The Analysis of Selected Issues Pertaining to E-Administration in Poland in the Context of Smart City

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Abstract

The article attempts to answer the question regarding the implementation of the smart city concept in the context of e-administration and its influence on smart and sustainable development. It should be noted that the use of IT in the public administration in Poland is at an early stage of development.¹ The level of e-services is still low, and the major part of the administration remains at the second level of e-services maturity (Interaction – the user can communicate electronically with individual offices, but offices do not always communicate via the web with the user).

The analysis of the research material indicates that at the moment a vast majority of Polish cities fits into the Smart City 2.0 model, in other words their local administrations cautiously use modern technologies to improve the quality of life for citizens. It is also possible to state that several of them aspires to advance to the third generation of smart cities.

Keywords: public administration, e-government, e-administration, smart city, new technologies, information society.

¹J. Drobiazgiewicz, One-stop Government jako kierunek rozwoju administracji publicznej, *Zeszyty Naukowe Uniwersytetu Szczecińskiego nr 852, Ekonomiczne Problemy Usług nr 117*, Szczecin 2015, s. 477–478.

1 Introduction

In order to provide an efficient management of a city we need to stimulate innovation, use advanced technologies and promote cooperation between the economy and the society to facilitate smart and sustainable development. Thus, technological advancement and innovation determine socio-economic development of a country, region and a city. They also determine the civilization progress and enable changing the existing economic system to create a new more efficient one that is based on high competitiveness. Problems of cities is the subject of a particularly current and attention perceived by many international institutions that inspire and finance the creation of detailed reports in this regard. The city through its development affects the environment in which people live. If the impact is strongly negative in the long term, this leads to destruction of the fabric of the city due to the emergence of negative social factors, and these have a direct strike at the economic factors which stand directly behind all the development plans of the city.² Apart from technology itself, the development of a smart city requires relevant infrastructure, databases that can be connected to form a city information network and a management system based on social integration, participation in governing and shared responsibility. Analysing the use of advanced technologies in a city to assess the actual implementation of the smart city concept, we need to examine a number of areas, including:

- energy management,
- system of transport,
- public safety, and
- e-administration.

Implementing activities that promote the development of a smart city administration is particularly important. Such administration involves using ICT for servicing external clients and for the organization of the town hall activities in general. The use of advanced technologies in providing services aims at making the operation of the town hall more efficient and to reduce the cost of servicing clients and the cost of town hall operation.³ One of examples is

²S. Kotylak, *Potencjał klasy kreatywnej jako elementu strategii rozwoju zrównoważonego na przykładzie wybranych obszarów miejskich*, [w]: *Współczesne problemy ekonomiczne. Rozwój zrównoważony w wymiarze krajowym i regionalnym*, Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, Nr 417, Wrocław 2016 s. 64.

³I. Windelkilde, *Nowe modele biznesowe w erze konwergentnej komunikacji*, Zeszyty Naukowe Uniwersytetu Szczecińskiego nr 762, Ekonomiczne Problemy Usług nr 104, Szczecin 2013, s. 279.

the provision of electronic services to clients, involving standardization of IT service systems and the entire public administration. It should be noted that the use of IT in the public administration in Poland is at an early stage of development.⁴ The level of e-services is still low, and the major part of the administration remains at the second level of e-services maturity (Interaction – the user can communicate electronically with individual offices, but offices do not always communicate via the web with the user). The article attempts to answer the question regarding the implementation of the smart city concept in the context of e-administration and its influence on smart and sustainable development.

The article presents research methods based on the theoretical analysis of the Smart City concept and the analysis of domestic public statistics. Empirical data have been sourced from Year Books of the Chief Statistical Office.

2 Smart City Idea

In recent years, a number of terms have started to be used while referring to cities encountering the growing role of information and modern techniques and technologies. Such terms include smart city, digital city, city of the future, and sustainable city. It should be noted that ‘smart city’ is most frequently used of the above mentioned terms. Examining the specialist literature, it is difficult to determine a single valid definition of a smart city [Komninos 2008, A. Caragliu, Ch. Del Bo and P. Nijkamp 2011]. Whether a city can be considered smart depends on a number of factors. They include physical factors that can be seen in the city build-up structure, information techniques and technologies, underground infrastructure and communication systems and their use, as well as efficient institutions and procedures and functional links. Due to geographic differences, and consequently various needs, challenges and resources, the coining of a single definition of a smart city is nearly impossible. Therefore, we eventually have a number of different definitions. For certain, the notion of a smart city involves making the lives of citizens easier by using technologies and investment in society and knowledge.

Smart City is a term defined as an intelligent solution combining increasingly efficient digital information and communication systems (compared to neurons), common intelligence (compared to brains), sensors and markers

⁴J. Drobiazgiewicz, One-stop Government jako kierunek rozwoju administracji publicznej, Zeszyty Naukowe Uniwersytetu Szczecińskiego nr 852, Ekonomiczne Problemy Usług nr 117, Szczecin 2015, s. 477–478.

(compared to human senses) and software (compared to knowledge and cognitive competences). Such intelligence can hardly exist independent from other urban systems. There is a growing network of interconnected and overlapping links with mechanical and electrical systems in buildings, systems built-in household appliances, systems of transport, power grid, water supply and sewage systems and systems providing security to citizens⁵. A smart city is one which aims at solving public problems by using ICT solutions (Information and Communication Technologies) through a partnership cooperation between stakeholders and service providers at the level of the local government.

Smart cities use information and communication techniques to enhance the capacity of their infrastructure and its components, interactive functionalities, and to build the awareness of their citizens.⁶ The term is very broad. A city can be considered smart when it is involved in activities and investment supporting the development of human and social capital and communication infrastructure aimed at active promotion of sustainable economic growth and high quality of living, including efficient management of natural resources and participation of citizens in decision making.

Smart City is thus a wide concept encompassing infrastructure, and organizational and social issues. A smart city is an area comprising four main constituent parts as indicated in Figure 1.

These components include:

1. A developed broadband infrastructure, e-services and on-line tools for knowledge management;
2. Efficient institutions and procedures supporting knowledge, its acquisition, adaptation and development;
3. A creative population involved in intensive activity using information, knowledge or a cluster of such activities;
4. Documented capability to innovate, govern and solve problems that appear for the first time, since innovation and management in uncertainty are crucial for assessing intelligence⁷.

⁵Mitchell W., *Intelligent cities*, e-Journal on the Knowledge Society, 2007.

⁶Azkuna I. (ed.), *Smart Cities Study: International study on the situation of ICT, innovation and knowledge in cities*, The Committee of Digital and Knowledge-based Cities of UCLG, Bilbao, 2012.

⁷Komninos N., *Intelligent Cities and Globalisation of Innovation Networks*, London and New York, Routledge 2008.

Figure 1 Components of smart city.

Source: Own materials.

3 Smart City Evaluation

Despite the fact that the majority of cities in highly developed and developing countries aspire to become smart, there is no single scenario that could help reaching the goal. It should be pointed that every city is different, they face different challenges and expectations of their citizens, enjoy different conditions and development opportunities. There are attempts, however, to define those issues, and one of them is the theory of three generations of smart city development. Smart cities can develop due to the activity of technology companies, effort of the local government or the initiative of citizens. The evolution is presented in Figure 2.

Figure 2 Smart City Evolution.

Source: Own materials.

3.1 Smart City 1.0

Smart City 1.0 concentrates on setting a city on track towards its smart development. The process of using technologies in these cities is typically initiated by major ICT companies that provide ready-made or nearly ready technological solutions in their attempt to attract customers and thus create demand on those cities. Proposed technologies are not always needed in such cities, they do not solve actual problems, and no one has thought of solving those problems in other, perhaps more efficient ways. Creating demand in those cities is easy⁸, since frequently the public administration is not ready to assess technologies proposed.

3.2 Smart City 2.0

Smart City 2.0 is another phase in the smart city development. The process of using advanced technologies is initiated by the local government. The local government looks for technological solutions to actual problems in the attempt to improve conditions for citizens. It is a more cautious and selective process of using solutions offered by ICT companies. The implementation of technology is not the goal in itself, but rather the effect. Some of solutions used by smart city 2.0 include public Wi-Fi, traffic management systems, big data, promotion of e-mobility, mass involvement of the city into the Internet of Things, e.g. smart sensors, meters, and controllers used for improved management of the city. A drawback pointed to by critics of Smart City 2.0 is excessive technocracy that makes citizens secondary.

3.3 Smart City 3.0

The Smart City 3.0 model is a new approach to developing smart cities that opens cities to active involvement of citizens in creating their further development. The role of the local government is to create space and opportunities for using versatile potentials of citizens. This includes encouraging citizens to use advanced technologies (e.g. through education projects focusing on digitally excluded people), as well as creating opportunities for using their own technological solutions (e.g. open data). Although Smart City 3.0 still applies to using advanced technologies to improve living conditions in cities, the model, apart from projects typical for generation 2.0, encompasses social

⁸Extreme examples of smart cities 1.0 include Masdar, United Arab Emirates, and Songdo, South Korea, which have been developed as technological experiments aimed at creating ideal cities of the future.

issues, equal opportunities, education, and ecology. Smart City 3.0 fits into an increasingly popular sharing economy. This requires the courage of the local government to empower citizens. It does not always necessitate a mental change (government vs. citizens), but primarily resilient communication. A prevailing role is dialogue and mediation.

Main components of a smart city vision:

1. ICT is a crucial component. An example is an integrated technological e-administration platform and its multi-faceted application. It provides for broad access, transparency and speed in public services. It is important that information is available in the Cloud. The possibility of analysing information is particularly important, since it prevents negative phenomena on the one hand, and on the other supports decision making by providing correct information and optimised allocation of resources.
2. High degree of environmental care. Attempts to reduce CO₂ emission, generating space for parks and open green areas, creating technological and economic conditions for using renewable sources of energy, reducing water consumption, recycling and waste management involving advanced scientific methods are some of key solutions for the Smart City concept. Additionally, we should also mention the optimised and efficient use of energy and reduction of greenhouse gas emission. All above mentioned measures can be more efficient, provided cooperation is promoted at the regional level between the city and its rural environment.⁹
3. Energy efficient public and private transport. It is important to encourage and motivate people to use less private cars by modernising street lighting, smart traffic lights and safe bicycle traffic network. By reducing the number of vehicles in a city we can reduce emission and demand for wide and long transportation routes, and at the same time increase the number of pedestrian crossings.
4. Social progress revealing itself through high social cohesion, sustainable housing, available social and healthcare services, and a common access to education. Citizens should become local decision makers through their social participation (e.g. public space development, public transport and education), and the use of advanced technologies should facilitate the process, whereas the local government should play a facilitating role while trying to meet citizens' expectations and remain open for consultation.

⁹An example of this is the Parisian project of the 'City of Light' aimed at reducing public lighting by 30% in the next decade by using smart street sensors.

5. High level of safety. High social awareness and modern technologies shall create a safe environment for citizens – especially for women, elderly people and children.

The ultimate goal of sustainable economic success of the city and satisfaction of citizens is not achievable without a common vision of sustainable long-term development of a city. It is based on the assumption that all infrastructural and organizational components are developed in the spirit of reciprocity and cooperation. Thus, the key success factor for having a smart city is integration and interoperability of systems, services and processes.¹⁰

Some analysts distinguish 6 basic components comprising a smart city:¹¹

1. Smart governance (in terms of transparent exchange of information between citizens, city, central government agencies and city services, police, fire department, and medical emergency service);
2. Smart economy (e-business and e-commerce as market drivers) that enables efficient movement of goods, services and knowledge at the level of the city and between cities;
3. Smart mobility (safe, effective and efficient transport management systems, logistics, city transportation, cycling traffic, car parking);
4. Smart management of natural resources (smart meters, energy storage facilities, energy efficiency measures, rational power consumption, smart lighting systems, use of renewable sources of energy, and waste management);
5. Smart education/information (access to training, education using advanced communication and information technologies, resource support, creativity and human potential, active participation of citizens in city public life);
6. Smart living (improved life quality involving ICT – wider and more versatile culture and services, better knowledge about medical care establishments, and housing opportunities).

Summarizing the discussion on the smart city concept, the authors believe that cities to be considered smart need to have the following characteristics:

- Digital economy,
- Smart and sustainable development,
- Information society,
- Collaboration, and
- Improved life quality.

¹⁰(<http://polskiemiastoprzyszlosci.pl/#btk>) 26.10.2016

¹¹(<http://polskiemiastoprzyszlosci.pl/#btk>) 26.10.2016

Their significance depends to a large extent on the development strategy adopted by a given city or the state. The Figure below shows factors determining a smart city.

4 Application of Advanced Technologies

While analysing the above mentioned factors we should emphasise that a common denominator for all operational areas in a smart city are advanced technologies that enable enhancing the capacity of the infrastructure while at the same time reducing administrative cost and improving the quality of services. It should be emphasised that today modern technologies and innovation determine the level of socio-economic development at the country, regional and local levels. Moreover, they indicate the social advancement that to a large extent determines a new economic setup and efficiency of the system based on high competitiveness. A crucial role for the development of a smart city is played by relevant infrastructure, database development facilitating the building of an information network between cities, and a governance system based on social integration,

collaboration and shared responsibility for the functioning of a city. Efficient city governance requires effort designed to stimulate innovation, application of advanced technologies and cooperation between specific components (e.g. individuals, organizations) capable of influencing smart and sustainable development.¹²

While analysing the application of advanced technologies in a city in terms of implementing a smart city concept, we should take into account several city operation areas, including:

- Energy management,
- System of transport,
- Public safety, and
- e-administration.

Although all the above areas are crucial for a smart city, the further analysis will focus on e-administration. It should be highlighted that the idea of smart administration is based on using ICTs while providing services to external customers and internal organization of a city. Advanced technologies are used in provision of services to improve the operation of a town hall and reduce cost of services provided as well as the operational cost. One of ways to achieve the above is to provide e-services to customers, which involves standardization of information and communication services in the entire public administration. Digitization of the public administration in Poland is still in its early stage. The level of e-services remains low, and the majority of public administration agencies reached the level of providing digital information. According to the Chief Statistical Office, in recent years, the number of companies using the Internet to contact public administration has been growing. A reference point for analysing information about the situation in Poland comprises European e-administration indicators.

5 E-administration in Europe

Among e-administration services provided in countries analysed, searching for information at public administration websites turned out to be the most popular. In 2014, the service was used by 41% of EU citizens, i.e. 21 percentage points more than in Poland, with Denmark (81%) remaining in the forefront.

¹²Wiśniewska, J., Janasz K., *Innowacyjność organizacji w strategii inteligentnego i zrównoważonego rozwoju*, Wyd. Difin, Warszawa 2012, p. 12.

Table 1 Individuals with computer skills in selected European countries in 2014

Countries	Obtaining Information From Websites of Public Authorities	Downloading Official Forms	Sending Filled in Forms
	In % of Total Individuals		
Austria	54	37	30
Belgium	44	28	36
Bulgaria	20	13	7
Croatia	25	20	13
Cyprus	41	29	19
Czech Republic	36	17	11
Denmark	81	49	66
Estonia	48	25	32
Finland	76	60	56
France	48	40	44
Greece	38	21	24
Spain	46	34	29
Netherlands	62	54	57
Ireland	44	39	46
Iceland	79	64	67
Lithuania	40	31	31
Luxembourg	44	58	35
Latvia	53	19	19
Malta	38	31	20
Germany	52	32	16
Norway	76	61	56
Poland	20	17	15
Portugal	38	25	29
Romania	9	5	3
Slovakia	52	30	17
Slovenia	52	38	21
Sweden	79	52	50
EU-28	41	29	26
United Kingdom	40	31	34
Hungary	48	31	24
Italy	20	16	11

Source: Eurostat database.

6 E-administration and Corporations in Poland in 2011–2014

It should be noted that e-services enhance the efficiency of public administration in Poland. The solution enables collecting various affairs managed by various public administration units in one place and make procedures available

over the Internet. Table 2 presents the level of e-administration by size and type of activity.

The analysis of the above figures shows growing use of e-administration in the period concerned. This confirms intensive activity of companies in that area. In the period, we can note a major interest among large companies. E-administration services have been most frequently used by large and slightly less by medium-sized companies. In 2014, nine out of ten companies used the Internet to contact public administration in the majority of areas.

7 Purpose of Using E-Administration

Most frequently, companies use e-administration to download and send forms and to search for information. This type of contacts is mainly preferred by large companies and slightly less by medium-sized ones. The most active in this area are companies dealing with generation and supply of power, gas, steam and hot water, as well as repair and maintenance of computers and communication equipment. For the past several years, the least frequently used

Table 2 The level of e-administration by size and type of activity

	2011	2012	2013	2014
Specification	In % of Total Enterprises in a Group			
Total	90,2	90,4	88,0	92,4
Small	88,5	88,6	86,0	91,1
Medium	97,2	98,0	97,7	98,4
Large	99,7	99,6	99,5	99,5

Source: Report *Information Society in Poland*, GUS 2016, p. 108.

Table 3 The main factors determining the use of e-services

	Obtaining Information	Downloading Official Forms	Sending Filled in Forms	Offering Goods or Services in Electronic Procurement Systems of Public Authorities
Specification	In % of Total Enterprises in a Group			
Total	78,7%	82,5%	91,6%	14,7%
Small	75,8%	79,9%	90,2%	13,7%
Medium	91,2%	93,9%	98,1%	17,8%
Large	98,6%	98,9%	99,4%	28,5%

Source: Report *Information Society*.

Table 4 Individuals using e-government services by purposes in the last 12 months

	2011	2012	2013	2014	2015
Specification	In % of Total Individuals				
Individuals using e-government services in order to:	27,6	31,6	22,6	26,9	26,6
obtaining information from websites of public authorities	20,9	24,9	17,4	20,4	19,1
downloading official forms	14,4	15,1	15,6	16,8	16,8
sending filled in forms	8,8	10,6	11,4	14,8	15,7

Source: Report *Information Society in Poland*, GUS 2016, p. 169.

e-service was filing electronic public procurement bids. In 2014, only every seventh company decided to use this form of contact with the e-administration.

While analysing e-administration, we should emphasise the main factors determining the use of e-services.

8 Analysis of E-Administration in Poland in 2011–2014 – Example of Society

In 2015, people using online public services accounted for more than one fourth of the population at the age of 16–74. That year showed a decrease in the percentage of people using public administration services over the Internet comparing to the previous year (by 0.3 percentage point). The e-administration was most frequently used to seek information on public administration websites.

9 Conclusion

Rapid development of modern technologies as well as continuous development in mobile communication technologies [M. Czaplewski, 2012, s. 56] promotes fast and unrestricted transfer of data, accessibility of databases and efficient and programmable infrastructure supports digitization in cities. A major benefit is the improvement of the quality of services provided to users and reduction of financial cost, as well as time and energy for the functioning of a city. Smart cities should look for their development potential. Poland and other countries in Central and Eastern Europe struggle against financial and institutional barriers. However, it should be noted that the CEE region

received a major support under the EU cohesion policy and relevant political and legislative framework. The analysis of the research material indicates that at the moment a vast majority of Polish cities fits into the Smart City 2.0 model, in other words their local administrations cautiously use modern technologies to improve the quality of life for citizens. It is also possible to state that several of them aspires to advance to the third generation of smart cities.

The concentration solely on the IT integration of various city affairs may lead to barriers, in particular for elderly people. Smart solutions, improving for instance the comfort of transportation, should not exclude any of social groups.

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