

SMART CITIES. THE INTELLIGENT POSSIBILITIES FOR SUSTAINABLE DEVELOPMENT OF URBAN COMMUNITIES IN ROMANIA

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ABSTRACT: *During the latest ten years, several cities all over the world have been starting to develop their own smart strategy, aiming at improving the quality of life of citizens and reducing environmental footprint. Romania as an EU member state must take into account the example of the other smart cities from Europe, for urban communities' development and life quality improvement, considering the fact that, smart and technological means more educated, healthier, less expensive, more involved in everything the public administration process means, more opportunities for the business and citizen.*

KEY WORDS: *smart city, digital city, sustainable development, Romania.*

JEL CLASSIFICATIONS: *R0, R1, Z3.*

1. INTRODUCTION

According to Business Dictionary, a smart city is a “developed urban area that creates sustainable economic development and high quality of life by excelling in multiple key areas; economy, mobility, environment, people, living, and government. Excelling in these key areas can be done so through strong human capital, social capital, and/or information and communication technology infrastructure.”

A smart city uses digital technologies or information and communication technologies to enhance quality and performance of urban services, to reduce costs and resource consumption, and to engage more effectively and actively with its citizens. Sectors that have been developing smart city technology include government services, transport and traffic management, energy, health care, water and waste.

A smart city may therefore be more prepared to respond to challenges than one with a simple “transactional” relationship with its citizens. Other terms that have been

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used all over the world for similar concepts include “cyberville”, “digital city”, “electronic communities”, “flexicity”, “information city”, “intelligent city”, “knowledgebased city”, “MESH city”, “telecity”, “teletopia”, “Ubiquitous city”, “wired city” (figure 1).



Source: <http://www.intelligentcommunity.org>

Figure 1. Smart cities in the world

The European Union has devoted constant efforts to find a strategy for achieving smart urban growth for its metropolitan city-regions and has developed a range of programmes under “Europe’s Digital Agenda”. Examples of Smart City technologies and programs have been implemented in countries like: UK (Southampton), Netherlands (Amsterdam), Spain (Barcelona) and Sweden (Stockholm) (figure 2).



Source: <http://www.europarl.europa.eu>

Figure 2. Smart cities in Europe

In 2020 in Romania were 594 projects or initiatives either in the projects stage, in implementation or completed, in 87 large, medium and small cities throughout the

country, as compared to 330 projects in 45 cities in 2019, a considerable evolution, almost double by number.

The top cities by number of projects either in the projects stage, in implementation or completed are: Alba Iulia (106), Cluj-Napoca (54), Timișoara (26), Arad (19), Iași (19), Brașov (18), Bucharest – Sector 4 (18), Oradea (17), Sibiu (16), Piatra Neamț (15).

Alba Iulia, the city of the Great Union, is the first smart city from Romania since 2018 and became a model for the whole country. Energy consumption has been streamlined, and local government controls the intensity of light from public posts. Buses are more welcoming with travel (WiFi), monitor air, projects to digitize education, and interact with public institutions.

In Alba Iulia, air quality monitoring sensors are also installed in the 15 buses equipped with Wi-Fi hotspots. The solution provides both authorities and citizens with information on the impact that their daily activities have on the environment.

On the other hand, the existing public lighting management solution has generated savings of 50-70% on electricity consumption, depending on the intensity of light selected for each pillar, and the water management solution is being installed.

With the Civic Alert application, citizens can alert authorities to the problems identified in the city, while through City Analytics, the City Hall can track city traffic trends, depending on the day's weather or weather conditions, also identifying the most common routes.

2. FEATURES OF THE SMART CITY

During the latest ten years, several cities all over the world have been starting to develop their own smart strategy, aiming at improving the quality of life of citizens and reducing environmental footprint. However, smart cities show heterogeneous profiles, as they both reflect the history and geographical individuality of each city and implement the political address of their own local and central governments (Mulligan & Olsson, 2013).

A smart city includes all the aspects of the urban life: from tourism to commerce, from industry to agriculture, including logistics, research and education. A smart city program impacts on all the urban infrastructures: public and private buildings, factories and transport facilities. A strong information and communication infrastructure should support knowledge management in the urban context and the sustainability of a smarter city could positively affect water, energy and mobility.

The smarter city has the larger intellectual capital and is able to use its knowledge to choose the better solutions for the further development of the city quality. Investments in cultural initiatives are therefore welcome, but especially the city should use its awareness to promote sustainable development, equal economic growth and environmental quality in the urban areas. This idea is supported also by the definition of knowledge city and intelligent city, sometimes overlapped with the definition of smart city and digital city.

The business vision of a smart city is strongly based on the pivotal role of technology. It derives from both the previous idea of the digital city, and from the need

to solve several concrete problems strongly affecting the life in large metropolis, such as traffic, pollution, energy consumption, waste treatment and water quality. These aspects are also near to the idea of green city and the environmental themes are an important part of the smart city goals (Dameri, 2012).

In this smart city vision, initiatives to improve the city smartness are especially focused on some lines such as:

- energy production from renewable sources, to reduce energy cost, CO₂ emissions and to satisfy the increasing energy demand in urban areas;
- building efficiency, to reduce energy demand and consumption;
- local transport quality and greenness, to reduce pollution deriving from transport in cities.

Technological, cultural and environmental aspects are the core elements of a smart city, but their role is not the same and it is important to explicitly declare which aspect is the more important, what has the leading role and how this component interacts with the main stakeholder of the smart city strategy, that is, the citizens. To explicitly define the smart city vision and to align it with smart initiatives and desired outcomes is the first step to implement a successful smart city program (Nam & Pardo, 2011).

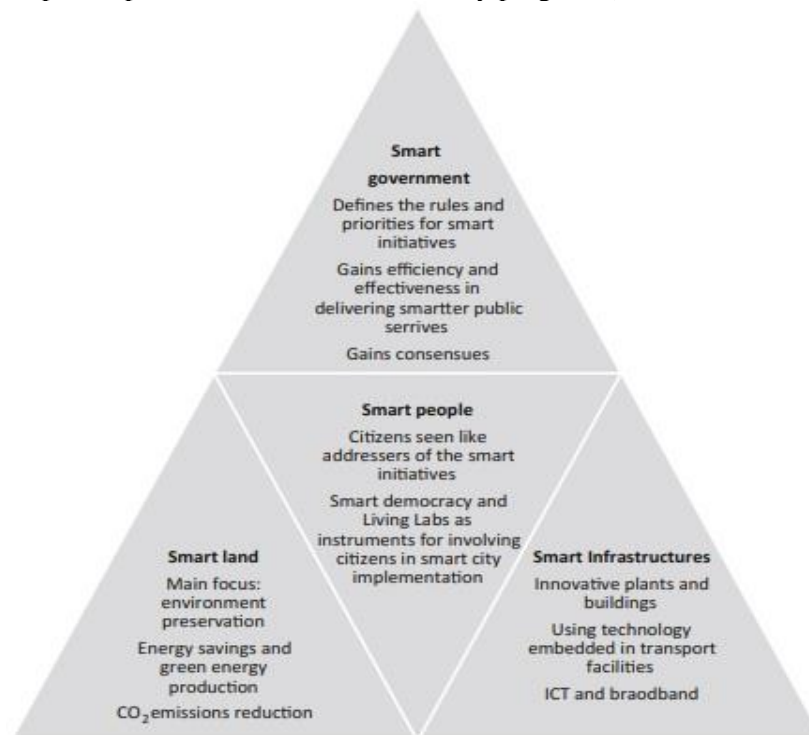


Figure 3. The core components of a smart city

Several authors agree to consider three main aspects of a smart city:

- *effectiveness* means the capacity of a city to supply effective public and private services to several subjects, such as citizens, companies, not-for-profit organizations; and in detail to different categories of citizens such as students, workers, elder men and

women, and so on. It requires including the subjective role of several stakeholders in the smartness definition. Therefore, a smart city is not smart for itself, but if it creates public value for people;

- *environmental consideration* regards the increasing impact that large cities have on the environmental quality of urban areas. One of the main pillars of smarter cities is to prevent a further environmental degradation. The main impacts regard energy consumption, air and water pollution, traffic congestion, land consumption. A smarter city therefore acts to reduce all these aspects to preserve the environmental quality;

- *innovation* means that a smart city should use all the new and higher available technologies to improve the quality of its core components, to deliver better services and to reduce its environmental impacts. Technology is therefore a central aspect of smarter city, used for implementing smart initiatives for the quality of life in city.

3. SMART CITY VISION

Universities all over the world have been the first actor interested in studying and experimenting smart city pilots, starting this wave now interesting a very large set of heterogeneous stakeholders. As technology is the core component of a smart city, solution vendors are also first movers in designing and suggesting smart city solutions.

Municipalities are involved as both players and coordinators of smart city plans interesting the city as a whole. The involvement of universities, industries and (local) governments in the smart city implementation responds to the triple helix idea; where citizens or their representatives are involved too, it becomes a quadruple helix.

A smart city emerges therefore like an innovation ecosystem, exploiting social and economic development thanks to the hybridization of elements from university, industry and government to generate a creative renewal in the knowledge economy and society (Etzkowitz, 2008).

Technology is one of the most important enabling factors to implement a smart city. Thanks to high technologies such as Smart Computing, it is possible to support traditional hardware and software interaction, to collect data from the urban sensors and to deliver real-time information to support better decisions. These technologies need an adequate ICT infrastructure, including broadband, optic fibre, Wi-Fi networks, wireless hotspots. Technology and infrastructures are therefore the premises to create a smart city.

The *human factor* is considered not only with regard to the citizen participation, but also regarding the human and social capital existing in a city and knowledge, culture and values characterizing a community.

Universities and research centres recognize the role of a smart city program in supporting the human factor development, by attracting talented people, developing work and entrepreneurship, settling excellent schools and universities.

Private companies consider people like the addressees of their technological solutions. Therefore, companies and advisory officers often have been settled where the local community is more interested in smart projects, offering their technological solutions or consulting (Dameri & Sabroux, 2014).

4. SMART CITY VERSUS DIGITAL CITY

Smart cities and digital cities are often linked together in the urban strategies for better quality of life and have been also confused in several academic papers and public policies. Smart city and digital city are different in their components, enabling technologies and goals.

There are two main reasons for this confusion. The former depends on the use of some words like smart, digital, green, to define innovative urban policies, without a clear reference to a sound definition or standard. This is therefore a terminological confusion, but it has few impacts on the concrete implementation of smart or digital city programs. The latter derives from the interlaced role of technologies and goals that need both smart and digital projects to realize a better city for people.

The comparison between smart city and digital city and the analytical individuation of their components aim not to separate, but to create a sound basis for pursuing a better quality of life in urban areas (Nam & Pardo, 2011).

The role of technologies, environmental quality, energy safety, information and communication access should work together, but with the awareness of their differences, and not putting all of them on the same footing. The separation between smart city and digital city could be functional to better investigate about what and how to plan smart and digital strategies, and especially how much results and returns are awaited and finally reached (table 1 and table 2). However, it is important not to be wrong, considering smart city and digital city two different, separate urban strategies. They should be linked together and harmonized to individuate priorities and effective investments to create the maximum outcome and public value for citizens.

To support this vision of smart city and digital city, defining them like two different but integrated innovation paths for urban areas, the empirical analysis is necessary.

Table 1. Main components and actions of a digital city

DIGITAL CITY			
Digital infrastructure	Data	Information	Service development
New information and communication technology infrastructure	Data analysis at city level	Processing of information to service programs	Development of service application
High speed broadband	Data collection and storage		
Networked information systems			
Wireless technology			
Fibre optic cables			

Table 2. Main components and actions of a smart city

SMART CITY		
Transport and mobility	Renewable energy and energy efficiency	Smart and sustainable buildings
Congestion charging	Waste collection systems	Automatic weather forecasting
Real time bus timetable	Electric vehicle charging points	Energy efficiency measures
Electric vehicle car pool	Sensor to monitor traffic, pollution, emissions	Smart meters
Bike schemes	Combined heat and power	Buildings integrated renewables
	Renewable energy	Smart appliances
	Smart grids	

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5. CONCLUSIONS

Smart city is a wired urban space aiming at implementing digital data, services and communication and clean infrastructures, to improve the quality of life in the city through a large web connection and a reduced environmental footprint. Assuming this definition, a digital city is indeed a subset of a smart city, but a required part, because a city without wired connections and web communications is not conceivable like a smart city.

Smart and technological means more educated, healthier, less expensive, more involved in everything the public administration process means, more opportunities for the business and citizen, benefits that translate into improving the quality of life - an easier and easier interaction friendly people with the city, with the environment, with the peers and oriented towards a future supported by integrated intelligent technologies,

The concept goes beyond the relationship between citizens and public service providers and provides the tools that encourage citizens to be more active and more participatory in community life. For example, provide feedback on road condition, adopt

a healthier lifestyle, or participate as volunteers in various social activities. In this way, a smart city will be a more attractive place to live, work and recreate.

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