

## SMART CITY INTELLIGENCE SYSTEM: INFORMATION AND ANALYTICAL SUPPORT

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Based on the United Nation's population forecast the world population is expected to increase by 2 billion persons in the next 30 years, from 7.8 billion currently (2020) to 9.7 billion in 2050 (68% of the world population is projected to live in the urban areas by 2050). Digitalization is a key trend in urbanization over the coming years is crucial to the implementation of the 2030 Agenda for Sustainable Development. One of the great contributions of the digitalization, particularly due to telecommunication infrastructure, is to the development of the so-called smart cities (the intelligent city is the equivalent term in languages derived from Latin), which are cities that invest in social and human capital, urban mobility, modern communication infrastructure facilities, and technology, including the sensible management of natural resources, through participatory governance. Measuring and analyzing the Key Performance Indicators (KPIs) for monitoring and assessment the smart city performance is the important stage of a smart city planning. In this context, this study discusses the development of the information and organization support of smart city intelligence system development.

The concept of smart city has been shaped in the literature that spans over 30 years, since the first references to the idea of smart cities at the end of the 1980s to the current explosion of smart city publications. This terminology referred to a "direct association towards optimal, positive, and sustainable development of a town, city, or region" (Lindskog, 2004) [1]. Also, at the same time, the concept of digital cities was used, in a time where the general assumption was that many problems would be solved by simply distributing technology around the cities. Internet technologies are used to empower citizens and organizations in developing innovative and collaborative solutions that make cities more efficient, sustainable, and inclusive (Mora et al. 2017) [2].

According to Zubizarreta, Seravalli, and Arrizabalaga (2015), several factors are characterizing smart cities, such as citizens fully participating in public life; quality of life, and participatory governance, emphasizing the transparency in the use of public resources [3].

In our research we identified the following approaches for the "smart city" definition, namely economical, social, ecological, technological and institutional.

Nowadays, an analysis of the ontology of many formal definitions of "smart city" and "intelligent city" reveals that three blocks of entities characterize this concept: (1) the city, citizen, user, activities and infrastructure and flows in cities; (2) the information, knowledge, intelligence and innovation institutions and processes within cities; and (3) the smart systems, urban technologies, the Internet, broadband networks and e-services of cities [4].

Thus, summarizing the approaches, the concept of "smart city" is defined as a comprehensive and multifactorial municipal system based on the full use of information and communication technologies by effective integration of physical, digital and human subsystems in an artificial environment to solve current problems of the city and to deliver its sustainable, prosperous and inclusive future in the economic, social, environmental and institutional spheres and improving the safety, comfort and quality of life for its citizens in the future.

The research is devoted to the investigation of the information and organization support of smart city intelligence system formation. To achieve this goal, the following tasks were fulfilled: the concepts of the smart city were analyzed; the methodological approaches for measuring smart city Key Performance Indicators (KPIs) are systemized, on the base of theoretical, methodological, and organizational background the smart city intelligent system on the base of Balanced Scorecard (BSC) is developed. It adopts case study methodology, data collection, and mixed-method data analysis.

There are a lot of different approaches to evaluating smart city KPIs. Literature has focused on different measurement methodologies to capture the impact of smart cities.

Among the smart city KPIs solution the most widely used are the following indexes:

- Smart City Index (created by the IMD World Competitiveness Center's Smart City Observatory, in partnership with Singapore University of Technology and Design (SUTD), ranks 102 cities worldwide) is based on a survey of 120 residents, chosen at random, in each city. Each survey has 40 questions, mainly focused on infrastructure and technology and relating to health and safety, mobility, activities, opportunities for work and education, and governance. Citizens were also asked about their attitudes to the use of personal data, facial recognition and overall trust in local authorities. A final question asked them to summarise the perceived priority areas out of 15 possible options. The cities' scores were tallied and each was given a grade from AAA to D. Singapore and Zurich were the only cities to receive AAA scores. Sixteen cities appear in the A range, 48 in the B, 32 in C and six in D. Following the IMD Smart City Index 2019 top 10 cities are Singapore, Zurich, Oslo, Geneva, Copenhagen, Auckland, Taipei City, Helsinki, Bilbao, and Dusseldorf.

- Smart City Strategy Index (founded by Roland Berger) is systematically analyzed 87 urban centers around the globe (39 in Europe, 26 in the Asia-Pacific region, 17 in North, Central, and South America, and 5 in the Middle East and Africa), which were selected based on published smart city strategies and other policy papers. Cities were of all shapes and sizes: 18 had under half a million inhabitants, 39 had up to 2 million, and 30 had over 2 million. Evaluation criteria: action fields (weighted 50% in final evaluation), strategic planning (30%), IT infrastructure (20%). Action fields refer to the scope of the applications and services that make up the overall smart city strategy. Action fields with equal weighting divided into six core areas: smart education, smart health, smart government, smart mobility, smart energy, and smart buildings. Strategic planning refers to the city's ability to execute its smart city strategy. It divided this into an implementation

plan and schedule (30%), coordination (30%), budget (20%), and target group and stakeholders (20%). IT infrastructure refers to the technological basis for the city's smart operations. It divided into the city's IT policy (70%) and Internet connectivity (30%). In accordance with Smart City Strategy Index 2019, Vienna heads the ranking, with Chicago and Singapore close behind.

The suggested smart city intelligence system is based on the smart city KPIs from the building blocks of smart cities: knowledge skills, innovation ecosystem features and digital spaces for the baseline condition; measuring efforts by investments and use of broadband, ICT, and e-services; and documenting the outcome on typical subsystems of cities, such as the urban economy, quality of life, infrastructure, and government using widely accepted indicators (following the international standard ISO 37120:2014) [4].

We suggest the application of balanced approach to the smart city intelligence system formation. A balanced approach in the municipal sector must look at four areas of responsibility, some of which correspond to the original concept of the BSC: public governance, operational, supporting, and client responsibilities.

The smart city strategy should be based on the set of guiding principles, that include visionary (establish a clear, compelling and inclusive vision for the city); citizen-centric (to all aspects of service design and delivery); digital (integrative and inclusive digitization of city spaces and systems); open and collaborative (openness and sharing in the way the city works).

The smart city mission needs to be principle-based and should be addressed at an early stage in development of the city vision and [smart city roadmap.

Development and delivery of a successful smart city strategy requires collaboration and change across a wide range of individuals, communities and organizations over a sustained period of time.

In this context the operational responsibilities combine key city-wide governance and delivery processes. To be successful in this area the key aspects of governance, planning and decision-making need to be managed at a whole-of-city level including public value chain analysis for measure time, cost, quality, and quantity of delivery processes and establishment of an operating model which balances the need for city-wide management on the one hand and local innovation on the other.

Supporting responsibilities are based on the effective stakeholder collaboration. Establishing a process of sustainable change and smart city programmes development requires a critical mass of stakeholders inside and outside of the city administration to be both engaged and supportive. Also the city authority must drive improvements to its own services through the application of smart data and more citizen-centric ways of working

In conditions of increasing digitization of city services and of city assets client responsibilities are based on the engagement of citizens and businesses as owners as the participants in the creation and delivery of city service on the base of citizen-centric service management The city authority itself (together with other major service deliverers in the city) has a responsibility to to accelerate the externally-

driven innovation, to design and deliver city services on the digital level, to create new sorts of public value.

Customer satisfaction is particularly important to public-sector organizations, since one of the customer – the taxpayer – is the source of funding.

Also taking into account that smart city programmes face significant risks to successful delivery, the critical success factors for smart city programme should be identified, measured and managed.

Digitization requires a comprehensive, adaptable concept of a smart city and smart city strategy development.

“Smart city” in the context of ensuring the sustainable development is viewed as a comprehensive and multifactorial municipal system, which is:

the city of smart people;

the living space of great comfort;

the economically viable urban system of generation and efficient distribution of public goods, capable of accelerated development and improvement by combining the possibilities of full-fledged financial security with technological saturation and social readiness for self-development;

the city which operates on the base of open, city-wide, service-oriented, interoperable IT platform.

The Smart City Intelligence System as defined as the system of information and organization support of smart city strategy development on the outcomes-based approach to benefits realization, covering the following elements: benefit mapping; benefit tracking; benefit delivery

The smart city intelligence system should include a clear statement of objectives, define smart city Key Performance Indicators that account for the entire process of urban intelligence, and combine a policy-focused and city-focused approach. Smart city intelligence system is the integrated approach that brings together areas traditionally viewed as separate: energy and mobility, government and health, education and environment, etc. This approach affects all parts of the city administration, which is difficult to coordinate in condition when the different functions each take their own approach to digitization. A solution to this challenge is to set up a central function or office with responsibility for coordinating and cross-linking digitalization activities. On the base of international experience, it is clear that cities that have Chief Information Office (CIO) or Chief Digital Officer or (CDO) reap considerable benefits (for example Amsterdam, Vienna and Seoul). Thus, the creation of central individual or office looking after digitization makes it much easier to coordinate the various smart initiatives in accordance with smart city intelligence system, which should be taking into account on the further research.

#### **References:**

1. Lindskog H. Smart communities initiatives. Proceedings of the ISOneWorld Conference. 2004.

URL:[https://www.researchgate.net/profile/Helena\\_Lindskog/publication/228371789\\_Smart\\_communities\\_initiatives/links/549812230cf2519f5a1db56d.pdf](https://www.researchgate.net/profile/Helena_Lindskog/publication/228371789_Smart_communities_initiatives/links/549812230cf2519f5a1db56d.pdf)

2. Mora L., Bolici, R., & Deakin M. The First Two Decades of Smart-City Research: A Bibliometric Analysis. *Journal of Urban Technology*. 2017. DOI: <http://dx.doi.org/10.1080/10630732.2017.1285123>
3. Zubizarreta I., Seravalli A., & Arrizabalaga S. Smart city concept: What it is and what it should be. *Journal of Urban Planning and Development*. 2015. 142(1), 1-8. DOI: [https://doi.org/10.1061/\(ASCE\)UP.19435444.0000282](https://doi.org/10.1061/(ASCE)UP.19435444.0000282)
4. Komninos N. Smart Cities. In Warf, B. (ed.) *The SAGE Encyclopedia of the Internet*. 2018. P. 783-789. Sage Publications. DOI: <http://dx.doi.org/10.4135/9781473960367.n229>
5. Smart City Emergence. Cases From Around the World. 2019. 484 p. DOI: <https://doi.org/10.1016/C2017-0-03541-3>

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### Abstract

As domestic markets continue to progress in the wake of technological advancement, cryptocurrency has become a rapidly developing factor in socio-economic environments. Since its launch in 2009, cryptocurrency has progressed from a single-network engagement system into a universal blockchain model being integrated into global financial systems. In partnership with the prestigious O. M. Beketov National University of Urban Economy in the Ukraine, the union of two students from the University of North Florida seek to intricate on the fundamentals of cryptocurrency. To cohesively understand how cryptocurrency systems operate, elaboration on the mechanism of blockchain has been provided to enable insight into the functionalities of digital assets. Additionally, through the incorporation of current contingencies, perspective on the existing cryptocurrency market is denoted, inclusive of key exchange platforms and the most prominent coins. The leading endeavor of the presentation is to inform students of how to invest in cryptocurrency as a means of early investment opportunities. In turn, information on how to develop a portfolio of investments and upkeep a healthy cryptocurrency wallet, an actual example of one of the researcher's personal investments is discussed. Moreover, as modernity becomes further embedded into societal norms, students are educated on how cryptocurrency enlists as an emerging player in fiscal models through conversation on the challenges posed and opportunities arising. Lastly, to showcase that cryptocurrency is being propagated amongst distinguishable markets, a series of companies have been listed in which their respective business strategies have begun to integrate the usage of cryptocurrencies as a form of transactions and to levy the value to which digital assets will mow undertake. As history has progressed and been delineated by several means of currency bound systems, the 21<sup>st</sup> century seems to be pursuing cryptocurrency as a transparent, secure, and flexible structure that promotes independence, control over assets whilst also enabling investors with strong purchasing power on a global scale.