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KOSOVO - SMART CITIES NOW AND THE FUTURE

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Author

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Michael Roick & Dr. Minire Çitaku

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The aim of this study was to identify the implemented or already planned smart city tools and innovations in
Kosovo local self-government (LSG) units; the difficulties encountered by municipalities on their implementa-
tion; the potential for networking between local and central level institutions; post- COVID opportunities for
smart city technologies; as well as citizen participation on smart city transformation. The study was supported
by Friedrich Naumann Foundation for Freedom.

Foreword

Since 2013, the Friedrich Naumann Foundation for Freedom has increasingly dedicated itself to the topic area of the "Smart City", particularly on the municipal level.

The focus is on innovative ICT-based smart city concepts and solutions that can sustainably improve the quality of life of citizens, not only in urban areas, but also and especially in rural regions.

"Smart City" is to be understood not as a goal, but as a process.

Furthermore, the Foundation pursues a deliberately regional approach, in which empirical values are communicated, discussed and implemented practically within the framework of initiatives via educational measures, cross-border networking and European dialogue measures.

The mapping study presented here is therefore not an isolated measure. Comparable studies are also available for Bosnia and Herzegovina and Serbia. And so here, too, the exchange of experience is of particular importance.

This mapping study is, first and foremost, an inventory of already implemented, initiated or planned smart city innovations and tools in local self-government units in Kosovo. In addition, it provides information on the extent to which smart city solutions have received greater attention or even an additional boost as a result of the COVID pandemic.

The methodological approach of working with pre-tested questionnaires and targeted interviews with municipal decision-makers or their partners at national level (focus groups) is convincing, as is the diction and style, which makes the topic comprehensible even to the interested non-expert.

Due to the relatively low number of participating municipalities, it certainly cannot claim to be representative; however, as a "qualitative exploration" it provides important information for political and civil society actors: as a base and guideline for future decisions.

Michael Roick
Head of Western Balkans Office
Friedrich-Naumann-Foundation for Freedom

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List of Abbreviations

AIS	Agency for Information Society
AKM	Association of Kosovo Municipalities
BO	Budget Organizations
CSIP	Cross Sectoral Intervention Plan
DPPP	Digital Platform for Public Participation ICT - Information and Communication Technology GHG - Greenhouse Gas
KEEA	Kosovo Energy Efficiency Agency KODE - Kosovo Digital Economy
LSG	Local Self Government
MEE	Ministry of Economy and Environment NAMA - Nationally Appropriate Mitigation Action ODK - Open Data Kosovo
PGGC	Prizren Green Growth Centre

1. Executive Summary

The Smart City concept is used to define the place that makes efficient use of resources through the use of innovation and technology, ensuring citizen participation through e-participation and e-governance for addressing issues and improving the quality of the citizens' life.

This study aims to assess the level of knowledge of Kosovo local self-government (LSG) units on Smart City Concept, and identify planned and implemented smart city initiatives in Kosovo, the difficulties encountered by municipalities on their implementation, the potential for networking between municipalities and central level, post- COVID opportunities for smart cities, as well as citizen participation on smart city transformation. The study was supported from Friedrich Naumann Foundation for Freedom.

For the purpose of the study, a web-based questionnaire with Kosovo municipalities, semi structured interviews with participants of the web-based questionnaire, and five (5) focus groups were organized. While web-based questionnaires and semi structured interviews were addressed to the mayor's office, focus group discussions were held with municipal directors from the sectors of Administration, Public Services, Urban Planning, Energy and Information and Communication Technology (ICT) and Open Data, officials from central governmental institutions, and representatives from enterprises and non-governmental organizations.

1.1 Key findings

- Initially, when asked to rate their level of knowledge about the smart city concept on a scale from 1 (no knowledge) to 5 (complete knowledge), more than half of the respondents 56.14% have claimed to have knowledge to some extent/ moderate extent on this concept. The average level of knowledge for the respondents was 2.928.

- Contribution to the realization of a comprehensive vision for the development of the city (16.9%), digitalization of the city (15.3%), citizens' life quality improvement (13.6%), active participation of citizens in economic development (10.2%), and contribution to sustainable development (8.5%) have been identified as the five top statements that are used to describe smart city initiatives by municipalities

- Data reveals that social media is the primary source of information about smart city concepts and initiatives (30%) followed by events/ conferences (17.5%).

- 78.6% of municipal representatives consider participation in conferences to be of high importance as they work on their smart city projects, followed by dissemination of best practices (64.3%) and evaluating the process of becoming a smart city (64.3%).

- More than half of the municipal representatives from the survey (65%) claimed to not have undertaken smart city initiatives in any of 12 given areas/sectors.

- In general, the initiatives planned and implemented included: digital transformation of public services, citizen participation through e-platforms, opening of data for public use, encouraging the use of renewable energy sources, providing infrastructure for sustainable mobility modes, etc.

- The majority of municipal representatives (71.43%) declared that they allocate a certain amount of funding for smart city initiatives.

- Further, half of the participating municipalities claimed to allocate 1-5% of their budget for smart city tools and 25% allocated 5-10% of their expenditure.

- Public funds from local or central government (50%) and funds from international donor organizations (42.86%) were identified as the main sources for financing smart city projects.

- The main challenge for implementing smart city projects listed by the respondents was budget constraints (27.1%). Other difficulties reported are: lack of technical expertise (12.5%), the need for a long term plan (12.5%), lack of supporting infrastructure (10.4%), lack of internal capacities (6.3%), etc.

- When listing the easiest components of smart city to implement, the respondents' answers varied. 31% listed smart governances as the easiest, 20% smart environment and the rest were equally divided between smart mobility and smart economy.

- More than half of municipal representatives (57.14%) consider their commitment for smart city initiative to be a high priority, and for 14.15% it is not a priority at all.

- Data reveals that smart city initiatives are considered a top priority in the sector of Health, Education and Human Services, and Customer Service and Public Engagement by the majority of the respondents (57%). Other sectors where smart city initiatives are a main priority based on responses include: Public safety (35.7%), air pollution and environmental protection (35.7%), energy (35.7%), electronic payment and intelligent finance (35.7%) and open data (35.7%).

- In general, there is a lack of inter-municipal cooperation for sharing experiences and lessons learned for smart city initiatives. Whereas, there is a central- local level collaboration on sectors of ICT and Energy, Urban Planning and Public Services sectors have highlighted the lack of such cooperation as one of their main challenges for Smart City transformations.

- More than half (71.4%) of the municipal representatives stated that the values of the smart city solutions have increased since the outbreak of COVID-19.

- 64.29% of the participating municipalities on the study claimed to have undertaken smart city projects since the spread of the pandemic. In general, the implemented initiatives included digitalization of services for citizens, building platforms for online teaching, building platforms for financial help applications, etc.

- The majority of the municipal directors confirmed to have noticed a mobility behavioral change since the spread of COVID-19, thus resulting in an increased number of cyclic and pedestrians and decreased number of cars in traffic.

- The primary source for informing and raising awareness among citizens for the new initiatives and the benefits that rise from them is social media.

2. Introduction

Today, more than half of the world population lives in urban areas, a trend which is estimated to rise up to 66 percent by 20501. While urban areas expand exponentially, one of the most important challenges is becoming the capacity of the local governments to manage the increasing demand for public services. Creating innovative solutions and approaches for more efficient use of the limited resources in the ever- changing environment is becoming essential1. Thus, besides challenges, the increasing urbanization trend has offered an opportunity to transform cities into sustainable and inclusive places where the feedback of citizens through e-governance and e-participation is used to improve urban life. These places, where innovation and technology are used for efficient and sustainable use of resources, are referred to as smart cities. Smart tools and innovations are making possible to transform our communities into smart, connected, cleaner, safer, and more comfortable, and highly energy-efficient places to live.

Kosovo has joined the initiative of Smart Cities, aiming to integrate efficient innovative solutions that will serve the needs of the rising urban population in the long run. Creating a digital society of the future, i.e. smart and safe communities, is one of the objectives of the Government of Kosovo. This objective is also supported by the national regulation that aims to ensure the systematic improvement of the innovation capacities of cities and municipalities. The activities carried by Kosovo institutions cover up a wide range of areas such as finance and banking, public services, sustainable mobility, urban planning, and sustainable energy. As it works on its Smart City Agenda, Kosovo has the advantage to see what has worked in other countries, what are the challenges, and how the government in other countries addressed similar issues.

COVID-19 has catalyzed the process of digital transformations in urban areas. With safety being one of the main concerns, the institutions had to prioritize the digital transformation of their administration on their agendas. We have witnessed the shift in mobility behavior since the lockdown in March 2020, experiencing a significant decrease in the usage of cars for mobility, resulting in increased usage of pedestrians and cyclists. Kosovo should leverage the possible post-COVID-19 opportunities for quality of life paradigm shift in Kosovo cities, learning from recent experiences of lockdown, i.e. public health, security, transportation, and behavioral shifts.

The transformation of existing urban areas to smart and sustainable places in Kosovo lacks a vision and strategy that fosters progress. This study among others aims to identify initiatives, limitations, and opportunities for progress in this direction. The study's results would be presented to all relevant institutions and stakeholders, and serve as a guideline for them to design their programs, activities, or forms of interventions towards supporting Kosovo municipalities in transforming their urban areas with smart solutions.

The present study was designed to investigate:

- Knowledge of public officials on Smart City concept

- Planned and already implemented Smart City initiatives

- Financing of Smart City initiatives

- Limitations and challenges on the implementation of Smart City initiatives

- Prioritization of Smart City initiatives on municipal agenda

- Cooperation between different stakeholders' part of the smart city ecosystem

- The impact of COVID-19 on the Smart City planning

- Citizen participation

This study, commissioned by Friedrich Naumann Foundation for Freedom, and implemented by UBO Consulting agency includes the following tasks:

- Drafting the policy brief on the Smart Cities initiatives in Kosovo

- Proposing the data collection methods and procedures

- Conducting online surveys and semi- structured interviews with LSG units

- Conducting focus group discussions with municipal directors, officials from central governmental institutions, and representatives from enterprises and non-governmental organizations from five (5) different sectors (Administration, Public Services, Urban planning, Energy, Information and Communication Technology (ICT) and Open Data)

- Conducting data analysis

- Drafting publication from quantitative and qualitative study parts

This document is drafted to present the results derived from a web- based questionnaire, semi-structured interviews, and five (5) focus group discussions. Furthermore, it includes the methodological approach, instrument and recruitment process. Conclusions and recommendations from the results of this particular study are part of the report, as well.

3. Methodology

3.1 Quantitative Research

With respect to the purpose of this study, UBO Consulting used both the quantitative and qualitative methods of research, in order to identify the already implemented Smart City innovations and tools, along with Smart City projects – either implemented, initiated or simply planned in Kosovo LSG units.

In the first phase of the study, UBO Consulting used a quantitative method of research, to evaluate the perception of LSG units on smart city initiatives, identify planned or already implemented tools and innovations and assess the challenges that the municipalities face on their implementation. The questionnaire consisted of 24 questions, 5 of which were demographic questions. The questionnaire included questions designed to assess the level of knowledge of the LSG units' representatives on the topic, activities carried by their municipality, limitations and challenges, as well as financing of these initiatives. In addition, descriptions were provided for concepts which were potentially not familiar to respondents, in order to give them a clear understanding of their meaning.

One of the most significant steps in the survey is the sample design since it principally ensures the accuracy of the survey information. In this sense, the sample design has to reflect the main purpose of the study within the framework of scientific principles and the possibilities they offer. Given the purpose of this study, the sample for the online survey consisted of representatives from each LSG. The invitation to be part of the survey was sent to the Mayor's office on 34 municipalities from both the Albanian and Serbian community. The invitation to complete the survey was sent through emails, followed by direct phone calls. The emails contained the purpose of the study, the attached web-based online questionnaire link, and the researcher's email and telephone contact information. In the midst of 38 municipal representatives that were contacted, 14 of them responded to the web-based online survey. The municipalities that are part of the sample are listed on Table 1:

Municipalities
1. Ferizaj/ Uroševac
2. Gllogovc/ Glogovac
3. Hani i Elezit/ Elez Han
4. Kamenicë/ Kamenica
5. Klinë/ Klina
6. Leposaviq/ Leposavić
7. Lipjan/ Lipljane
8. Mamusha/ Mamuša
9. Partesh/ Parteš
10. Prishtinë/ Priština
11. Prizren/ Prizren
12. Rahovec/ Orahovac
13. Suharekë/ Suva Reka
14. Vushtrri/ Vučitrn

To identify the potential problems that may arise during the administration of the questionnaires in the field, UBO Consulting conducted a pilot-testing of the questionnaires to validate them in terms of content and logic. The pilot test also allowed to establish the validity (the degree to which the questionnaire measures what it is supposed to measure) and reliability (general internal consistency) of the questionnaire. Necessary modifications were made to the questionnaires during this stage including: editing or reformulating questions, adding filters to certain questions, etc. The finalization stage of the questionnaires produced the final version of the survey questionnaires in three languages. The changes in questions were also reflected in these three languages, which are: English, Albanian, and Serbian.

3.2 Qualitative Research

In the second phase of the study, UBO Consulting used the qualitative method of research, namely online discussions (semi structured interviews) and focus group discussions. This method of research is usually used to draw in-depth information from the complex personal experiences, beliefs and perceptions of the participants. Considering the Government's measurement in response to COVID-19, the study was conducted using ONLINE PLATFORMS (Zoom and Skype).

Semi structured interviews were conducted with representatives from LSG units who participated on the Online Survey to get in-depth information regarding the issues that were treated by the questionnaire. The aim of the semi structured interviews was to gain more in-depth opinions of respondents based on their responses on the Online Survey. Moreover, for the second phase of this particular study, UBO Consulting also conducted a total of five (5) focus-group discussions with representatives from local and central level and private sector. There were 53 participants in total, categorized as shown in Table 2:

Table 2: *Administering of the Focus Group Discussions*

Sector 1: Administration		
No. of FGDs.	Local	Position:
1.	- Prishtinë/ Priština - Mitrovicë/ Mitrovica - Kamenice/ - Klinë/ Klina - Istog/ Istok - Dragash/ Dragaš - Junik/ Junik - Shtime/ Štimlje - Mamusha/ Mamuša - Malishevë/ Mališevo - Rahovec/ Orahovac - Drenas/ Glogovac - Ferizaj/ Uroševac	- Director of Administration

Sector 2: Energy		
No. of FGDs.	Local	Position:
2.	- Dragash/ Dragaš - Kaçanik/ Kačanik - Klinë/ Klina - Novobërdë/ Novo Brdo - Drenas/ Glogovac - Viti/ Vitina - Mitrovicë/ Mitrovica - Rahovec/ Orahovac - Prizren/ Prizren - Shtime/ Štimlje - Gjakovë/ Đakovica	- Officer for Energy Efficiency
	Central	Position:
	- Ministry of Economy and Environment	- Senior Officer for Energy Efficiency and Cogeneration - Senior Officer for Energy Statistics - Senior Officer for RES - Senior Officer for Environmental and Social Affairs - Director of Energy Department

Sector 3: ICT and Open Data

No. of FGDs.	Local	Position:
3.	Prishtinë/ Priština Skenderaj/ Srbica Drenas/ Glogovac Shtime/ Štimlje	Information Technology Officer IT Network Administrator IT Director Director
	Central	Position:
	Agency of Information Society (AIS) Ministry of Economy and Environment	Director Head of Department of Post, Telecommunications, and Information and Communication Technology
	Enterprises and Organizations	Position:
	Kode Labs Open Data	Co-founder & President Project Manager

Sector 4: Public Services

No. of FGDs.	Municipalities	Position:
4.	- Prishtinë/ Priština - Mitrovicë/ Mitrovica - Skenderaj/ Srbica - Viti/ Vitina - Klinë/ Klina - Dragash/ Dragaš - Junik/ Junik - Hani i Elezit/ Elez Han - Kacanik/ Kačanik - Shtime/ Štimlje - Rahovec/ Orahovac - Drenas/ Glogovac	- Director of Public Services and Protection

Sector 5: Urban Planning

No. of FGDs.	Municipalities	Position:
5.	- Prishtinë/ Priština - Prishtinë/ Priština - Prizren/ Prizren - Pejë/ Peć - Gjakovë/ Đakovica - Suharekë/ Suva Reka - Shtime/ Štimlje	- Director of Urbanization - Director of Urbanization and Strategic Planning

The focus groups were divided into categories which represented five major sectors (Administration, Public Services, Urban Planning, Energy, and ICT and Open Data) for identifying the Smart city initiatives. These meetings provided the representatives from local and central level the chance to discuss about planned and already implemented smart city tools and innovations and exchange good practices, in terms of potential implementations. Participants had the opportunity to discuss concretely and in more detail the challenges they face towards their smart city objectives and opportunities for inter-municipal cooperation.

The potential invitees for the focus group discussion were selected from current in charge directors from the sectors on the five main topics. The directors from all the municipalities from the five (5) above mentioned sectors and officials from many central governmental institutions were invited to reduce the number of no-shows. After identifying the list of officials for each particular theme, the participants were recruited through emails, followed by direct phone calls. The emails contained the purpose of the study, the attached web-based online meeting link, and the researcher's email and telephone contact information. In the midst of 165 municipal representatives that were contacted, a total of 53 representatives were part of the focus groups discussions.

All confirmed participants were contacted the day before in order to be reminded of the time and location of the focus group discussion, and in order to confirm their participation once again. Considering the situation created by COVID-19, the discussion took place online, via connection to an online platform.

Focus group discussions resulted as most advantageous due to the fact that it allowed the participants to fully express their experience and share practices about the Smart City initiatives.

The questionnaire for the online survey and the focus group discussions was divided into the following themes:

- Familiarity/ knowledge with smart city concept

- Planned and already implemented Smart City tools and innovations

- Sources of finance for the Smart City initiatives

- The Limitations and challenges faced by municipalities/ director- ates on the implementation of Smart City solutions

- Prioritization of Smart City initiatives on municipal agenda

- Cooperation with municipalities, central level institutions and private sector on the planning an imple- mentation of Smart City solutions

The impact of COVID-19 on the long term strategy for implementation of Smart City tools and innovations

- Citizen participation

Further, UBO Consulting drafted the discussion guide- lines. These guidelines focused on the topic covered by the study. The discussion guide consisted of an introduction and discussion section, providing the moderator with a summary of the issues to be discussed at these meetings. Both the semi-structured interviews and focus group discussions were conducted in Albanian language, given that all the participants were Albanian speakers.

4. Results

The following sections disclose the results from the online survey and semi-structured interviews with representatives from LSG units, and focus group discussions with municipal directors, central level officials and representatives from enterprises, and non-governmental organizations. Through this study, the latter had the opportunity to express their opinions on certain issues, including initiatives planned and implemented, difficulties faced by municipalities on implementation of Smart City tools and technologies, sources of financing for Smart City initiatives, measures taken by municipalities to prioritize Smart City innovations on their agenda, the impact of COVID-19 on the opportunities for quality of life paradigm shift, and the importance of citizen participation for the transformation of future cities.

4.1 Demographic profile of LSG units

The sample of the online survey consisted of 14 municipalities. Among them, five towns (35.71%) were with 60,000 and 150,000 inhabitants; four towns (28.57%) with 20,000 to 60,000 inhabitants, one town with more than 150,000 inhabitants, and four small towns with less than 20,000 inhabitants (see Figure 1). Among them, twelve cities were Albanian and two of them (towns with less than 20,000 inhabitants) were Serbian.

Town under 20,000 inhabitants	28.57%
City 20,000-60,000 inhabitants	28.57%
City 60,000-150,000 inhabitants	35.71%
City over 150,000 inhabitants	7.14%
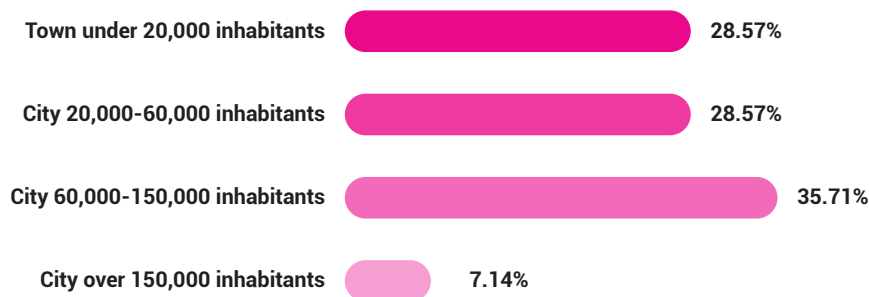
The semi structured interviews were held with the representatives from the municipalities that participated on the Online Survey. Finally, part of the focus group discussions for the qualitative part of the study were municipal directors from 26 municipalities, officials from central governmental institutions, and representatives from enterprises and non-governmental organizations.

4.2 Familiarity/ knowledge with smart city concept

To begin with, initial questions from the online survey aimed to assess the respondent's opinion on the Smart City concept. Therefore, the questions from these sections aimed to discover how they assess their level of knowledge on smart cities and how they define Smart Cities.

The following graph shows the evaluation on the knowledge regarding the Smart City concept according to the respondents. Asked to rate their level of knowledge from 1 (no knowledge) to 5 (complete knowledge) on Smart City concept, the majority of respondents have declared to have knowledge to a moderate extent (28.57%) or knowledge to some extent (28.57%). There was only one municipality who confidently affirmed that they had complete knowledge on the Smart City Concept. On the other hand, two municipalities (14.29%) declared that they have no knowledge on this concept.

- 5 - Complete knowledge
- 4 - Knowledge to a moderate
- 3 - Knowledge to some extend
- 2- Knowledge to a small extend
- 1 - No knowledge
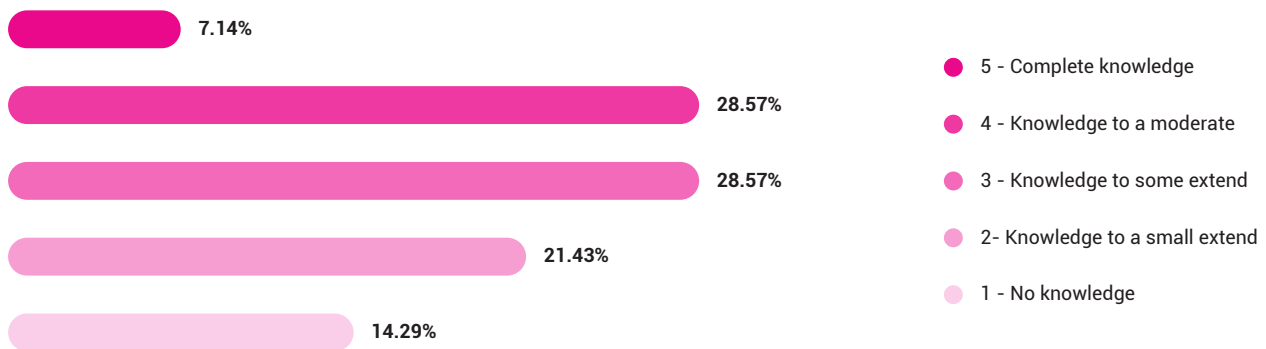
Figure 2: How do you assess the level of knowledge of municipal officials in relation to the notion "Smart City"? Rate from 1 to 5, where 1 = No knowledge and 5 = Complete knowledge

Within the same theme of question, the respondents were asked to choose an unlimited number among the statements that best describe the Smart City concept of their municipality. The definition of Smart Cities for the majority of municipalities was associated with contribution to realization of a comprehensive vision for the development of the city (16.9%), followed by digitalization of the city (15.3%), and improving the quality of life for citizens (13.6%). Improving the identity of the city, higher quality of project planning and implementation, and sharing of data were chosen by only 8.5% of the respondents as components for defining the smart city concept in their municipality.

Statement	Percentage
Contribution to the realization of a comprehensive vision of the development...	16.9%
Contribution to the digitalization of the city	15.3%
Improving the quality of life in the community	13.6%
Active participation of citizens in economic development	10.2%
Contribution to sustainable urban development	8.5%
Contribution to sustainable urban development	8.5%
Improving the identity of the city	8.5%
Sharing data with entities outside the government	8.5%
Contribution to local development	6.8%
Others	3.4%

Figure 3: Which statements best describe the Smart City concept in your municipality

Further, the results from the data show that social media is listed as the primary source of information for Smart City concept and initiatives (30%). Events/conferences were the second most listed choice (17.5%), followed by websites with content on Smart cities (15.0%) and Workshops/training on the topic (12.5%).
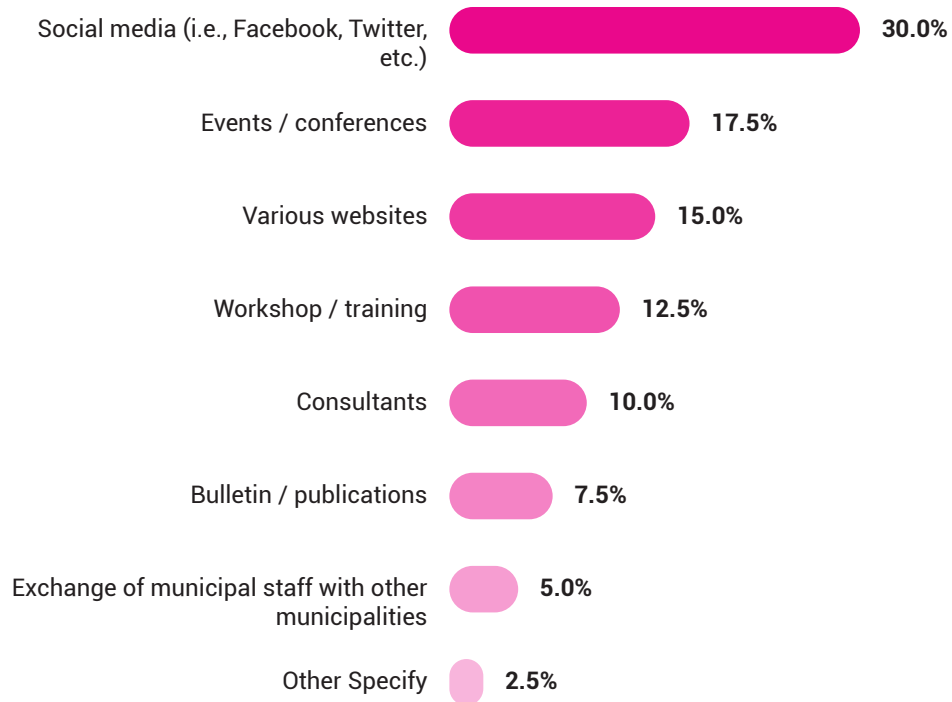
Figure 4: How did you find out about the "Smart City" concept and initiatives?

Further, participants were asked to rank six different measures that would help them toward their smart city project implementation from very important to not important at all. A cursory glance at Figure 5 shows that 78.6% of respondents consider participation in Smart City conferences to be very important as they work on developing Smart City tools and initiatives in their places. Having a website where practices and lessons from other places is the second measures with the highest percentage of respondents (71.4%) that consider it to be very important. Other actions include dissemination of best practices (64.3%), evaluating the process of becoming a smart city (64.3%), accepting support from relevant stakeholders (57.1%), and measuring the progress toward the smart city concept (42.9%).
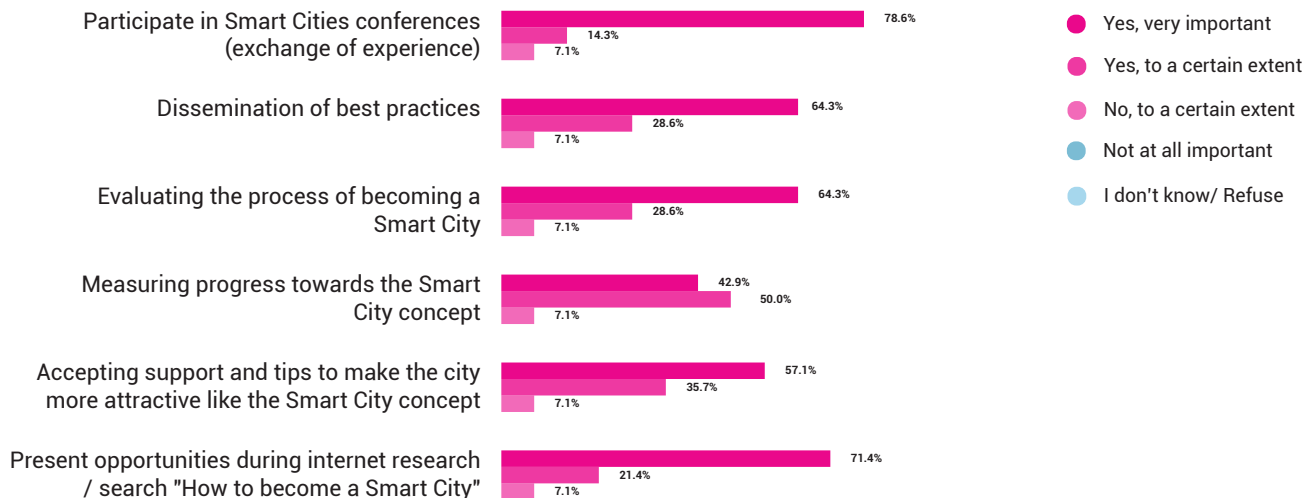
Figure 5: In your efforts to be a Smart City, how important do you think it is …

The municipal directors had the chance to further elaborate on possible measures on the focus group discussions. In this context, the director of Administration from the municipality of Dragash/Dragaš suggested that meetings where comparable municipalities share their experiences with their initiative would be helpful. Similarly, the director of Administration from the municipality of Suharekë/ Suva Reka stated that meetings, conferences, workshops where municipalities get to share their experiences, practices and lessons would be very beneficial as their work on this transformation. On a different matter, the municipality of Ferizaj/ Uroševac voiced the importance of having a national strategy for fostering the implementation of smart city projects and educating the relevant actors on the topic and its importance. Directors from other sectors support this point, claiming that a national strategy would provide guidance for implementation and management of smart city projects.

4.3 Planned and undertaken initiatives towards smart city objective

This study, among others, aims to shed light to the Smart City tools and innovations planned or implemented by LSG units or central institutions. Similar to above sections, the participants were asked if they have implemented Smart City initiatives in 12 different areas. The results from the study show that citizen participation through digitalization of services and education/health care are the two areas with the highest percentage (57.1%) of implemented Smart City projects as rated by municipalities. Half of the municipalities present on the study claimed to have implemented smart city technologies in the field of Finance, Open Data and Information System. The bottom two fields with the least number of municipalities which have implemented innovative tools are the field of water and wastewater and agriculture. However, unfortunately, the overall trend shows that a higher percentage of municipalities (65%) have not implemented smart city tools in any of the 12 listed areas.
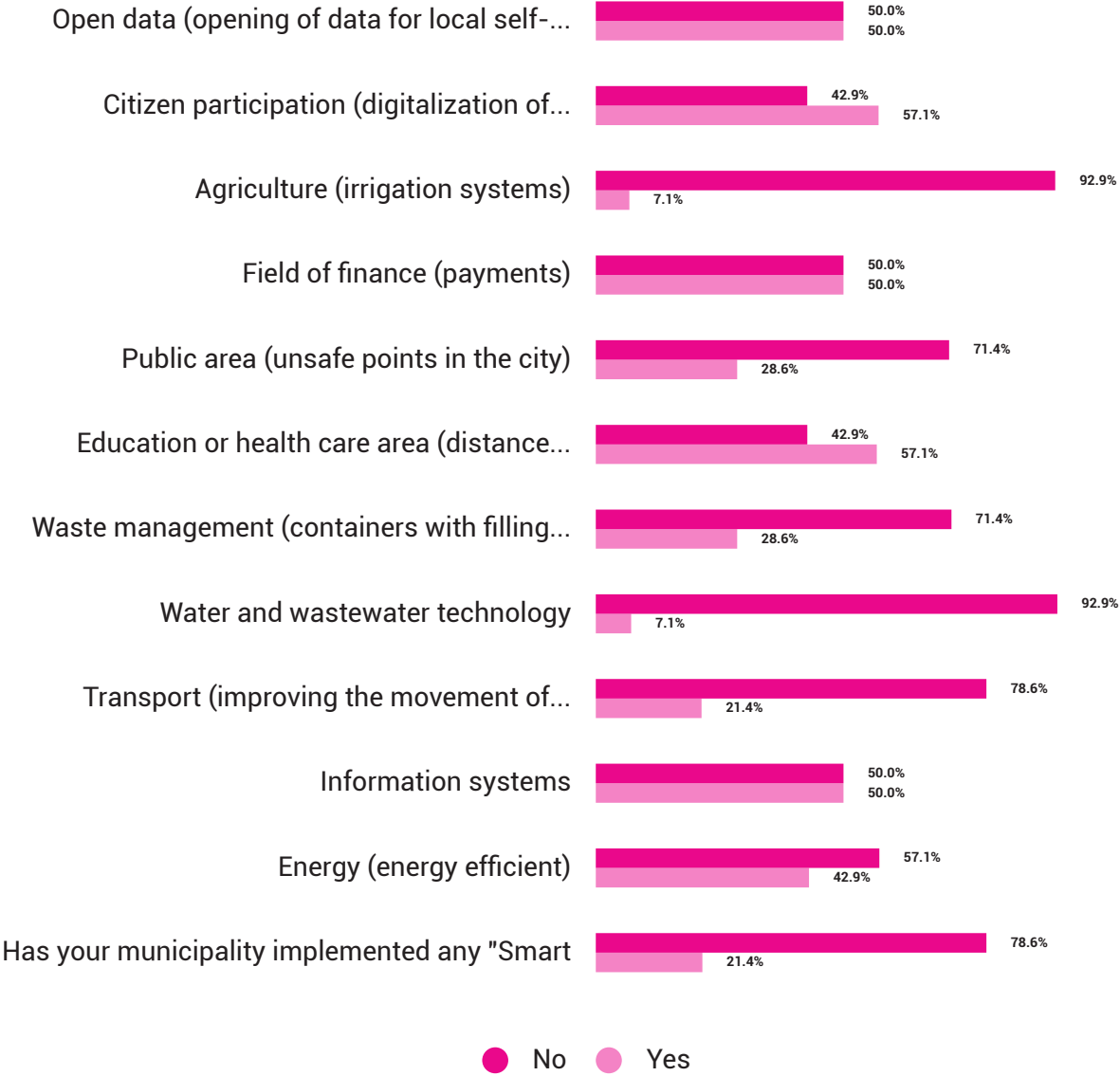
Figure 6: Has your municipality implemented any "Smart City" project in any of the following areas:

In order to grasp further information on the initiatives planned or already implemented, the representatives from the municipalities on the online survey and the participants on focus groups discussions from five different sectors, were asked to list the initiatives and measures taken on their behalf. The initiatives listed are categorized below based on sectors.

Administration
- Online Applications
- One Stop Shop
- E-Payments
- Digital platform for public participation (DPPP) 2
- Digital Diary
- Public Document Access
- ndreqe.com

Public Services
- Security Cameras
- Smart Waste Management
- Sensoring for measuring Air Pollution
- Te Pema T

Urban Planning and Mobility
- Smart Bus Stations
- New Public Transport Information System
- Improving Ticketing System
- Reconstruction of Bus Stops
- Enhance Pedestrian Scheme
- Bike Higher Scheme
- Bike Parking and Cycling Facilities
- Cycle Paths

Energy
- Introducing district heating
- Energy Efficiency
- Prizren Green Growth Center (PGGC)
- District Heating System using solar energy
- Wind Energy
- Solar Energy
- Lighting of Public Spaces using Solar Energy

ICT & Open Data
- Open Data
- E-Kosova
- Prishtina Open Data
- Smart Poles
- Smart Agriculture
- Smart Property Registration

Figure 7: Summary of Planned and Implemented Initiatives in Kosovo Municipalities classified by sectors

4.3.1 Administration

Kosovo, like many governments around the world, has considered digitalization of existing public administration services by making them easily accessible for citizens. In this regard, municipalities have already implemented various measures which among others, enhance citizen participation. This section will present the initiatives taken on the Administration sector.

Digital Self- Service

E- Kiosks– an automatic system for extracting documents from the Civil Registry of citizens. The municipality of Prishtinë/ Priština was the first to introduce the system for receiving documents digitally from the Civil Status Registry Kosovo in 2015. With 19 E- Kiosks available, the municipality of Prishtinë/ Priština covers up to 85% of the total requests of citizens for civil status documents. 19 other municipalities have followed the estab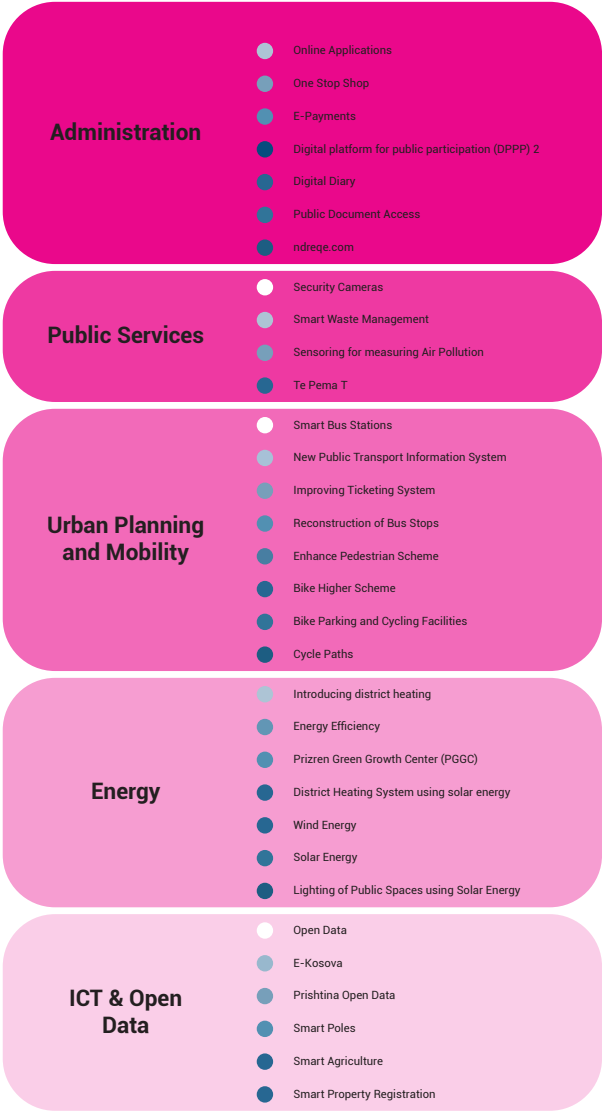lishment of an automatic system for extracting documents by setting up electronic kiosks. In some municipalities such as Suharekë/ Suva Reka, the services provided by these electronic kiosks have extended to include property certificates. In the future, the municipality of Suharekë/ Suva Reka plans to make further advancements to allow citizens to extract documents of municipal and property tax. While for cities with a larger number of inhabitants the benefits of introducing E-kiosks outweighs the cost of their maintenance, in places such as Dragash/ Dragaš they were not deemed necessary because of the size of the municipality and the size of the city population.

The maintenance costs were deemed high and unnecessary considering that the personnel can manage the requests of citizens.

In addition, the municipality of Prishtinë/ Priština has taken two more initiatives toward digital transformation of administration services:

- possibility of printing forms by any directorate of the Municipality of Prishtinë/ Priština, and

- sending completed forms automatically to the Citizen Service Center

Online Applications

It enables citizens to apply online for documents they need and receive them on their address in two (2) working days. This increases the efficiency of the municipal administration and helps to avoid the long queues of people waiting to receive documents. Respondents from the municipality of Prishtinë/ Priština, Gjakova[2] and Suharekë/ Suva Reka have stated that this service has become available for their citizens. The director of Administration from the municipality of Prishtinë/ Priština claimed that they offer all types of services online in the same way they do in person. However, the lack of information and/or knowledge of citizens poses some limitations on using these opportunities.

One Stop Shop

This project has been implemented in the municipality of Ferizaj/ Uroševac and Prizren/ Prizren. Through this project, the municipalities aim to offer their citizens all of the services in one place. The offices such as property tax office, economic development office, coronation office, and cadastral office, were all remodeled and reorganized. By integrated technology and digitization, this service has resulted in simplifying around 60% of the 190 services offered on behalf of public administration, have stated the representatives from the municipality of Prizren/ Prizren. With more than 56 counters where citizens can direct their requests, this technology will result in more efficient use of resources for citizens, saving their time and money at the same time.

Limitations towards implementing the project fully were present as there are limited spaces in the municipality; however, the project has been successful as the citizens have the opportunity to access all of the services in one place.

E- payments

The purpose of this is to print the waste invoice in order to save time, cost and track the property tax balance at all times. In addition, the taxpayers can make payments through the banking system. This initiative has already been implemented in many municipalities.

Digital platform for public participation (DPPP) [3]

DPPP is platform that aims to improve the transparency of public institutions by providing a medium that enhances communication between municipal officials and citizens. The platform is currently available in municipalities of Prishtinë/ Priština, Prizren/ Prizren, Gjakovë/Ðakovica, and Kamenica. Citizens can have access and propose projects for their neighborhoods as well as vote for projects already proposed and contribute in designing a city that works for all.

[2] Gjakova Online. Retrieved from: https://gjakova.e-komuna.com/
[3] Platforma Dighitale. Retrieved from: https://platformadigjitale.com/

Digital Diary

Digital Diary is initiative that was undertaken by the municipality of Ferizaj/ Uroševac is Digital Diary, which aims to contribute to the education system by providing real-time access of parents to their children's progress in schools. Parents whose children attend public schools can access their children's grades, and view their attendance.

Public Document Access

An informative site has been created with information on the documents that are accessible for public use and how the citizens can approach them.

ndreqe.com[4]

ndreqe.com is an online platform that gathers and addresses citizens' concerns to municipalities. It does so by offering the opportunity to their citizens to easily report their concerns and serves the municipalities to have easier access to citizens' concerns. The following problems can be reported at ndreqe.com: public lighting, problems related to sidewalks, road signs, barriers for people with disabilities, sewage systems, and waste. The platform is available for citizens from all municipalities and citizens can use their current location to report a problem. Furthermore, they are provided through the platform with real-time information on the actions taken on behalf of their concerns.

4.3.2 Public Service on behalf of their concerns

Smart tools and innovations aim to transform current urban areas to clean, safe, and comfortable places where citizens enjoy living. In this section, solutions that aim improving the public services that citizens receive and transform their places to liveable areas are introduced.

Security Cameras

Aiming to ensure security in public spaces, many municipalities have installed security cameras for surveillance. The director of Public Services from the municipality of Prishtinë/ Priština stated that they have been able to install these cameras in institutional buildings, as well as schools and the city's main square. With the help of some organizations, they will be placed in neighbourhoods as well. The directors of Public Services from municipalities of Skenderaj/ Srbica, Shtime/ Štimlje, and Klinë/ Klina reported that they have taken similar actions by installing security cameras which are monitored by the Kosovo police and can track anyone at any given time.

2 Gjakova Online. Retrieved from: https://gjakova.e-komuna.com/
3 Platforma Dighitale. Retrieved from: https://platformadigjitale.com/
4 Ndreqe.com. Retrieved from: https://ndreqe.com/

Smart Waste Management

Integrating smart systems to monitor waste collection, is part of the measures that many municipalities plan to implement. Among the proposed solutions is the installing of GPS systems on the trucks that collect the waste, thus providing real-time data on the locations where the waste is being collected. This would enhance the monitoring of waste collection and increase efficiency. In addition, this would give citizens access to check if their waste has been collected. Other proposed initiatives include the usage of sensors to detect when the garbage cans are full, sending notifications to the company to collect the cans on specific locations.

Along with this, the municipality of Mitrovicë/ Mitrovica is planning to install devices that detect when cans have been through on their garbage bin and give the person 15 min of free Wi-Fi and the ability to charge the phones when they do so. Similar solutions have been proposed by the directorate of Public Services in other municipalities as well.

Sensors for measuring air pollution

More people living in urban areas translates into more economic activity, consumption of energy and, greenhouse gas (GHG) emission. Thus, data on air quality become crucial for assessing the effect of initiatives on air pollution and the environment. Sensors for measuring air pollution have been installed in six key points of the city of Prishtina/ Pristina. In addition to the current parameters, the allowed pollution rate according to EU regulations will be reflected, so that the parameters can be compared.

By informing people on the air quality, they can choose whether or not to go outside on days with bad air. Similarly, the municipalities of Suhareka/ Suva Reka and Shtime/ Štimlje plan to place around 7 air pollution sensors in different locations that provide people with real-time data on air pollution levels. Drenas/ Glogovac in cooperation with the Ministry of Environment has set up measuring points for monitoring the air quality as well.

TE Pema T

A local product that cleans the air in the city - "TE Pema T" is full of plants that have very high capabilities of air filtration and oxygen production. This is possible thanks to the arrangement, position and, automatic irrigation system which makes the plants filter the air with maximum capacity.

2 Gjakova Online. Retrieved from: https: 5 Pristina Sustainable Urban Mobility Plan; Retrieved from:
https://www.Pristinaonline.com/uploads/sump_pristina_final_report_en_a.pdf
6 "Support for Sustainable Prizren - Initiating Urban Nationally Appropriate Mitigation Action
(NAMA)". Retrieved from: https://sway.office.com/Kr5Rfx50dtLSlSD5?ref=Link&fbclid=I-
wAR2ZSukFaIDgZFygbY5Gi2Yzv7Idgc3G4OvG IksDlaevqQf2HgrSj09G5AY//gjakova.e-komu-
na.com/
3 Platforma Dighitale. Retrieved from: https://platformadigjitale.com/
4 Ndreqe.com. Retrieved from: https://ndreqe.com/

4.3.3 Urban Planning and Mobility

The transport system is one of the main causes of air pollution. Being aware of this fact, many municipalities have designed sustainability mobility plans with regards to road transportation, ranging from improving the public transport infrastructure to encouraging more environmentally friendly means of transport and restricting vehicle access to the city centre. This section lists the initiatives planned in this regard.

Improving Public Transport Infrastructure [5]

The municipality of Prishtinë/ Priština, on its Sustainable Urban Mobility Plan proposes actions that aim to provide the proper infrastructure for using public transport, thus resulting to a reduced car usage. The actions planned in this regard are:

- Development of the Bus Hubs Central Stations with waiting and information facilities and bus stop shelter for passages[5].

- New public transport information system will real-time information on the vehicles, online and on the bus stops. This service will attract more passengers by providing a more comfortable usage of public transport by providing information on the vehicles they can use and their timetable[5].

- Integrated ticketing system enabling the purchase of bus tickets through street bus tickets and e- tickets through Buss App to speed up boarding times[5].

- Reconstruction of bus stops to increase the quality of public transport and ensure accessibility for all[5].

Similar measures are foreseen on the "Support for Sustainable Prizren - Initiating Urban Nationally Appropriate Mitigation Action (NAMA)"[6] project which aims to promote the use of sustainable modes of transport that contribute to reducing the GHG emissions in the municipality of Prizren/ Prizren. The measures planned on the transportation sector on behalf of the cross-sectoral investment plan that will help the municipality of Prizren/ Prizren achieve the targets of reduced GHG emissions are:

- Encourage the use of public transport, electric cars, and sustainable modes of transport such as walking and cycling[6]

- Raising awareness among the citizens to encourage behavioural change[6]

- Training for citizens and professionals to foster these changes[6]

Further, in this regard, the director of Urbanization from the municipality of Shtime/ Štimljehas stated that they plan to build bus stations for the transit buses that stop through Shtime/ Štimljein order to provide citizens with the proper infrastructure for bus usage. Increasing the capacity of public transport through making more buses available has been highlighted by the directorate of Urbanization in the municipality of Mitrovicë/ Mitrovica as well.

Improving walking and cycling infrastructure

Along with improved infrastructure for public transport, municipalities will make sure to improve the cycling and walking infrastructure. Making mobility sustainable and inclusive where citizens can easily travel and have access lies at the heart of the sustainable mobility plan for the municipality of Prishtinë/ Priština. Among the proposed actions that aim to encourage cycling and walking are:

Improved pedestrian scheme[5]

improving the pedestrians for creating a safe environ-ment for walking that encourages citizens to use other transport means rather than private cars. In addition, the new mobility plan proposes the construction of the pedestrian and cycling areas as part of an integrated network that works for all the citizens and improves their walk, cycle, and transport journey.

Implementing the city Bike Hire Scheme and Bike parking and cycling facilities[5]

that provides easy, safe and affordable access to bikes for citizens. Making available bikes for hiring on an hourly and daily basis, will encourage citizens to switch to this mode of transport in the city. Additionally, citizens will have the possibility to pick up a bike at one location and return on another, making it easier for them to access and make trips.

Cycle paths[5]

are part of the cycling measures on behalf of the sustainable mobility plan. Besides, new city cycle paths to be developed, improvements to the existing cycle paths that enhance the safety of cyclists will be taken.

Encouraging bike usage has become of the main priorities for many municipalities as they work on the sustainable mobility plan. The director of Urban Planning, Cadastre, and Geodes from the municipality of Shtime/ Štimlje has stated that in the frame of the mobility plan, they have established three main roads with bicycle lanes which approximately count 24km of bike lanes. Bike lanes have become a priority in the municipality of Mitrovicë/ Mitrovica as well, according to the director of Urbanization where separate policies are being developed for urbanization, environmental protection, and waste management.

Municipality of Prizren/ Prizren projects similar measures on the reconstruction of green areas initiative[7] for a sustainable and healthy environment. Among the actions that will take place on this context are:

- Establishing green pedestrians and green areas
- Providing charging stations for electric cars
- Creating bus stops with smart systems
- Making bikes available for citizens
- Creating green Solutions for streets and lanes

Restricting the vehicle access to city centre

Restricting vehicular access to urban centres can have a significant impact in creating communities with better air quality. In the longer-term, reducing the crowd and traffic jam in the city centres, translates into less air and noise pollution and helps establish an urban clear zone. Thus municipality of Prishtinë/ Priština on behalf of its Pristina Sustainable Urban Mobility Plan, has planned the following measures that aim to reduce traffic congestion by providing more parking spaces and restricting access to the city centre, thus contributing to less pollutant air.

Restrictions on the vehicles accessing city center

aims to reduce the emission produced by vehicles by placing additional control measures for vehicles types that can access the city centre. Around 1.5 million tons of CO_2 is produced from fuel used for cars on a yearly basis in Kosovo8. Restricting the types of vehicles that access city centres is one of the possible alternatives to get these numbers down.

[7] Support for Sustainable Prizren - Initiating Urban Nationally Appropriate Mitigation Action (NAMA). Retrieved from:
https://www.ks.undp.org/content/kosovo/en/home/projects/support-for-sustainable-prizren--initiating-urban-namas-- nationa.html?fbclid=IwAR2rEPAVap7h8dPMn-moOHZl_lsszuUGlkVJiiqxWnSQSkiMw57cTSGeO0-g

[8] Ekonomia e veturave. Retrieved from: https://veturat.institutigap.org/
[9] Prishtina Parking. Retrieved from: https://www.prishtinaparking.net/

Paid parking zones for the residential areas in the municipality of Prishtinë/ Priština[9]

will help to reduce the number of cars in the traffic looking for parking and regulate the parking activity in the city centre. These parking zones will use an integrated digitized system based on developed countries using smart payments and sensors to detect available parking spots. Three zones for parking places have been identified, the first one being the closest to the city centre and the most expensive one at the same time. A smart payment system will enable citizens to make payment through the parking application, through sms via telephone operators in Kosovo (Vala and Ipko), tickets, or kiosks[9].

The residents will have an advantage because they will have their parking place reserved based on monthly payments. In addition, the first car for the family will have free parking but they are asked to pay for each additional car, thus aiming to reduce car ownership.

Establishment of park and ride facilities

a concept that aims at reducing traffic congestion in the city centre by providing parking availability at the public transport terminals on the remote areas of the main radial routes. Citizens in their parking ticket will have the public transport cost included which will be an incentive for them to use public transport to go to the city centre. This will result in a reduced number of cars in the city centre as a high number of visitors who commute every day for work will park their cars in the remote city area and use public transport to access the city centre.

Underground parking

aims to tackle the problem of on-street parking. This will result in additional spaces for pedestrians and extend the space on the streets as cars are no longer parked on the streets. The parking will use sensors to provide real-time data to users on the available parking places for each parking zone without having to spend time on traffic to look for available spaces. At the same time, this will solve the problem of traffic in the city centre, given that 30% of traffic is caused by cars in search for a parking place. This measure will be introduced in accordance with the congestion zone initiative, given that cars will need to be parked nearby the city centre where they will otherwise need to pay a fee to enter.

[8] Ekonomia e veturave. Retrieved from: https://veturat.institutigap.org/
[9] Prishtina Parking. Retrieved from: https://www.prishtinaparking.net/

4.3.4 Energy

An aspect that needs to be considered to achieve sustainability, is to use renewable sources of energy to meet the energy needs of the citizens. Thus, in order to reduce the consumption of energy from non- renewable sources, renewable alternative sources should be considered for energy production, mobility, heating, and other operations. This section presents the measures taken by municipalities and central institutions toward reducing energy consumption and substituting non-renewable sources of energy with alternative non-pollutant sources.

Introducing district heating

One of the initiatives that the central government has taken toward reducing the energy consumption is to introduce heating centres in some of the municipalities, such as Ferizaj/ Uroševac, Gjilan/Gnjilane, Pejë/ Peć, Prizren/ Prizren, Mitrovicë/Mitrovica. This initiative plans on reducing the demand for electricity and increasing efficiency at both, central and local levels. To date, district heating is only available in municipalities of Prishtinë/ Priština, Gjakovë/Đakovica, and Mitrovicë/Mitrovica. The director of Public Service from the municipality Shtime/ Štimlje has also added that they plan on building their district heating system.

Introducing district heating will have a direct effect on reducing the pollution by providing incentives to citizens to substitute their individual heating systems which are highly based on high pollutant.

Energy Efficiency

The majority of municipalities have joined the energy efficiency plan. The plan among others included the renovation of institutional buildings, health buildings, and schools. Alongside the renovations, a platform where municipalities could track the energy savings after the renovation or interventions was launched. Through the program, the municipalities could track the reduction of energy sources used for heating for example after the renovation. The employees were trained on behalf of the project to ensure that they have the skills to use the platform. Additionally, other projects from donors will enable the renovation of residential houses and apartments to ensure long term energy savings. Other initiatives aiming to reduce energy consumption were the replacement of all public lights with economic and efficient bulbs. The Official for Energy Efficiency from Drenas/ Glogovac confirmed that they have invested on the replacement of old lights with LED lights, which has resulted in a 50% reduction in energy consumption.

The Senior Officer for Energy Efficiency and Cogeneration from the Ministry of Economy and Environment (MEE), added that there are also other initiatives being undertaken by the central government on the creation/drafting of the energy and climate plan and the revision of the energy strategy. The energy and climate plan is being drafted for the 2021-2030 period, with a view until 2050.

4.3.4 Energy

Furthermore, the revision of the energy strategy is looking into new policies that lead to an increase in energy efficiency, but also on smart solutions into the energy sector. These policies aim to increase efficiency, reduce gas emissions, strengthen the stability and security of the network. Attempts are being made to introduce gas as a source of energy, which would result in increasing energy stability, diversifying energy sources, and empowers municipalities in their energy privatization and development.

Prizren Green Growth Center (PGGC)- Sustainable Prizren[10]

Prizren Green Growth Centre (PGGC) has been established on behalf of "Support for Sustainable Prizren - Initiating Urban Nationally Appropriate Mitigation Action (NAMA)" project. The main objective of "Support for Sustainable Prizren - Initiating Urban Nationally Appropriate Mitigation Action (NAMA)" project is to improve the quality of life of citizens of Prizren/ Prizren by reducing the Greenhouse Gas (GHG) emissions. This planning and oversight office assists the municipality to set out their climate-related top priorities, and identify and prioritize urban mitigation actions. In addition, the project aims to bring together different stakeholders, by serving as a meeting point of relevant institutions that have been working separately in the field of Green Growth. Other actions taken toward combating climate change issues on behalf of this project are:

- Feasibility studies for installing solar panels in public buildings[10]

- Green House Gas (GHG) Emission inventory with data on direct and indirect GHGs emissions from sectors of energy, agriculture, waste, transport, land use, industrial processes, and industrial products use[10]

- Cross-Sectoral Intervention Plan (CSIP) includes around 74 actions in the sectors of: energy, waste management, transportation and public services[10]

- The measures planned on behalf of cross-sectoral investment plan on the energy sector are:

- Taking actions for energy-efficient buildings thus contributing to the reduction of GHG emission1[10]

- Encouraging the efficient use of energy in residential buildings[10]

- Encouraging the reduced use of energy for heating and lighting of public spaces[10]

- Enhancing human and internal capacities in institutions for energy[10]

- Raising awareness and promoting the benefits of behaviours that promote reduced energy consumption and GHG reduction[10]

[10] Support for Sustainable Prizren, Cross-Sectoral Intervention Plan (CSIP). Retrieved from:
https://www.ks.undp.org/content/kosovo/en/home/projects/support-for-sustainable-prizren--initiating-urban- namas--nationa.html?fbclid=IwAR2rEPAVap7h8dPMn-moOHZl_IsszuUGlkVJiiqxWnSQSkiMw57cTSGeO0-g

District Heating System using solar energy

Considering the rate of population growth in Prishtinë/Priština, it is foreseen that by 2029 an additional 13.500 new customers will demand the district heating[11]. Attempts have been made on replacing a significant part of the heat production source in the district of Prishtinë/Priština with solar energy. The main objective of this project is to increase energy efficiency and savings. At the same time, it increases the capacity of the current city heating plant, increases efficiency, expands the network, decreases final electricity consumption, and makes the system more sustainable. Using solar thermal collectors, the heat is absorbed from the sunlight to heat the water. The heated water then distributed through the network of district heating. The plant will store the energy from solar panels during the summer and use a Combined Heat and Power Transmission System for heating during the winter.

This would benefit an additional of around 4,000 households and 18,000 people in the capital city. Replacing electrical heating and reducing the emission caused by lignite-based TPP will be one of the båenefits of this initiative. Another one is that the individuals will be encouraged to substitute their individual heating systems such as stoves (based on wood) and have a significant effect on the harmful pollutant and climate[11].

Wind Energy[12]

In the smart city vision, a growing number of private companies that produce energy through the installation of wind turbines is emerging. In North Kosovo, an investment for wind energy generation has been approved which includes the installation of 27 wind turbines which will help generate around 105 MW capacity to be distributed to the municipality of Vushtrri/Vučitrn.

From the total number of entities that are approved by the Energy Regulatory Office, a capacity of 114.4 MW will be generated using wind turbines[12]. These projects will have a direct effect on reducing CO_2 emissions and provide environmentally friendly solutions for energy production.

Solar Energy[13]

Aiming to diversify energy sources, investments that harness the benefits of solar thermal energy have taken place. Installing solar panels assists to cover the energy needs of citizens without producing pollution. From the approved applications from the Energy Regulatory Office, a capacity of 20 MW energy will be produced from the installed solar panels. Additionally, the approval of other entities in the Preliminary Authorization stage will contribute to the generation of up to 82.27 MW energy[13]. The aim is to cover the energy needs of the families in these areas while avoiding harmful emissions of carbon dioxide.

4.3.5 ICT and Open Data

The lighting of Public Spaces using Solar Energy

Solar energy has become the source for the lighting of public spaces and streets in municipalities of Ferizaj/ Uroševac, Pejë/ Peć, Gjakovë/ Đakovica, and Shtime/ Štimlje. The municipality of Ferizaj/ Uroševac plans to implement similar initiatives for other parts of the city as well considering this to be a major step towards more energy-efficient solutions. The director of Energy Efficiency from the municipality of Drenas/ Glogovac has stated that during the upcoming year the public lighting will be transformed into a smart system. Alongside, the municipality of Prizren/ Prizren is planning to use solar energy as a source of energy for their public and administration buildings. All these initiatives aim to increase energy efficiency and introduce renewable sources of energy for providing their citizens with proper infrastructure.

Smart cities are transforming the current urban and rural areas to improve the quality of life for citizens, from mobility, and environment, to water and energy. Smart technologies demand data that is open, and can be accessed, shared, and used by the public free of charge. The following section lists the initiatives planned and implemented on the Open Data and Digital Technology field which aim to increase transparency and make use of data for creating smart solutions.

Open Data Kosova[14]

The portal where data is released in an open format by Kosovo public administrations. The portal is managed by the Agency for Information Society (AIS), which aims to provide the society with information that is made accessible from the governmental institutions. Up to date, 205 datasets are available which can be extracted in different formats and further processed. For example, the Public Procurement Regulatory Commission posts on a monthly basis the list of plans and tenders.

E- Kosova

A platform in its pre-launching phase, being managed by the Agency for Information Society (AIS). The platform aims to centralize the provisions of all the services to citizens, including online applications and electronic payments. Through this platform the citizens will need only one account for all the services of different sectors they need, making it easier for them to meet their requests. At the same time, the citizens can have real time information on the process of their request. The general director from AIS added that through this page citizens can apply for any documents and receive it via mail. Moreover, they can also track their requests real-time on the website.

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[11] Kosovo, Termokos District Heating Network - Solar Thermal Project, Pre-Feasibility Study
[12] https://www.ero- ks.org/zrre/sites/default/files/Publi- kimet/BRE/11.12.2020%20Regjistri%20i%20Aplikuesve%20p%C3%A Br%20Autor- izim%20dhe%20Pranim%20ne%20Skemen%20Mbe....pdf
[13] https://www.ero- ks.org/zrre/sites/default/files/Publi- kimet/BRE/11.12.2020%20Regjistri%20i%20Aplikuesve%20p%C3%A Br%20Autor- izim%20dhe%20Pranim%20ne%20Skemen%20Mbe....pdf

Pristina Open Data[15]

In an attempt to increase the transparency of work, the capital city has created the Pristina Open Data platform to make the data available for the public. The data is collected from different departments and visualized for better understanding. It may also be used for further analysis if necessary. Making data available to citizens facilitates the transparency of governance in the municipality of Prishtinë/ Priština, the accountability and participation of the public. This platform includes a total of 17 categories, including the work of the mayor of Prishtinë/ Priština.

Smart Poles[16]

A project implemented by the Ministry of Economy and Environment (MEE) through the Kosovo Digital Economy (KODE). Using technology, they have extended fixed high-speed broadband infrastructure based on optical fibbers in remote areas of Kosovo. An important investment is the installation of smart poles in three villages in Kosovo, specifically in Dol, Breznica, and Recan. Using solar energy, these devices are used to offer many services such as: monitoring of air and ground parameters, security cameras, public sound system, smart lighting, information screen, free Wi-Fi internet, wireless charger, and USB, etc. "We have also supplied schools with smart devices, and students can put various ads, and express their creativity", stated the Head of Department of Post, Telecommunications, and Information and Communication Technology from MEE. Through these projects, they aim to improve lives of citizens in these areas.

Smart Agriculture[17]

This project uses smart tools to provide the farmers with real-time data on atmospheric conditions in the regions of Gjakovë/Đakovica, Junik/Junik, Deqani, Pejë/ Peć, Podujeva/ Podjeva, Kamenicë/ Kamenica, Viti/ Vitina, Obiliq/ Obilić, and Rahovec/ Orahovec. Sensors that generate real-time data on atmospheric pressure, winds, have been placed on agrologic stations which use which are further used to forecast various pests and diseases18. These agrologic data are provided to farmers free of charge in an interpretable and easy to understand format.

Smart Property Registration

Similar technologies have been implemented in Krushë e Madhe/ Velika Kruša, Kosovo for providing the landowners with their property rights. Unmanned aerial vehicles, also known as drones have been used to establish land surveys thus enabling land registration in the village. This has enabled the single household women to apply for a loan by claiming their property rights and establish their business cooperatives. Similar technologies that utilize high-resolution maps can be used to detect illegal contractions as cities in Kosovo continue to expand at a rapid speed, especially during the last years[19].

Similar platforms are developed by non-governmental organizations, enterprises, and other institutions for disclosing data from governmental institutions and enabling public participation. By doing so, they contribute toward more transparent and efficient governance and witness the importance of stakeholders, other than public institutions for accessible and transparent cities.

State Budget[20]

a project on GAP Institute's platform, offers the citizens the opportunity to see data regarding the budget allocation and public spending for all the Budget Organizations (BO) on local and central level. Each drop-down narrow walks the citizens to a different section depending on the institution, type of expenses, economic aggregates (wages and salaries, good and services, capital expenditures, utilities, and reserves[20]), and classification based on functional, economic, and institutional categories.

Municipal ID[21]

through his platform citizens can get all the information ranging from the number of people employed in public institutions, to the number of students in schools, the number of businesses operating in different sectors, the budget, and pension savings schemes.

In addition, they can be updated on the promises made by the mayors of the municipalities and the ones that have been implemented up to date.

Open Businesses[22]

a platform that provides information on active businesses in Kosovo. The data are presented in easy to understand format and are visualized. Besides the number of businesses, they can access other information such as the number of employees, sectors, type of businesses, share of number of businesses in municipalities, etc.

[20] How does the state spend our money? Retrieved from: https://www.institutigap.org/spendingsEng/
[21] Municipal ID. Retrieved from: https://www.komunat.institutigap.org/
[22] Open Businesses. Retrieved from: http://biznesetehapura.com/en

4.4 Financing of Smart City initiatives

An important part of the research was to identify sources of financing for Smart City Initiatives. The initial question in this regard was whether local governments allocate funding for smart city technologies such as sensors, prediction software, and others when planning physical infrastructure projects. The majority of municipal representatives on the online survey (71.43%) declared that they allocate a budget for smart city tools.
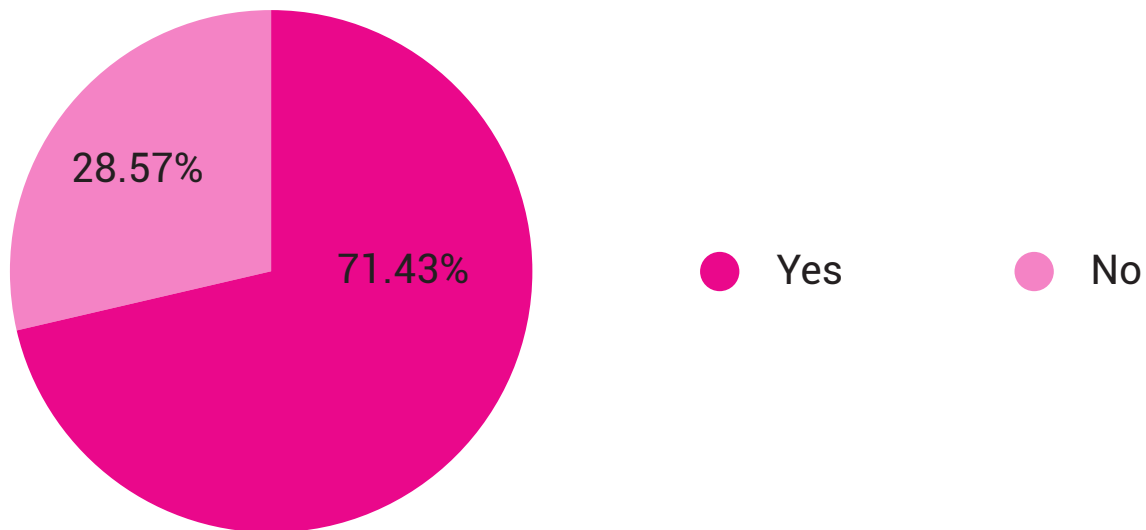
28.57%

71.43%

● Yes   ● No

Figure 8: Does your local government typically allocate a certain amount of funding for smart city technologies (sensors, monitoring, and prediction software, etc.) when planning for physical infrastructure projects (transportation, water, energy, communications technology, etc.)?

Municipalities that stated that they allocate budget on smart city initiatives were further asked about the amount that they allocate. Half of them (50%) stated that they allocate 1-5% of their budget for smart city tools. One-fifth of them allocates up to 1%, and another 25% allocates from 5 to 10% of their budget.

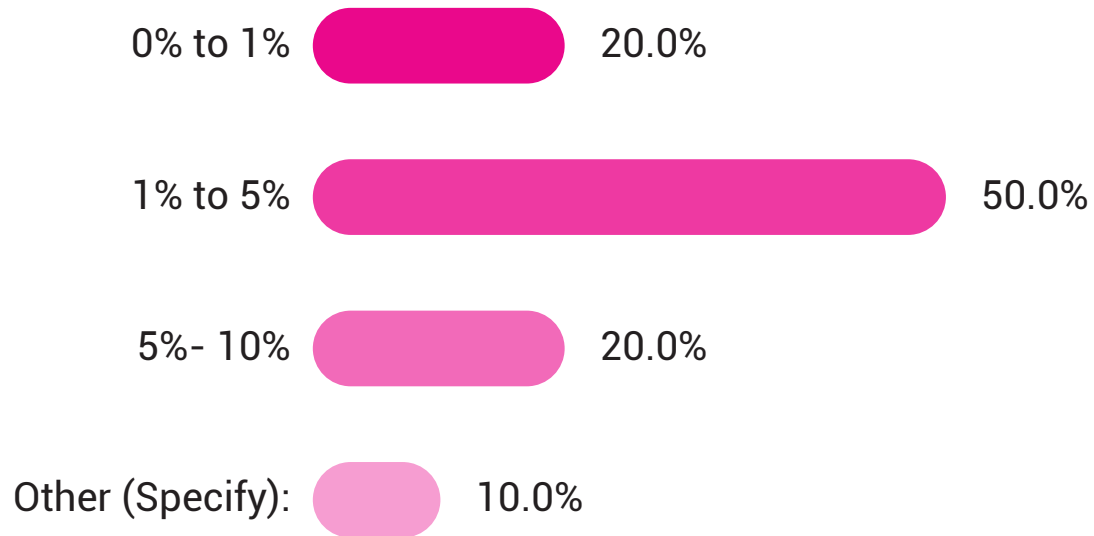| Category	Percentage
0% to 1%	20.0%
1% to 5%	50.0%
5%- 10%	20.0%
Other (Specify):	10.0%

Figure 9: If yes, on average what percentage of the project budget is typically allocated to ''Smart City'' technologies?

Smart City tools and innovation go along with huge investments in infrastructure and internal capacities. The two main sources for financing of Smart city initiatives have been identified public funds from local or central government (50%), and funds from international donor organizations (42.86%).

Local or government of Kosovo public funds — 50.00%

Funds of international donor organizations — 42.86%

Public-private partnership — 7.14%
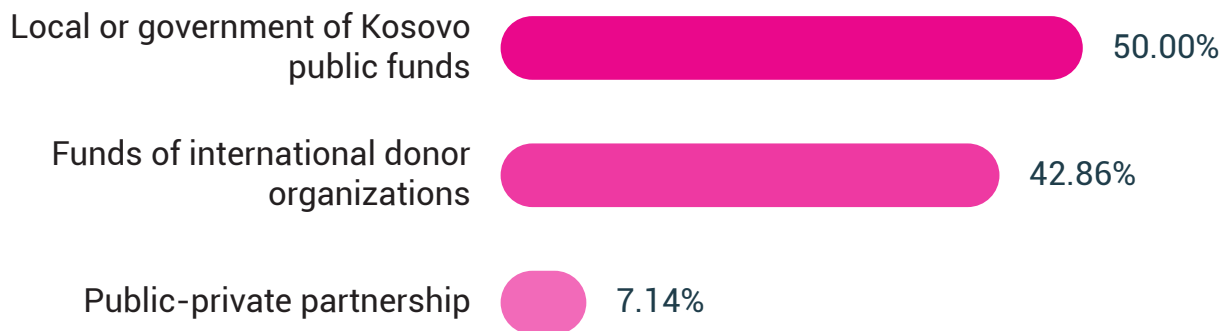
These two sources for financing smart city initiatives have been highlighted during the focus group discussions with municipal directors as well. The director of Urbanization from the municipality of Suahrekë/ Suva Reka has stated that they have received financial support from Government on building their Bus Station and currently waiting for donations to secure the funding for projects that aim improving air quality. In other municipalities funds from international donor organizations are the main drive for implementation of these projects. Some examples are: The Green Growth Centre in Prizren/ Prizren, efficient energy management in municipalities, etc.

Figure 10: What were the sources of funding for the "Smart City": projects implemented in your municipality?

4.5 Limitations and challenges

In order to reveal the difficulties faced by the municipalities on implementing the Smart City tools and innovations, the participants on the study (through the online survey and focus group discussions) were asked about the challenges and limitations they face while working on their Smart City Agenda.

It was no surprise that the main listed difficulty by municipal directors, in general was lack of municipal budget and funds (27.1%), for financing the investment on these technologies and maintaining them afterward (see Figure 11). In addition, municipal directors have highlighted budget to be the main limitation especially for the initiatives that require massive investments such as building new technologies for digitizing administrative processes or investing in renewable energy sources.

"Unfortunately, the maintenance cost of the e-Kiosks used to automate the process of extracting civil registry documents on Administration is high" thus making many municipalities unable to meet the cost."

- Director of Administration, Municipality of Ferizaj/ Uroševac

It is important to emphasize that the limitation of funds has been identified as a common challenge in all focus groups discussion (Administration, Public Services, ICT and Open Data, and Energy).

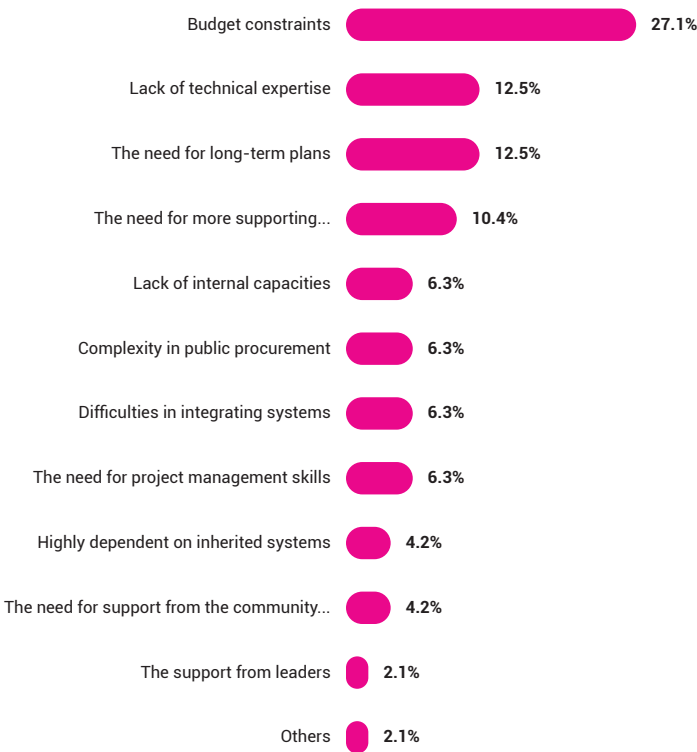| Barrier	Percentage
Budget constraints	27.1%
Lack of technical expertise	12.5%
The need for long-term plans	12.5%
The need for more supporting...	10.4%
Lack of internal capacities	6.3%
Complexity in public procurement	6.3%
Difficulties in integrating systems	6.3%
The need for project management skills	6.3%
Highly dependent on inherited systems	4.2%
The need for support from the community...	4.2%
The support from leaders	2.1%
Others	2.1%

Figure 11: Which of the following issues are the main barriers for your municipality in order to implement "smart city" technology

Along with the budget constraint, lack of technical expertise (12.5%), long term plans (12.5%), the need for supporting infrastructure (10.4%), and lack of internal capacities (6.3%) comprise the list of top five selected barriers from the municipalities. Being concerned about the lack of technical expertise of the staff, the municipal directors on the focus group discussions have mentioned that besides investments in technological infrastructure efforts should be made on increasing and enhancing the skills of the workforce. They have brought to attention the need for training the officials on the procedures and policies of new initiatives to provide them with needed skills to work with these systems.

Supporting infrastructure for implementing Smart City Technologies is a common challenge identified among the directorates of Administration, Energy, and ICT and Open Data participant in the focus groups discussions. Many municipalities have stated that they cannot support the infrastructure needed neither financially nor the staff has the capabilities to sustain it, especially in the sectors of Energy and digital transformation where enormous investments are needed. In Administration, for example, network failure has resulted in the non-functioning of many E-kiosks for extracting civil registry documents in remote areas.

"The current infrastructure in the Republic of Kosovo poses a problem, as there are large capital investments related to the energy diversification, increasing network security and other similar issues." - Senior Officer for Energy Efficiency and Cogeneration

- Ministry of Economy and Environment

Talking about the lack of internal capacities deemed necessary for the maintenance of smart city initiatives, one of the respondents stated:

"There is only have one Information Technology official who works in the municipality who is close to retirement. This presents a problem because we are amongst the largest municipalities in national level."

- Director of Administration – Municipality of Ferizaj/ Uroševac

Similar responses were recognized from directors of other sectors. In the municipality of Prishtinë/ Priština the need for increasing internal capacities is crucial, especially for the IT department. In other municipalities such as Kline and Dragash/ Dragaš, the directors for Public Services have emphasized that the lack of official personnel that would take care of the maintenance has resulted in failure to introduce smart solutions that would improve the quality of services provided to citizens.

The IT Official from the municipality of Drenas/ Glogovac has highlighted:

"IT departments are not prepared for such changes since they only have one IT official supervising all other officials. This department is not a priority for the municipalities; and thus, it has remained undeveloped"

- Municipality of Drenas/ Glogovac –
  The IT Office – Directorate of Administration

Other issues raised by the directors of municipalities were: the coordination between departments and institutions, the need for a long term plan, and the civil society participation who come to be the end-users of these tools and innovations.

4.6 Prioritization of Smart City initiatives on Municipal agenda

One of the main important parts of the study was to observe the commitment of municipalities on prioritizing smart city initiatives on their Agenda. According to the research results, the participants provided various responses in relation to the domain that is considered the easiest for implementing in their city. The respondents were provided with four main domains where smart city solutions have been implemented. 30% listed governance as the easiest domain for implementing smart solutions, around 21% consider the environment to be the easiest field, and the remaining 48.2% are equally distributed between mobility and economy.
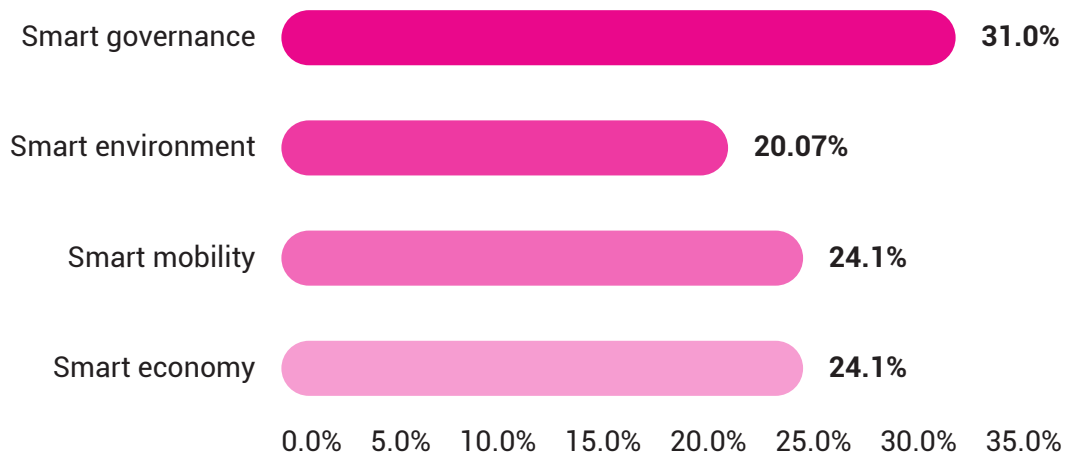

Figure 12: Among the components of the Smart City concept, which seem the easiest for your city to implement?

Further, the municipalities were asked about their overall commitments for integrating smart city initiatives on their Agendas. The majority of them (57.14%) responded that the implementation of smart city initiatives is considered a high priority for their city.

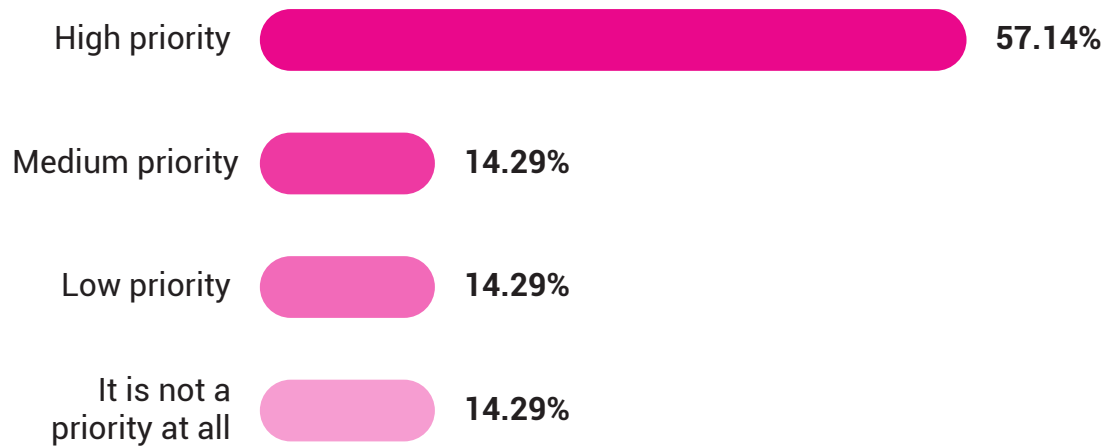|	
High priority	57.14%
Medium priority	14.29%
Low priority	14.29%
It is not a priority at all	14.29%

Figure 13: How would you characterize the overall commitment of your municipality in the implementation of Smart City initiatives?

Looking further into the prioritization of Smart City initiative in their agendas based on the number of inhabitants of the municipalities, it can be easily noticed that whether cities prioritize these investments is highly dependent on the number of citizens it has to provide services for (see Table 3). While for small towns with less than 20,000 inhabitants these initiatives are considered as a low priority or not a priority at all, for cities with 60,000 to 150,000 inhabitants and cities over 150,000 inhabitants these initiatives are a high priority in order to provide their citizens with services.

Table 3: How would you characterize the overall commitment of your municipality in the implementation of Smart City initiatives? Based on the size of the municipality

	City over 150,000 inhabitants	City 60,000-150,000	City 20,000-60,000	Town under 20,000	Total
High Priority	100.0%	100.0%	50.0%	0.0%	57.1%
Medium Priority	0.0%	0.0%	50.0%	0.0%	14.3%
Low Priority	0.0%	0.0%	0.0%	50.0%	14.3%
It is not a Priority	0.0%	0.0%	0.0%	50.0%	14.3%

Further, the study aimed to identify the sectors where these technologies are considered as a priority. Based on the research results, respondents most frequently identified smart city technologies as a priority in the sectors of health, education and human services and customer service/ public engagement, with more than half of respondents (57.1%) considering these initiatives as a top priority in this area. Public safety (35.7 %), air pollution and environmental protection (35.7%), energy (35.7%), electronic payment and intelligent finance (35.7%), and open data (35.7%) were also among the top seven sectors in which smart-city technologies were identified as a top priority by respondents (see Figure 14).
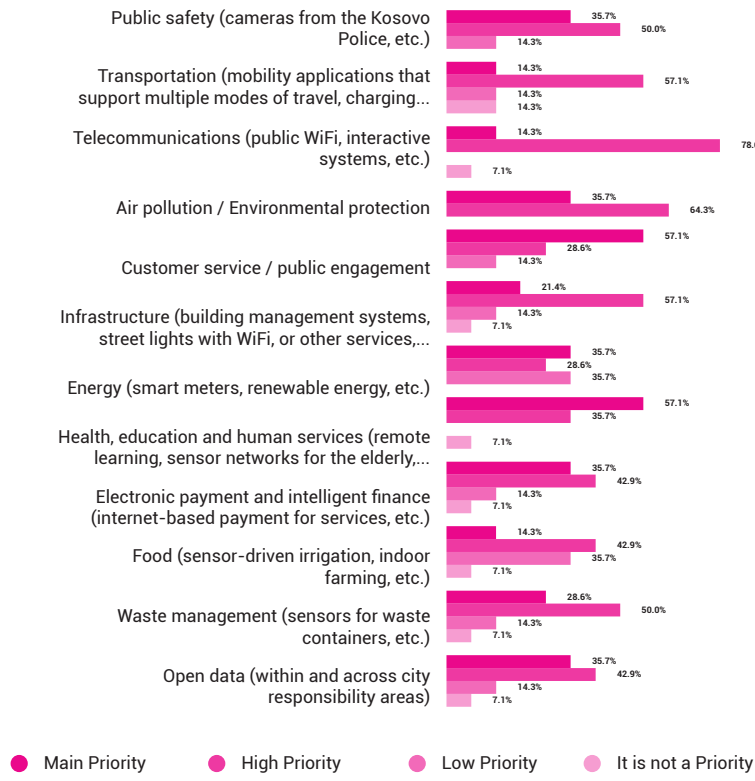

Figure 14: For each of the following sectors, what level of priority do Smart City technologies represent for your municipality?

That customer support and civic participation are considered with high priority was confirmed from the focus group discussions as well. The director of Administration of the municipality of Suharekë/ Suva Reka, affirms that numerous initiatives taken from the municipality of Suharekë/ Suva Reka in regard to integrating Smart City technologies and digitalization of the administration systems, an indicator that local government has been making the integration of Smart City technologies a priority. On the other hand, numerous developments in the field have opened a pathway for other cities to be followed, as they understand that the integration of Smart City technologies in their administration sector is amongst the most important factors for development.

A common response was observed from the directors of Urbanization towards prioritizing movements that result in environmental protection. In the municipality of Mitrovicë/ Mitrovica, the initiatives that are taken on the urban planning field involve a harmonization between infrastructure and environmental policies. The director of Urbanization from the municipality of Mitrovicë/ Mitrovica states that "usually more than 90% of the budget goes to infrastructure". Thus, the municipality of Mitrovicë/ Mitrovica is currently working on tailoring plans that protect the environment and extend green spaces while taking into account the infrastructure. Similar nature of the process is happening in Shtime/ Štimlje, where cooperation between protecting the environment and infrastructure is being established. This is done by investing in building parks, adding efficient lighting, following the law for the protection of waters, and similar initiatives.

4.7 Cooperation between different stakeholders

Developing technological solutions for smart cities requires collaboration between public institutions from local and central level, and private entrepreneurs and innovators. The collaboration between these actors, was another aspect assessed by the questionnaire.

4.7.1
Inter-municipal cooperation

The initial question on this theme was about inter-municipal cooperation. In general, the majority of the directors stated that there is a lack of cooperation between municipalities, which presents a challenge for them while working on transforming their cities into sustainable and inclusive places. The directors of Administration from municipalities agreed that there is little to no cooperation between municipalities on smart solutions and tools implemented on their administration. However, it is worth noting that municipalities showed readiness for possible cooperation. The director of Administration from Dragash/ Dragaš suggested that organizing meetings where failures and success stories are shared could help the development of Smart City technologies, as well as enhance the inter-municipal cooperation. Other than that, municipalities of Suharekë/ Suva Reka and Drenas/ Glogovac are examples of a closed inter-municipal cooperation, taken on their self-initiative for sharing experiences in regards to energy efficiency initiatives.

The sector of ICT and Open Data has taken actions toward enhancing inter-municipal cooperation. The Collegium of Information Technology23 is an attempt by the Association of Kosovo Municipalities (AKM) that brings together directors from IT Departments from different sectors on the municipalities of Kosovo. The director of the Collegium of Information Technology, which functions as part of AKM, stated that they are undertaking initiatives towards digitalization of services and availability of online information for citizens of every municipality.

Similarly, The Centre for Innovation and Development of Project is a developed entity in the municipality of Shtime/ Štimlje which provides opportunities for the creation of smart tools and innovations which brings together businesses, students and local institutions.

Smart city solutions are not only the responsibility of the cities or enterprises. Municipalities need the government's help to provide the necessary infrastructure and support for the delivery of these innovative solutions. Being asked about the cooperation with the central level institutions, the responses varied based on different sectors.

Regarding the open data aspect, a sense of coordination between the central and local levels can be pointed out. This cooperation includes the placement of preconditions for the digital transformation of traditional services in an attempt to increase the cooperation between different stakeholders that promote Smart City initiatives. The Senior Officer for Energy Efficiency and Cogeneration considers that the support and cooperation between the central and local government has increased in recent years. The trainings and capacity building processes in the field of energy efficiency are being done simultaneously on both levels.

The Kosovo Agency for Energy Efficiency (KAEE) has established a partnership with local offices for municipal-level energy.

However, the director of Urban Planning from the municipality of Mitrovicë/ Mitrovica, has stated that lack of cooperation between local government and central government results in one of the biggest challenges to address for implementing smart city tools and innovations. Another problem related to the cooperation between different stakeholders is the readiness for cooperation between local and central institutions. Similarly, the director of Administration from the municipality of Dragash/ Dragaš, is concerned with the level of readiness of the central government in answering various concerns posed by local governments.

Regarding the level of this cooperation in Kosovo institutions, the Senior Officer for Energy Efficacy and Cogeneration from the Ministry of Economy and Environment believes that the cooperation between the governmental institutions as well as the private sector is reflected in policy-making processes. He provided the example of drafting policies for the Energy and Climate Plan there are numerous entities involved such as non-governmental organizations, private companies, business representatives, and international organizations.

"It would be impossible to continue with any projects without Open Data. They must know in which direction the country and the cities want to go. They have to provide the data so companies can know what is needed in the cities so they can provide projects in that area."

- Co- founder and President of Kode Labs

Regarding the level of this cooperation in Kosovo institutions, the Senior Officer for Energy Efficacy and Cogeneration from the Ministry of Economy and Environment believes that the cooperation between the governmental institutions as well as the private sector is reflected in policy-making processes. He provided the example of drafting policies for the Energy and Climate Plan there are numerous entities involved such as non-governmental organizations, private companies, business representatives, and international organizations.

"Cooperation is growing to facilitate the implementation of smart solutions"

- Senior Officer for Energy Efficacy and Cogeneration from Ministry of Economy and Environment

The representative from Open Data Kosovo (ODK) shares an experience of good cooperation with public institutions for developing platforms that will serve citizens. Among others, they emphasize the cooperation with the municipality of Prishtinë/ Priština for the development of the platform "Open Contracts" which informs citizens for procurement processes and contracts. However, this is not always the case, and depends highly on the institutions involved. Among other the representatives from ODK stated that, in some cases, the officials were reluctant to share data due to misconceptions about the open data and privacy concerns. In other cases, the institutions did not have the data themselves, thus highlighting the need for having the data available for enabling enterprises to become part of this ecosystem that designs smart tools and solutions.

4.8 The impact of COVID-19 on the Smart City Planning

The world's fight with the pandemic COVID-19 has brought to the attention of institutions the need for smart city solutions. Many cities have taken the advantage of digitalization, technology, and open data for the management of the spread of the virus. As the pandemic highlighted the need for smart solutions for city planning, governments started reconsidering the positioning of smart technologies in their budget hierarchy. A matter of significance important for this study was to recognize the effect of COVID-19 for creating opportunities for integrating smart city solutions. All the respondents (100%) stated that Smart City technologies were needed in their fight with the pandemic COVID-19.
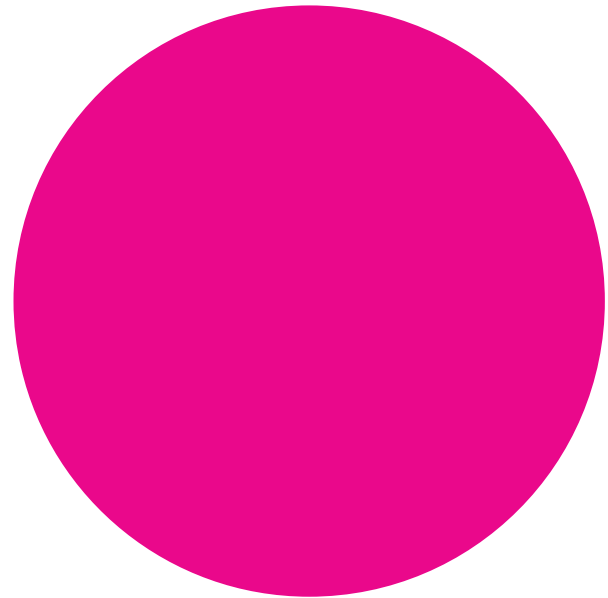
Yes

Figure 15: Do you think Smart City technologies were needed while dealing with the COVID pandemic? [By Smart City technologies we mean solutions in various fields such as transport, infrastructure, public services, medicine, education, etc.]

Further, they were asked if the value of Smart City Solutions has increased since the spread of the COVID- 19 pandemic. The majority of the respondents (85.72%) claimed that the importance of these tools has increased a lot/to a certain extend.

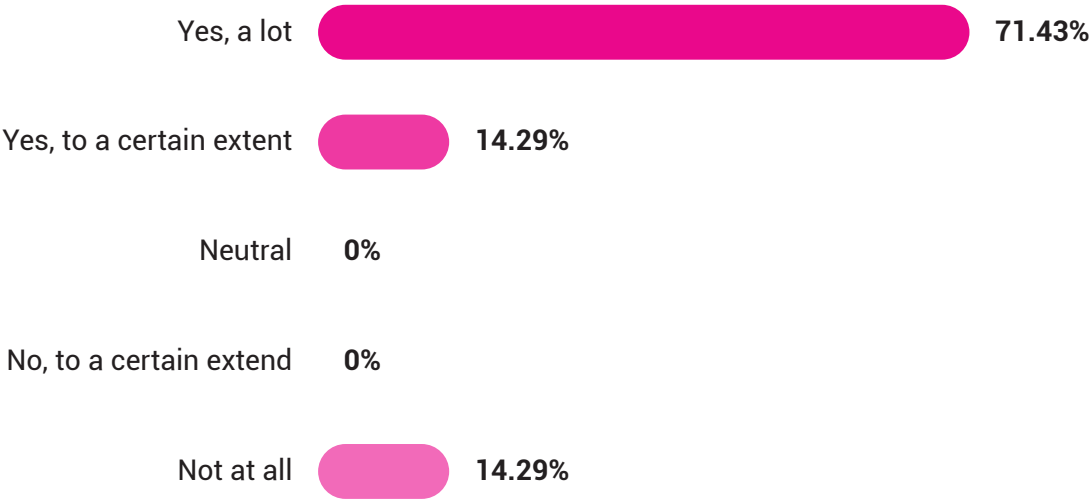|	
Yes, a lot	71.43%
Yes, to a certain extent	14.29%
Neutral	0%
No, to a certain extend	0%
Not at all	14.29%

Figure 16: Has the value of using smart solutions increased since the spread of the COVID-19 pandemic?

The respondents had the opportunity to share if they have taken any Smart City initiative since the spread of the pandemic. 64.29% asserted that they have leveraged the benefits of smart city innovations in their fight with the pandemic.
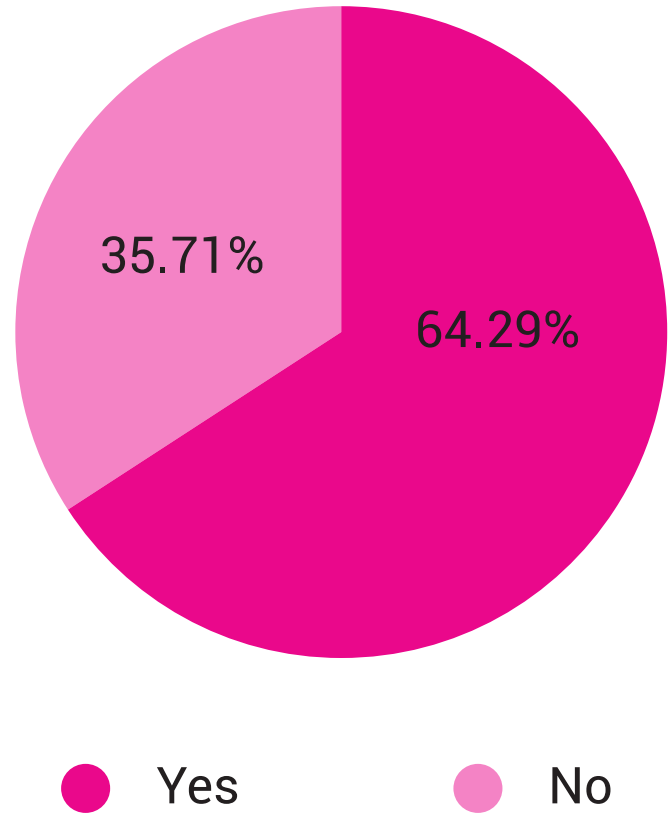

Yes   No

Figure 17: Have you taken any initiative in the "Smart City" concept since the spread of the COVID-19 pandemic?

In order to grasp even further information on the Smart City initiatives taken by the municipalities, each respondent was asked to list smart solutions made in an attempt to manage the situation created by the COVID-19 pandemic. The initiatives undertaken by the municipalities since the spread of the pandemic are summarized below:

- Online Portal with information on COVID- 19 (Prizren/ Prizren, Prishtinë/ Pristina, Suahreke/ Suva Reka, Kamenicë/ Kamenica) where citizens were provided information on actions to take in case they show symptoms, where to ask for psychological help, how to protect themselves, as well as real-time numbers of cases that resulted positive for COVID-19 on the municipality.

- Online platform for financial assistance application for businesses

- Online platform for financial assistance application for people who tested positive for COVID-19 (M. of Prishtinë/ Priština)

- Online teaching platform (M. of Prizren/ Prizren)

According to the focus group discussion results, the participants provided various responses in relation to the change in lifestyle of citizens in response to the situation created by COVID-19. In addition, the director of Urbanization from the municipality of Mitrovicë/ Mitrovica stated that they have observed a decline in the number of citizens who use public transportation and an increase in the number of citizens who use private vehicles because of safety concerns to be in crowds of people. A completely different experience was in the municipality of Shtime/ Štimlje. According to the director of Urbanization from the municipality of Shtime/ Štimlje, the citizens, including elders and youngsters, have started to use their bikes instead of cars and find green spaces more attractive for spending their time as bars and restaurants closed. Given this change in behavior of citizens, the municipality has started to prioritize measures that improve the infrastructure for cycling and provides more spaces for recreational activities.

The representatives from the sector of ICT and Open Data sector voiced that COIVD-19 did not find citizens from all demographic groups ready to adapt to digitalization and technological changes. Further, the director of Urbanization from the municipality of Mitrovicë/ Mitrovica stated that although their municipality has provided online many services that on normal conditions required the citizens to visit the institutions physically, the citizens did not take their advantage and they did not notice an increased number of users for online services.

"The development of applications is not the main problem in Kosovo. The problem is the back-end or the courage and motivation to use such resources. For example, teachers and professors had all the necessary "equipment" for online classes, but they did not have the courage or did not know to use these technologies".

- Head of Department of Post, Telecommunications, and Information and Communication Technology, Ministry of Economy and Environment

Lastly, the co-founder and Director from KODE Labs suggests that changes due to the pandemic have created opportunities for Smart City Solutions. He suggests that municipalities can follow examples of other places, such as the United States, and start creating solutions that will serve people during these times when they spend the majority of their time at home. He brings to discussion the example of smart tools for keeping track of indoor air quality, which are easy to install and sustain.

4.9 Citizen participation

Smart cities utilize information and communication technologies with the aim to provide solutions in areas of mobility, energy, governance, education, and others. However, reaching their objectives can be possible, only if citizens as the end-users of these technologies become part of the city design. This makes the citizens, actors rather than mere participants of these innovative technological solutions. On the one side, this requires investment from the government in the country's technology, telecommunication networks, and programs to ensure that citizens have all the means to be participants in the online world. On the other hand, the adoption of smart city technology, requires a population that is comfortable with the technology and provides active feedback.

Among others, the respondents had the opportunity to share actions they have taken for educating citizens in a way that ensures their active participation. The majority of the respondents have listed social media as their primary source for raising awareness on the new initiatives and providing citizens with instruction on usage. A famous action taken by municipalities is the development of platforms on their site that educate citizens and provide guidance on new tools available that make service delivery easier for them.

The Director of Administration from the municipality of Rahovec/ Orahovac has shared their camping for educating citizens for extracting documents through E-kiosks. E-kiosks in the municipality [laity of Rahovec/ Orahovac consist of two display screens. One of these screens played the role of informing the citizens while displaying the steps that need to be followed when using e-kiosks services, and the other screen was used for operating and choosing the service that they needed.

Further on, the Official for Energy Efficiency in the municipality of Drenas/ Glogovac affirmed that they have been working closely to raise awareness among businesses and citizens, especially for energy efficiency products.

"70% of citizens are aware of the devices that are more efficient and they are able to purchase themselves or invest more in energy efficiency appliances in the markets. In addition, 68% of businesses have reported that they have the knowledge needed to provide clients with information about the items."

- Energy Efficiency Official- Municipality of Drenas/ Glogovac

Similarly, Senior Officer for Energy Efficiency and Cogeneration explained that campaigns that aim to raise awareness about the benefits of particular measures are part of their projects. For example, The Energy Efficiency campaign launched by the MEE, informs the citizens of the long-term benefits that they will have with the increase in energy efficiency and their consumption. He further suggested that enhancing cooperation with the citizens using a bottom-up approach would provide fruitful results. This cooperation could be established by introducing "Energy Corporations"- a term used for a community coming together and deciding on investing in a different source of energy, e.g., solar; whilst, encouraging other small communities to behave in the same way. According to the representative from MEE, this is a successful practice that has been working in the European Union.

Promoting the long term benefits of these initiatives is an approach considered from the sector of Mobility as well. The municipality of Prishtinë/ Priština plans to organize a Sustainable Transport Campaign for encouraging public transport and other sustainable means of commuting. Thus, providing the proper infrastructure for cycling and walking will go hand in hand with promoting the health benefits that come as a result of the use of bikes, and walking. Giving citizens strong initiatives that are translated into health benefits has shown to be a successful initiative adapted from New York and the United Kingdom. Similar campaigns are projected on the Sustainability Plan of the municipality of Prizren/ Prizren, as they take actions that reduce the GHG emission.

5. Recommendation for future smart city initiativesin Kosovo

Regarding the level of this cooperation in Kosovo institutions, the Senior Officer for Energy Efficacy and Cogeneration from the Ministry of Economy and Environment believes that the cooperation between the governmental institutions as well as the private sector is reflected in policy-making processes. He provided the example of drafting policies for the Energy and Climate Plan there are numerous entities involved such as non-governmental organizations, private companies, business representatives, and international organizations.

5.1 Provide support to city governments

The central government should provide support to municipalities to develop capabilities that enable investments in smart city projects. The online survey with mayors of the cities has identified budget as the main challenge for implementing smart city initiatives, followed by lack of internal capacities and lack of long term vision. Thus, the government needs to provide support in terms of funding and guidance to city governments to help them develop a vision and strategy that integrates digital technologies in the design of their cities. This would be the first step toward assisting cities in addressing their challenges for developing solutions that improve the lives of their citizens.

5.2 Strengthen inter-municipal cooperation

Results from the study indicate a lack of inter-municipal cooperation, which is essential for addressing social challenges and designing places that respond to the needs of citizens. Enhancing the collaboration between cities would enable them to identify common issues such as air pollution, for example, and work together on designing digital solutions that address them. This could be achieved by establishing a network of cities, an initiative to connect cities for sharing knowledge and actions. Results from the study showed that lack of such collaboration has hindered the progress of municipalities toward the transformation of their communities to smart places. Creating this network would allow them to exchange practices and learn from each other's actions. For example, other municipalities can learn from the actions taken from the municipalities of Prishtinë/ Priština and Prizren/ Prizren for sustainable mobility and environment and implement similar initiatives for their cities.

5.3 Assign leadership on the municipal and national level

That leadership on a national level is important, can tell the efforts of many national governments to create leadership roles on their national governments that monitor the progress of cities based on their agendas. Australia, for example, has assigned a Minister of Cities, and the UK has named the Minister of Cities and created the UK All Party Parliamentary group (UAPP) which brings together stakeholders from different institutions to share smart city challenges and find solutions for them[24]. Such leadership from the national level is needed to align the work of all involved stakeholders of the smart city ecosystem and foster the progress of smart cities. The need for such leadership has been highlighted in the study from participating municipalities in Kosovo as well.

However, leadership on the national level is not enough. Cities themselves should have a vision and strategy for implementing their smart city projects and foster digital transformation. We recommend that cities create posts that provide guidance and support for the implementation of digital strategy. Such actions have been taken by cities such as New York for example, which has established the position of Chief Digital Officer for their digital strategy. Other places have established similar posts to make sure the municipalities have the needed guidance and advice on technology and data issues. This would ensure working on alignment with the vision and strategy developed for their city and facilitate cooperation between different departments. National governments can play an important role in inspiring such action. The UK Government motivated 30 municipalities to work on their smart cities strategy by providing them with £50,000 to develop their strategy and an additional £24 million for its implementation[24].

[24] Growing Smart Cities in Denmark. Retrieved from: https://www.arup.com/perspectives/publications/research/section/growing-smart-cities-in-denmark

5.4 Develop national smart city vision and strategy

We recommend Kosovo to develop a Smart City vision and strategy, including the challenges that cities face, and the opportunities and benefits that smart cities bring to these urbanization issues. Having a smart city vision, where the outcomes and benefits are clear, would help to gain the commitment of businesses, governments, and citizens for supporting these initiatives. A clear strategy afterwards, would shed light for the actions to be taken toward accomplishing the outcomes.

5.5 Digital transformation of public services

The difficulties Kosovo is facing in designing its smart cities are not unique. This provides a good opportunity to look at how governments of other countries have tackled the challenges of smart city growth. Kosovo has already taken action on the digital transformation of its public services. However, it needs to make sure that these services are accessible and answer the needs of the citizens. The UK Government Digital Service is a valuable lesson Kosovo can follow as it works on digital transformation of public services24. They have created a platform that responds to users' needs and not government needs. This became possible after developing principles that would guide the creation of a single website for the UK Government, based on a user-centered approach. Kosovo has a good opportunity to integrate all the public services into one single location. Designing the platform on a user-friendly approach would result in increased citizen participation and foster the digital transformation of Kosovo cities.

5.6 Encourage involved stakeholders to use open data

Making data available online is the first step towards generating value from it. The other is to encourage citizens and businesses to use it. Kosovo has taken steps towards making its data available for the public by providing access to datasets from different sectors. Platforms from reporting concerns of citizens to those that provide information to citizens on public spending have been developed. However, in order for Kosovo to create a culture of open data and use data for creating smart city solutions, is crucial to involve different stakeholders, from data scientists to urban planning designers and innovators. It is of paramount importance for the government to provide the businesses and innovators with the relevant data infrastructure as their work on innovative tools. An option could be to establish an Open Data Institute that brings together governmental institutions and businesses as their work on developing technical standards and specifications for integrating digital solutions.

Kosovo can follow the actions of cities for opening data and creating meaningful value from it. The London Data Store24 is one of the leaders for making public data available and assisting for the functioning of the city. Their aim is to make data easily understood for the citizens and also create opportunities for businesses to use them and create smart city solutions. Sharing and aggregating data from different sectors helps to look at the bigger picture and results in more efficient decision making24. Opening data for public use has produced significant output in the UK. The digital economy has encountered an accelerated growth, with more than 460 transport apps developed from the London database24. This highlights the opportunities and benefits that using the data to create value from it will create for Kosovo.

5.7 Education and literacyof civil society

Last but not least, Kosovo needs to understand that civil society are the actors rather than mere participants of these digital solutions. Their feedback is essential for identifying challenges and designing inclusive cities that improve the quality of living. The first step toward making citizens part of this transformation is to ensure that the Kosovo population has access to a digital infrastructure and education. In other words, municipalities need to make sure that citizens have access to the benefits of digitalization. In order to make it happen, all the citizens shall be educated on digital technology and adapt to the new public services that digitalization has transformed. Furthermore, job training for employees of municipal institutions should be provided to ensure that they are able to adapt to the transformed service provision that digitalization has brought. COVID-19 has been a reminder for action in this direction, as many people were required to work from home without the proper knowledge of digital technologies. This would enhance civil society participation on digital platforms, and enable policymaking by being part of the smart city ecosystem.

In Denmark, besides the government, organizations from civil society have played a role in digital education of the society. The government of Denmark on the other side stimulates these initiatives by giving a prize to the organization that contributes to the education on technology and literacy of the civil society24.

One can be confident that with a vision, long-term strategy, and effective governance, Kosovo has the potential to develop digital solutions that use information and communication technology for more efficient use of its resources. At the heart of this strategy should lie strong cooperation between the public institutions on the central and local level, enterprises, associations, civil society, and other relevant stakeholders part of the smart city ecosystem. Examples from countries worldwide have witnessed the importance of public participation to bring these solutions to action. Thus, a special focus should be placed on education programs and initiatives that raise awareness among people and educate them to comfortably adapt these technological solutions and encourage behavior change.

FRIEDRICH NAUMANN
FOUNDATION For Freedom.

Western Balkans