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Smart Cities and Challenges for European Integration

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Abstract
European integration is a multidimensional process, which can be seen both in economic and innovations aspects. The growth of importance of digitalization and smart cities development can be analysed as a factor of European integration. A significant number of smart cities, which may be connected in a network, is located in Western Europe. This article reflects on searching for European Integration conditions as was as for turning points in digitalization process. It is intended to draw attention to several issues related to European Integration, which are crucial from the vantage point of Europe's prospective development. Location of smart cities and their networks indicates on weak innovation capacity and development disparities in some member countries of European Union. Therefore, smart cities can be also an indicator of European integration process but their wider cooperation can create new solutions for developing regions of European Union.

Keywords: *European Integration, smart city, smart cities network*

JEL Classification: *G18, L86, O18, 019, N14*

1. Introduction

The contemporary growth of the economy is determined by a number of simultaneous processes such as: globalization, scientific and technical revolution connected with the expansion of internet technologies and telecommunication technologies, system transformation of post-socialist countries and their more or less successful attempts at European Integration. Progress is caused by many factors which have the ability and strength to influence the structure of the European Union. One of them is digitization in form of Industry 4.0, because is an element of economic growth and it can be seen as a part of European integration process. Moreover some digitization aspects create all necessary infrastructure for integration processes (Klímová and Žítek, 2012).

In this paper the digitization is analysed as a factor of European integration process based on term "smart city", which in connection with European Union and its cities is important to discuss. The article reflects on searching for European Integration conditions as well as for turning points in digitalization process. It is intended to draw attention to several issues related to European Integration, which are crucial from the vantage point of Europe's prospective development. The formulated problem is based on characteristic of smart cities, which create network of well managed and developed cities located in Western Europe mainly in so-called "old European Union" countries, and indicate on weaker innovation capacity in some other regions of EU and significant development disparities.

2. The Definition of Smart City

The ongoing digitization is not only restricted to the classic factories and manufacturing economic sector. Indeed is the so called Industry 4.0 almost fully connected with this sector of the economy, but many parts of it are easy to find in other sectors of private and public life i.e. in cities. In case of privacy the influence of technical and digital improvements has the name of smart home. And in this specific case the digitization concentrated around few themes, like energy management (contains heating and cooling system management), but also communication between human and machine; machine in form of household facilities i.e. refrigerator, oven, TV. But in this particular paper the digitization on this private sphere would not be discussed. We decided to focus on the public sector and special on the Smart Cities and possibilities to create networks containing them.

Looking back in the past to the 20th century there can be defined two main reasons, which caused growth of greater cities and on the other site the marginalization of the rural spaces. These are the urbanisation and continuously higher importance of so called Information and Communication Technologies (ICT). Beside also other two evident factors were the economic acceleration and the technological innovations in the urban environment, that mainly speed up in 1980's and 1990's (Cocchia [online], 2014, p. 14).

One of the two terms, which are mainly in use to explain the continuously digital implementation in urban spaces are the Smart or Digital City. Other words, that embrace this same, but seldom to find are: intelligent city, ubiquitous city or sustainable city (Cocchia [online], 2014, p. 13). Between the scientists there is no one ultimate description of the term Smart City or Digital City. In following two tables each Smart City and Digital City definitions are presented, but all of them show a different approach to the topic of new-age city.

Table 1: Extraction of Different Meaning of the Term Smart City

Source	Definition
(Su. Li and Fu, 2011, p.1029)	"Smart City is the product of Digital City combined with the Internet of Things"
(Northstream [online], 2018, p. 4)	"A Smart City uses innovation and technology to contribute to sustainability, an efficient use of resources, and a higher quality of life for its citizens."
(Hall, 2000, p. 635)	"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"

Source: listed in the left side of this table.

Taking into consideration definitions mentioned above it is possible to define smart city as a city, which is smart if investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure promote sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance. Then idea of smart city can be distinguished in to digital city which is more connected to new internet based technologies. The Digital City definition then is more focused on technical aspect of its maintenance. In Table 2 definitions of digital city presented and compared.

Table 2: Extraction of Different Meaning of the Term Digital City

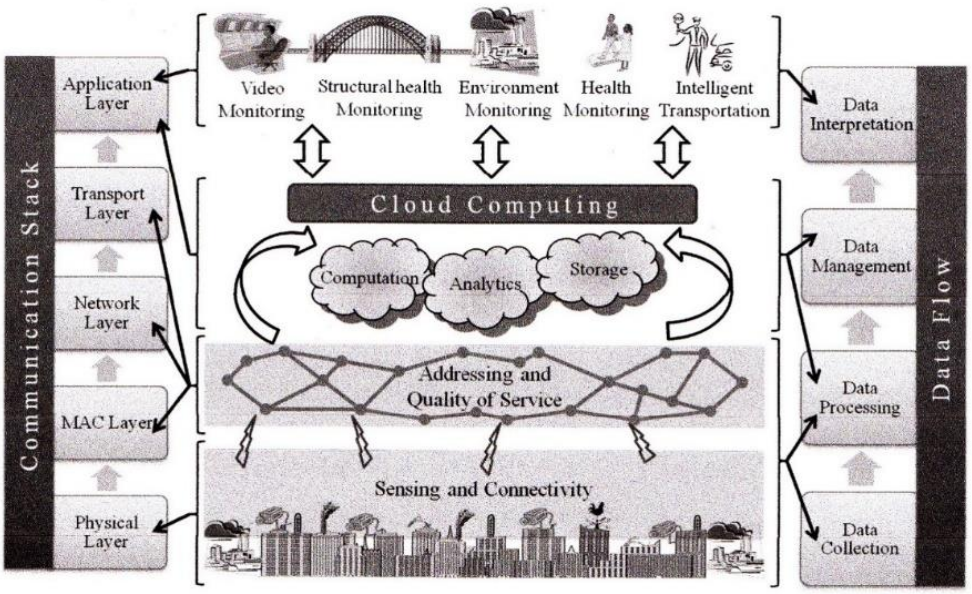
Source	Definition
(Qi and Shaofu, 2001, p. 32)	"A digital city is substantively an open, complex and adaptive system based on computer network and urban information resources, which forms a virtual digital space for a city. It creates an information service marketplace and information resource deployment centre"
(Ishida and Hiramotsu, 2001, p. 106)	"The concept of Digital City is to build an arena in which people in regional communities can interact and share knowledge, experiences, and mutual interests. Digital City integrates urban information (both achievable and real time) and create public spaces in the Internet for people living/visiting the city"
(Komninos, 2008, p.120).	"Digital city denotes an area that combines broadband communication infrastructure with flexible, service-oriented computing systems. These new digital infrastructures seek to ensure better services for citizens, consumers and business in a specific area"

Source: listed in the left side of this table.

According to the concept of Smart City there can be defined three key determinants: technology, people and institutions (Taewoo and Pardo [online], 2011, p. 282). From the technological side it contains all elements of technological infrastructure needed to maintain a functioning of Smart City. On the other site at least it's important to strengthening human individuals in case of continuous learning (Kollár and Melková, 2014). Last crucial essential components of it are institutions i.e. in form of governance. Especially the governance is responsible for the engagement of its citizens and improvements on an institutional layer.

The overall concept of Smart City is not entirely new. But what is new, is the usage of so called ICT in term of implementation in city surround (Taewoo and Pardo [online], 2011, p. 283). The main purpose of it to integrate the important services ongoing in city infrastructure. The smartness of a Smart City is mainly grounded by usability of ICT and especially the recent emerging technology of Internet of Things (IoT). It's even more than that. In such an evolutionary environment exist a ubiquitous Internet network that not only receives the information from interconnected objects (on a hardware level). Such new-aged Internet also interact with the physical world through every kind of actuators and giving commands and controlling even providing information transfer services or analytics (Jiong et al. [online], 2013, p. 1). An example of working of IoT in a Smart City environment is presented in a Picture 1.

Figure 1: Extraction of Different Meaning of the Term Smart City



Source: Jiong et. al (2013, p. 3)

The continuous increase of population in cities conduct to a higher density in urban centres. Year 2008 was a very significant year in this case, in that more than 50% of a world's population (this meant to that time 3,3 billions of individuals) lived in urban places. The forecast till 2030 shows also this trend, where the total amount of people living in cities are going to be 5 billion (Taewoo and Pardo [online], 2011, p. 282). By 2050 this number will cross the line of 6 billion if individuals, which is equal to a 70% of the expected world's population, where the center of them lifes are going to be the big cities or the surrounding regions (Jiong et. al [online], 2013, p. 1). According to the definitions of Smart City it's possible to find even nowadays few examples of this type of cities, and there can be defined overall three main geographic spots of accumulation of so called Smart Cities which are:

a) South East Asia (mainly China),
b) North-Western and South-Western Europe,
c) East and West of North America (USA and Canada).

Listed above regions have one characteristics in common all these spaces are to find at or near to coast-sides and lead to formulation of problem.

3. Problem Formulation

The main problem can be formulated based on characteristic of smart cities, which create network of well managed and developed cities located in Western Europe mainly in so-called "old European Union" countries, and indicate on weaker innovation capacity in some other regions of EU and significant development disparities. On the other hand, this dynamic economic growth leads to numerous hazards typical of economies that enter the path of fast development. Moreover, the European economy features innovation capacity that is weaker than that of the USA when measured by the traditional ratio of R&D to GNP expenditures, but is also characterized by the share of innovative high tech products in the EU exports and the

pace of expenditure growth (Sulikova et al., 2015). The innovation capacity of economies is the result of knowledge development which becomes the most important. This resource grows in the process of its being exploited in smart city concept. Moreover European countries are characterized by considerable differences in the development level. That may be a future European integration asset, if it is considered that less developed countries will manage to catch up in the field of development.

4. Problem Solution

The concept of Smart City tries to solve problems, which came onto surface in the same time of rapid increase of population in big cities. That problems are for example deteriorating conditions in transportation and air. The highest goal is defined as a creation of better life for their citizens living in this environment. The vision of Smart City (Taewoo and Pardo [online], 2011, p. 283) are to gain improvements on such areas as: transportation, mobility, environment, energy consumption, safety and so on. The basic of effective realisation of Smart City is the digital hardware. From this site it's necessary to enrich every kind of facilities to find in a city, like: private households, schools, universities, airports, main stations, hospitals. These buildings have to be equipped with sensors, actuators, as embedded devices and mobile terminals. A fully digitalized Smart City contains of: sensors level, storage level, analytics including the right data interpretations (Jiong et. al [online], 2013, p. 2).

Since the European Integration process has diminished differences in economic, social and environmental standards, cities have converged in their basic conditions for competition, which is increasingly scaled down from the national level to the level of cities and regions (Giffinger and Haindlmaier, 2010, p.8). This trend enhances the importance of specific local six characteristics (Table 3).

Table 2: List of Characteristics and Areas of Smart City Enhancing European Integration

Areas	Characteristics
Competitiveness	Smart Economy, described by: innovative spirit, entrepreneurship, economic image and trademarks, productivity, flexibility of labour market, international embeddedness, ability to transform.
Social and human capital	Smart People, represented by: level of qualification, affinity to lifelong learning, social and ethnic plurality, flexibility, creativity, cosmopolitanism/open-mindedness, participation in public life.
Participation	Smart Governance: participation in decision-making, public and social services, transparent governance, political strategies & perspectives
Transport and ICT	Smart Mobility: local accessibility, (inter-)national accessibility, availability of ICT-infrastructure, sustainable, innovative and safe transport systems.
Natural resource	Smart Environment: lack of pollution of natural conditions, pollution, environmental protection, sustainable resource management.
Quality of life	Smart Living: cultural facilities, health conditions, individual safety, housing quality, education facilities, touristic, social cohesion

Source: (Giffinger and Haindlmaier, 2010, p.14-15)

There are different areas of city's life, in which a concept of Smart City gives promising improvements. The added-value is expected on a ground of: health, wellbeing mobility,

pollution or productivity. So from the health site many applications are according to noise limitations, air and water quality ensuring (Vlček, Čemerková and Wilczková, 2014). To the examples of the Smart City in terms of transportations, there are to define the mobility of pedestrians, cyclists, cars, freight vehicles or a smart public smart monitoring system, which helps easily to find empty spots in a neighbourhood without long searching process (Jiong et. al [online], 2013, p. 2). The same approach can be expected in case of energy management and the methods of resources savings (Klímová and Žítek, 2012).

5. Conclusion

Creation of Smart Cities in Western Europe leads to creation Europe of two speeds of development, and creates peripheries in European Union. When some part of EU become periphery then all Europe become it. To prevent such situation significant increase in research and development expenditures and directing them at the areas that have been discussed above, as well as a coherent European policy determining medium and long term goals in the field of innovation policies and science development. Necessary is also a "new opening" in the area of regional convergence, creation of economically strong economic regions, which may also contain border areas that have similar economic position, are culturally closely connected and boast development potential.

Growth of the economy and progress in European Consistent realization of the idea of society based on knowledge, achieved through support and spread of innovative technologies (ICT) and development of Smart or Digital Cities need balanced management to create also favourable conditions for social life and environmentally friendly technologies and their implementation. Growth of the economy and progress in European integration is based on innovations related to technical revolution and the smart cities development in area of the Industry 4.0 technology. Consistent realization of the idea of society based on knowledge, achieved through support and spread of innovative technologies (ICT) and development of Smart or Digital Cities need balanced management to create also favourable conditions for social life and environmentally friendly technologies and their implementation. Smart cities are based on the newest achievements, dedicated for the citizens' prosperity and protection combined with the natural environment care. Quantitative analysis based on data related to smart cities development and their direct impact on the European integration should be examined in further researches.

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