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Smart Cities Prospects from the Results of the World Practice Expert Benchmarking

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Abstract

Smart cities involve complex sociotechnical systems which are built on the flows of an increasing amount of data coming from multiple sensors, thanks to the technology of the Internet of Things. In this context, smart cities aim to provide sustainable urban development worldwide. This paper presents the results of world practice benchmarking for 20 smart cities and it seeks to determine the most successful cases that could be of interest for better urban development. B. Cohen's Smart City Wheel was used as the system of indicators, and expert assessment, document analysis, and statistical methods were applied to the research. Results indicate that the cases of Songdo, Singapore, Melbourne, Bodo, Delft and Toronto got the highest marks. Also, the level of resource management, e-government infrastructure, education and safety indicators showed a positive impact on the other smart city components.

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1. Introduction

Nowadays, the popular term "smart city" implies the intertwining of several parallel social and technical processes in modern society. Firstly, it encompasses the process of scientific and technological progress and the constant

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diffusion of technology as well as their implementation into all spheres of human life. The second process is the desire to improve the quality of life and create comfortable living conditions, which characterizes the modern development of the urban environment. The third process reflects the transformation of a territorial management system, the use of innovative approaches to the allocation of resources as well as the setting of tasks and the coordination of their implementation. It is assumed that synergy across three processes should lead to the creation of new social values and urban sustainable development [1].

However, when the technological component is absolutized, there is a risk of giving in to the illusion of creating a "smart city" from typical technological units, and to believe that this design will work effectively.

It becomes then obvious that for the effective functioning of new "smart cities" it is necessary to consider the adaptive capacity of the population, as well as the management factors that determine the resource provision of the territories. This paper takes that into consideration by providing results of a smart cities' benchmarking identifying the most successful cases that could be of interest for better urban development. This research is committed with revealing successful cases from a systematic point of view, based on experts' assessments. The collected data could be helpful for the researchers and practitioners who are going to make simulations involving smart cities.

2. Literature review

Many attempts to conceptualize smart cities have been made. While a variety of researchers have focused on definitional boundaries [2], there seems to exist a lack of consensus about what a smart city really is [1, 3, 4].

Researchers have found clear definitional overlaps, with cities being portrayed in a myriad of ways. Chourabi et al. [4], for instance, have referred to smart cities as being intelligent, digital or creative based on a variety of attributes like their ability to govern "stakeholder's relations" and to leverage an IT infrastructure. Expanding upon one of the first works in the realm [5], authors have looked at smart cities as having the ability to integrate through information and its technologies [6, 7]. Others will focus the consider innovation and entrepreneurship as being more central [2, 8, 9].

Definitions, nevertheless, seem to clearly depend on the context and the lenses through which smart cities are studied. That means that the extent to which a city can be considered smart depends on how the problems inherent to that city are tackled [10]. For instance, for Anthopoulos & Vakali [11] and Batty [12], city planning seems to be a critical component if a city wants to be efficient at tackling its problems, while others see better governance [13, 14] and city-participation as deserving more attention [15, 16]. Particularly, information and knowledge seems to be a crucial component. For instance, Nam & Pardo [7] have highlighted that smart cities are able to use information through policies, technologies and people. That finds echo on the work of Kourtit and Nijkamp [17] who implied that smart cities are "knowledge- intensive" the problems to be solved involve addressing performance issues. Harrison et al. [18], on the other hand, implied that smart cities leverage "collective intelligence". Although interest in information and knowledge remain, more attention has been given to the use of data analytics and big data as a potential catalyzer of smartness in local governments [19, 20]. Henceforth, it is possible to say at this point that smart cities disclose commonalities that really allow for an easier identification of local governments that are really advancing in the smartness agenda.

A team of researchers from Indonesia [21] prepared a generalized analysis of research works in the subject "Smart City" and identified the following areas, which are now actively engaged by researchers from all over the world: ICT infrastructure [22]; development of public transport systems [23]; environmental sustainability [1]; social and cultural pluralism in the conditions of "smart cities" [24] development of educational potential and training systems [25]; health services [26]; entrepreneurship and innovation [23]; social security and protection [27]; economic planning and organization [28]; ICT and e-government technologies [29]; "smart house" system [30]; open government and open data [31, 32].

The emergence of "Smart Cities" in foreign and domestic literature is often called a risky initiative, because at this stage there are not many unambiguous evidences confirming their effectiveness and contribution to improving the quality of life of the population.

The smart city concept is multileveled and is often associated with the cities of the future. However, the concept of these cities of the future is quite old and it means a city which is innovate quickly, build big, with the focus on commercial infrastructure, and ready to be copied. In the book "A History of Future Cities", Daniel Brook [33]