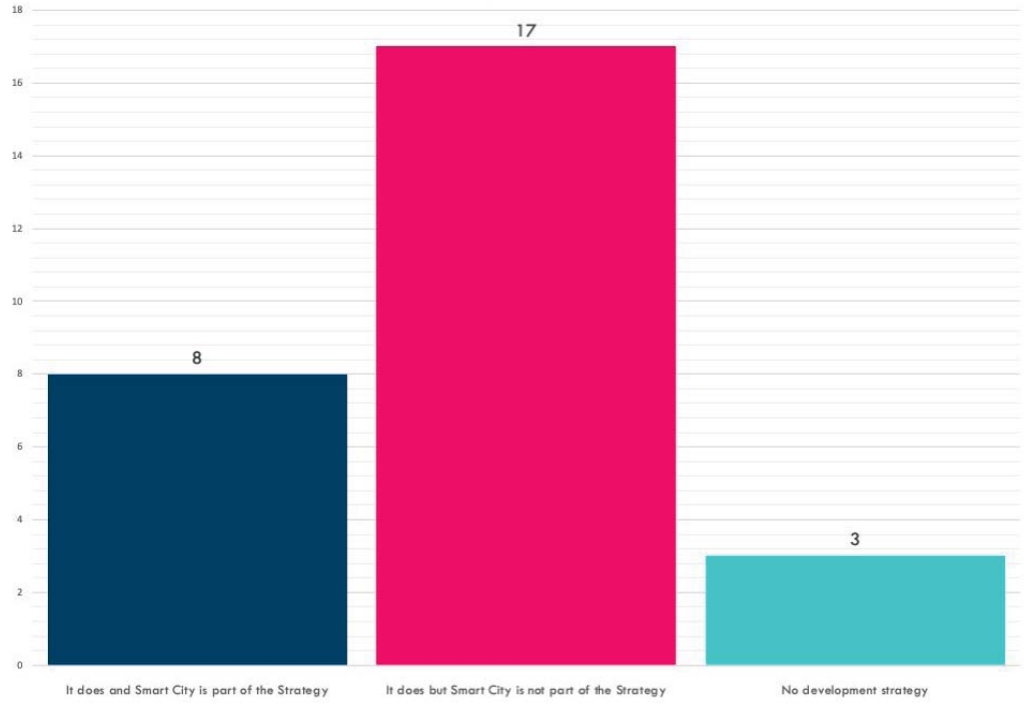

Figure 10 – Awareness of the development strategy on the concept of Smart City in BiH LSGUs

Given that the research established the thesis that the strategic approach is very important and that strategies are significant documents in the implementation of the ***Smart City*** Agenda, it was logical to ask how many and whether LSGUs have defined this attitude, that is how many development strategies were there and whether they took into account smart solutions as an important segment (Figure 10), or how many of them have defined goals of the ***Smart City*** concept (Figure 11).

The fact that most respondents have development strategies should be encouraging, however, a simple look at some of these documents gives the impression that they are mostly documents that represent a set of analytical data and only partially, mostly in their respective final chapters, provide vision and strategic guidelines for development. Methodologically, they still have a very conventional and traditional approach, they do not include citizens in the drafting, and the wider community, mostly businessmen and investors, take investors under the impression of their own assumptions and individual initiatives received. Such strategies generally fail to have the aforementioned ***Smart City*** concepts, and seem to have a purpose of their own. Only eight of the 28 respondents stated that their local self-government had a development strategy of which the concept of a ***smart city*** is an integral part, namely the municipalities of Tešanj, Maglaj, Laktaši and Kiseljak and the cities of Tuzla, Banja Luka, Zvornik and Gradačac which is related and seen through the question of goal definition, shown in the figure 11.

Assuming that the answers to the question of development strategy and the ***Smart City*** concept as a strategic commitment will be exactly as they were obtained in the research, respondents were asked in which domain they think ***Smart City*** solutions would be most needed by their LSGUs. In addition to the question, answers were offered, and the respondents were able to give more preferences (Figure 12).

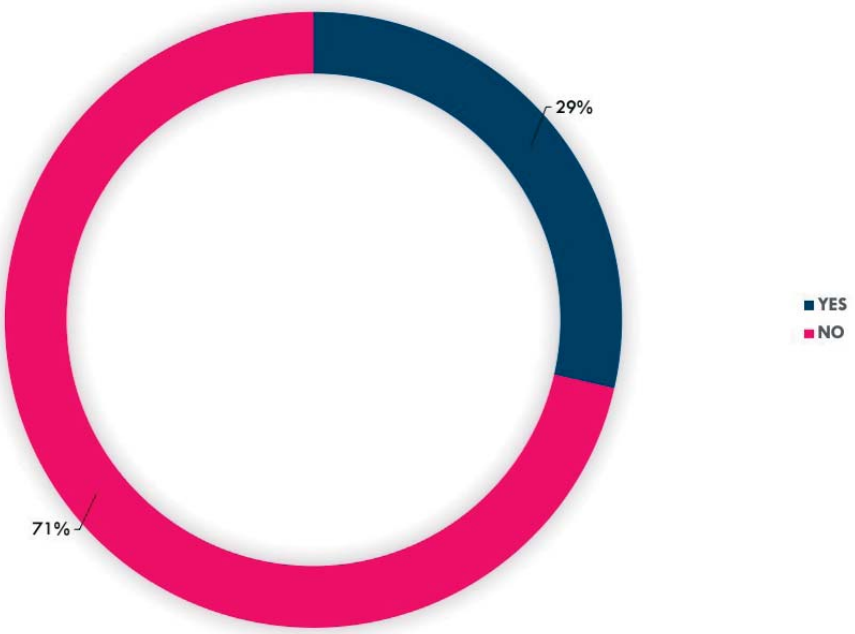

Figure 11 – Definition of the goals of the Smart City concept in BiH's LSGUs

Judging by the earlier answer to the question of what they associate the term ***smart city*** with, answers to this question were anticipated, as well. Most respondents believe that the digitalization of administration is crucial, followed by communal infrastructure and, what is important to emphasize here, and what will be given more space in the final discussions of this document, is the economy and economic development as the third most common answer. However, what is unexpected, given the fact that the research was conducted during the crisis caused by the COVID-19 pandemic, is that only nine respondents believe that the benefits can be seen in the field of social and health care and only a few more that the benefits can be seen in the sphere of transport and mobility, that is civic participation.

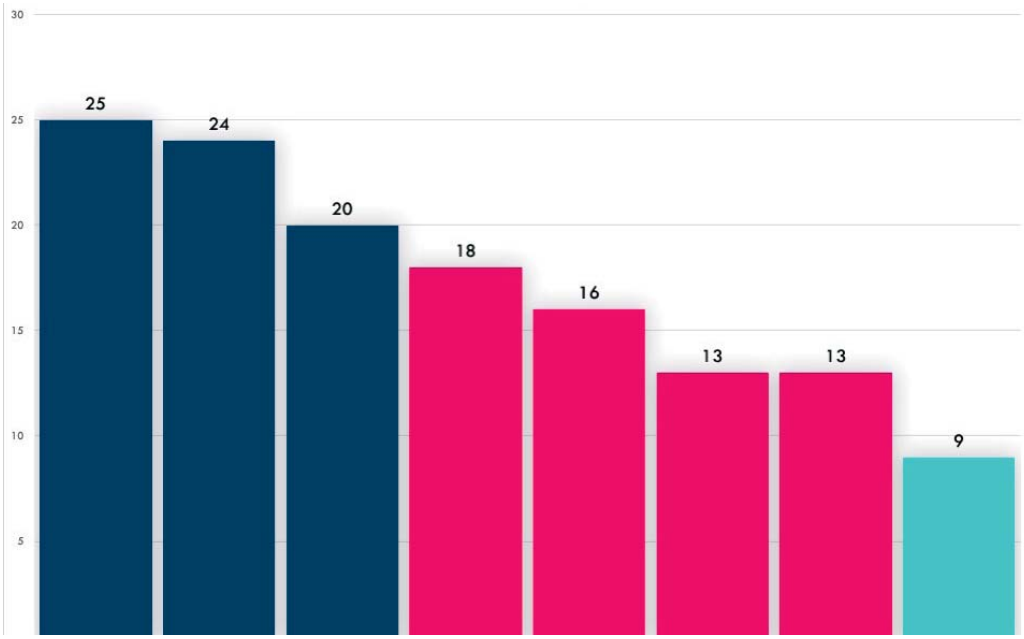

Figure 12 – Domains in which Smart City solutions are recognized as the most needed

If we know that during the pandemic a large number of residents were recommended not to leave their houses, and at some point the freedom of movement was completely banned, it would be expected that the benefits of smart solutions would be considered in the areas of social and health care and transport.

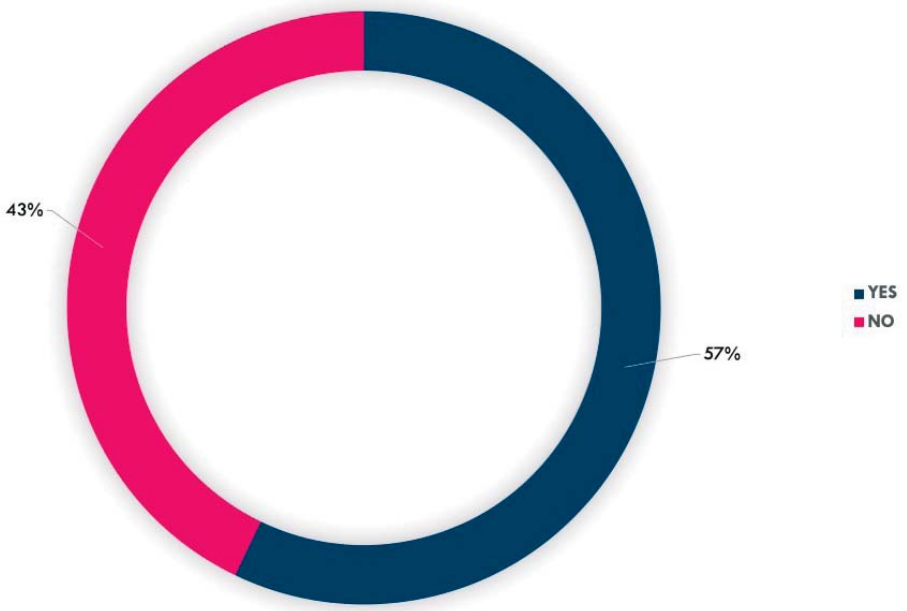

Figure 13 – Percentage of current implementation of Smart City projects among respondents

For instance, most of our LSGUs do not have an e-health system in place. The conventional health care system means that a retired person, who has been prescribed and received a steady therapy for years, must physically go to their family doctor on a monthly basis to collect prescriptions, even though they have paid and enjoy a guaranteed health insurance with their retired person status and although they have had no changes in therapy. For the purpose of going to the doctor in a clinic where they are exposed to a potential encounter with sick and even virus-infected people they take public transportation on which occasion it is not easy or even possible to maintain the recommended physical distance, and then going to the pharmacy where they are repetitively exposed to possible encounters with the sick. The e-health system would automatically send information and e-prescriptions to a pharmacy on a monthly basis, which would then deliver medicines to the address by home delivery. This is one example of how the system works and how it reduces crowds, waiting, risk exposure and simplifies service.

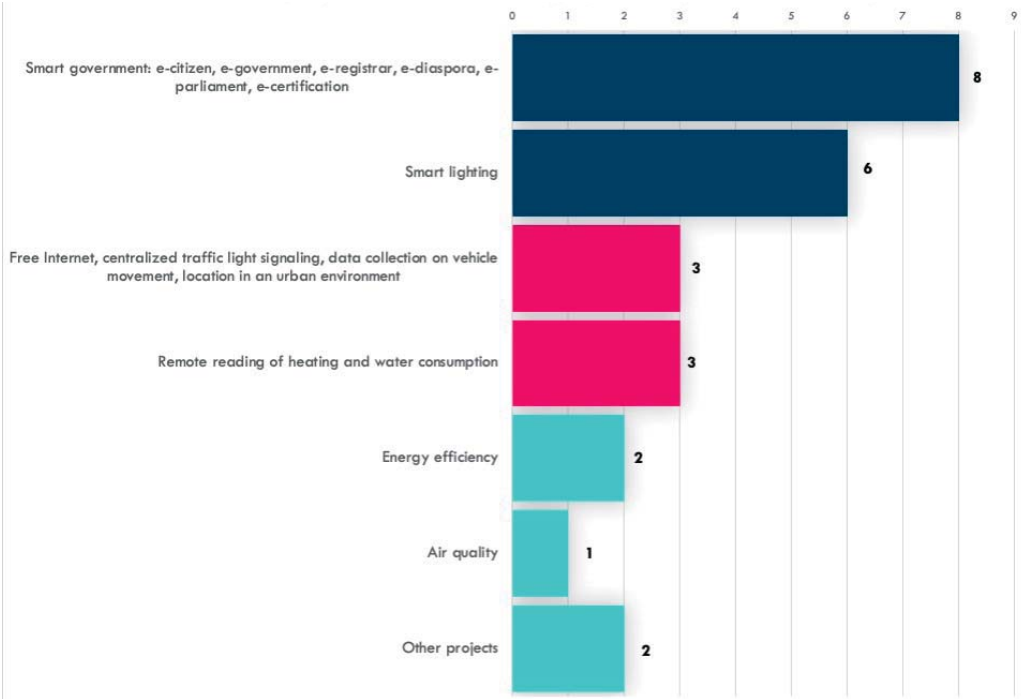

Figure 14 – Types of Smart City projects implemented in surveyed LSGUs

Naturally, a possible reason for this percentage of responses in these areas is the division of competencies where health and social welfare are usually not local competencies, but even so it cannot and must not be a reason not to consider such important segments of local government functioning as important ones to be improved. The initiative for their improvement must start from the level at which the benefit is felt, and therefore the answer to question number 11 "In which domain do you think that ***Smart City*** solutions are most needed by your LSGU?" still cannot be amnestied because the need is necessary to be recognized in order to be met, or an issue to be solved.

That the strategic approach is mostly negligible in the local self-government, and yet the readiness to implement projects in this area does exist, can be argued even after summarizing the results of the answers to the next two questions. Namely, when asked whether any of the Smart City projects are being implemented in your local self-government, more than half of the respondents answered in the affirmative (Figure 13). This result shows that the readiness does exist, but when looking to the answers to the question concerning the type of projects being implemented (Figure 14), there is an obvious lack of inspiration or insufficient information about where and how such solutions can be helpful, i.e. where and what benefits they can bring. It can be stated once again that the most common approach is actually the ***ad-hoc*** one, without a deeper analysis and visionary understanding of how solutions can be interlinked with a quality system.

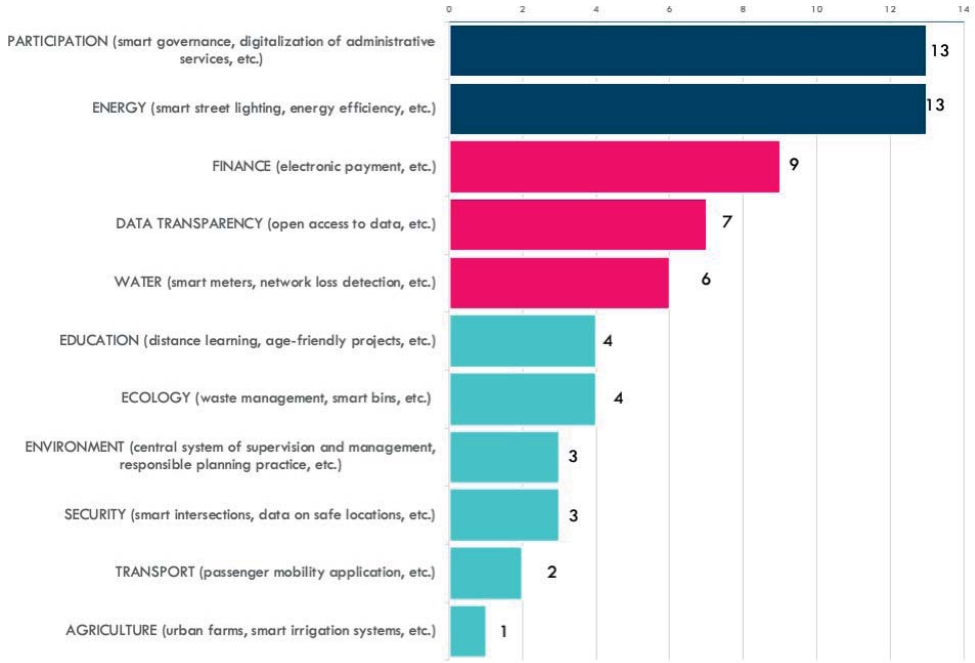

Figure 15 - Smart City areas in which LSGUs have been or are involved through project implementation

From the previous figure, Figure 14, it can be read that the most frequently implemented projects are those in the field of digitalization of public administration and a very limited sector of communal infrastructure, mostly closely related to smart lighting. Later, more detailed communication with some of the respondents generated the most common answer to the following question: "What do you mean by smart lighting?" which was "use of LED bulbs", that is replacement of conventional light bulbs in the public lighting system with those that save energy and have a longer lifespan. ***Dimming***[18] or being equipped with lighting fixtures with additional sensors to collect certain data (such as pollution level, counting the movements of participants in traffic or the like) is not an implied answer. Since the answers to this question were open, meaning that the respondents created them without the offered options, it is important to join the results of the answers collected to a similar question, which were followed by the offered answers. Therefore, when asked whether a LSGU has implemented or is implementing the ***Smart City*** project from one of the offered areas, the answers, as expectedly compared to the previous answers this time, were again related to the same: digitalization of public administration and smart utility infrastructure/lighting (Figure 15).
A negligible number of responses relate to transport, which may be related to the responsibilities of LSGUs or the fact that only few LSGUs have local public transport, as well as to agriculture which is potentially a very flexible area for smart solutions (such as irrigation automation, temperature monitoring, soil acidity, the presence of pests on crops, etc).

When it comes to the implementation of any project, there are several important factors that play a role in the context of the success and quality of the implemented. These factors can be subsumed under quality monitoring, cost-effectiveness in the context of invested funds and those that are returned to the investor through the project, and the benefits arising from the project that justify it. Guided by the factors defined in this way, the respondents were asked the following questions:

1. How Smart City projects are funded in your LSGU
2. What monitoring methods are established in your LSGU
3. What benefits from Smart City projects do you see for your LSGU

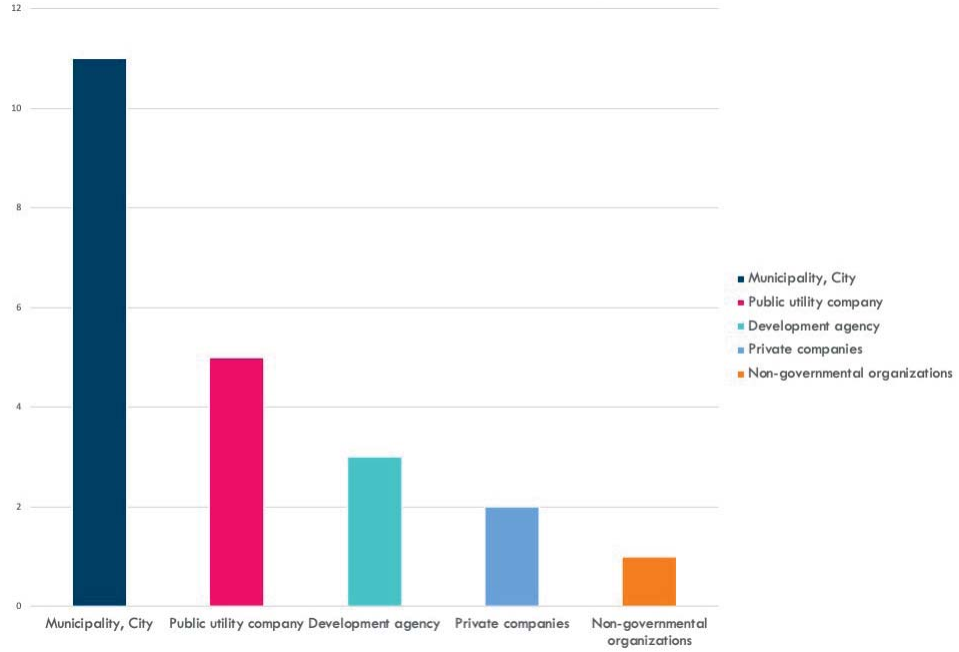

Figure 16 – Overview of Smart City project implementers in LSGUs

These questions were preceded by the question of who implements the projects that they listed as those that already exist within the local self-government that they represent in the research, and the answer (Figure 16) most often indicated that the role of implementer is seen as the local self-government itself either generally or as a service within the LSGU.

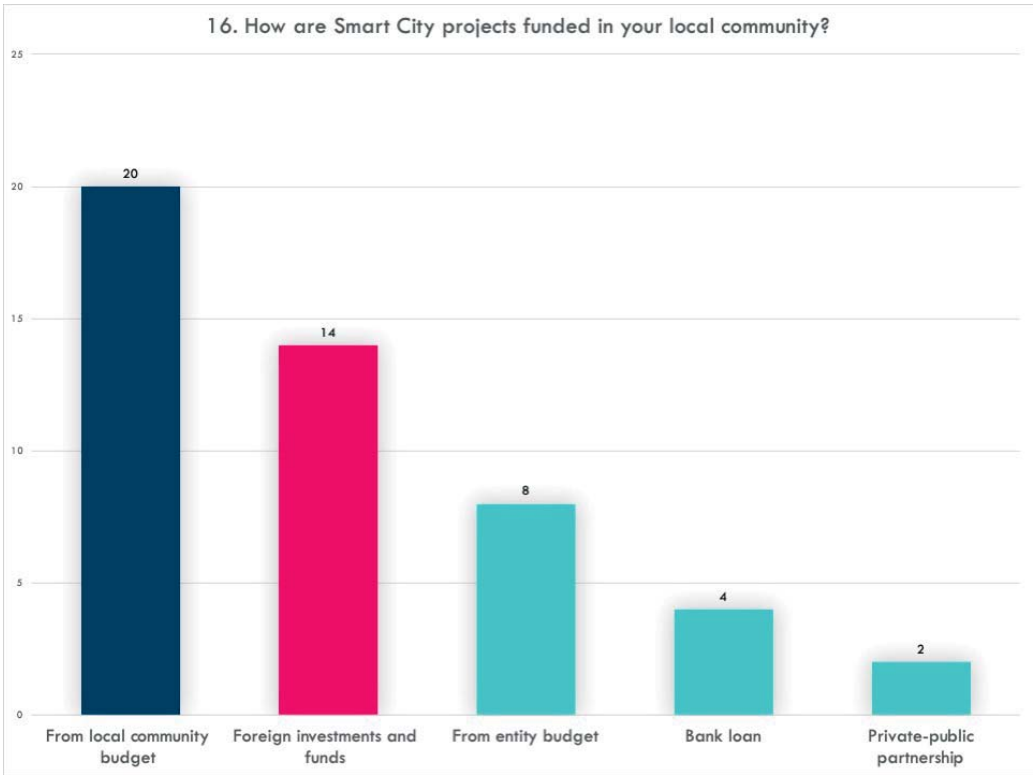

Figure 17 – Models of financing Smart City projects in LSGUs

Answers to the question of financing projects in this area showed that LSGUs are mainly focused on financing from their own budget (42%) and to a significant extent on financing of foreign investors and funds (29%). However, at the same time, the share of private-public partnership is very low, only 4% of respondents answered that they financed projects with this model, namely Kakanj and Šamac (Figure 17).

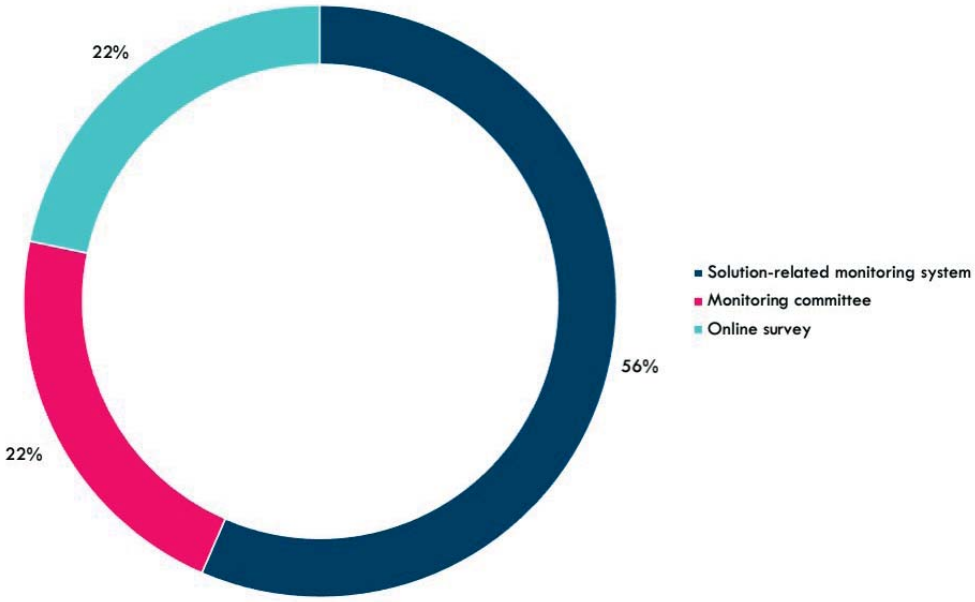

Figure 18 – Implementation monitoring manners

The methods of monitoring the quality and level of implementation, i.e. the justification of the project in general, selected by the local self-government units included in this research, mainly rely on the monitoring system associated with the solution itself. Such systems are reliable and can be very relevant for assessing the effectiveness of the selected and implemented solution, however, it would be good to connect it with the survey of end users using one of the known methods (surveys, online testing, interviews ...). Judging by the answers, LSGUs rarely decide on this type of monitoring (Figure 18).

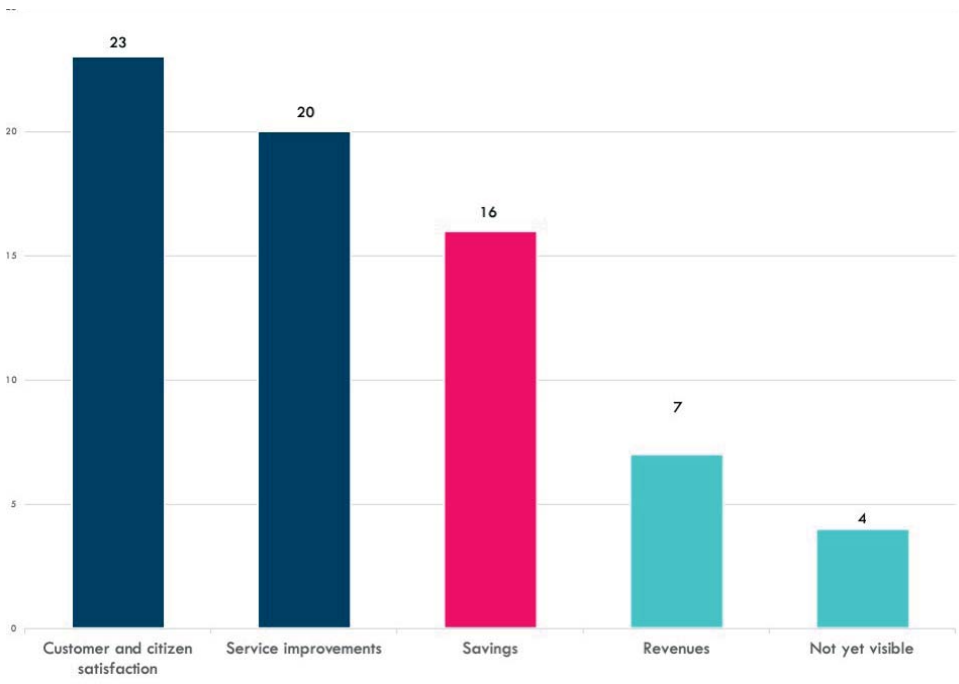

Figure 19 - Benefits of Smart City projects and how LSGUs see them

Recognition of the benefits for LSGUs in the context of projects in this area is most evident in customer satisfaction and service improvement, which again could be expected given the responses shown in Figures 9 and 12.
Equally, it is expected that respondents do not yet see the benefit, i.e. that they only see it through savings and, judging by the percentages, only 10% of respondents recognize the benefit through possible income (Figure 19).

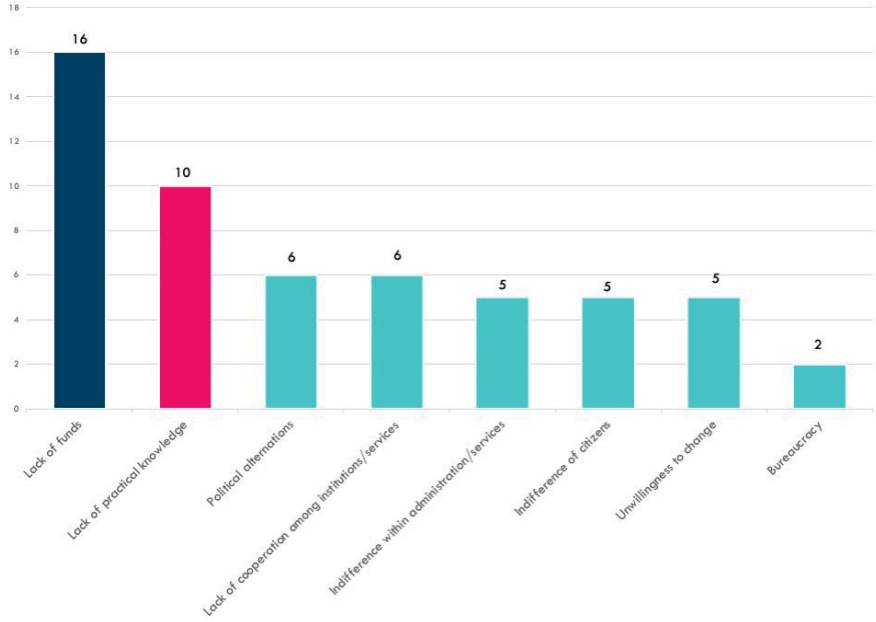

Figure 20 - Obstacles identified in the implementation of Smart City projects in LSGUs

As in any other area, whit this one being no exception but perhaps even more pronounced given that it is relatively unknown, there are various obstacles in the implementation, even at the very beginning of the project, due to which projects are often insufficiently recognized, successful or given up. In order to understand these phenomena, it was important to find out what the most common obstacles that respondents recognize are and why projects are compromised in one of their phases (Figure 20).

The most common answer was "***lack of funds***". If we add the previous figure to this answer, the answer to the question of how projects in this area are funded within the local self-government, or even more important answers to the question shown in Figure 19, a possible conclusion is that one of the reasons for the modest percentage of acceptance and introduction of smart solutions in BiH local communities is actually insufficient understanding or ignorance of the financial benefits that these projects can bring with them through their implementation.
For example, if a public lighting pole is equipped with a sensor that measures the height of grass in a park or public area maintained by a public utility company, mowing will be streamlined and occurs when the sensor sends information that the grass height has reached a level defined as optimal for mowing. In the same way, damage due to wastewater spillage can be prevented if the manholes are equipped with a sensor for measuring the water level inside them. Each of these operations implies savings through a more rational use of human resources and mechanization. In these cases, it is an indirect profit, which, for instance with the introduction of organized bicycle service as a segment of the public transport system, where the local self-government charges parking to the owner of this system, also generates income. It is important to emphasize that the financial benefit exists, that it is multi-valued and that it can be recognized by users and implementers and service providers in the implementation of the project.

Immediately after the lack of funding, respondents cited a "lack of practical knowledge" which suggests that it is necessary to work on strengthening the links between the academic and real sectors in which knowledge and solutions are formed and found with the administration and public sector through which they are still largely implemented. Here, the importance of involving the academic and real sector, that is citizens and the general public in the creation of development strategies, should be emphasized once again, in order to bring know-how knowledge and ideas closer to the implementers.

Figure 21 – Reasons for giving up on started Smart City projects

Lack of cooperation between institutions and political dismissals are an important factor, although the number of responses may not seem so, but on the example of the Sarajevo Canton (KS) we can monitor the impact of these indicators on the implementation of the ***Smart Sarajevo*** project. In particular, the project started in 2018 as initiated by the then Prime Minister of Sarajevo Canton[19] who immediately upon the appointment formed the Commission for the Development of the Terms of Reference for the development of the Action Plan of the ***Smart Sarajevo Project***[20]. The Commission ended its activities by drafting a document that it was presented with in November 2018. With the appointment of the new Government of KS in December 2018, the activities continued, considering that the newly appointed Prime Minister of KS[21] was committed to projects in this area and maintained continuity by consulting Commission members when defining further steps in designing the ***Smart Sarajevo Project***. In cooperation with the UNDP, all preliminary activities were carried out, and in December 2019, a bidder was selected for the development of the ***Smart Sarajevo Strategy and Platform***.[22] With the dismissal of the Government in January 2020 and the interruption of the continuity of monitoring activities on this project and the slow

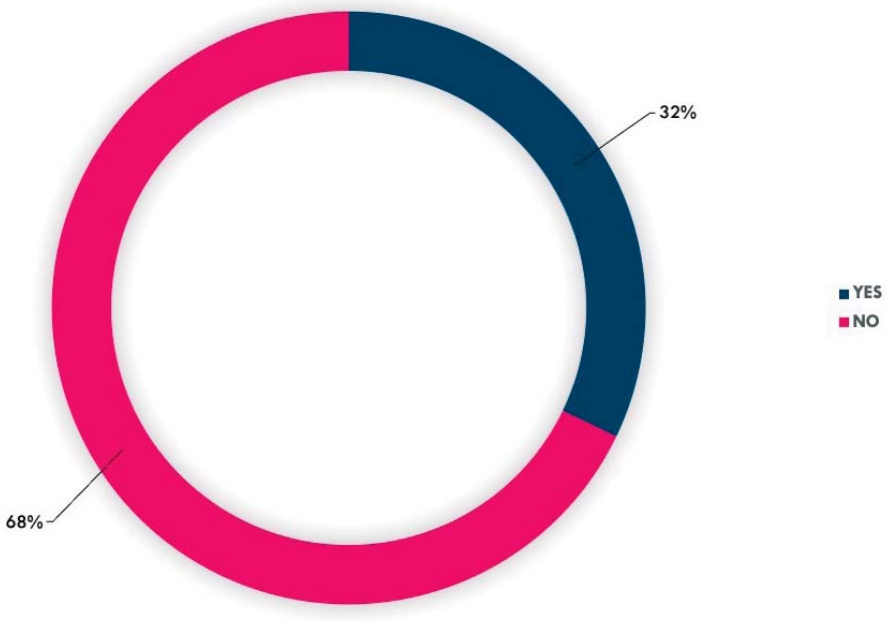

Figure 22 – Introducing the Smart City solution in the pandemic era

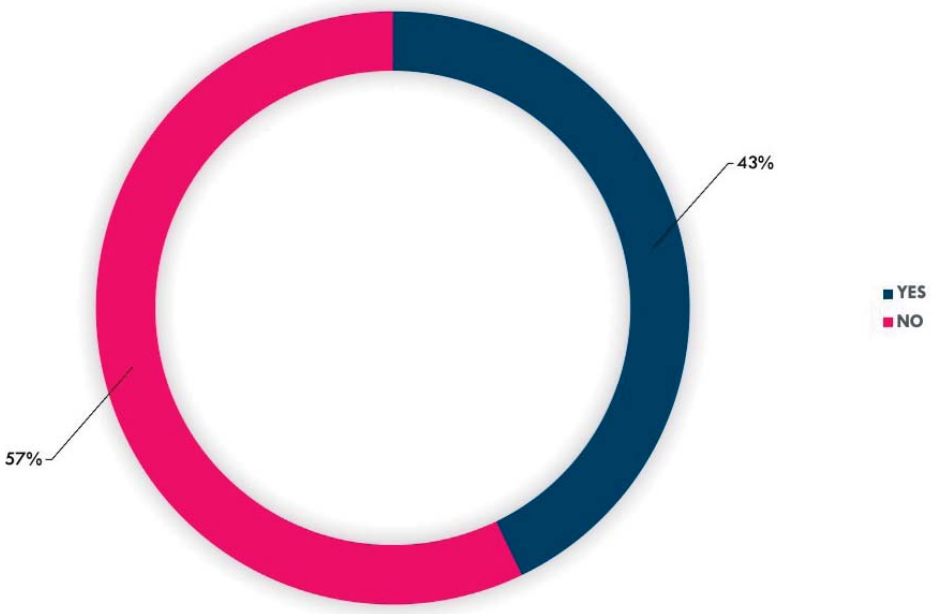

Figure 23 – Ratio between LSGUs that improved services in the pandemic and those that failed

cooperation of public institutions and companies, the implementation almost stopped completely. Such experiences were also shared by the respondents in a direct, online session.

The slowness of the system is further complicated by the overlapping of competencies or unwillingness of both institutions and citizens to change and innovate. For employees of the administration, institutions and services, the solution may be in capacity building, education and staffing, while for citizens the key lies in information and education. All these answers have their weight and all require special attention to ensure greater representation of projects in this area, but also their quality implementation. Withdrawal from the started projects among the respondents is not a common case, but the reasons that lead to them are previously listed and described.

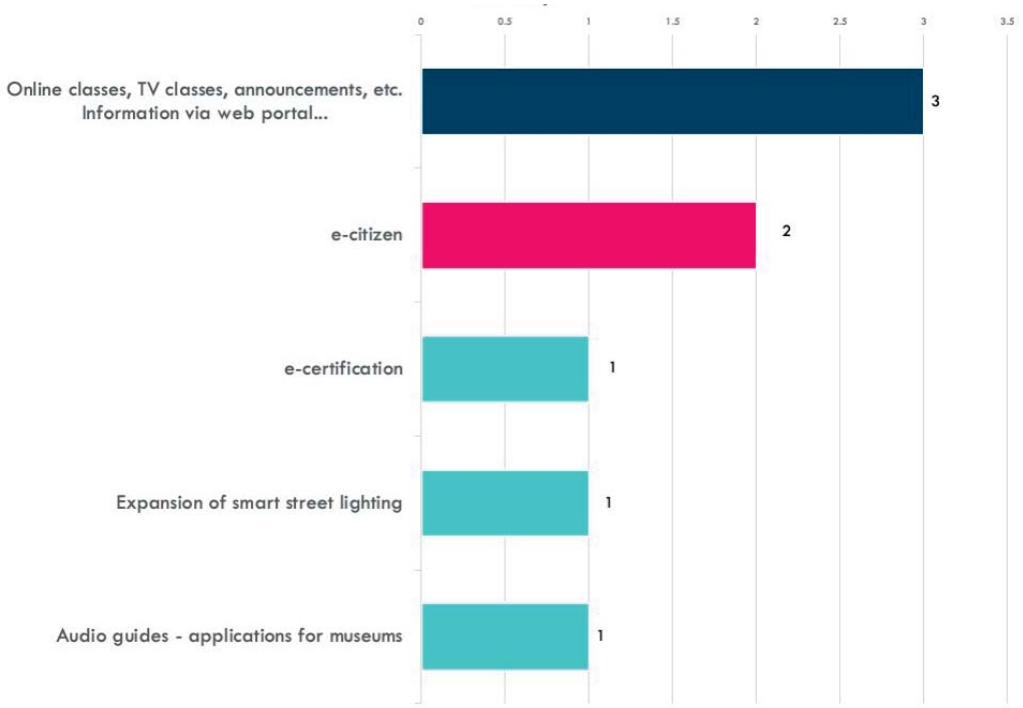

Figure 24 – Implemented Smart City solutions in the era of the pandemic

As already mentioned, the period of this research was marked by the global crisis and coincided with the COVID-19 pandemic, and the research partly touched on the experiences of local self-government in the context of the administration's reaction to the situation that hit the whole world. Quite unexpectedly, as many as 68% of respondents, when asked if their local self-government introduced any Smart City solutions during the pandemic, answered in the negative (Figure 22).

Very similar to the previously shown ratio is the percentage of those who improved some of the services using smart solutions and those local governments that failed to do so (Figure 23)

The review of modest reactions in terms of recognizing ***Smart City*** solutions and tools as those that can contribute to improving the quality of life in the new reality created by the impact of the pandemic is reflected mainly in the following (Figure 24).

Nevertheless, all respondents interviewed directly recognized the potential of these solutions in challenging times such as the one brought by the pandemic.

In conclusion, LSGUs, if identified with those involved in the research, possess the necessary prior knowledge of ***smart city*** solutions, recognize the opportunities and benefits that these solutions bring, but are also aware of the obstacles encountered in the implementation and they do need help and assistance. The lack of a development strategy that would include in its content a commitment to the concept of a smart, but essentially healthy and adaptable, resilient and functional city, is also recognized as a common problem within the LSGUs. Specifically, the lack of strategic commitments is a possible reason for the modest scope of applied solutions and implemented projects. Another significant factor influencing the fact that the ***Smart City*** concept is not generally accepted is the funds, both those necessary to launch projects and those that LSGU does not yet recognize as the profit that comes with these projects. All this is the basis on which to build a platform within the LSGU for the development of ***Smart City***.

3.1.3 Online discussion with selected LSGUs

As described in subchapter 1.2, the applied methodological framework involved a longitudinal research process and surveying respondents from the same cohort at two time points. Simply put, after conducting a survey within the local self-government, several key respondents were targeted for research, and after summarizing the results, a direct, online discussion was conducted with them, based on a comparative presentation of the survey findings.

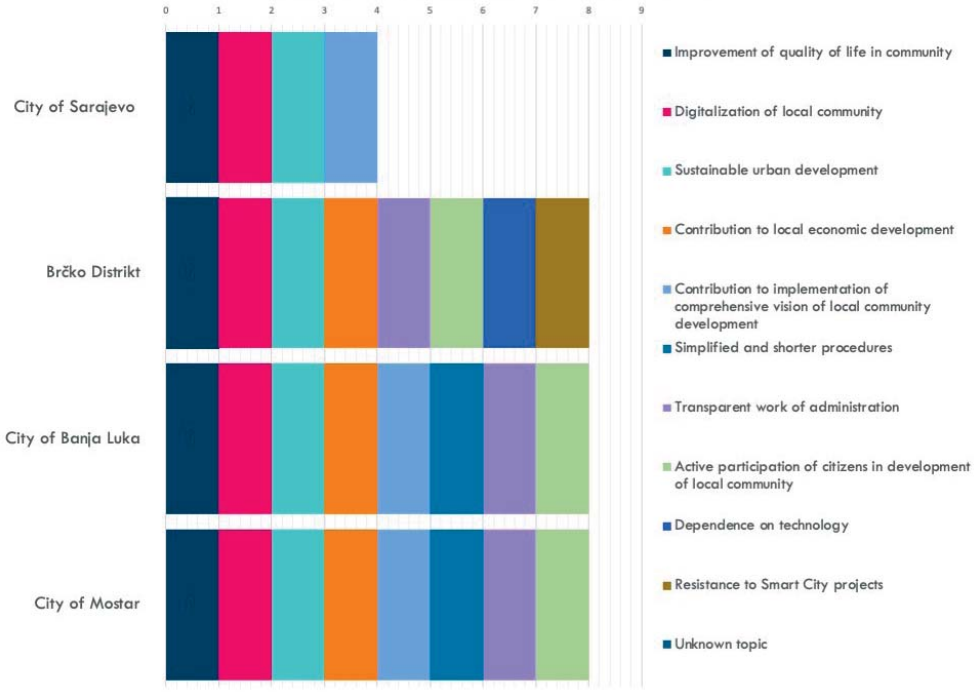

Figure 25 – Terms associated with the idea of Smart City

Online discussion was performed through two panels.
The first panel gathered the main urban and administrative centres of Bosnia and Herzegovina: the City of Sarajevo, the City of Mostar, the City of Banja Luka and the Brčko District (Sa-Mo-BL-BD).

These four LSGUs are the administrative centres of regions, cantons and entities respectively and as such represented a logical choice for direct discussion.
The second panel was supposed to gather Tuzla and East Sarajevo (Istočna Ilidža) as centres of somewhat smaller level in terms of hierarchy of centres, but still significant, administrative and economic centres and smaller local self-government units recognized as economically very important Tešanj, Kiseljak and Trebinje. (*Tz-Il-Te-Ki-Tr*).

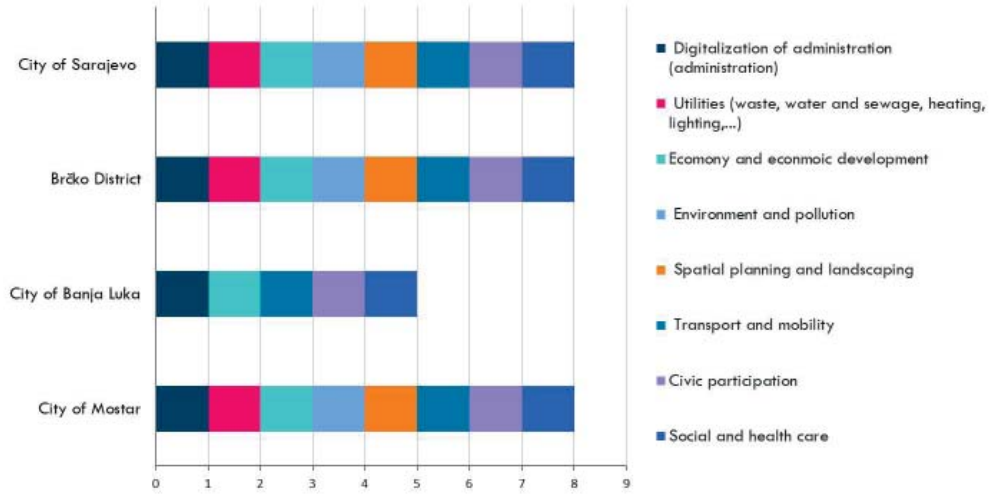

Figure 26 – Domains where Smart City solutions are most needed

The *Sa-Mo-BL-BD panel* showed the interest of local self-government units and their representatives, the knowledge of the matter and a critical attitude towards the situation in this area, which was very important for the research. The discussion focused on the situation in these local self-government units, and the most significant answers follow.

Nearly complete uniformity of the answers to the question of what the term *Smart City* is associated with is not surprising, but there are two things that could not go unnoticed.

1. The City of Sarajevo, unlike other respondents, does not link *Smart City* to its contribution to local economic development
2. Brčko District does not emphasize the connection between the *Smart City* term and the contribution to the realization of the comprehensive vision of development

Given the competencies of the City of Sarajevo, this response may be understandable, although the City can and should continue to impose itself as a pioneer in understanding the benefits that such projects can "spill over" to lower levels. On the other hand, from direct communication with the representative of the Brčko District, it is learned that no project in this area is currently being implemented in this local self-government and that *Smart City* Development Strategy is not included in any form and scope. Based on the above, it is clear that the stated position, that is the lack of connection between the concept of *Smart City* and the contribution to the vision of development, transpired from the fact that this LSGU does not have a defined position towards projects in this area.

The domains that respondents recognize as key to their LSGUs (Figure 26) are once again uniform, although in this case we can recognize minor discrepancies, especially in the answers given by Banja Luka. Through direct communication, it was shown that Banja Luka did not state the answer related to Communal Infrastructure and Environment and Pollution because the implementation focus is on projects in this domain, and for that reason they did not consider them necessary. Specifically, Banja Luka has a number of launched projects in this area and it is the only LSGU within this group of respondents that implements *Smart City* solutions through a separate institution, Business Incubator/Innovation Centre and has a Development Strategy of which the *Smart City* concept is an integral part (Figure 27).

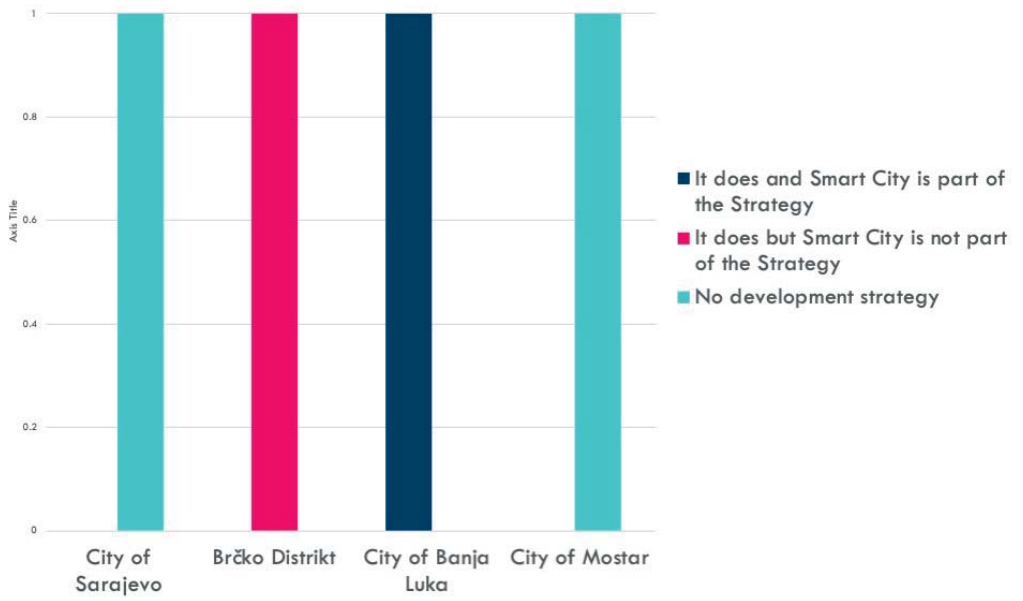

Figure 27 – Development strategy and Smart City concept in Sa-Mo-BL-BD group of respondents

The benefits that respondents from this group recognize as important for their local self-government units (Figure 28) do not deviate from those identified as general in the research (Figure 12), if we exclude the previously stated data that the Brčko District is not involved in this type of projects.

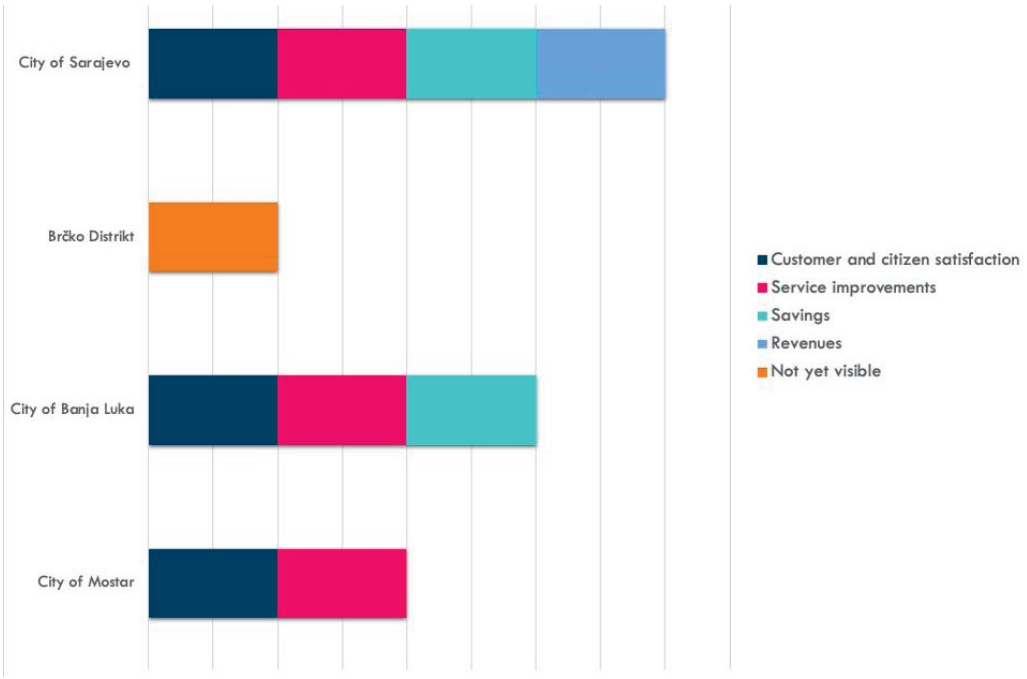

Figure 28 – Benefits of Smart City projects identified by LSGUs from the Sa-Mo-BL-BD group of respondents

What differs from the general observations on this issue is the fact that within this group of respondents, the City of Sarajevo and Banja Luka also emphasize savings, while Sarajevo even states revenues as a recognized benefit. It is encouraging that Sarajevo and Mostar and Banja Luka are quite involved in the application of smart solutions and that, in addition to the usual ones, in these LSGUs we find some solutions that were not mentioned in the research (e.g. audio guides for museums or applications for products and services with rural areas).

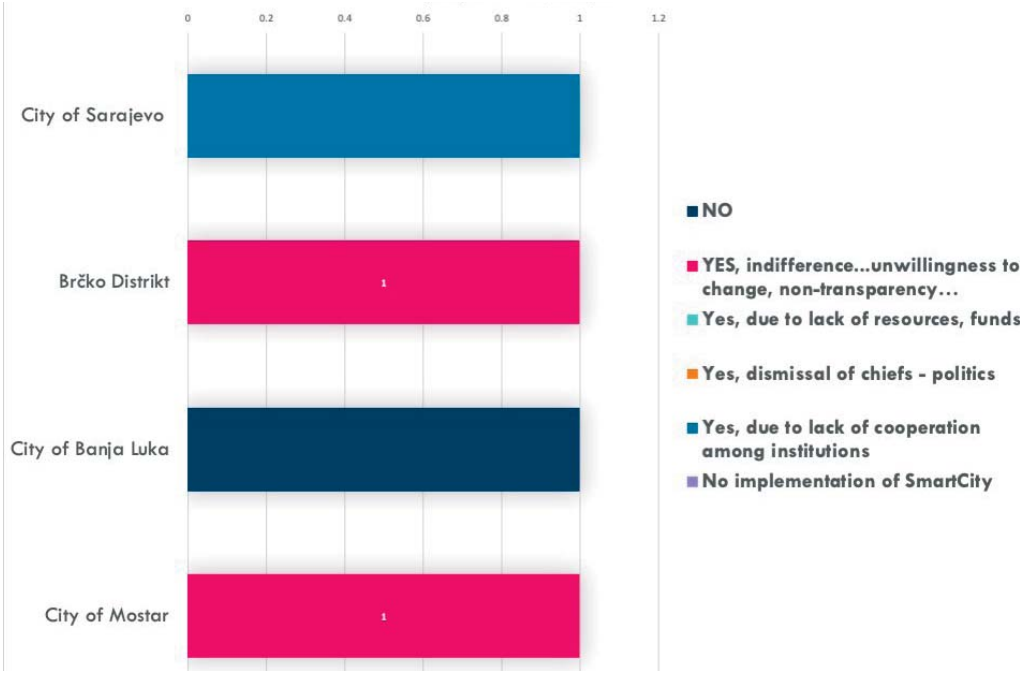

Figure 29 – Reasons for abandoning Smart City projects as indicated by the od Sa-Mo-BL-BD respondents group

At the same time, it is important to point out that both Mostar and Sarajevo abandoned the project at one point for the reasons listed in Figure 29 and that respondents in direct contact stated the importance of continuity of political will and understanding as well as inclusion and finding ways for more interest displayed by human resources of local government administration and local self-government units themselves.

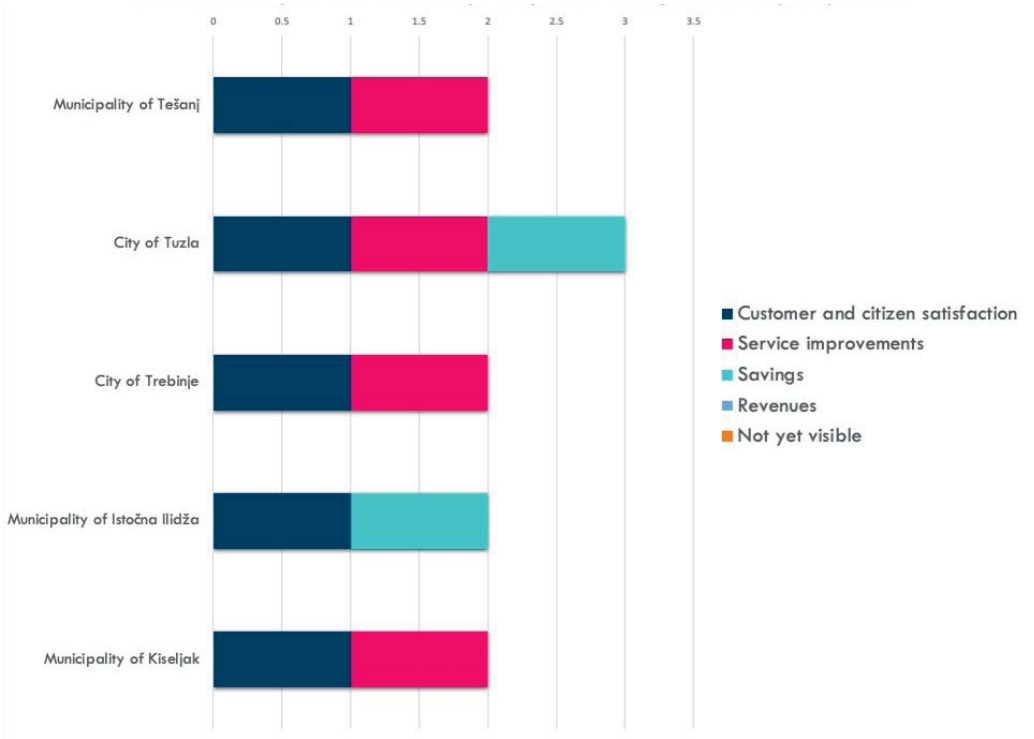

Figure 30 – Identified benefits for LSGUs from Smart City projects within the Tz-Il-Te-Ki-Tr group of respondents

The second group of respondents Tz-Il-Te-Ki-Tr did not show any interest that would make results adequate for the research. Of all those invited, only Tesanj participated in direct communication and confirmed the findings from the survey. The most significant data obtained from the answers of this group of respondents is the confirmation of the previously mentioned recognized benefits

for LSGUs from projects in the ***Smart City*** area, Figure 30. Within this group, all except Trebinje currently have some of the projects in this area in implementation and all except Trebinje and Istočna Ilidža state that they have a development strategy that includes the ***Smart City*** concept. However, when asked whether the goals of the ***Smart City*** concept are defined, in addition to these two local self-governments, Tešanj provided a negative answer as well.
The specificity that is noticed within this group, was manifested in the question of who is in charge of the implementation of projects in the area in question; Tešanj indicates private companies, while Istočna Ilidža indicates the Development Agency. As a reminder, in the general overview of the survey results in subchapter 3.1.2 , Figure 16 shows that the most common implementer is the LSGU management itself. Only three local self-governments have development agencies dealing with the implementation of these projects: Banja Luka, the City of Sarajevo and Istočna Ilidža, and the same number of respondents indicate private companies in this context: the City of Mostar, Banja Luka and Tešanj.

Both groups of respondents have had a very modest effect of improving services during the pandemic, but in direct contact they point out the advantages of smart solutions and recognize their potential in this crisis period.

3.1.4 Conclusions of research conducted within LSGU

As already mentioned, the total of 28 LSGUs participated in the research, and through direct communication, additional verifications and consultations were conducted with five LSGUs (City of Sarajevo, City of Mostar, City of Banja Luka, Brčko District and Tešanj).
After summarizing the results of the research conducted using the methodology defined in subchapter 1.2, it is possible to reach the following conclusions:

1. Nearly 90% of respondents are familiar with the terms ***Smart City*** and ***Smart Solutions.***
2. Close to 90% of respondents associate these concepts with the improvement of the quality of life in the community and digitalization.
3. More than 70% of respondents do not have defined goals of the ***Smart City*** concept, development strategy or it does not include a ***Smart City*** vision.
4. Nearly 90% of respondents believe that ***Smart City*** solutions in their local governments are most needed in the field of digitalization of public administration and communal infrastructure while it is least needed in the field of social and health care.
5. More than 50% of respondents state that some of the ***Smart City*** projects are implemented in their respective local self-government units, where 50% of them state that the projects are in the field of smart administration and almost as many mention smart lighting projects.
6. In 50% of cases, the implementation is carried out by the local self-government units.
7. Financing of these projects for more than 40% of respondents is done from the budget of the respective local self-government unit while 30% is funded by foreign investments and funds. Lending and private-public partnerships are reported in less than 10% of cases.
8. Respondents see the greatest benefit in customer satisfaction and service improvement (over 80%), savings are indicated by 60% while only 25% recognize the benefit in revenue. At the same time, the most frequently mentioned obstacle in the implementation of these projects is funds (almost 60%) and then the lack of practical knowledge.
9. Monitoring of project implementation in more than 50% of cases is related to the monitoring system related to the solution.
10. Very rarely do LSGUs give up the implementation of the started project and as reasons they state unwillingness to change, lack of finances and political alternations.

In the context of the COVID-19 pandemic, the conclusions of the study conducted within 28 LSGUs are as follows:

1. Only 30% of respondents confirmed that their LSGUs introduced some of the ***Smart City*** solutions during the pandemic and it was mostly online sessions and information.
2. Neraly 60% of respondents have done nothing to improve some of the existing services.

Bearing in mind all of the aforesaid, the following may be concluded:

1. The implementation of ***Smart City*** solutions takes place ***ad-hoc***, without a strategic approach and a comprehensive vision of development, therefore the implemented solutions are modest and showing no full capacity.
2. LSGUs are generally inclined to improve the conditions and quality of services for citizens (in the context of a pandemic, this seems to be only declarative), but not in recognizing the benefits in financial terms when it comes to ***Smart City*** solutions.

3. LSGUs perceive *Smart City* projects as a potential financial cost, and not as a financial benefit.
4. Implementation of *Smart City* projects depends on the political will and determination of local authorities and the education and readiness of staff within the administrative structures of local self-government units to change and implement new projects.
5. Insufficient practical knowledge and experience adversely affects the interest and understanding of the benefits of solutions from the *Smart City* area both among implementers and users.
6. Evident slowness and sluggishness in innovation even when LSGUs are aware of their benefits (e.g. the pandemic period - in nine months very modest effects of service improvement).

3.2 Results of research on social networks

The success of projects of any type and within any area must be viewed in two directions, that is from the perspective of the person who implements the project and the perspective of the person for whom the project is designed and intended. How justified and purposeful the project is should be reflected in the satisfaction and number of its users, and for that reason, and through this research, the opinion of citizens of the local communities in BiH was taken into account.

Figure 31 – Social networks survey

3.2.1 Survey results

A survey was conducted via social networks, sponsored on the Facebook page of FNF Western Balkans, to which 376 respondents, aged 18 to +65, responded in less than seven days (Figure 32), with unexpectedly few answers given by the younger population (20 % of responses).

The survey focused on three key questions:

1. Which *smart solutions* do you use in everyday life (answers are offered)
2. Which *smart solution* do you think would improve your life
3. Have *smart solutions* made your life easier during the COVID-19 pandemic

This focus transpired from the need to determine whether and to what extent the views of LSGUs, those implementing the projects and those using them, concur.

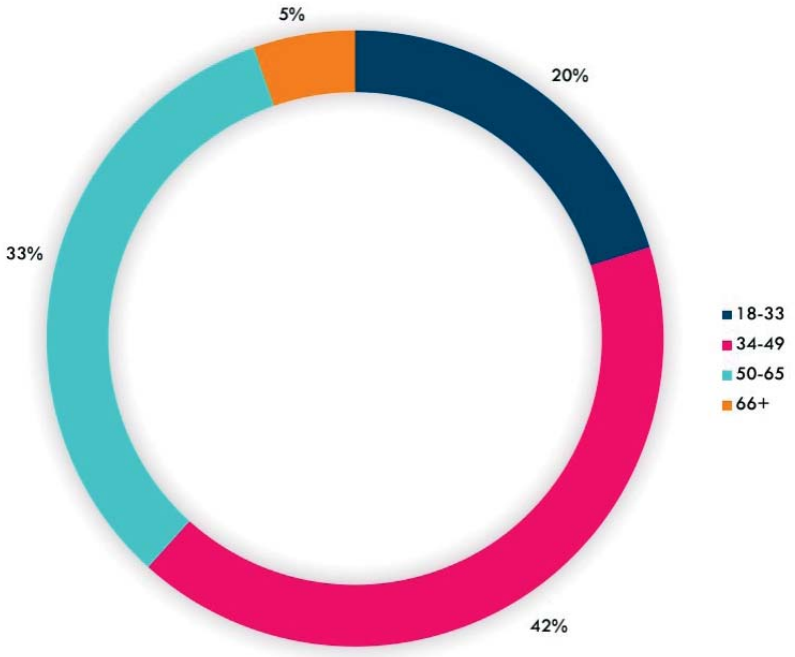

Figure 32 – Overview of the age structure of the respondents

The answer to the first question (Figure 33) again shows the scarcity in the implemented solutions and the modesty in the knowledge and demand for the quality of service for citizens. In particular, the most common answer is the bill payment service, which is, in fact, mainly an e-banking service, and significantly less often the actual bill collection system. The solutions that citizens indicate as those that are in everyday use are mainly applications for online shopping and orders (30%) and applications that monitor their own health (30%). If these data were to be added to their e-health card on a weekly or monthly basis, we could be talking about a smart health system that has more than an informative role.

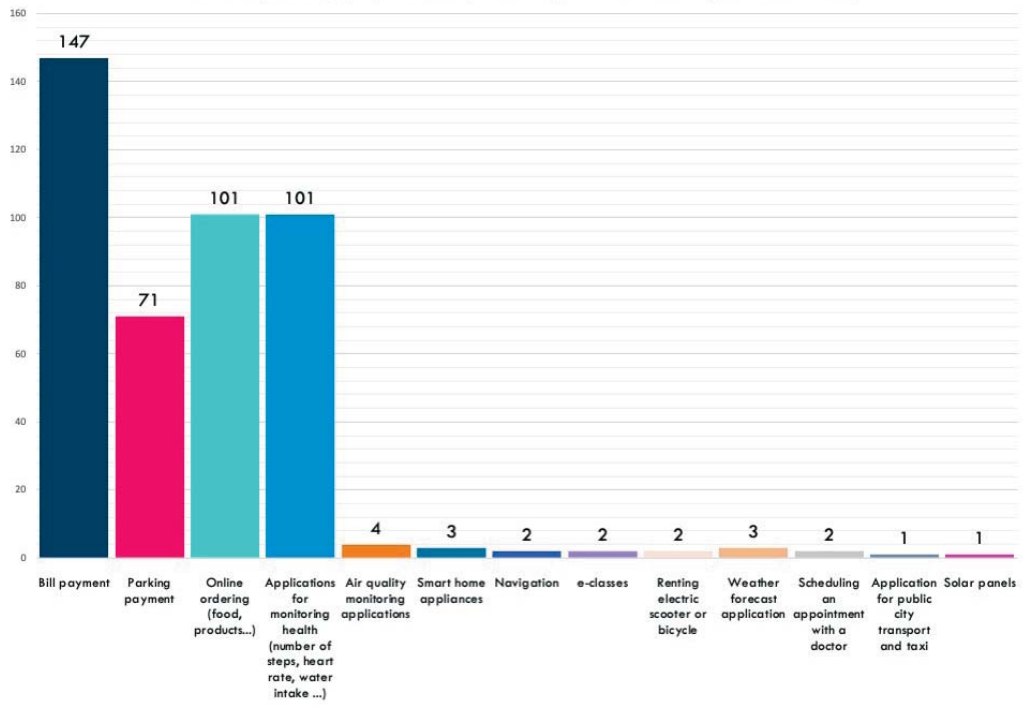

Image 33 – Smart solutions in daily use among surveyed citizens

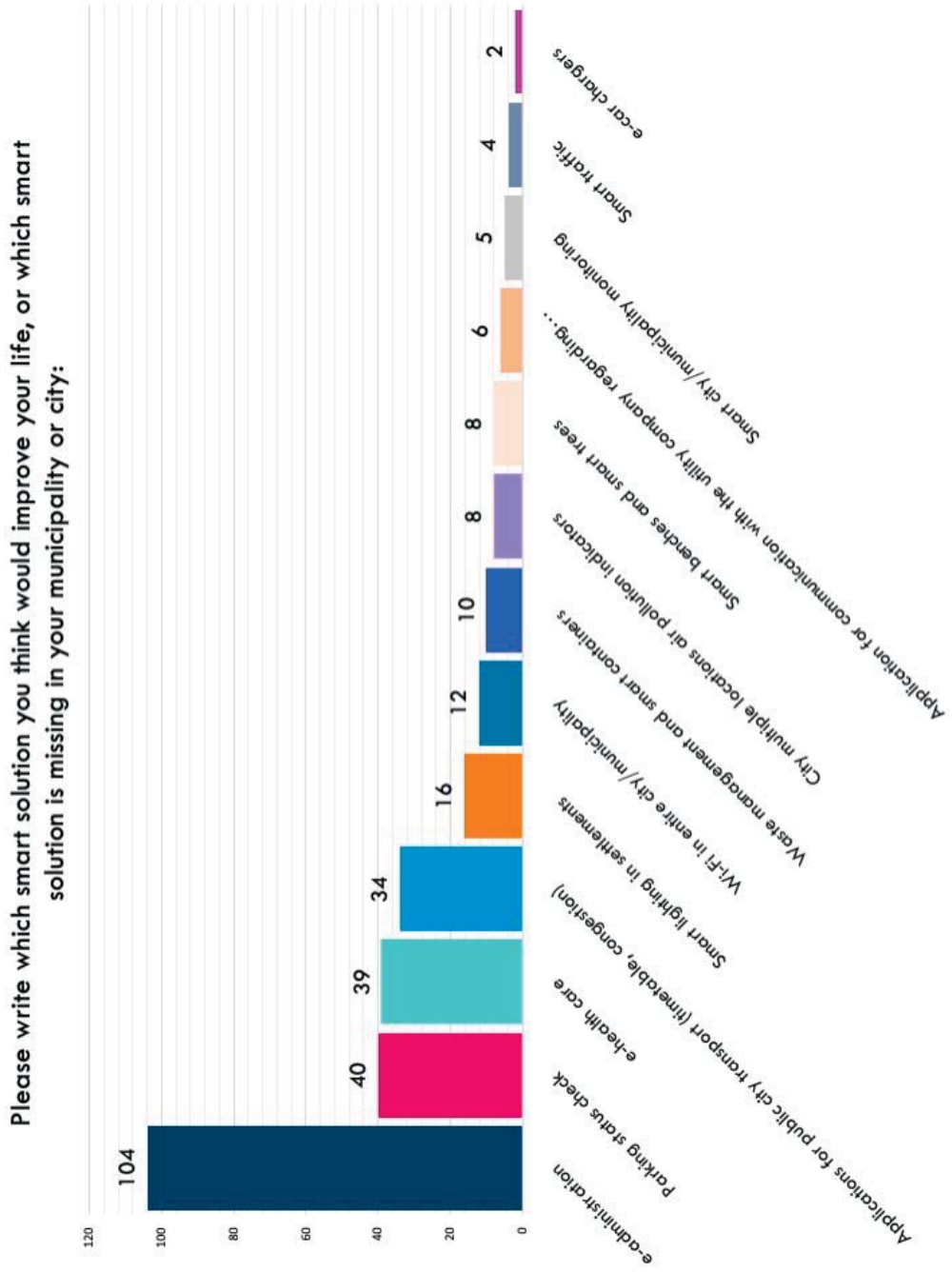

Figure 34 – Smart solutions that would improve lives of surveyed citizens

If we recall the conclusions from the previous subchapter and compare them to the statements of citizens in response to the question: "Which smart solution would improve your life" (Figure 34), we will see the justification of this two-way approach in research. LSGUs mainly indicated the most important benefit of ***Smart City*** projects, the one for citizens, and the improvement of service quality, while at the same time they indicated digitalization and communal infrastructure as the most important projects in this area. Both projects certainly aim to improve the quality of life and services for citizens, but at the same time these projects are the ones that facilitate the work of the administration and bring savings to the local self-government, which is not wrong, it is not exclusively the welfare of citizens.

On the other hand, citizens also indicated e-government as the most important service, but unlike local self-government transport (public parking, public city transport) they also indicate e-health as the next important thing for the quality of their life in the city.

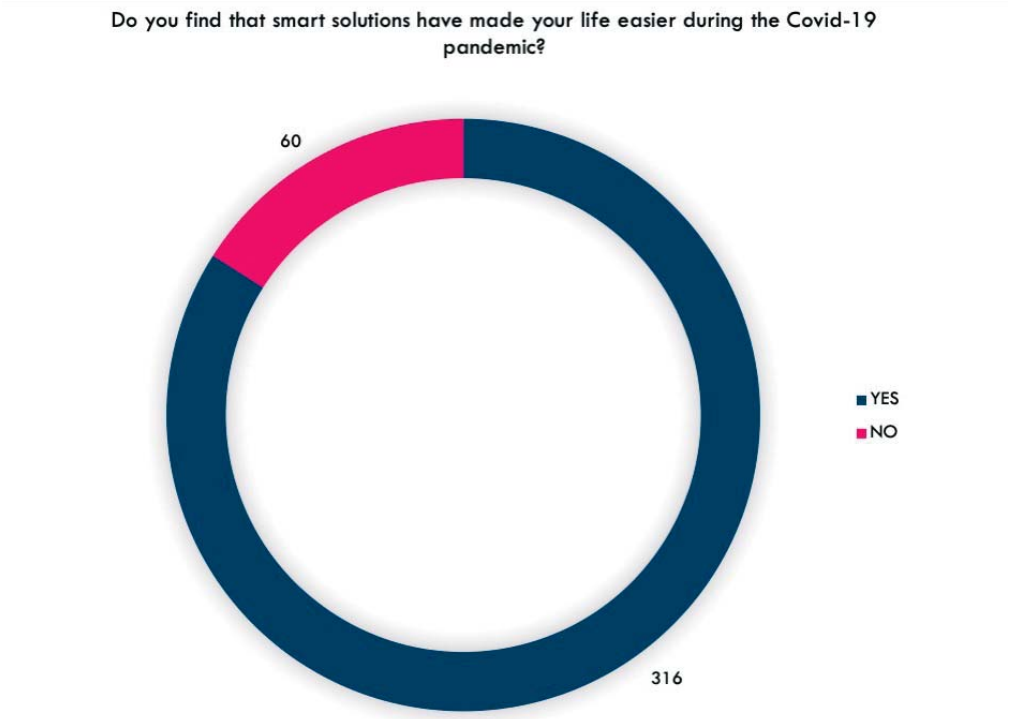

Figure 35 – Have smart solutions made life easier during the pandemic for the surveyed citizens

As a reminder, Figure 12 shows the responses of LSGUs where at the bottom of the scale transport, social and health care are the last answers that LSGUs provide when they answer the question: "In which domain do you think ***Smart City*** solutions are most needed by your local community". This discrepancy indicates a lack of understanding of the needs of citizens or insufficient knowledge of the local self-government of the matter or, as already pointed out, the lack of jurisdiction of local self-government for these areas. Once again, we emphasize the importance of delegating themes and projects from the lower level of government, because local communities are the ones in which citizens meet their everyday needs and they should be recognized at that level.

Improving life is important, perhaps even more important in times of a crisis such as the COVID-19 pandemic. Citizens confirmed in the survey that the use of ***smart solutions*** made their lives easier, although we assume that these improvements were reduced to the use of certain platforms and applications, because we could see earlier that LSGUs failed to introduce or improve new ***smart solutions***, which excludes system improvements. As many as 80% of respondents answered in the affirmative to this question (Figure 35), but if we take into account that the survey was conducted in the midst of a pandemic, then from the answer to the question shown in Figure 33 it is possible to confirm the previous assertion. Even during the pandemic, citizens mostly used applications for bill payment, shopping and orders.

3.2.2 Conclusions of social networks research

Based on a sample of 376 respondents on social networks and a comparison of the answers collected through this survey with the answers given to similar questions by LGUs, the following conclusions may be drawn:

1. Citizens are aware of the benefits that smart solutions bring
2. There is a willingness to use smart solutions
3. Areas where citizens see the need for smart solutions are e-government, e-health and transport
4. Citizens and local self-government units do not have a common position on priority areas for the implementation of smart solutions

3.3 Comparative analysis of “Smart Local Communities in BiH” vs. “Smart Cities of Serbia After the Crisis“

Initially, as one of the additional goals of this research is the one that follows:

1. Comparative analysis of the results of this research and the research conducted through the project “Smart Cities of Serbia After the Crisis” with the aim of comparing the situation in BiH and Serbia and a comparative analysis of the research given through these two documents was possible because the following starting points were close or the same:

    1. Both researches were conducted with the support and under the auspices of the same foundation “Friedrich Naumann Stiftung für die Freiheit” which, among other things, has been very successful in leading the *Smart City* Education Initiative for several years[23]
    2. The time frame of the conducted research was similar, that is both surveys were created during the second half of 2020
    3. Conditions and situation in the treated area within the local self-government in Bosnia and Herzegovina and Serbia are very similar

    The understanding and acceptance of the term *smart city* was of particular importance for comparison. Both studies specify this term in the introduction and do not differ substantially.

    “Smart Local Communities in BiH”: A smart city is a vision of urban development that uses digital and communication technology (ICT) and the Internet of Things (IoT) to better meet the needs of citizens and improve the efficiency of city services.
    “Smart Cities of Serbia After the Crisis”: A smart city is a community, either in urban or rural areas, which, thanks to data analysis, efficiently uses its physical infrastructure, which effectively cooperates with citizens through open and transparent processes, e-participation and e-governance, and which adapts to innovation in a proactive way to changing environments.

Additional common characteristics, which were important for usable and adequate analysis, are the operational parameters that were the subject of comparison:

1. The number of respondents is nearly identical - BiH 143 vs. Serbia 145
2. The type of questions asked and their content are quite standardized

Figure 36 – “Smart Local Communities in BiH” vs. “Smart Cities of Serbia after the Crisis”

3.3.1 Results of comparative analysis

In the earlier subchapter, we have learned that the initial settings set by the author teams responsible for the research were very similar. An equal understanding of the term ***Smart City*** steered both researches in the same direction and led to the chosen methodology and the questions asked were uniform, as well. What the author teams had no influence on, and which was still the same, was the number of respondents who responded to the research and the results of the very research.
In particular, the number of LSGUs in BiH and Serbia is very similar, 143 versus 145. All LSGUs are included in the survey. In BiH by e-mail sent to the official e-mail addresses of local self-government, in Serbia through the Standing Conference of Towns and Municipalities.[24]
At the same time, the question arises as to whether this random equation (30%) actually speaks to a potential statistical fact about the interest of administrations to engage in research or the actual knowledge of local governments in the ***Smart City*** area, or is it really just a pure coincidence?

In addition to these equations, the research had some differences, such as the fact that research in Serbia dealt with ***smart cities*** after the crisis, focusing on the COVID-19 pandemic period, while in BiH it focused on the general crisis in which the cities of today, not forgetting but not emphasizing the pandemic and the crisis it brought with it.
Another difference was in the detail of the research on specific projects in this area, which Palgo smart (Srb) emphasized, because what was stated in subchapter 1.3 of this research as a special goal in the research of the Serbian team was the ultimate goal.
The last difference was noticed in the set of questions by which the team in Serbia tried to figure out the ways in which local self-governments are informed about projects in this domain and how they exchange experiences and knowledge, which was not done in BiH, so that this research, in the chapter ***recommendations*** relies on experiences and knowledge of the team from Serbia with reference to the aforesaid.

Methodologically, the analysis was done using the desk method, selecting questions that could be compared and then comparing the answers and translating them into a diagram. After sublimating the results of the comparison, online discussions were held with the team from Serbia, so that the findings could be checked and the comparison corrected, since some of the compared findings were abandoned after clarification.
The last step was the presentation of a comparative analysis whose results will be presented below.

As it was important for the comparison that the research had the same initial parameters, such as understanding the term ***smart city***, it was important to determine at the beginning of the comparison how the term ***smart city*** is viewed by respondents in both cases. Figure 37 shows graphs of the results as the answer to this question. The answers given by the respondents are astonishingly equal. Specifically, the largest number of respondents associates the term smart city with the improvement of the quality of life in the community and then with the contribution to the digitalization of local self-government. At the same time, an equally small number of respondents on both sides offered a negative response, such as that the topic is unknown or that they associate the term with dependence on technology or fear of sharing sensitive data, or cyber insecurity.

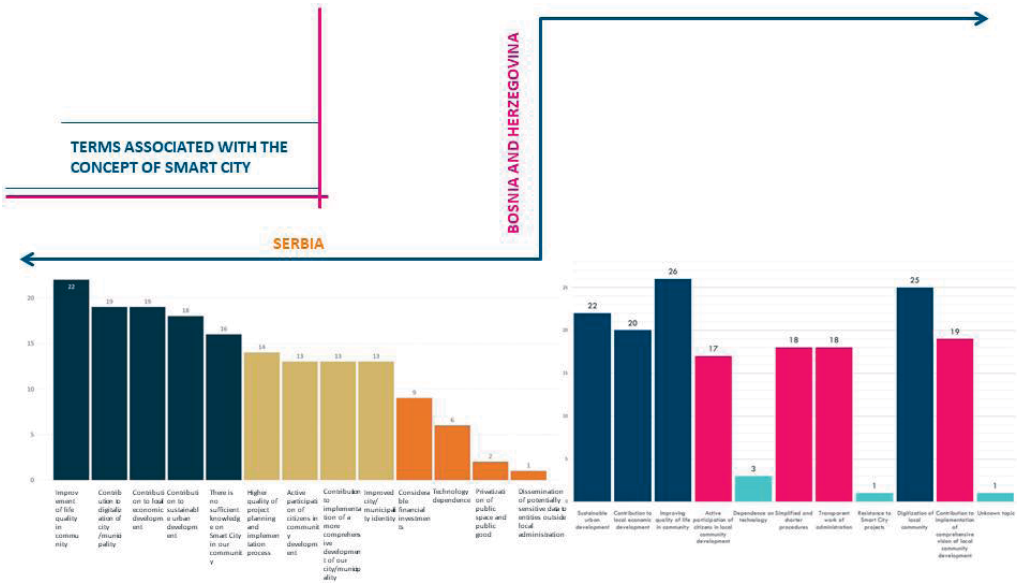

Figure 37 – Terms associated with the concept of smart city

These results support the previously stated conclusions in subchapter 3.1.4.

How coordinated the projects are and whether they stem from development strategies or strategies that also imply *Smart City* concepts was the next question to which we sought answers in both surveys. As a reminder, Chapter 2, based on the experiences of successful world cities, emphasizes the importance of coordination and strategic approach when it comes to solving the problems of dysfunction, non-optimization and crisis of cities, and a few examples of clarification in addition. The answers to the compared question are shown in the figure 38.

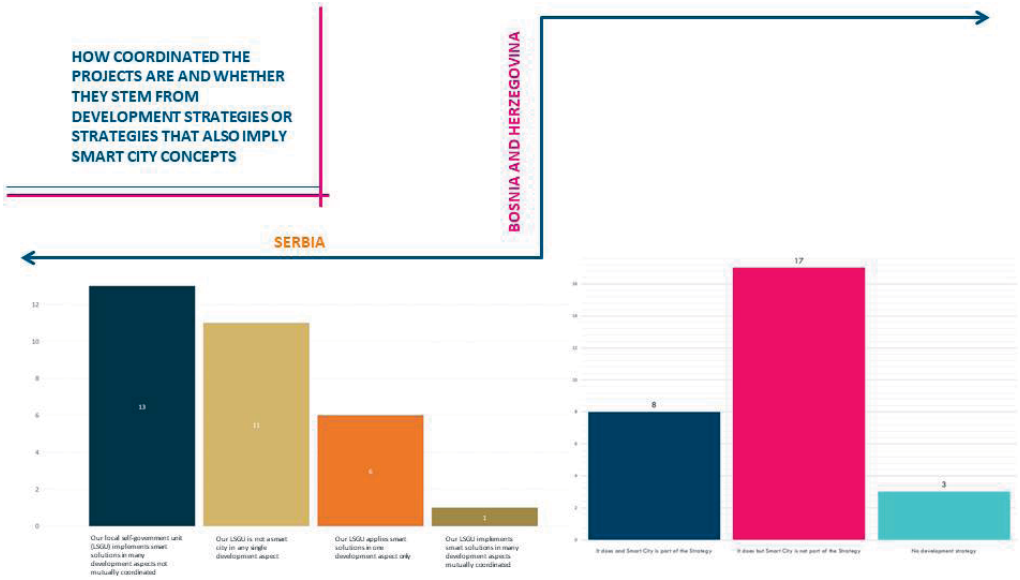

Figure 38 – Are the projects coordinated and do they stem from development strategies or strategies that include Smart City concepts?

The answers to the previous question show that the vast majority of LSGUs involved in the research are prone to an ***ad-hoc*** approach, that ***Smart City*** projects are not coordinated or that they are the result of strategic commitments and a visionary approach, which reaffirms the conclusions from subchapter 3.1.4.

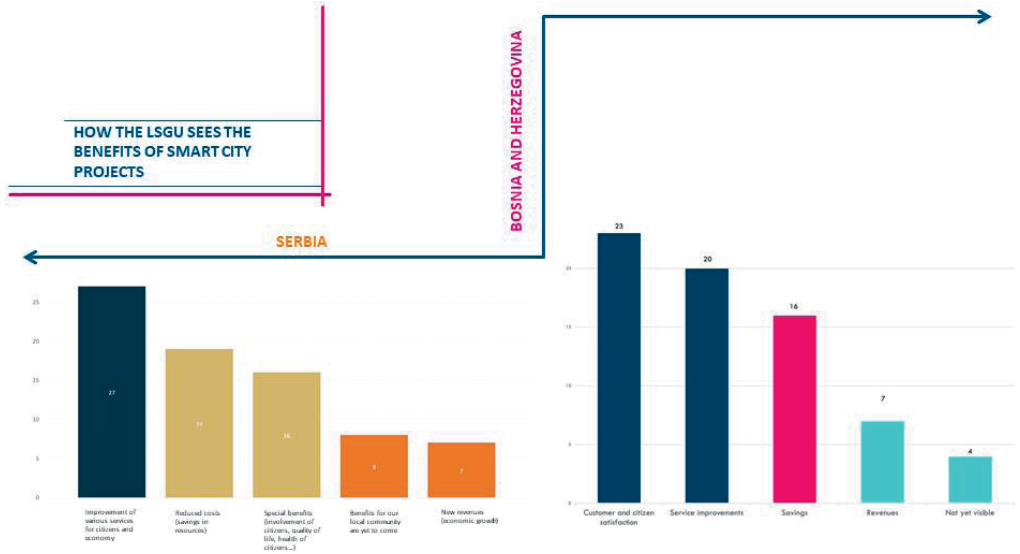

Figure 39 – Recognized benefits from Smart City projects - comparison

The research also confirmed that a part of local self-government units is already implementing projects in the field of ***smart cities***, and that they are mostly implemented by local self-government units themselves. It was not possible to compare the results because, as mentioned earlier, there was a certain difference in the conducted research as a result of the set goals.

What was possible to compare, however, is the answer to the question of how the LSGU sees the benefits of ***Smart City*** projects (Figure 39). As in the previous questions, the answers are more than similar, so LSGUs generally state that the benefit is in improving services and satisfaction of citizens, they also recognize the benefit in reducing costs and savings, but in both surveys LSGUs, very few of them (only seven respondents), saw a benefit in potential income for local self-government. This response leaves room for potential recommendations to follow in the final considerations and once again confirms the conclusions from subchapter 3.1.4. In particular, the fact is that it is easiest to opt for projects that bring financial benefits. If the profit is accompanied by little or no investment of own financial resources, then the commitment is even simpler. What is currently a fact when it comes to projects in the ***Smart City*** area, judging by the results of this research, is that LSGUs do not see financial benefits, except in the segment of savings, and that the implementation of these projects still relies on local government budgets making them particularly attractive and making it difficult to lobby for their implementation.

The next observation attributes to the aforesaid, figure 40.

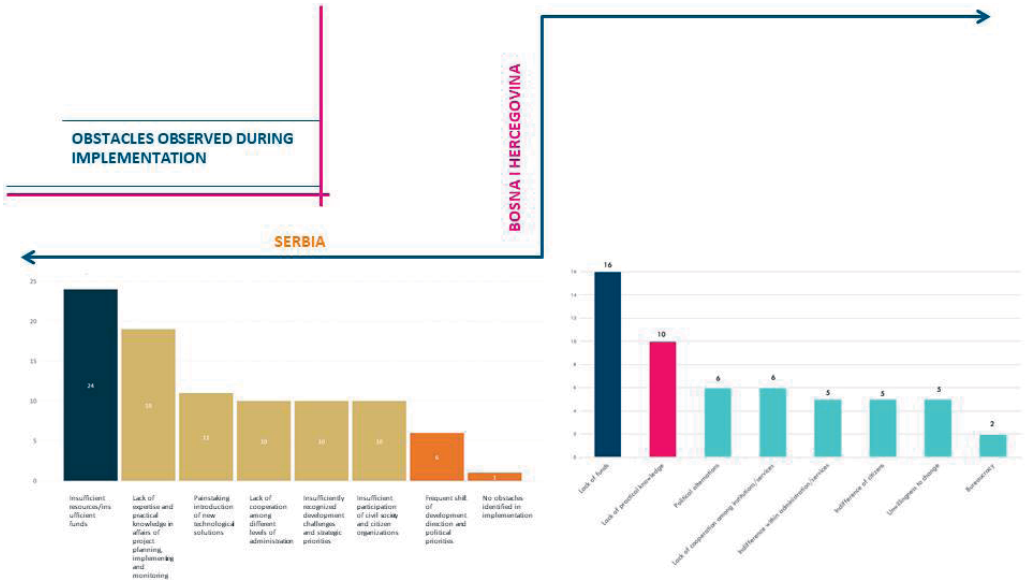

Figure 40 – Obstacles observed during implementation

Most often, as an obstacle in the implementation of projects in the *Smart City* area, respondents in both Serbia and BiH indicate the lack of finances and again, equally not often insignificant, they indicate the lack of practical knowledge.

One of the reasons that this research was initiated is to establish an exchange of experiences, which is given in subchapter 1.3 in the General Objectives, as Objective 2: ***Exchange of experiences and good practices, including the exchange of information and experiences on solutions that have not taken root***. Good practices and their exchange, as well as the establishment of the database that Palgo smart strives for in its research, can be one of the ways to address the barrier that respondents recognize as important and common. Two years ago, i the Sarajevo Canton the City Mind Lab was established as a concept that brings together citizens and experts on the idea of transforming Sarajevo into a city where people live, work or visit more comfortably. Such concepts can help LSGUs to inform, connect with experts, discover successful projects that they can implement in their LSGUs or those that should be avoided as unsuccessful, but also to discover funding models and/or consulting assistance that are once crucial for joining a project.

Ultimately, both studies also dealt with the global current situation, and the observations that could be compared were singled out, considering that the research in Serbia paid significantly more attention to this segment than the one done in BiH.

From the previously presented answer in Figure 41, it may be observed that the local self-government units in both Serbia and BiH missed the opportunity to improve the quality of life of citizens (which they emphasize as very important) by introducing new ***Smart City*** tools and solutions in city systems. In both surveys, the percentage of those who did not work in this field is extremely high (over 65%), and if we recall the illustration from Figure 22, the solutions introduced by those who answered in the affirmative to the question "Has your LSGU introduced any of ***Smart City*** solutions during a pandemic?" are more than modest.

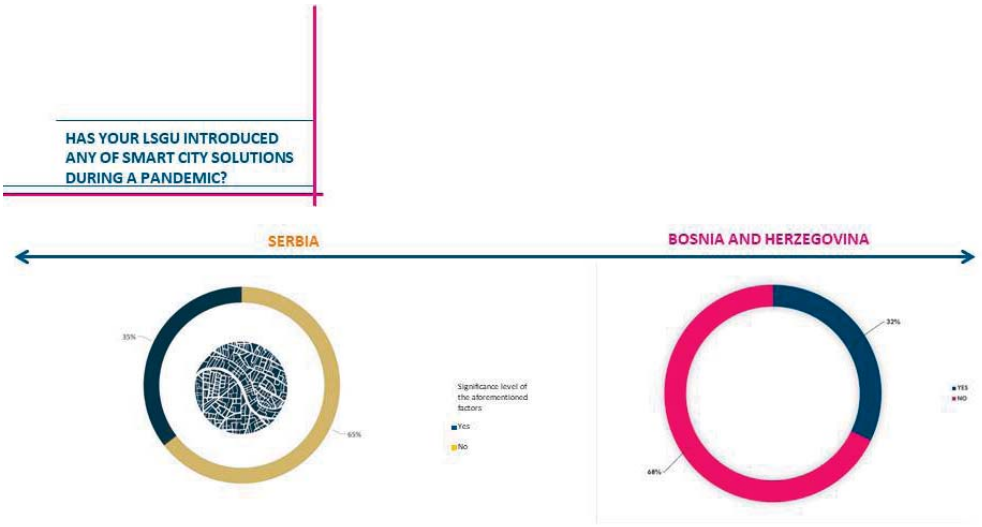

Figure 41 – Introducing new Smart City solutions in the pandemic era

Equally little has been done to improve existing services that use ***Smart City*** tools, as seen in Figure 42, with BiH responding slightly better in this field.

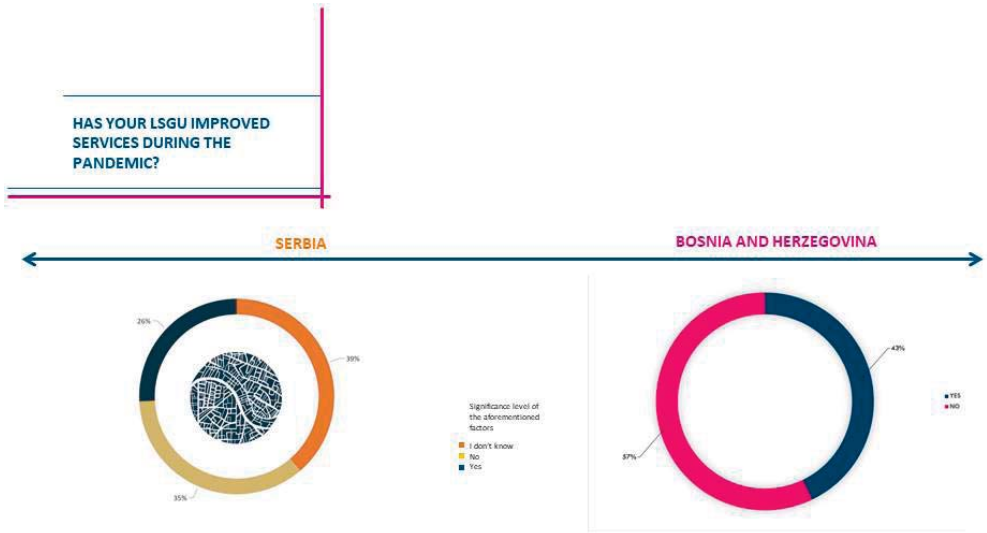

Figure 42 – Improved services during the pandemic

3.2.2 Conclusions of comparative analysis

After comparing the results on the issues that could be related, it is possible to draw the following conclusions:

1. A total of 30% of LSGUs in both countries show interest in participating in research regardless of the manner the respondents have been contacted
2. Respondents in both countries primarily associate the term smart city with improving the quality of life in the community, but not with negative connotations
3. LSGUs percentage in both BiH and Serbia do not have Smart City concepts in development strategies nor do they approach this area strategically
4. LSGUs see the greatest benefit from ***Smart City*** tools and solutions in the same way as they understand the term ***smart city*** as improving the quality of life in the community
5. Obstacles in the implementation of these projects in both BiH and Serbia are associated with a lack of funds and a lack of practical knowledge

4 Concluding remarks

The research "Smart Local Communities in BiH" was conducted in the period October 2020 - December 2020. In the first phase of the research, the concept was set, the methodology was determined and selected, and the goals were defined. Within the concept, a list of questions and the manner of its distribution were formulated.
The author team made interactive surveys from the list of questions and forwarded them to the official e-mail addresses of the LSGUs, from which they collected answers in the course of 21 days and then processed them and arranged them in diagrams for the purpose of clarity of the results.
During the research, a total of 28 surveys conducted by respondents, representatives of local self-government units and 376 respondents, citizens who responded to the survey via social networks, were processed. The research also included a direct online discussion with selected respondents from a cohort of 28 local self-governments who joined the research through which some of the research findings were confirmed or refuted.
The final phase of the research included a comparative analysis of the results of this research and the research "Smart Cities of Serbia After the Crisis" conducted on similar starting points in Serbia. With the presentation and discussion on the topic of smart, healthy and adaptable cities within the webinar organized by the Friedrich Naumann Stiftung on 23 December 2020, the research was concluded.

Having in mind the set goals, divided into general, additional and specific, it can be stated that the general goals were fully achieved, that the additional goals were partially achieved, in the sense that the first goal was achieved, and that the second goal was referred to in Chapter 3 and that this goal was discussed in the concluding online session of the webinar. The specific objective is an objective that will require time and resources and has not been achieved within this research and therefore it will be translated into recommendations.

4.1 Conclusions

Based on the results of the research presented in Chapter 3 and the individually listed conclusions by subchapters within the same chapter, the general conclusions are as follows:

1. **LSGUs fail to show significant interest in participating in the research**
   Only 30% of local self-government units responded to an e-mail and a very simple, interactive survey that required less than 10 minutes of their time. The local self-government units in Serbia had the same response.
2. **LSGUs know the term *Smart City* and those associated with it, in most cases have already implemented or are implementing some of the projects in this area**
   The most common projects are those in the field of e-government and *smart lighting*.
3. **LSGUs equate the meaning of the term *smart city* with the benefits they see in projects in this area, that is with the improvement of the quality of life in the community**
   The same answers were given by the respondents in BiH and the respondents in Serbia, which indicates either the real readiness of the administration to offer better conditions to the citizens or the declarative statement understood as the "correct answer".
4. **Local self-government units and citizens do not have the same opinion on the needs or projects in this area that would affect the quality of life**
   Both local self-government units and citizens agree that digitalization of administration is the number one priority, but the priorities that citizens indicate after that are transport, social and health care, while the local self-government remained with the communal infrastructure.
5. **LSGUs fail to see financial benefits from *Smart City* projects**
6. **Projects in this area are mainly funded from the budget and implemented by LSGUs**
7. **The main obstacles in the implementation of these projects are the lack of funds and the lack of practical knowledge**
   Respondents stated that in addition to these obstacles, political indecision or misunderstanding as well as disinterest and indolence within the work environment discourage, as well.
8. **LSGUs do not possess a *Smart City* concept within development strategies**
   Projects are mostly done spontaneously, without a visionary or strategic approach, which makes them weak and dependent on the political will and interest of certain individuals within the local self-government.
9. **During the pandemic, no progress has been made in terms of introducing or improving services using the *Smart City* solution**
   Although respondents (both LSGUs and citizens) state that the benefits of these solutions are expected, very little has been done to achieve something systemic about this issue.

10. **The results of the research are uniform in key issues in Serbia and BiH**

4.2 Recommendations

General goals of this research are as follows:

1. Mapping and recording the situation in 143 local self-government units (LSGUs) in Bosnia and Herzegovina - both Entities and the Brčko District in the context of *smart solutions* and tools (*implemented or planned, established tools in use and tools not used, levels of knowledge and capabilities, the capacity of the local community in the context of several important issues and topics to be explored*)
2. Exchange of experiences and good practices, including exchange of information and experiences on solutions that have not taken root.

Guided by the objectives of the research and the conclusions that followed through it, although this was not foreseen, the research can be concluded with the following recommendations:

1. ***Smart City* area has a large opus of diverse solutions and tools that give the optimum when used and applied systemically, so local governments should, before deciding on any of the *Smart City* projects, pre-establish the following:**
    a. **The biggest problems within the local community**
    b. **Needs recognized by citizens**
    c. **Their own capacities, primarily in terms of human resources**
    d. **Analysis of the situation within their institutions and public companies in terms of available data and started projects**

    All of the above should be part of the development strategy or strategic document of the *Smart City* concept.
    The advantage of this approach is the right decisions, quality projects and their greater success. For example, if a LSGU introduces the *Smart parking* project, invests in sensors, in the application, maybe even in the parking space blocking system during the reservation, before deciding whether the zone in which this pilot project is introduced is a future pedestrian zone, because citizens express the need for it or the like, it is clear that an unjustified financial cost has been incurred, that the work has been duplicated and that the process itself is "unwise".
2. **The professional community, the academic and real sector, in addition to designing projects and solutions, should work on advocating for an alteration paradigm within the local self-government and on accepting innovations and changes.**
    Make solutions clear and their benefits easily recognizable, emphasize ease of use and aesthetic appeal, and highlight financial and other benefits.
3. **Inform the local self-government about the funds and financial possibilities for the implementation of the *Smart City* solution.**
4. **Establish a Mind Lab at the level of BiH or the region**
    A platform that would bring together experts, enthusiasts, citizens and employees of the administration and public institutions and companies interested in the *Smart City* area, and which would present projects in this area with a financial framework and clearly stated indicators. A platform for *Smart City* beginners and veterans to provide support.
5. **Continuous education** is the task of the profession and the academic community, but also of the NGO sector, both towards the population, the youngest population, and towards the administration and decision makers, as well as towards services and institutions involved in the implementation of projects

5 Sources

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2. Smart City Eng.
3. 1974 – Los Angeles first *urban big data* project: "A Cluster Analysis of Los Angeles".
4. Research "Smart Local Communities in Bosnia and Herzegovina" was conducted as part of the project "BiH Going Smart" in the period June through December 2020 with the support of the "Friedrich Naumann Stiftung für die Freiheit" Foundation.
5. ICT (Eng. Information and Communications Technology) Information and Communications Technology is a term that underlines the role of unified communication and telecommunication integration (landline and wireless), intelligent building management systems and audio-visual systems in modern information technology.
6. https://ec.europa.eu/croatia/future_we_live_in_smart_city_hr (12 December 2020)
7. Virtualni 'digital city' – De Digital Stad (DDS)
8. The municipality is the basic unit of local self-government in BiH. In the Federation of BiH, there are cantons that are above the municipalities, while in the Republika Srpska (RS) there are regions (mainly for statistical purposes), while the Brčko District corresponds to the municipality. A municipality, similar to a municipality in the time of the Socialist Federative Repubic of Yugoslavia (SFRY), usually consists of a town and associated settlements; on the other hand, Sarajevo consists of four while Istočno Sarajevo of six city municipalities. In the Socialist Republic of Bosia and Herzegovina (SR BiH), that is before the war, there were 109 municipalities in BiH. After the Dayton Peace Agreement, their number increased to 143: namely, 79 in the FBiH and 64 in the RS.

   https://sh.wikipedia.org/wiki/Opštine_Bosne_i_Hercegovine (20 December 2020) (Municipalities in BiH)
9. On March 17, the Council of Ministers declared a state of natural and other disaster. On March 21, a curfew was introduced in the Federation of BiH and the Republika Srpska, but not in the Brcko District, where there are no confirmed cases.

   https://bs.wikipedia.org/wiki/Pandemija_koronavirusa_u_Bosni_i_Hercegovini_2020.#cite_note-81 (20. December 2020) (Corona virus pandemic in BiH)
10. "The overall goal of this project is to map innovative projects and initiatives in the field of smart cities in local governments in Serbia, which allows decision makers, policy makers and all stakeholders to better understand the concept and goals of a smart city, as well as to explore potential for networking and inter-municipal cooperation in this area. " (taken from Palgo smart from Policy Brief, introduction)
11. Longitudinal design – data collected at two or more time points.
12. Fixed-sample panel design
13. Event-based design, cohort design
14. Cohort – (*lat*. cohors – cluster, multitude) is any group of individuals with a common characteristic, https://hr.wikipedia.org/wiki/Kohorta_(statistika) (20 December 2020)
15. https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html (20 December 2020)
16. https://www.euro.who.int/__data/assets/pdf_file/0011/101009/E56270.pdf (27 November 2020)
17. https://www.isglobal.org/en/ciudadesquequeremos (22 November2020)
18. Dimming – light absorption, the desired level of light intensity achieved by reducing the voltage at the light source.
19. Adem Zolj, April 2018 – December 2018
20. Assistant Professor Nasiha Pozder, PhD, engineer of architecture, presided the Commission appointed on 3 May 2018
21. Edin Forto, December 2018 – January 2020
22. Innovation and Smart Cities Initiative, subproject "Smart Government", GDi
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List of figures

* All figures, except for Figure 3 originate from the authors and have been generated in the course of this research.

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TIONAL POLICY • CIVIL RIGHTS • DATA PRO
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