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Author: Patrycja Krauze-Maślankowska

Affiliation: University of Gdańsk, Faculty of Management, Department of Business Informatics

Title of PhD thesis: The study of conditions of development of smart cities in Poland

Supervisors: prof. dr hab. Stanisław Wrycza (until 13.01.2022)

dr hab. Anna Wojewnik-Filipkowska, prof. UG (currently)

Supporting supervisor: dr inż. Przemysław Jatkiewicz

Abstract of PhD thesis

More than 60% of the population lives in cities, and by the end of this century this number is expected to increase to 80%. Additionally, despite the fact that cities occupy only 3% of the Earth's surface, they contribute to the consumption of 60-80% of energy and generate over 75% of CO_2 emissions (Wojewnik-Filipkowska, Gierusz and Krauze-Maślankowska, 2021). The concept of a smart city may contribute to the effective use of resources, but the success in introducing changes largely depends on local government units (LGUs). Pursuant to the Act on Municipal Self-Government, LGUs, acting on their own behalf and on their own responsibility (Article 2 (1)), deal with all public matters of local importance in order to meet the collective needs of the self-government community. Based on the applicable regulations, these units are free to shape the strategy and tactics of conduct aimed at achieving the assumed goals (Mańka-Szulik and Krawczyk, 2022). Therefore, the way in which they are managed by the local public administration is of increasing importance for the smart development of cities. Despite the cases of implementing the smart city concept in cities all over the world, widely described in the literature and the continuous creation of innovative solutions related to the implementation of its assumptions, there is still no recognition of what activities are undertaken by various cities in Poland and in which direction the discussed concept is developing. Therefore, the doctoral thesis takes up the subject of the development of the smart city concept in Poland by recognizing the method of implementing the smart city concept by the local public administration.

The main purpose of this dissertation was to identify the concept of smart cities, the state of its implementation in selected cities in Poland and to indicate the directions of its development, created by local public administration units in Poland. Changing the approach to city management by local governments to a more innovative one is an important aspect from

the point of view of implementing the discussed concept. In this case, innovation is understood as improving existing processes through the use of technological solutions.

For the purposes of achieving the main goal, the following specific goals were formulated:

1. Identification of dimensions and development factors of the smart city concept.

2. Formulating a definition of a smart city that embraces the specificity of a smart city in Poland.

3. Characteristics of smart city dimensions.

4. Identification of the technology supporting the implementation of the smart city concept.

5. Identification of opportunities and threats related to the implementation of the smart city concept by local public administration.

In view of the main and specific goals defined above, this paper attempts to answer the following research questions:

1. What is and what elements / aspects make up the smart city concept?

2. What is the level of knowledge of the smart city concept in local public administration units in Poland?

3. Do local public administration units in Polish cities provide appropriate technological conditions for the development of the smart city concept?

4. How are the assumptions of the smart city concept implemented in relation to the six dimensions: smart people, smart environment, smart economy, smart governance, smart mobility, smart living?

5. In what direction is the development of the smart city concept in Poland going? What are the opportunities and threats associated with this process?

As part of the last research question, two auxiliary questions were formulated, which contributed to the specification of actions taken by local governments in relation to the development of the discussed concept:

- Does the local public administration use electronic communication channels (including popular social media) to learn about the opinions of residents on selected topics?

- What is the significance of the implementation of the smart city concept in cities for the development of an intelligent transport system?

The doctoral dissertation consists of five chapters. The first chapter covers the origins of the concept of a smart city; the concept is considered not only in the context of management, but also in legal terms. The content of the first chapter covers the analysis of the definitions of smart city contained in the scientific literature and a discussion of the existing measures of the development of the smart city concept. This part also proposes its own definition, which

emphasizes the technological aspect related to the smart city concept and the conditions specific to cities in Poland.

The second chapter presents a description of the six dimensions of a smart city according to the division proposed by Giffinger, i.e .: smart economy, smart living, smart governance, smart environment, smart mobility, smart people. For each of the dimensions, appropriate solutions are presented that indicate the implementation of tasks related to their development. In addition, selected technological solutions that have been developed by example cities around the world in relation to the implementation of the resulting assumptions are also indicated from the development of each dimension.

The third chapter relates to digital innovations related to the implementation of the smart city concept. This chapter highlights the essence of such solutions as Big Data, IoT, blockchain or Artificial Intelligence, and describes examples of the use of these technologies in an urban environment.

The fourth part contains a detailed description of the survey, which in the first part goes through the description of the motivation for selecting the surveyed population, the method of selecting and drawing the sample, questions included in the questionnaire, and information on the number and structure of the survey sample and the returns received. The second part of the fourth chapter presents the detailed results of the study along with their interpretation by city size. The description of the results of the study, as well as the questionnaire itself, was divided into six dimensions, in accordance with the division of smart city into areas, adopted and described in the second chapter.

Chapter four also answered the first, second, third and fourth research questions. The last chapter is devoted to indicating the directions of changes in the development of the smart city concept. It describes the importance of social media in managing a smart city, the impact of new ways of moving around the city on the development of the smart city concept and the role of digitization and creating digital images of buildings, parks or entire housing complexes on the effective implementation of changes in the urban space, taking into account the active participation of residents. Finally, the opportunities and threats for the development of the smart city concept, indicated by the local public administration in the survey conducted, were summarized.

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