

## ***Smart Visegrad - How modern and dynamic are the local governments of the V4 regions***

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**Abstract:** The megatrend of building Smart Cities in the context of sustainable development of local governments is highly topical. The movement and intensity of Smart City solutions are proportional to the need to eliminate serious global and regional problems. The most pressing of these relates to socio-economic impact. Therefore, the most attractive areas of interest include infrastructure, environment, management, and governance. The geopolitical context and the vision of a sophisticated, efficient, high-quality, and beneficial municipality leads to the production of economic, social, and environmental benefits also in post-communist European countries. The effects of synergies of high technology and reflection on the virtuous behaviour of people and society are prerequisites for the desired socio-economic development and sustainability of countries. Promoting the paradigm of multi-subject and multi-sectoral involvement of actors contributes to the performance of regions and enterprises at the same time. The primary impetus for writing the article was the ambition to identify the significant attributes of the Smart City concept and to assess the propensity of V4 countries to address this issue. Within the framework of the study, the analytical methods used were the investigation of the current state of the art, the search of available relevant literature and case studies, the summarisation of results on the basis of induction, deduction, mathematical-statistical calculations and other methods allowing us to draw correct conclusions. The most significant of these conclusions is that there are no significant differences in the propensity of Visegrad Four (V4) countries to be smart. On the contrary, the interest in improving and developing the country, the unit, and the society can be considered a global phenomenon.

**Keywords:** Smart City, Visegrad Group, local government.

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## **Introduction**

Smart cities, smart solutions, and smart strategies are a unique manifesto of the ages and society. Analysing the scientific literature, it should be noted that the theoretical and practical issues of the application, solutions, and impact of Smart technologies have different directions and reveal different aspects of this topic. The two main ones are the technocratic solution or the application of information and communication technologies (ICT) and the consumer solution or the improvement of the citizen's life quality through ICT. Technocratic solutions are a pillar of the second model, which is gaining in importance. This is leading to a shift and a clearer focus on meeting citizens' needs.

Criticism has helped this shift to a large extent. This has pointed to a lack of citizen orientation and involvement. The combination of ICT infrastructure, social infrastructure and commercial infrastructure, therefore, has not only resulted in a change in the status of the city. Synergistically, there is also a change in the status of the citizen. The synergy of the whole process is the achievement of collective intelligence, which is the essence of the current understanding of the Smart City issue.

Smart solutions cannot be ignored. They are becoming an essential part of life and modern cities. They bring increased convenience and quality of service to citizens, businesses and municipalities (Duygan et al., 2022; Javed et al. 2022; Siokas et al., 2021; Ahad et al., 2020; deGuimaraes et al., 2020). They also contribute to regional economic development and urban sustainability (Jiang et al., 2023). Thus, they represent new models of governance, business and living standards. Advanced and sophisticated technologies make it possible to achieve higher social interests. They offer unlimited possibilities to satisfy needs and demands. They lead to open governance, municipality, and entrepreneurship.

Studies addressing smart issues confirm that the construction of smart cities positively impacts and improves the environment, promotes coordinated regional economic development, and facilitates businesses to achieve their goals (Jiang et al., 2023). The model of the smart cities rise, where the rights and well-being of the smart city citizens are assured, the industry is in action (Javed et al., 2022). The ubiquity of implementing smart solutions creates a myriad of opportunities to apply new elements to ecosystems of institutions and communities. Strengthening the openness, transparency, and sustainability of the technology-human capital-governance nexus is leading to changes in the process management framework. The ability to integrate different environments, issues, and actors is one of the biggest challenges of the whole concept.

Supporting technological innovation and smart platforms, green economy, and low-carbon industrial transformation, developing innovation and workforce capabilities

are the main areas of the 21st century smart policy solution. For the needs of the business and non-business environment, the production of smart services and goods is the core of the functioning of smart concepts.

The fundamental advancement in the application of smart concepts lies in synergies and sectoral collaboration. Available studies that address smart issues (Liu et al., 2022; Siokas & Tsakanikas, 2022) show that system modification alone leads to the interconnection of the State, local governments, entrepreneurs and citizens. The results of the studies point to the fact that Smart city leads to the development and growth of small and medium-sized enterprises, making the dimension of smart municipality more holistic. This is closely related to the driving effect of information-driven smart cities and the pooling of talent resources that these smart cities bring (Wang & Deng, 2022).

## **1. Literature review. Smart paradigm in 21<sup>st</sup> century reflection**

Countries and communities face several challenges. These challenges vary in nature, dimension, origin, impact, and form. One of the most discussed challenges of today is a sustainable, efficient and prosperous smart society. That is, a society that takes into account the needs of the present and future generations, protects the environment, and conserves resources, respects the laws of technological and societal development and expansion, and enhances ethical and moral integrity.

Cities are the liaison officers for the above. These highly dynamic entities must respond effectively to the economic and social needs of their inhabitants, such as the sustainable development of cities with the needs of citizens, the requirements for a healthy and environmentally safe environment with the intention of achieving uniqueness, and so on. In addition, they must follow global trends in which sustainable and inclusive growth for all becomes a priority for urban management (Mavlutova et al., 2023; Balasescu et al., 2022). This idea is supported and developed throughout the European Union. Therefore, the redevelopment of cities and the application of smart features supporting urban sustainability policies (Xia et al., 2022; Russo and Rindone, 2023), including the development of more efficient urban environments and the transformation of cities into safe and healthy eco-units, are taking place.

An active tripartite result-orientation is an essential prerequisite for the building and development of local governments. Current trends in this question are sustainability, prosperity, livability and inclusion (Elad, 2024; Lim et al., 2024; Kim et al., 2021; Pérez et al., 2020; Kikutake, 2019). Thus, based on the above, the very entity of the Smart City paradigm lies in the reflection and integration of physical, digital and human systems (BSI - British Standards Institute). Smart City can be defined as the innovation of the physical city with high integration of advanced monitoring, sensing, communication, and control technologies to provide interactive and intelligent services to citizens in real time (Kousis & Tjortjis, 2021). Recognition of the multidimensional nature of the Smart City concept leads to a paradigm shift to a

holistic form. Smart City is the implementation of the main postulates of sustainability built on the synergy of engineering, informatics and community (Popova & Popovs, 2022; Janík et al., 2020).

Authors dealing with Smart City issues also suggest that the complex process transformation of municipalities and communities requires the promotion of human well-being, the rational use of resources and technology, as well as the implementation of sophisticated innovative solutions (Yang & Zhen, 2024; Alfaro et al., 2023; Bonte, 2020). This transformation should result in improving the citizens' life, increasing the efficiency and effectiveness of urban operations, and overcoming regional and transregional societal challenges (Sharifi et al., 2021). At the same time, they call for all elements of Smart City, namely smart people, smart economy, smart mobility, smart living, smart governance, and smart environment, to be achieved in the same consistent manner (Purba & Jayadi, 2023, Popova & Popovs, 2022).

Threats also require attention, among which the weak link between smart and sustainable urban practices is the most intensely pointed out (Franchina et al., 2021). The lack of reflection on the creation of the different dimensions of smart and sustainable cities is also a problem that hinders the fulfilment of the goals and objectives of local governments (Spicer et al., 2023; He et al., 2022; Antwi-Afari et al., 2021; Huang et al., 2021).

From the above, it is clear that to understand Smart City as a purely technology-oriented system is an outdated concept. This paradigm is losing its weight. A Smart City full of technological innovations in which digitally disengaged citizens stand out has no value and no meaning. It is the citizens of the city who form the focal point. It is essential for and with residents to participate regarding strategies and solution proposals (Bajdor & Mayor-Paty, 2021). Therefore, in a socially oriented construction, the status of the inhabitant is modified, namely from a passive user to that of an active co-creator.

Also, speaking about Smart City is meaningless if there is not enough attention to understand the real local needs and grand challenges. Drawing on Vitalisova et al. (2024), Vanova (2021), transforming a city into a Smart City requires significant efforts from politicians, city leadership, residents, entrepreneurs and various communities in the city. Therefore, to fully apply the Smart City concept requires deriving patterns and analysing the behavior of citizens (Butoracová-Shindleryová & Čajková, 2023; Baraniewicz-Kotasińska, 2022; Kousis & Tjortjis, 2021), whose needs are paramount to be met. The actors of Smart City must be both professional and lay public, including stakeholders and end-users. This leads to a faster, more targeted and more precise achievement of the expected benefits. Communication and feedback occurs immediately at every stage, from identifying and naming the problem, to finding solutions to the problem and to launching the developed solution. However, it must be said openly that Smart City is not for everyone, or not all city inhabitants have the chance to participate in or benefit from innovation (Mossberger & Tolberg, 2021). We base this assertion on findings that conclude that the Smart

City phenomenon is a utopia (Wulff-Wathne, 2024; Bina et al., 2020). Based on the above, the question of an objective assessment of the Smart City arises.

The fact that we do not find a unified framework of practices, assessments or measurement of Smart City indicators, neither within the social community nor within the academic community, is remarkable. The frameworks (Table 1) vary in intensity, region and geopolitical characteristics of the environment to which the authors subscribe (Zou, Ma, & Xin, 2022; Corejova et al., 2021). In terms of narrative value and usefulness, the IMD Smart City Index (IMD, 2024) can be described as the most beneficial. The index reflects subjective perceptions and attitudes of citizens, in addition to an objective assessment of economic and technological aspects. Involving the citizen and allowing him/her to make inquiries as a Smart City user is natural. In the context of the Smart City, the idea and vision of Smart Cities, i.e., a city full of technological innovation and digitally engaged citizens, is thus fully realised (Mossberger & Tolberg, 2021).

**Tabuľka 1. Ranking according to selected indices**

Rámec	World No.1	The Visegrad Group (V4)							
		Bratislava (Slovakia)		Prague (Czech Rep.)		Budapest (Hungary)		Warsaw (Poland)	
		World ranking	V4 ranking	World ranking	V4 ranking	World ranking	V4 ranking	World ranking	V4 ranking
Cities in Motion Index 2024	London (UK)	101.	4.	50.	1.	87.	3.	63.	2.
Global Innovation Index 2024	Zurich (Switzerland)	48.	4.	30.	1.	34.	2.	38.	3.
Digital City Index 2022	Copenhagen (Denmark)	-	-	-	-	-	-	-	-
Innovation Cities Index 2023	Tokyo (Japan)	337.	4.	59.	1.	78.	2.	89.	3.
Smart Cities Index 2024	Zurich (Switzerland)	56.	2.	15.	1.	89.	4.	38.	3.

Source: own analysis as per IESE, 2024; ICI, 2023; GII, 2024; DII, 2024; IMD, 2024

## 2. Objective and research methodology

The information and data needed to meet the objective of this article was obtained from secondary sources, case studies and statistics that are freely available to the general public through online platforms, for example, Scopus & Web of Science (WoS). We analysed, statistically and mathematically computed and evaluated these sources. The criteria for selecting the objects were the Smart City scheme, which is valid within global and regional areas, including the countries forming the Visegrad Group (V4), namely Slovakia (SK), Czech Republic (CZ), Poland (PL), and Hungary

(HU). The reason for this choice is the relative similarity of historical, social, cultural and economic circumstances. For our purposes, sources meeting the criteria of timeliness, credibility as well as quality of content were used. Studies published in reputable database platforms, primarily the Web of Science database, formed the basis. The data for network construction and bibliometric analysis were obtained from the WoS database. WoS was chosen for three main reasons, reputation for indexing and quality peer-reviewed research; detailed quantitative and qualitative bibliometric information allowing for more accurate searching and processing using a bibliometric analysis tool (VOS viewer); and a large number of publications on smart cities. In order to include as many relevant articles as possible in the analysis, we used a broad search string containing two keywords: smart city and smart cities. The same case was for the data. We drew these from the schemas of reputable statistical database platforms. The Smart City Index (SCI), Statistical Performance Indicators (SPI) and Corruption Perceptions Index (CPI) were the basis of the analysis. The choice of indicators was based on the need to meet the objective and the need to clarify interrelationships. The motivation for selecting SCI was that it is the best known and most objective index for evaluating cities. It was natural for us to pursue the SCI, which ranks among the quantitative indicators used to measure and evaluate the performance of various aspects of the system. CPI because of the importance of tracking links in corruption risks.

For the purpose of testing the dependence, we decided to use Pearson's correlation coefficient (1):

$$rp = \frac{n \cdot \sum xy - \sum x \cdot \sum y}{\sqrt{[n \sum x^2 - (\sum x)^2] \cdot [n \sum y^2 - (\sum y)^2]}} \quad (1)$$

where n is the number of observations (CZ, SK, PL, HU);

x and y are the variables for which the correlation is calculated (SCI, SPI, CPI).

The values of the correlation coefficient range from -1 to +1:

- Positive values close to +1 indicate a strong positive linear dependence.
- Negative values close to -1 indicate a strong negative linear dependence.
- Values close to 0 indicate linear independence of the two variables.

The main spatial range was the V4 partner countries. The observation period was 2020 to 2023 (the latest year of data availability).

The aim of the article was to highlight the uniqueness of the Smart City concept and to assess the propensity of V4 countries to address this issue. Based on this, we defined the basic research hypotheses and formulated the main research question as follows:

RQ Do the V4 countries have a positive attitude towards the development of the Smart City concept?

H1 Is there a statistically significant link regarding Smart City development and the level of SPI?

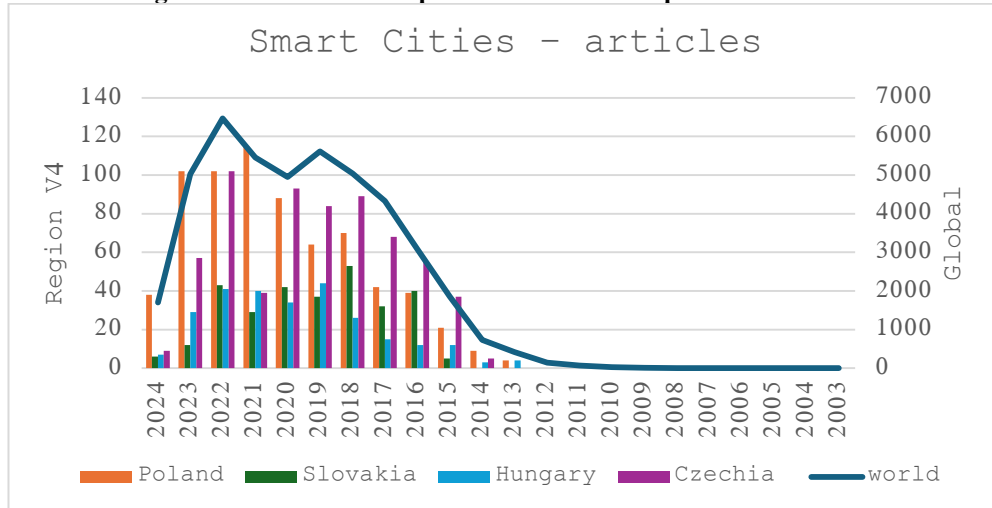
H2 Is there a statistically significant relationship regarding Smart City development and CPI level?

### 3. Research findings and discussion

Along with the growing interest in smart city agendas, the scholarly literature on smart cities has been expanding rapidly in recent years (Figure 1). For the first time, an article on Smart City was published in 1991 (Drohojowska: San-Francisco style, Art-deco elements inform a Smart city residence + Interior-design by Arnold, Val). However, it was not until the turn of 2010 and 2011 that we saw the first significant interest in this topic in society. In addition to general theoretical knowledge, there are unique studies dedicated to the exploration of individual Smart City areas. However, this has only occurred in recent times. Likewise, there are researches that consider the impact of separate economic indicators on a specific smart area or solution. Conversely, there have been no significantly identified studies that consider the mutual impact of these areas.

The number of publications on Smart City and the interest in the development of the concept has been increasing over the last 10 years also within the V4. The reason for this growth is the paradigm shift as well as the justification of the Smart City concept. Theory and practice have shifted the perception of Smart City as a technology-only approach towards a more holistic approach. The latter takes into account not only hard infrastructure and components, but also so-called soft components such as social participation (Bajdor & Starostka-Patyk, 2021). The analysis of the findings shows that researchers from Hungary and Poland were the first to publish on the topic of Smart City, followed by the Czech Republic and Slovakia. The Czech Republic became the leader in publishing almost immediately (since 2015). However, it has been robbed of this leadership by Poland (since 2021), which has been the most active over the last period. Hungary and Slovakia remain at the tail of this ranking. We attribute this state to the different intensity and characteristics of the promotion of Smart City ideas, application of elements and solutions, policies and strategies at regional, national, and supranational levels.

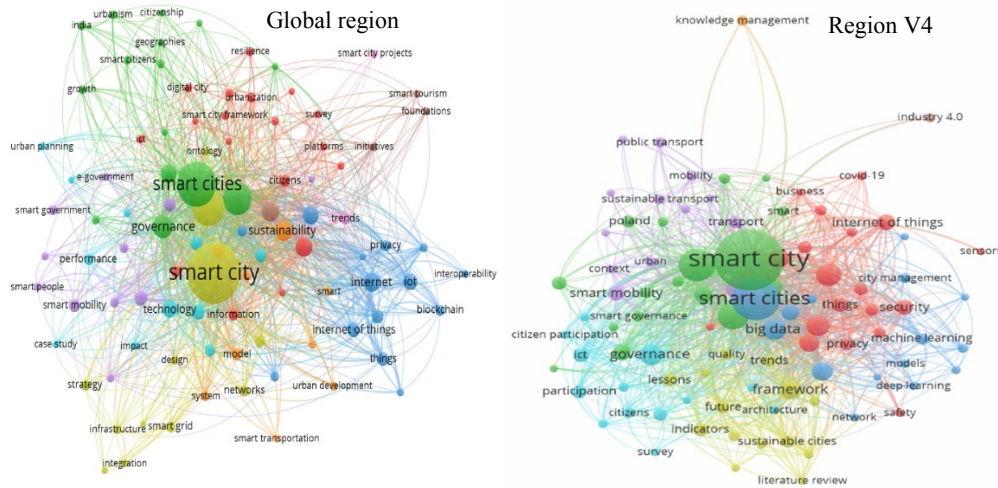
**Figure 1. An overview of publications on the topic of Smart cities**



Source: own analysis as per Web of Science (2024).

Within the dimension of scientific studies, we were also interested in the links that are preferred in connection with the issue. Within the network, links to the keywords Smart City and Smart Cities were identified. The strength of these attributes is represented by the size of the primary and secondary nodes (Figure 2). Through VOS viewer content analysis, the validity of the construct represented by the clusters was confirmed. As it can be noticed, the strength and linkage are mainly related to the main components of the Smart City and their subsequent spatial clustering.

**Figure 2. Keyword network in smart cities research**



Source: own analysis as per Web of Science (2024).



However, in this article, we are not only concerned with understanding the scientific dimension and approach, but also the practice and reality. For this reason, we decided to find out whether there is a dependency or a link within the Smart city issue and the selected indicators.

In answering the question of the changes that occur within the application of the Smart City concept over time, we have taken the help of IMD data. We processed this data using a radar chart (Figure 3). The graph shows five key aspects (healthcare and safety, mobility, activities, opportunities, and governance) for three years, 2020-2023. Since there was no World Cities Assessment in 2022, this year was excluded from our research. The aspects respect the current division into two categories, namely structures and technologies.

**Figure 3. Smart City aspects over the selected years**



Source: own analysis as per IMD (2020-2023)

The analysis shows that each subject is unique, and the results achieved are equally unique. In the health & safety category, technological aspects outweigh the structures area in all the entities surveyed. This is particularly the case for services in the online space, such as healthcare, free wi-fi networks and citizen-facing sites. Budapest/HU shows steadily lower values in the aspects monitored. The situation in the area of finding housing with rent equal to 30% or less of a monthly salary is particularly critical. However, this area is critical for all subjects surveyed. In the case of Warsaw/PL we observe a fluctuation within the technological aspects (decrease 2020 and 2021 - 2.77 points). Stably higher values, which trend downwards, characterise Prague/CZ. The differences within the Prague Smart City model are the lowest within structures and technological aspects (difference<sub>max</sub> - 3.89 points). Bratislava/SK shows an alternating fluctuation of values. However, it is encouraging

that together with Warsaw/PL they are progressing in the area of recycling services. The other side of the coin is the fact that Prague/CZ is a class or two higher in this respect.

In the mobility category, there are fluctuations in both aspects. Bratislava/SK was the weakest in the assessment. On the other hand, the leader is Warsaw/PL. The difference in structure and technological aspects is significant for all the entities surveyed, except Prague/CZ. Warsaw/PL and Prague/CZ show slightly increasing trends. Budapest/HU and Bratislava/SK show slightly decreasing trends. Within mobility, the most pressing issue arises from road congestion and the associated high frequency of traffic jams. On the other hand, the availability and quality of public transport is pleasing, with Bratislava/SK making the most progress in this area (increase - 6.1 points), predicting a possible convergence to the competition.

There are minimal deviations in the activities category. Despite this, Bratislava/SK is the weakest entity. In the most recent monitoring period, the values for both structures and technology aspects are improving for Bratislava/SK. The leader in structures is Warsaw/PL. The leader in technological aspects is Prague/CZ, which is, however, slightly attacked by Budapest/HU in the last year. Again, the services of the online space, as well as the diversity and quality of the cultural events on offer, have a positive impact on the ranking.

In the category of opportunities, the structures in case of Warsaw/PL and Prague/CZ have a better rating. The weakest link to the area of structures is Budapest/HU (53.86 points). The weakest link in terms of technological aspects is Bratislava/SK (56.92 points). A surprising finding is related to the teaching of IT skills, where there is a decrease in scores for Bratislava/SK and Prague/CZ. Moreover, Bratislava/SK scores the lowest among all the subjects and years surveyed (50 points). Stagnation is also evident in the case of support for lifelong learning.

In the government category, Warsaw/PL is the leader in both aspects. Moderate growth trends in structures are recorded for all subjects, yet Budapest/HU is the weakest. As the only one of the entities with a decreasing trend in the technological aspect and the worst among the entities surveyed is Bratislava/SK (41.7 points) in this category. Positive are the values of residents' participation in the life and affairs of the municipality, but the perception of corruption and corrupt behaviour remains sensitive in all the entities studied.

These findings regarding Smart City development encourage us to try to identify the links of the development of the selected facts.

H1 Is there a statistically significant link regarding Smart City development and the level of SPI?

In terms of implementing policies towards building Smart City, this includes improving and pro-client-oriented services to citizens as well as ensuring their welfare and growth. As the SPI measures the social and environmental progress of countries based on various indicators that include basic human needs, foundations of well-being, and opportunities, we ask if there is a link between SCI and SPI (Table 2).

**Table 2. SCI vs. SPI**

	2023			2021			2020		
	SCI	SPI		SCI	SPI		SCI	SPI	
	rank	score	rank	rank	score	rank	rank	score	rank
Slovakia	62	79,54	35	42	89,7	20	26	85,9	23
Hungary	87	77,47	40	78	89,1	24	63	85,8	24
Czechia	14	84,82	19	10	91,2	11	4	87,6	15
Poland	44	79,53	36	41	91,1	12	48	89,2	7
$r_p$	0,894			0,926			0,598		

Source: own analysis as per Social Progress Imperative (2020-2023)

Based on the Pearson correlation coefficient, we conclude that there is a positive correlation between SCI and SPI. Rationale: Countries that achieve higher levels of SCI also tend to achieve higher levels of SPI. This is mainly due to the implementation and innovation that cities undertake. These facts therefore result in improved perceptions of social and environmental well-being, which are measured by the SPI. Moreover, some impacts of changes and modifications to systems may not have a visible impact immediately. The impacts can only be perceived after a certain time period has elapsed, which can be considered natural. An integrated approach to modernisation and innovation in urban systems is key to building sustainable, inclusive, and prosperous communities.

H2 Is there a statistically significant link regarding Smart City development and CPI levels?

In terms of implementing policies towards building Smart City, this includes improving and pro-client services to citizens, as well as ensuring transparency and reducing corrupt behaviour. Modern digital platforms, blockchain as eGovernment are some of the most popular tools that help to reduce the scope for corrupt practices and hence are also applied in the Smart City concept. As the CPI assesses the perception of corruption in countries around the world and highlights practices, we ask whether there is a link between SCI and the CPI (Table 3).

Based on the Pearson correlation coefficient, we conclude that there is a positive correlation between SCI and CPI. Rationale: Higher country scores on the SCI correlate with higher scores on the CPI. This relationship is important for understanding the impact of technological innovation and digital tools on governance and transparency in public affairs. Countries with higher SCI also tend to have lower perceptions of corruption. Smart City investments in smart technology and innovation can have a positive impact on transparency and reducing corruption in the public sector. Digital platforms in Smart City projects allow monitoring of public spending, procurement, and budgets. They provide citizens and stakeholders with access to data on resources, increasing transparency, and minimising the scope for corrupt practices. New paradigms reduce bureaucracy and increase pro-clientism in city administration.

**Table 3. SCI vs. CPI**

	2023			2021			2020		
	SCI	CPI		SCI	CPI		SCI	CPI	
	rank	score	rank	score	rank	score	rank	score	rank
Slovakia	62	54	47	42	52	56	26	49	60
Hungary	87	42	76	78	43	73	63	44	69
Czechia	14	57	41	10	54	49	4	54	49
Poland	44	54	47	41	56	42	48	56	45
r <sub>p</sub>	0,869			0,769			0,478		

Source: own analysis as per Transparency International (2020-2023)

#### 4. Conclusions

The evolution of changes and progress in the context of urban development and quality of life is becoming dominant for the time being. The dynamism of change, needs and expectations is enormous. Preference, participation and feedback together with openness, transparency and sustainability are key pillars of the Smart City concept. The concept is mainly about changes in the perception of the roles and tasks of the different actors and the significant use of sophisticated technologies and processes. It is not only the theoretical dimension and conception of the Smart City phenomenon that is gaining momentum. More and more cities are naturally turning into Smart Cities. The idea is to create space for everyone so that they are burdened as little as possible while getting the most out of what is possible. Large cities, but also smaller towns or units, reflect the necessity of orienting themselves towards the Smart City model. The positive impact can be observed on several levels through mobility, services, security and transparency.

The parallel of smart innovation policies of local governments is also clearly visible in the regional impacts. However, a smart city is not only beneficial for society, but also for the environment. Thanks to smart models and processes, negative impacts on living and non-living nature are reduced, which is very important not only for the present but also for future generations. Achieving sustainable, low-carbon urban development is a goal that the European Union has also set itself. It is the European Union that sees the Smart City as the means by which this goal can be achieved. As of 2023, Europe is leading the way with 170 Smart City Initiative projects. All EU countries, including the V4, are helping it to achieve this leadership. The authors see significant practical value in this research that it is not possible to build and advance Smart Cities issues without seeing them without knowledge of other components, i.e. in isolation. These effects can be used in the process of developing other Smart Cities or Smart Areas. Therefore, we conclude that countries with higher SCI tend to have higher SPI and CPI values. This positive relationship is supported by the implementation and innovations undertaken by cities through Smart City initiatives. Smart City initiatives can be an effective tool to promote an efficient public system.

Therefore, it is important to continue systematic evaluation, as well as project support. This will maximise the potential benefits for society as a whole on a global level. The parallel of smart innovation policies of local governments is also clearly visible in the regional impacts. However, a smart city is not only beneficial for society, but also for the environment. Thanks to smart models and processes, negative impacts on living and non-living nature are reduced, which is very important not only for the present but also for future generations. Achieving sustainable, low-carbon urban development is a goal that the European Union has also set itself. It is the European Union that sees the Smart City as the means by which this goal can be achieved. As of 2023, Europe is leading the way with 170 Smart City Initiative projects. All EU countries, including the V4, are helping it to achieve this leadership. The authors see significant practical value in this research that it is not possible to build and advance Smart Cities issues without seeing them without knowledge of other components, i.e. in isolation. These effects can be used in the process of developing other Smart Cities or Smart Areas. Therefore, we conclude that countries with higher SCI tend to have higher SPI and CPI values. This positive relationship is supported by the implementation and innovations undertaken by cities through Smart City initiatives. Smart City initiatives can be an effective tool to promote an efficient public system. Therefore, it is important to continue systematic evaluation as well as project support. This will maximise the potential benefits for society as a whole on a global level.

### **Conflict of Interest Statement**

The authors declare that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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