

INDICATORS FOR ECONOMIC AND SOCIAL DEVELOPMENT OF FUTURE SMART CITY

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Abstract: *This paper identifies a set of criteria and indicators to highlight the economic and social development from different smart cities. To characterize and prioritize various urban areas of a city should be used a set of indicators. These indicators help us to establish the evolution and the grade of prepare of cities to smart society. This represents a starting point in formulating objectives and strategies for smart city development.*

Key words: smart city; indicators; local development; regional development

1. Introduction

This paper has in view the medium-sized cities and their perspectives for development.

In our days most of the population lives in urban areas, so exploring the development and evolution of cities is essential. The challenge of medium-sized cities in an important urban area is an important step. Medium-sized cities, which in next year's will be near the larger metropolises, appear to be less well equipped in terms of infrastructure, use of resources and organizing capacity. To enforce a solution of development and achieve a good position, these cities have to aim on identifying their strengths and advantages obtained by using smart solutions.

By smarter, we understand the use smart solutions to make the world work efficiently. The smart city means to infuse intelligence in all activities for improve the quality of work and of life, to reduce cost and to improve the efficiencies.

We can define the concept of smart city like a new solution for a better manages of infrastructure and resources.

The term smart city is used in literature regarding the education of its citizens, the implying ICT in the production processes, the urban traffic and the inhabitants' mobility, the use of smart solutions in health or referred to the relation between the city government or administration and its citizens.

2. Necessity of smarter cities

Our society is characterized by urbanization – a large number of people live in our days in urban area; technological progress – in every day we can see new solutions for communication, transmission and storage of data; environmental changes – every activity in

our day is characterized by the important impact on natural resources how in fact are limited; economical growth – the gross domestic product of our world is substitute by the big cities how bring the people together and stimulate creativity and efficiency.

The entire elements who characterized our society drive us to implement a good manage of infrastructure, of resources and to carer to existing and future needs of citizens.

All the cities who implemented smart solutions had in view to improvement of citizen everyday life. In the last years by implementing smart solutions in different countries from European Union was made:

- Increasing the employment rate of employment for men and women aged between 20 and 64 years, while employing a larger number of young people, older and low-skilled people, coupled with a better integration of legal immigrants;
- Improving the conditions for research and development in order to increase investment levels and stimulate research, development and innovation of new indicators;
- Reduction of greenhouse gas emissions compared, increasing the share of renewable in final energy consumption and achieve increased energy efficiency;
- Improving education levels by reducing dropout rates and increasing the proportion of persons aged 30-34 years with university degrees or equivalent qualifications;
- Promoting social inclusion by reducing poverty and eliminating the risk of poverty.

The most significant advantages (Figure 1) are improved of citizen transportation, the access to city resources (libraries and public buildings, malls, networks etc.) and the opportunities for the employment and local growth (Dirks, 2010 and Barrientos, 2010).

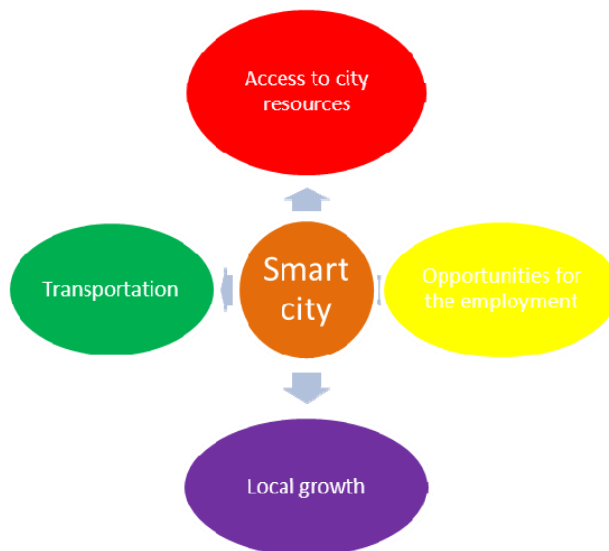


Figure 1.1 Smart city advantages

All these advantages highlight the need of implementations smart solutions in our country. The most important advantages and benefits of smart solutions are:

- use the last technologies;
- openness to smart technology;

- reducing costs;
- increasing degree of supports in case of disasters;
- improved the communication with citizens;
- citizen participation in community life economic, social and cultural;
- providing data coherent, consistent, updated;
- accessing open data;
- reducing time for solving citizens queries;
- reduce errors related to the information transmission security and transactions.

It is essential to highlight the necessity of smart solutions in city development. This can be described by a comparison between the traditional city and smart city (Table 1).

Table 1. Traditional city and smart city

Traditional city	Smart city
characterized by inefficiency of communication	better communication with citizens
inefficient use of resources	efficient use of resources
low access to administrative data	open access to administrative data
a lot of errors in information	reduce errors of information transmissions
without support in case of disasters	increasing the supports in case of disasters

These are only a part of elements who determinate us to try to implement a smart city. All these elements are the real support for urban development and for improve the quality of life.

It can take a lot of time for a city to become really smart. Sometime, the transformation is difficult to do because the mentality of citizens, or other time the evolutions can be stop by the natural disasters. But, to reduce costs, improve efficiencies, and deliver the quality of life citizens expect the implementing of smart city.

The urbanization without precedent of our cities and the technological progress on the hand, and on the other hand for a sustainable progress and for economic growth we need smart solutions for water, energy, transportation, healthcare, education, and safety or we can say we need smart solution for new cities.

3. Smart city characteristics

A question of our day is how do the cities smarter and what are the step and principles outlined above in the most cost-effective and productive fashion? The answer is to identify the high-impact areas of improvement of the city. These areas are correlated with the characteristics of the urban area. To the level of an urban city we can find seven characteristics (Figure 2). To describe a smart city and its seven characteristics it is necessary to develop a transparent and easy hierarchic structure, where each level is described by the results of the level below.

A set of factors were chosen to describe all the seven characteristics. For each characteristics we can identify a set of factors for describe the readiness and the use of smart solutions.

For smart economy were identified as factors: productivity and flexibility of the labour market, integration in the (inter-) national market, economic competitiveness, use of on-line solutions for sell or buy of products, quality of production, quantity of production, production diversity and research and development expenses of the authorities.

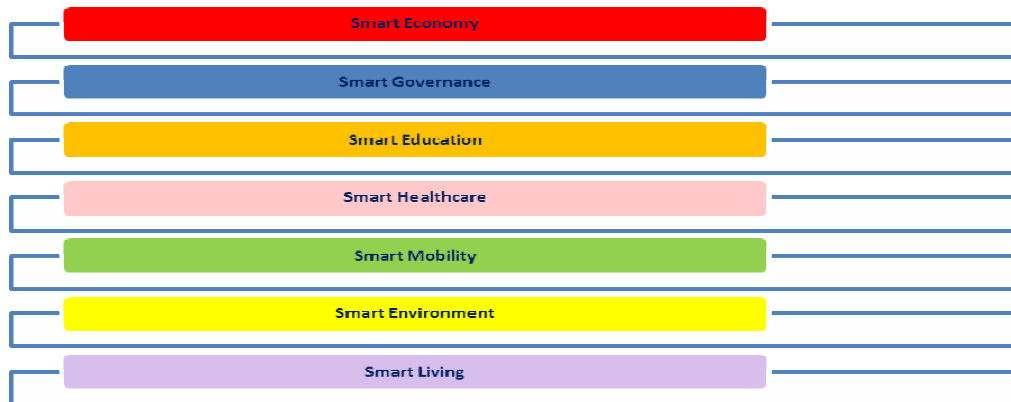


Figure 2. Smart city characteristics

Smart Governance includes factors like political participation, services for citizens as well as the functioning of the administration - we can say public and social services, transparent governance, political strategies and perspectives.

Smart Education is described by investment in education systems, education of the citizens, affinity to lifelong learning, education facilities, social interactions regarding integration and public life, research and investment in innovation and creativity.

Smart Healthcare is described by investment in healthcare systems, open access to medical health data, open access to patient data for interoperability of patient records, improved productivity of healthcare systems.

For smart mobility were identified as factors: local accessibility, (inter-)national accessibility, availability of ICT-infrastructure, sustainable, innovative and safe transport systems. In our days the smart cities promote walking, cycling, bike sharing, car sharing and smart mobility cards as part of an integrated mobility strategy to reduce travel times, fatal accidents and carbon emissions.

Smart environment is described by respected of natural conditions, environmental protection, level of pollution, sustainable resource management. And smart living cultural facilities, health conditions, individual safety, housing quality, education facilities, touristic facilities, social cohesion.

To analyze the performance of smart city a set of indicators can be assigned to each factor which describes one of the seven characteristics.

4. Smart city indicators

Observation of the economic and financial indicators illustrates the increases/decreases in quantitative and qualitative. It is important to watch how ICTs are used for the sale and purchase products online products and changing turnover due to online sales.

- the number of ICT specialists;
- the number of electronic devices;
- the number of personal computers connected to the Internet;
- the number of Internet users;
- share of number of enterprises with Internet connection in all enterprises active
- investment in hardware;

- investment and expenses for information technology products and services;
- investments and expenditures of communication products and services;
- share of enterprises that have their own website in total company assets;
- share of enterprises that buy-sell business online in total assets;
- share of employees teleworking employees in total employees.

It is very important that each institution using the electronic system. There are some indicators that can inform us of the progress of computerization of government sector:

- ICT specialists;
- the number of electronic devices;
- the number of personal computers connected to the Internet;
- the number of Internet users;
- percentage of institutions with Internet connectivity in all institutions;
- share of investments and expenditures for ICT products and services in total investment and expenditure;
- investments and expenditures for ICT products.

Education sector includes both educational institutions in the public and private educational institutions. Also, the calculation of indicators will take account of all three levels of training and primary, secondary and tertiary (National Institute of Statistics classification).

- number of PCs per 100 students;
- number of PCs connected to the Internet per 100 pupils and students;
- Education institutions connected to the Internet in total number of educational institutions;
- The number of students using Internet.

By implementing the health sector of new electronic communications services will achieve an increase in efficiency, with lower costs. Using ICT in medicine results in economic growth as the healthcare system, as well as the patient falls.

- The number of equipment;
- The number of personal computers connected to the Internet;
- medical institutions share Internet connection in all institutions;
- Share of investments and medical expenses for ICT products and services in total investment and expenditure;
- Investments and expenditures for ICT products.

Analysis is needed ICT indicators for the household sector and influences the degree of development of settlements.

- Share of households with fixed telephone
- Share of households owning personal computers connected to the Internet in total households
- Share of total household expenditure communications

Observing indicators SME sector illustrates the increases / decreases in quantitative but also qualitative due to the implementation of new information and communication technologies. It is important to watch how ICT products are used to establish the long path that we must follow company.

- Share of enterprises that have personal computers;
- Share of employees using personal computers;
- Share of enterprises with Internet access;
- Share of number of employees using the Internet;
- Share of enterprises that Web site;
- Share of enterprises that sell via the Internet;
- Share of enterprises purchasing on the Internet.

Take account of all cultural institutions are a pillar for each locality harmonious development. Without this sector without investment in ICT products could be considered as the history and future of the relationship are not forgotten what contributes to the positive development of the village.

- share cultural institutions holding personal computers;
- share of employees using personal computers;
- share cultural institutions with Internet access;
- share of employees using the Internet;
- percentage of institutions of culture that Web site;
- share cultural institutions that sell over the Internet.

Make large investments in tourism revenues, which make this sector a pillar of economic development and the implementation of new information and communication technologies.

- the percentage of tourism that have personal computers;
- share of employees using personal computers;
- the percentage of tourism with Internet access;
- share of employees using the Internet;
- the percentage of tourism that Web site;
- the percentage of tourism that provides services via the Internet.

Analyses of the areas of a community are affected by the use of new information and communication technologies are support for achieving a smart urban area. It is essential to follow the use of advanced communication technologies in the local and among all sectors to assess the level of development of settlements upcoming smart counterpart.

To compare the different indicators it is necessary to use the same values. One method to standardize is by z-transformation:

$$Z_i = \frac{x_i - \bar{x}}{s}$$

This method transforms all indicators into one value with an average 0 and a standard deviation 1. This method has the advantages to consider the heterogeneity within groups and maintain its metric information.

In (Dirks, 2010 and Barrientos, 2010) literature is highlight that we can implement new/intelligent solutions in our urban areas to become smarter and for this we can start from: transportation, education, healthcare and governance, which are the most important sectors of the city. In literature the attention is focus firstly on four high-impact areas of development.

5. Conclusions

The use of modern technology efficiently in our urban areas is an important part of modernization, growth and sustainable development. Our society today is more organized, smart and the information is situated in the center of it. In our age the cities development depend on the use of more and more smart solution. For sustainable growth of society is essential to use efficiently the modern technology and natural resources.

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