Slovakia on the way to the SMART future, the last opportunity for municipalities

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Abstract: *We are convinced that the topic of smart municipalities represents a significant opportunity for Slovakia to increase the country's innovation and export potential. In order for Smart Cities to successfully develop their capital, they need wide cooperation between stakeholders in many areas, from economics to social sciences. The application of the concept should be linked to strategic planning processes, which in the case of Slovakia means the programming of economic and social development and spatial planning. It can be accessed either by purchasing specific proven solutions or by testing innovative practices. In the period 2021 - 2027, the Slovak Republic will also draw fond of the development of smart municipalities within the framework of Europe Union structural funds. However, Slovak municipalities need to know their potential, implement a smart strategy and set up cooperation within the territory (for example, by creating functional urban areas). This research article is focused on the evaluation of municipalities in the Slovak Smart City Index within the territory and size of municipalities by their inhabitants, as well as the amount of implemented funds from the European Structural Funds. The basic question is - is the Slovak Republic ready for development in the field of smart cities and regions on the basis of the development of the smart government agenda within the previous programming period? Can the Slovak Republic implement funds in smaller municipalities? This research article will try to answer these questions through the use of statistical calculations and data obtained from the Slovak smart city index.*

Keywords Slovak Republic, smart cities, structural funds, strategy, benchmark

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Introduction

The concept of smart cities is not new. The essence is the implementation of such technologies or processes that will help municipalities to deal not only with current

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challenges but also prepare for future changes in the environment and its evolution. If the municipality applies the smart city agenda, it will gain an edge over the competitiveness of other municipalities. There will be an increase in investment opportunities in the municipality, improvement of services not only for its inhabitants, new tourism opportunities, and much more.

In Slovakia, however, there is a division of municipalities into local and regional (Siskovič, 2018). In this study, we will not name the links between municipalities (cities or villages), regions, and states. The approach of intelligent solutions in Slovakia should aim to interconnect these three levels and thus speed up the transfer of information, unify processes and deepen their cooperation. A smart city cannot be created without the access of organizations with innovative technologies and processes, but also we cannot forget services. The ecosystem of entrepreneurs and trade unions is able, in cooperation with municipalities, to develop and implement such tools that smart cities are able to absorb. Cooperation in finding the requirements of local governments, supplier technologies, and environmental possibilities is the interconnection of an ecosystem that can build smart cities and consequently smart regions (Androniceanu, 2019). Here he enters the process as an actor state, which in certain areas is also a key player.

The implementation of the Smart City agenda focuses on six main areas (Smart Economy, Smart Mobility, Smart Public Administration, Smart Life, Smart Government, and Smart Environment). If the local government excels or has shortcomings in any of the categories, this has a direct impact on the performance assumptions of generating revenue to the budget, as well as managing challenges and crisis situations. After service management, tourism is the second most visible category for residents, which also has an impact on the implementation of smart technologies or smart processes on local government revenues. Foreign direct investment (FDI) depends on many factors such as the capabilities of the territory, the workforce, laws or regulations, as well as the settings and access to the Internet of Things (IoT), and the level of self-government in all six areas of the smart city. After service management, tourism is the second most visible category for residents, which also has an impact on the implementation of smart technologies or smart processes on local government revenues. Foreign direct investment (FDI) depends on many factors such as the capabilities of the territory, the workforce, laws or regulations, as well as the settings and access to the Internet of Things (IoT) and the level of self-government in all six areas of the smart city.

1. Literature review

Within the central offices, Smart Cities is so far fragmented in terms of the competence of several state departments. The issue is more actively addressed within small teams at the Ministry of Economy of the Slovak Republic (MH SR), Ministry of Foreign and European Affairs of the Slovak Republic (MZVaEZ SR), Ministry of Investment, Regional Development and Informatization of the Slovak Republic (MIRRI SR), Ministry of Environment of the Slovak Republic. (MoE SR) and also

the Ministry of Transport and Construction of the Slovak Republic (MDV SR), whose members cooperate with each other rather informally. Materials related to this topic were submitted in recent years to the Slovak Government, especially the Ministry of Economy of the Slovak Republic and MIRRI (at that time it was the Office of the Deputy Prime Minister of the Slovak Republic for Investment and Informatization - IPVII).

1.1 Legislation and regulations, extended by methodologies

The most important document is considered to be the Concept of Urban Development of the Slovak Republic until 2030. Another important document dealing with the topic of SmartCities is the Pilot Scheme to support experimental development and innovation projects for building sensible municipalities and cities in the Slovak Republic. This pilot project was in charge of the Office of the Deputy Prime Minister, focusing on experimental development and innovation projects in the area of reasonable municipalities in Slovakia. MIRRI SR is responsible for informatization and in connection with the issue of smart governments also for example the solution of open data, but also coordination and availability of financial resources ESI Funds (ESIF), since January 2019 coordination of regional development policies and since July 2020 responsible for regional development as its central state administration body. (Horváth et al., 2018). According to Act no. 575/2001 Coll. on the organization of government activities and the organization of the central state administration, as amended, the Ministry of Economy of the Slovak Republic is responsible for the strategy of creation and implementation of innovations, including the support of small and medium-sized enterprises.

The Ministry of Economy of the Slovak Republic perceives the approach to the issue of Smart City as complementary to the approach of the Ministry of Transport and Construction of the Slovak Republic, which according to Act no. 575/2001 Coll. on the organization of government activities and the organization of the central state administration, as amended, deals with the issue of urban development.

The methodology of creation and implementation of programs of economic development and social development of regions, development programs of municipalities, and groups of municipalities with the application of the principles of sustainable smart development is a document that builds on the Program and social development of regions (Act No. 539/2008). The Smart Development Strategy follows the four basic principles of smart specialization, such as selecting and focusing on key priorities, leveraging its competitive advantages, leading collaboration with key stakeholders, and promoting collaboration through a variety of clusters. The unified methodological framework for the preparation of integrated territorial strategies and investments in the Slovak Republic in the programming period 2021 - 2027 aims from the national point of view to create a database of projects that regions and municipalities want to implement in their territories in their development. In this case, among the objectives of the document are also created urban development areas (UDA). The process of defining the UDA area as a

strategic-planning region will usually be led by the mayor of the core city of the urban region. The UDA integrated territorial strategies, elaborated as the Economic and Social Development Programs of the group of municipalities, are managed by the UDA nuclear city and its elaboration, including the establishment of cooperation structures, is initiated by the region. Based on the above criteria in the methodology, it is recommended to define the following UDA primary urban settlements (Ministry of Investment, Regional Development, and Informatization of the Slovak Republic, 2021):

- Bratislava
- Trenčín
- Humenné
- Košice
- Banská Bystrica – Zvolen
- Lučenec
- Prešov
- Trnava
- Rimavská Sobota
- Nitra
- Ružomberok – Liptovský Mikuláš
- Levice
- Žilina
- Michalovce
- Nové Zámky
- Martin
- Poprad – Svit –Kežmarok
- Prievidza – Nováky

In Figure 1 we designed the geographical localization of UDA based on a Unified methodological framework for the preparation of integrated territorial strategies and investments in the Slovak Republic in the programming period 2021 – 2027.

Figure 1. Geographical localization of UDA in the Slovak Republic

Within the OECD studies, 8 functional urban areas (FUA - similar to UDA) were determined in Slovakia and are shown in Figure 2. At the same time, these 8 FUAs are located within 8 self-governing regions, which are also regulated by Act no. 302/2001 Coll. on the self-government of higher territorial units - regions.

Figure 2. FUA based on OECD research

Source: Adapted by Gonnrad, 2021

The individual territories therefore overlap and the Slovak methodology has doubled the number of FUAs. It gets to cover Slovakia in all major cities. UDA concerns not only the territory of the city but also its functional area forming a specific urban strategic planning region (SPR). The UDA area is understood as the area of intensive interactions between the core city and the municipalities of its hinterland, in which the possibility and effectiveness of using development potential, solving problems and challenges are conditioned by inter-municipal cooperation and implementation of the common strategy (e.g. in the field of transport, water supply, waste economy, services of the population, education, flood protection, recreation, etc.). FUAs are listed by their size in Table 1, according to OECD into four classes (Kóňa & Dzureková, 2021):
• Small FUAs, with a population between 50,000 and 100,000
• Medium-sized FUAs, with populations between 100,000 and 250,000
• Metropolitan FUAs, with a population between 250,000 and 1.5 million

Table 1. Slovak Republic FUAs due to OECD classification

FUA object	FUA citizens number	FUA classification
BRATISLAVA	622712	METROPOLITAN FUA
TRENČÍN	69402	SMALL FUA

FUA object	FUA citizens number	FUA classification
HUMENNÉ	46399	NOT ENOUGH CITIZENS TO SMALL FUA CLASSIFICATION
KOŠICE	283366	METROPOLITAN FUA
BANSKÁ BYSTRICA	94209	SMALL FUA
ZVOLEN	51434	SMALL FUA
LUČENEC	43619	NOT ENOUGH CITIZENS TO SMALL FUA CLASSIFICATION
PREŠOV	128167	MEDIUM-SIZED FUA
TRNAVA	94288	SMALL FUA
RIMAVSKÁ SOBOTA	48071	NOT ENOUGH CITIZENS TO SMALL FUA CLASSIFICATION
NITRA	90439	SMALL FUA
RUŽOMBEROK – LIPTOVSKÝ MIKULÁŠ	72539	SMALL FUA
LEVICE *	32000	NOT ENOUGH CITIZENS TO SMALL FUA CLASSIFICATION
ŽILINA	95464	SMALL FUA
MICHALOVCE	48724	NOT ENOUGH CITIZENS TO SMALL FUA CLASSIFICATION
NOVÉ ZÁMKY *	37000	NOT ENOUGH CITIZENS TO SMALL FUA CLASSIFICATION
MARTIN	73744	SMALL FUA
POPRAD – SVIT – KEŽMAROK	79200	SMALL FUA
PRIEVIDZA – NOVÁKY	50373	SMALL FUA

* Not available data about all municipalities that are members in FUA

The discussion on the agenda of smart specialization (smart agenda) is concentrated by the Ministry of Foreign Affairs of the Slovak Republic. Intelligent transport systems have appeared repeatedly in several re-editions of national transport strategies and other domain concept materials. Since 2012, the Act on Intelligent Transport Systems in Road Transport has also been in force in the Slovak Republic. Environmental aspects are under the responsibility of the Ministry of the Environment of the Slovak Republic (Section of Environmental Programs and Projects, Section of Air Protection and Climate Change, and the Institute of

Environmental Policy) and smart agendas should also have a positive impact on public health.

To work with the topic of smart governments, it is necessary to accept several laws, national concepts, or methodologies. For an overview of how many documents are affected by this topic, we enclose a list

- Research and innovation strategy for smart specialization;
- Development strategy of Slovakia until 2030;
- Strategy of the economic policy of the Slovak Republic until 2030;
- Strategy of the Slovak Republic's adaptation to climate change and to the adverse consequences of climate change;
- Strategy of electromobility development in the Slovak Republic and its impact on the national economy of the Slovak Republic;
- Strategic plan for the development of transport in the Slovak Republic until 2030;
- Enviro Strategy 2030 - Greener Slovakia - Strategy of the Environmental Policy of the Slovak Republic until 2030;
- National strategy for the development of bicycle transport and cycling tourism in the Slovak Republic;
- National Strategy for Sustainable Development of the Slovak Republic;
- National priorities for the implementation of Agenda 2030;
- National Forestry Program SR 2021 – 2030;
- National Hydrogen Strategy, Hydrogen Action Plan;
- National Program for the Development of Education for the period 2018-2027;
- Action plan for the development of electromobility in the Slovak Republic;
- H2 VALUE IS WATER - An action plan to address the consequences of drought and water scarcity;
- Social Economy Act;
- Integrated National Energy and Climate Plan for 2021-2030;
- Integrated National Energy and Climate Plan for 2021-2030;
- The concept of energy efficiency of the Slovak Republic;
- The concept of urban development of the Slovak Republic until 2030.

1.2 Technologies and processes in the agenda of smart governments in Slovakia based on data

Based on the offer, it must be stated that there are several companies in Slovakia that can supply intelligent solutions to the local government, but due to low demand, they implement most of their solutions abroad. There is a lack of a systematic approach of the state to support the creation and deployment of intelligent solutions in Slovakia for Slovak companies, as well as support for the export of successful solutions.

At the beginning of the 21st century, a state approach that supports the implementation of intelligent solutions and the export of successful Slovak companies in this area is a prerequisite for the successful implementation of any territorial development strategy, and therefore this approach should become the starting point and part of the integrated development strategies of self-governing regions and territories of sustainable urban development in the form of programs of economic development and social development of regions, cities, and municipalities. However, in addition to a comprehensive national solution, it is also necessary to accept regional development and its disparities, together with the ability to implement technological and non-technological extensions in local governments. Municipalities in Slovakia are developing the smart city and smart region agenda to a relatively significant extent, mainly thanks to financial resources from the European Union and ESIF programs. However, as we have written, this is not a matter of balanced development not only between local governments but also within the areas of the agenda.

The Slovak SMART City Index was established as an academic project as a result of cooperation between the Faculty of Social Sciences, University of St. Cyril and Methodius in Trnava (FSV UCM in Trnava) and the Ministry of Economy of the Slovak Republic (MH SR) on the occasion of cooperation on the creation of Smart Cities Workshop under the auspices of the Organization for Economic Cooperation and Development (OECD). The first data comparing Slovak smart, i.e. smart self-governments, were presented on 25 November 2019 at the Hotel Bôrik in Bratislava at the aforementioned event. (Kóňa et al., 2020)

The comparison is based on six reference areas (pillars), which are smart governance (public affairs), people (and communities), environment, life (and services), mobility, and the economy. These areas are based on a study by Professor Giffinger (2010) of the Technical University of Vienna, who compared European cities and defined in his research the basic indicators that are evaluated in the index (Androniceanu et al., 2022; Androniceanu & Georgescu, 2021; Androniceanu et al. 2020). Slovak academics relied on the data of Professor Giffinger's study (2010) and filled the Slovak index with available statistical data of local governments, districts and regions, from which the comparison is based.

Slovak Smart City Index identified six 'smart' characteristics as you can see in Figure 3. Smart characteristics are divided into 31 relevant factors which reflect the most important aspects of every smart characteristic. Each factor of a smart characteristic was defined by a group of corresponding indicators. Completely 74 indicators were defined. (Cypher & Dietzz, 2014; Kóňa et.al., 2020) Data types that represent indicators are data sets across Slovak Republic or Europe Union statistics.

Figure 3. Slovak Smart City Index composition of data and its structure

Source: Kóňa et al., 2020

Because Indicators are defined in different ways aggregation procedure for defining the Slovak Smart City ranking is standardized through a z-transformation resulting in distribution with an average value of '0' and a standard deviation of '1'.

Through MS Excel database software we use AVERAGE and STDEV.S or STDEV.P formulas to calculate the mean and standard deviation of our final Indicators score. Which cities will be compared in the Slovak Smart City index is determined by population size, thus municipalities over 3000 inhabitants /inclusive/ are examined and compared in the Ranking. From this point, calculating the Z-Transformation index and average mathematic formula can be used for evaluating indicators. Data for districts and regions are calculated from municipalities located in their places. The average formula is used to get scores from municipalities to the district(s), and from districts to the region(s).

2. Research methodology

This study focuses on research in the field of the state of implementation of smart technologies in Slovak municipalities based on the identification of functional urban areas and the ratio of funds implemented from the ESI Funds. We will work within the statistical definition of the population of individual FUAs, the amount of implemented funds and evaluation within the Slovak smart city index. We assume a link between the individual variables that are identified and defined. Progress in the development of the implementation of intelligent technologies and non-technological solutions in Slovak local governments is an important part not only of regional development but also of the successful use of ESI Funds.

2.1 Research hypothesis and research quantitative and qualitative methods used

In this article, we want to identify the link between the size of FUA and the potential for implementation of ESI Funds. We have therefore established three hypotheses that we will identify.

Hypothesis 1 (H1): Metropolitan and Medium-sized functional areas are able to absorb more development funds from Euro funds than Small-sized functional areas. The conversion will be determined per capita of each FUA.

Hypothesis 2 (H2): Capital cities uniting Metropolitan and Medium-sized functional areas maintain a better position in the Smart City Index rankings than cities associated with Small-sized functional areas.

Hypothesis3 (H3): Financially and developmentally, Metropolitan and Medium-sized functional areas are developing better than Small-sized functional areas.

In order to verify the adopted hypotheses, F. Test with MS Excel is used in statistical analysis when comparing statistical models that have been fitted using the same underlying factors and data set to determine the model with the best fit. When $F > 2,5$ then we can reject the null hypothesis.

3. Research results and discussions

During the three years of the evaluation, the Slovak Smart City Index identified a shift in several local governments in the implementation of the smart city agenda. At the same time, there was a decline in many local governments associated with the COVID pandemic (Androniceanu, 2020). The basic overview is shown in Table 2, which shows the development of the position of the two largest municipalities, which are Bratislava and Košice.

Table 2. First free position in last three years of benchmarking of Slovak municipalities in Benchmark – 2019 vs. 2021

Municipality basic information			Citizens population of the municipality for each year				Overall position in benchmark for the municipality			
MUNICIPALITY	DISTRICT*	REGION*	2019	2020	2021 ***	CHANGE 2019 TO 2020	2019	2020	2021 ***	CHANGE
BRATISLAVA	BRATISLAVA	BRATISLAVSKY	411228	432864	436773	25545	2	1	1	1
BREZOVA POD BRADLOM	MYJAVA	TRENČIANSKY	5110	4834	4762	-348	154	200	2	152
MILOSLAVOV	SENEC	BRATISLAVSKY	-	3035	3913	-878	-**	2	3	-1
ZOHOR	MALACKY	BRATISLAVSKY	3214	3330	3418	204	3	3	4	-1
KOŠICE	KOŠICE	KOŠICKY	240433	238757	238138	-2295	1	64	81	-80

* Inclusion of self-government within the structure of the country and its division of public administration
** Municipality was not listed in the benchmark due to the basis of insufficient population.
*** Index is being updated based on data published by Slovak ministries or official statistics, only 33,333 % of indicators have been changed by new data for 2021.

The index points to those areas in local governments that could be improved and at the same time show the strengths of local governments. There are still a relatively large number of households that are not connected to water supply or sewerage. The low representation of women in communal politics also lowers the assessment of self-government. Of course, indicators whose change is not within the competence of the local government are also assessed. An overview of the factors is shown in the following table. There are also a number of sub-indicators in Table 3, for each factor and the level of data that are monitored at the national level of the Slovak Republic (slovaksmartcities.sk, 2021)

**Table 3. Characteristics and factors of six pillars
of Smart City Index and its data structure**

Smart pillar	Factors	Number of Indicators in Factor group	Type of data
SMART LIVING	CULTURAL FACILITIES	3	REGIONAL
	HEALTH CONDITIONS	4	MOSTLY LOCAL
	INDIVIDUAL SAFETY	3	LOCAL TO NATIONAL
	HOUSING QUALITY	3	LOCAL TO NATIONAL
	EDUCATION FACILITIES	3	LOCAL/NATIONAL
	TOURISTIC ATTRACTIVITY	2	LOCAL/REGIONAL
	SOCIAL COHESION	2	NATIONAL
SMART GOVERNANCE	PARTICIPATION IN DECISION-MAKING	4	LOCAL/NATIONAL
	PUBLIC AND SOCIAL SERVICES	3	LOCAL TO NATIONAL
	TRANSPARENT GOVERNANCE	2	NATIONAL
SMART MOBILITY	LOCAL ACCESSIBILITY	3	LOCAL/NATIONAL
	(INTER-)NATIONAL ACCESSIBILITY	1	REGIONAL
	AVAILABILITY OF ICT-INFRASTRUCTURE	2	NATIONAL
	SUSTAINABLE, INNOVATIVE AND SAFE TRANSPORT SYSTEM	3	LOCAL/NATIONAL
SMART ECONOMY	INNOVATIVE SPIRIT	3	REGIONAL
	ENTREPRENEURSHIP	2	LOCAL
	PRODUCTIVITY	1	LOCAL
	FLEXIBILITY OF LABOUR MARKET	2	LOCAL/REGIONAL
	INTERNATIONAL EMBEDDEDNESS	3	LOCAL/REGIONAL

Smart pillar	Factors	Number of Indicators in Factor group	Type of data
SMART PEOPLE	LEVEL OF QUALIFICATIONS	4	LOCAL TO NATIONAL
	AFFINITY TO LIFELONG LEARNING	3	LOCAL TO NATIONAL
	SOCIAL AND ETHNIC PLURALITY	2	LOCAL
	FLEXIBILITY	1	NATIONAL
	CREATIVITY	1	NATIONAL
	COSMOPOLITANISM/OPEN-MINDEDNESS	3	MOSTLY NATIONAL
	PARTICIPATION IN PUBLIC LIFE	2	LOCAL/NATIONAL
SMART ENVIRONMENT	ATTRACTIVITY OF NATURAL CONDITIONS	2	LOCAL
	POLLUTION	3	MOSTLY REGIONAL
	ENVIRONMENTAL PROTECTION	2	NATIONAL
	SUSTAINABLE RESOURCE MANAGEMENT	2	LOCAL

The index does not evaluate the implemented technologies, but the result of their impact, regardless of what technological or non-technological innovations the local government has implemented. The index presents long-term and industry data, which are statistically monitored and the values of the six reference areas of smart self-government are obtained by appropriate selection of their structure and arithmetic average. The index compares local governments with a population of at least 3,000 or more. However, due to the great diversity of municipalities, in addition to the overall comparison of 245 municipalities, comparisons are also available according to the size categories of the population. In this way, it is possible to obtain a more detailed overview and at the same time determine a clear difference between smaller municipalities, which are significantly driven by a nearby super-strong city and they will jump to higher positions in the overall ranking than large municipalities in areas where the super-strong city is not. ITMS is a central information system that serves for the registration and subsequent processing, export, and monitoring of data on programming, project and financial management, and control and audit for programming periods. The funds that are monitored for projects of the Slovak Republic at the level of local governments and regions are summarized in Table 4, which takes into account the level of UDA.

Table 4. All specified Slovak UDA units according to ESHIF project and price values for all projects that UDA is implementing and size specification based to OECD FUA classification

UDA unit (name by biggest city in unit)	ESHIF total price value of projects	Number of citizens for UDA	Projects price value Per citizens	Size of UDA based of the OECD FUA classification
BRATISLAVA	96940446,99	622712	155,6746088	METROPOLITAN FUA
TRENČÍN	21689358,58	69402	312,5177744	SMALL FUA
HUMENNÉ	7096888,71	46399	152,9534841	NOT ENOUGH CITIZENS TO SMALL FUA CLASSIFICATION
KOŠICE	144546741,9	283366	510,1061591	METROPOLITAN FUA
BANSKÁ BYSTRICA	16649732,19	94209	176,7318642	SMALL FUA
ZVOLEN	10054838,67	51434	195,4901168	SMALL FUA
LUČENEC	6572911,19	43619	150,6891765	NOT ENOUGH CITIZENS TO SMALL FUA CLASSIFICATION
PREŠOV	40064017,92	128167	312,5923047	MEDIUM-SIZED FUA
TRNAVA	13476707,73	94288	142,931314	SMALL FUA
RIMAVSKÁ SOBOTA	6406076,67	48071	133,2628127	NOT ENOUGH CITIZENS TO SMALL FUA CLASSIFICATION
NITRA	30206274,69	90439	333,9961155	SMALL FUA
RUŽOMBEROK – LIPTOVSKÝ MIKULÁŠ	15557685,93	72539	214,4733996	SMALL FUA
LEVICE	0	32000	0	NOT ENOUGH CITIZENS TO SMALL FUA CLASSIFICATION
ŽILINA	19391340,23	95464	203,1272546	SMALL FUA
MICHALOVCE	5356528,15	48724	109,9361331	NOT ENOUGH CITIZENS TO SMALL FUA CLASSIFICATION
NOVÉ ZÁMKY	0	37000	0	NOT ENOUGH

UDA unit (name by biggest city in unit)	ESHIF total price value of projects	Number of citizens for UDA	Projects price value Per citizens	Size of UDA based of the OECD FUA classification
				CITIZENS TO SMALL FUA CLASSIFICATION
MARTIN	4582441,24	73744	62,13985192	SMALL FUA
POPRAD – SVIT – KEŽMAROK	14182297,96	79200	179,0694187	SMALL FUA
PRIEVIDZA – NOVÁKY	7960757,59	50373	158,0362017	SMALL FUA

To confirm or not to confirm H1, it is necessary to create a UDA comparison so that it is defined how much money is implemented in a given UDA per capita. We start from table 4, which will be subjected to F.Test. Based on the assessment, it is evident that the hypothesis statement has been confirmed in Table 5.

Table 5. Hypothesis 1 calculation

H1	Small FUA	Medium & metropolitan FUA
PREŠOV		312,5923
BRATISLAVA		155,6746
KOŠICE		510,1062
TRENČÍN	312,5177744	
BANSKÁ BYSTRICA	176,7318642	
ZVOLEN	195,4901168	
TRNAVA	142,931314	
NITRA	333,9961155	
RUŽOMBEROK – LIPTOVSKÝ MIKULÁŠ	214,4733996	
ŽILINA	203,1272546	
MARTIN	62,13985192	
POPRAD – SVIT – KEŽMAROK	179,0694187	
PRIEVIDZA – NOVÁKY	158,0362017	
F.TEST	0,06652949	

Strong UDAs absorb more funds on their territory through project activities funded by Euro funds. From a cumulative perspective, Metropolitan FUA and Medium-sized FUA have implemented a total of 281551206.8 Euro. Small-sized FUA implemented projects in the total amount of 153751434.8 Euro. If we were to compare Small-sized and Medium-sized FUA against Metropolitan, the hypothesis would still be confirmed. Metropolitan FUA cumulatively implements more funds than other FUA (the ratio, in this case, would be 241487188.9 Euro Metropolitan FUA versus 193815452.7 Euro Small-sized and Medium-sized FUA).

4. Conclusions

The concepts of a smart city are mainly about transforming or changing behavior in its essence. Cities or municipalities do this much more effectively at the local level than regions, so they can best be supported in the smart cities agenda. At the same time, it is easier for the government to implement this approach at the regional level, which consists of local authorities. The use of the bottom-to-up principle is possible if all stakeholders adopt the following principles when implementing the smart city strategy:

- Transparency (process and results) and independent performance evaluation, promote accountability;
- An integrated holistic approach based on results, consistency in evaluation, results-oriented, stakeholder-oriented, technologically impractical and interoperable;
- A commitment to universal access and inclusiveness;
- A commitment to resource efficiency, sustainability and biodiversity;
- Willingness to innovate;
- Commitment to building trust, in particular in relation to data security and privacy;
- Not focusing inwards but outwards, with a global perspective and a focus on FDI.

The smart city "fulfill, in particular, lar the goals of sustainability, strives to increase the subjective quality of life (happiness of the people), if it uses modern technologies" and at the same time is "the primary place of innovation and new technologies" and "offers new and more effective solutions for a better quality of life" (Kóňa & Kóňa, 2020). It is time to create an environment that will vitally support the development of Smart Cities in Slovakia through the implementation of Slovak technical and non-technical solutions based on professional and comprehensive development strategies.

This also requires the state to address issues of terminology, standards, reference architecture, and other technical standards in order to guarantee the quality of the solutions that the municipality will procure. In some areas, the National Concept of Public Administration Informatization also addresses this for the smart domain, and at the same time complements the Smart Cities and Smart Mobility Action Plan, which has been under preparation since 2021. synergistic effects, e.g. in the analysis of the obtained data. As we have proved statistically and confirmed the hypothesis that large and strong cities can implement funds better and to a greater extent, it is also necessary to focus on supporting smaller ones. The country cannot leave out the process of developing smaller self-government and smaller FUA. Uneven development will bring several problems in the future.

Without conceptual direction on the part of the state and at the level of ministries, local governments will pursue their own goals, which may be different from the goals of the state. At the same time, the principle of the bottom to up must be

observed. It is necessary to build on the differences between local governments and their requirements, to fulfill the direction of the regions as well as the unified policy of the state. However, a unified state policy is still lacking.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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