

SMART CITY - ORGANIZATIONAL AND MANAGEMENT PERSPECTIVES

Nicoleta PETRICĂ¹

ABSTRACT

This paper discusses how we consider a certain city to be smart, assessing several smart cities of the world that managed to implement integrated strategies, thereby becoming role models for other capitals of the world. Due to the absence of a precise ideology, we shall explore the current working definitions. Many views are under debate, on what a smart city actually means. From some researchers' perspective, a city is smart by the innovation that was done in technology. Others say that a smart city means a change in its public administration. Few research works were undertaken from the perspective of organizational and management innovation, while specific literature is rich in technological innovations. This paper presents the efforts took by various cities in the world in order to become smart cities, and therefore they are an example of best practices in management and public policies, and also in technologies used. We shall discuss the needs of sustainable and functional strategies, as well as solutions and risks involved by transformation into a smart city.

KEYWORDS: *smart city, sustainable development, management innovation, urban growth*

JEL CLASSIFICATION: *H42, R11, Q01, Q56*

1. INTRODUCTION

This paper aims to highlight the work of researchers, entrepreneurs and public administration within a country in the way to digitalization and innovation by doing smart and informed choices in the aspect of improving the experience of using public services or certain products. This topic of research is one of interest due to the high discussions elaborated in every community in regard to improving the quality of life and managing in an efficient way the natural resources. As per the United Nations Population Fund, over 60% of world population will live in cities by 2030 (70% by 2050), and therefore operational strategies and sustainable solutions are needed (see <http://www.unfpa.org>). Many researchers agree that the city of the future is a comfortable, smarter and more efficient city. So, how do we improve the progress and inclusiveness of cities?

As urban population shows a fast increase worldwide, cities are faced with various problems, like deterioration of air conditions and traffic congestions, waste management, scarcity of resources, obsolete and damaged infrastructure (Borja, 2007). Another set of problems are those faced at public administration level, like the high complexity of policies and regulations on the issues faced by that city (Toppeta, 2010). At public policy and public administration level, there is a need to facilitate progress towards an improved dialogue with citizens and their involvement in achievement of objectives in order to maximize community benefits.

Urban development and fast growth require a demanding imperative for sustainable development and improved livability (Washburn, et. al., 2010).

In this paper we shall discuss on working definitions of specialized researchers and the contextual dimension of a smart city, innovation strategies that reflect involvement of the three pillars - technology, public sector and management – and few examples of best practices of communities that were labeled smart cities.

¹ PhD Student, Bucharest University of Economic Studies, Romania, email: nicoleta.petrica92@yahoo.com

This paper attempts to suggest the key elements for a smart city and the main differences between a smart city and an average city. We shall explore the current definitions of the smart city in urban context and we shall find out how these cities were successful in managing challenges met on the path to an innovative and progressive era.

1.1. Defining the concept of "smart city"

The concept of "smart city" is a dynamic notion, in full swing. Although many cities were labeled smart cities, we barely know what this label means, especially since there is no widely accepted definition (Hollands, 2008). In this article we will not focus on the labeling part of this concept, but on the efforts made by cities in order to transform and to open a new gate to an environment that facilitates information exchange, collaboration, interoperability and seamless experience for people all around the city.

We have already mentioned that the smart city concept is a dynamic notion. Researchers in IT industry focus on technological solutions dedicated to problem-solving in digitalization field (traffic, cybernetic security, urban agglomeration), while researchers in social-economics are focused on public policies and public administration to improve transparency of public institutions, to satisfy the needs of collaboration between public administration and stakeholders, as well as to improve the life of ordinary citizen from an opportunity standpoint (Hall, 2000).

1.2. Working definitions of a smart city

Researchers have not yet agreed on a generally accepted definition. While we explore the details of this concept we should try to understand its core conceptual elements. In specific literature, the perspective on the definition of "smart city" is regarded based on 6 conceptually distinct factors (Giffinger et al., 2007):

- The Smart Economy factor, an issue that is related, by researchers, to innovation spirit, entrepreneurship, fusion with international market and the capacity to adapt to new demands;
- The Smart Mobility factor, which relates to accessibility to all city's areas, functionality of ICT, integrated transport systems in the most safe and sustainable manner possible;
- The Smart Governance factor. This needs innovation in public policies leading to the use of tools that enable transparency, increase accessibility to transportation services, accessibility to health care and provision of safety;
- The Smart Environment factor, which may be achieved based on improvement of life conditions (absence of any type of pollution) and based on a sustainable and smart management of resources;
- The Smart Living factor regards quality of people's life, as determined by educational and cultural services, touristic attractions, social and political cohesion;
- The Smart People factor, which concerns the degree of qualification of human and social capital, flexibility, creativity, tolerance, participation to activities characteristic to communities.

Further, we will highlight different approaches of researchers who enhanced the social inclusion and who viewed the smart city as a large organic system with its core systems taken into account.

A smart city is a city which "combines ICT and Web 2.0 technology with other organizational, design and planning efforts to de-materialize and speed-up bureaucratic processes and to identify new, innovative solutions to city management complexity, in order to improve sustainability and livability" (Toppeta, 2010)

"A city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens." (Giffinger and Gudrun, 2010)

“The use of Smart Computing technologies to make the critical infrastructure components and services of a city – which include city administration, education, healthcare, public safety, real estate, transportation, and utilities – more intelligent, interconnected, and efficient”. (Washburn, et al., 2010)
“A city that monitors and integrates conditions of all of its critical infrastructures, including roads, bridges, tunnels, rails, subways, airports, seaports, communications, water, power, even major buildings, can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens.” (Hall, 2000)“A city striving to make itself “smarter” (more efficient, sustainable, equitable, and livable)”. (NRDC, see <http://smartercities.nrdc.org/about>)

Each researcher who elaborated a definition for the smart city concept relied on his/her own field of expertise. Therefore, as an example, researchers who stressed the technology factor more - compared to governance, felt compelled to picture the concept from a technological point of view.

While D. Toppeta stressed-out technology as a vital factor, and also considers that in order to live a sustainable life we have to come up with innovative solutions, another group of scientists based in Vienna (Giffinger et al., 2007) saw the smart city as an interconnected community of smart citizens.

2. SMART FACTORS

If we take under consideration the key-objectives pursued by smart cities – development, safety, interoperable and reconfigurable electronic governance – we may say that these cities benefit of an interoperable platform which provides the link between government, citizens and business environment in order to improve services, but also a good governance and democracy in local communities (Kanter and Litow, 2009). In fact, this involves the innovative role of local authorities based on the use of ICT in cities, which allows achievement of expected results and the setup of a confidence-based environment between the government and society as a whole (Păceșilă and Colesca, 2007).

This paper proposes a set of factors that would allow a better understanding of initiatives and projects for a smart city. According to literature, this set of fundamental factors comprises: management and organization; technology; governance; policy; people and communities; economy; built infrastructure and natural environment (Chourabi et al., 2012). We will discuss some of the above factors in order to draw special attention to management and organization, technology and the natural environment.

2.1. Management and organization

A smart city is the sum of organizational and management systems. With the rapid growth of urban areas and higher demands, we are in need of innovative strategies as well as technologies. The label of smart city in the context of urban areas cannot be taken for granted. It leads to a great movement of management and policy concerns. Many IT projects fail due to poor planning, poor business cases, lack of leadership, inconsistency between organizational goals and project objectives, vulnerability to policy swings, too much technology-driven enthusiasm, and political hyper-activism (Gil-Garcia and Pardo, 2005; Scholl et al., 2009). Therefore, technological performance depends on implementation of effective management, developing systems that are aligned with business process management.

Gil Garcia and Pardo pointed out that “establishing clear and realistic goals is an important factor in the success of IT initiatives”. Some of the effective strategies which pay off, the researchers say, is identifying the stakeholders who are relevant for initiatives, clear and realistic goals, technical skills within the IT department and good communication (Gil-Garcia and Pardo, 2005).

2.2 Technology

Technology represents a tool that serves for innovation in this rapid urbanization (Popescu et al., 2017). There are different terminologies related to the smart city concept from a technological point

of view, such as digital city (Anthopoulos and Tsoukalas, 2005; Ishida, 2002; Ishida and Isbister, 2000), intelligent city (Borja, 2007; Komninos, 2009), information city (Castells, 1996). The *digital city* represents innovative services that "meet the needs of governments and their employees, citizens and businesses" (Yovanof and Hazapis, 2009). It is a city that relies on a collection of smart computing technologies applied to critical infrastructure components and services. As Williams said, it is a "sharing of networks" – like a spider that weaves its web and connects all the dots, these networks "connect organizations, social groups and enterprises located in a city area" (Williams, 2010). A digital city is not necessarily an intelligent city. For a city to be labeled as an *intelligent city*, besides the digital part, it needs to meet the criteria of taking into consideration the knowledgeable and creative part of the society (effective and innovative ways in making the city an effortless city with smart technology in infrastructure, telecommunications, electronic and mechanical latest technology). An intelligent city stresses the aspects of learning related to research, technology transfer, product development and technological innovation (Malek, 2009). ICTs are important for smart city initiatives (Hollands, 2008). They can offer a wide array of opportunities, they can improve the quality of life for inhabitants, but also there are certain downsides in the lack of culture, IT skills or training programs. Through ICTs we can understand what an *information city* is, or can be. These cities can make interactions that stimulate the digital environment in helping to "collect the information from local communities to the public via web portals" (Sproull and Patterson, 2004).

2.3. Natural environment

It is considered valuable to discuss, in this paper, about the natural environment and how it is viewed within the smart city context. For future generations, it is paramount to protect and manage the natural resources with the help of technology, in order to improve sustainability and also to improve the quality of life (Hall, 2000; NRDC). An example worthy of our attention is Alba Iulia, which sets up innovative projects such as energy efficiency, smart mobility, environmental monitoring and digital education. These initiatives will eventually lead to a healthy impact on the sustainability and livability of a city.

3. IMPLEMENTING THE CONCEPT OF SMART CITY

It is public knowledge that Romania cannot move forward until bureaucracy is not resolved. There are both obvious and unexpected surprises arising from a city within our country, performances which Bucharest can only look at and take them as an example. This paper proposes to analyze a few cities that made incredible lengths to be labeled as "smart cities", but first, let us consider useful to identify some projects successfully implemented abroad.

3.1. Innovative projects

According to Forbes, the top 10 smartest cities around the world in 2017 are New York, London, Paris, Boston, San Francisco, Washington D.C., Berlin, Amsterdam, Seoul and Tokyo. For a better understanding, let's see the innovative projects of the smartest city in the world, New York:

- traffic monitoring using real-time information ("Midtown in Motion", since 2010);
- a system of 7,500+ high-tech public communications structures; each of these new structure will provide completely free access to encrypted Wi-Fi service (LinkNYC, Department of I.T. and Telecommunications, 2017);
- a system analyzes pollutants from traffic, buildings, and other factors that could impact air quality ("Community Air Survey", Department of Health and Mental Hygiene)
- in the next 3 years, an initiative will be implemented with a special focus on entrepreneurship education for women with free training and business services to help them

set up their own start-ups ("Women Entrepreneurs NYC", Department of Small Business Services)

- multiple sensors were installed this year (in the neighborhood of 90 schools across the 5 boroughs of NYC) reducing the city's greenhouses gas emissions and energy costs by \$2 million/year ("Accelerated Conservation and Efficiency Program", Department of Citywide Administrative Services)
- other innovative projects: Child Care Connect (performance of daycare centers), Print Smart (related to the managing of the city's print environment), etc (NYC Government, <http://www1.nyc.gov/>).

We can identify the *technological dimension*, an environment for sharing information and interoperability that consists in a large network; the *human dimension*, a beneficial and suitable climate where information is passed and shared through education, learning and knowledge and the *institutional dimension*, viewed as a method of common interests where governmental institution and stakeholders are working together to use IT tools in order to make smart decisions and to improve inclusiveness and raise awareness in their communities.

Another example is Singapore which (based on Green City Index for Asia), is one of the most famous Asian cities and, based on researches performed by Siemens, the city with the highest performance in this region, sustainability-wise. Singapore may be a role model for many cities with regard to sustainable development (Mahizhnan, 1999), as it capitalized on its only opportunity for economical survival. "With an increasing population and limited water resources, the city-state of Singapore managed to provide potable water to its citizens, building 17 tanks in the very center of this city" (Green Report, no. 44). Using the NEWater system, wastewaters are collected and treated thereby becoming an important source of drinking water, enough to satisfy 30% of city's demand. On an island with a surface of 650 square kilometers and 4.8 million inhabitants, space is vital. 10 years ago, city administrators warned that urban overcrowding might bring annual prejudices of \$2.3 billion to the island's economy, if transport infrastructure is not improved. IBM designed the smart payment system, e-Symphony, which processes 20 million transactions each day and which collects extended traffic data. Such data allows the local administration of Singapore to streamline the traffic and to solve any traffic jam. The e-Symphony card may be used for any transportation mean, cab fair and shopping. (IBM Case Study, 2009)

3.2. The "other capital" of Romania

Alba Iulia is a city in full development, and it is referred to by its citizens as the "other capital city". Alba Iulia was included in the list of the pilot project "Alba Iulia – Smart City" 2018. Thus, together with other cities all around the world, Alba Iulia participates in a modern "Smart cities research" performed by Siemens. "City authorities will have access to relevant information on smart technologies that may be implemented in this city, but also to data concerning the costs and benefits of possible future investments. Considering that every city has its own specific needs, based on its specific priorities, intelligent infrastructure axes shall be drawn, like: energy efficiency of buildings, traffic management, public transportation and public safety. Methodology of this study sets forth, among others, a series of in-depth interviews with representatives of local authorities on these projects, on their priority and on their strategy. For each city included in this research, three aspects will be assessed with priority, from the standpoint of financial impact and economic benefits", says Cristina Ionela Mihai in the Hitech publication (Hitech magazine, issue 02/2016).

Implementation of SmartCity in administration will be followed by or overlapped with implementation of Smart Home and IOT Business for consumers and companies. These actions will generate wide networks of sensors and devices interconnected through various radio technologies, raising problems related to interoperability and radio congestion.

Two citizen-oriented projects were already implemented successfully with a special impact on urban mobility: the e-ticketing service and the option to purchase a bus ticket through SMS. Currently, the Wi-Fi service may be used in 15 buses of the Alba Iulia Public Transport Service, a solution provided

by Orange Romania. Also, in the same PTS (Public Transport Society) 15 buses, sensors were installed to monitor air quality, which provide real time data. In the main bus stations, displays are installed which provide data on the number of buses and waiting time until arrival of the bus.

Another important project, already completed, is destined to provide communication with citizens using an application that facilitates interaction with people or directly through a dispatcher (a dispatcher specialized in interaction with citizens for all city-related issues: public domain, utility services, street lighting, parking, etc.). "In partnership with Orange, we benefit of the Civic Alert application, which allows citizens to notify problems directly to the local administration. This application allows attachment of photos of identified problems. Another application provided by a local start-up will allow chat sessions with our citizens", the Alba Iulia City Manager declared (Concord Communication, June 7, 2017).

4. CONCLUSIONS

This paper discussed some perspectives that a city in transition has to take into account. As stated above, a smart city it's not all about technology. Certainly, technology is a vital part in the process of transformation of an ordinary city into a smart city. But, for its urban development, we need to improve the quality of life by linking socio-economic factors like improved communication with citizens, transparency in public administration, good management of resources, and so on, with IT tools. There are lots of risks to take into consideration when a city transcends from the current state to a powerful potential that it already has, but which is limited perhaps by poor management services, lack of strategic policies, bureaucracy and poor public administration. Success depends on innovation and research as building strategies for an effective organizational and policy governance.

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