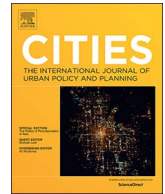




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Smart City implementation and discourses: An integrated conceptual model. The case of Vienna

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ABSTRACT

In recent years many initiatives have been developed under the Smart City label in a bid to provide a response to challenges facing cities today. The concept has evolved from a sector-based approach to a more comprehensive view that places governance and stakeholders' involvement at the core of strategies. However, Smart City implementation requires lowering the scale from the strategy to the project level. Therefore, the ability of Smart City initiatives to provide an integrated and systematic answer to urban challenges is constantly being called into question. Stakeholder involvement in both the projects and the city strategy is key to developing a governance framework that allows an integrated and comprehensive understanding. This can only be done if Smart City strategies take the stakeholders' opinion into account and seek a compromise between their views and the implementation of the strategy.

Multiple attempts have been made to analyse Smart Cities, but tools are needed to understand their complexity and reflect the stakeholders' role in developing Smart City initiatives and their capacity to face urban challenges. This paper pursues two objectives: (A) to develop a conceptual model capable of displaying an overview of (a) the stakeholders taking part in the initiative in relation to (b) the projects developed and (c) the challenges they face; and (B) to use this model to synthesise the opinion of different stakeholders involved in Smart City initiatives and compare their attitudes to the key projects implemented in a corresponding SC strategy. The methodology combines project analysis with surveys and interviews with different groups of key stakeholders (governments, private companies, universities and research centres, and civil society) through text analysis. The conceptual model is developed through discussions with different European stakeholders and is applied to the case of the Vienna Smart City strategy.

1. Introduction

Cities are places where agglomeration economies attain their highest yields, producing cultural, economic and social benefits (United Nations, 1996). However, growing urbanisation patterns create a series of problems that reduce quality of life in urban settlements, such as inequality, pollution, ageing population, insecurity and others. The Smart City concept first emerged in the 1990s (Alawadhi et al., 2012) as an alternative to traditional planning modes, using new technologies (specially ICT) to tackle these problems. Smart cities are usually seen as a tool to solve urban challenges in an increasingly urbanised world (Albino, Berardi, & Dangelico, 2015; Chourabi et al., 2012; De Santis, Fasano, Mignolli, & Villa, 2014; Meijer & Bolivar, 2015; Nam & Pardo,

2011b).

The lack of consensus as to the definition of a Smart City has led to specific research on this topic. Several authors have designed conceptual and typological approaches to provide a systematic understanding of Smart City concepts and policies. Some authors focus on the essential components of Smart Cities, understanding the balance between people, technology and institutions (Ben Letaifa, 2015; Colldahl, Frey, & Kelemen, 2013; Nam & Pardo, 2011b) as crucial for a city to be considered Smart. Other proposals for classifying Smart City concepts and policies are based on schools of thought (Kummitha & Crutzen, 2017) or a spatial approach, and suggest other strategic choices without any specific spatial reference (focusing on society, innovation or business models) (Angelidou, 2014). However, when the focus is on

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governance, authors such as Meijer and Bolivar (2015) align themselves with the ideas of Ben Letaifa (2015) and Coll Dahl et al. (2013). Meijer and Bolivar (2015) classify Smart City definitions in terms of technology, human resources and collaboration, incorporating a fourth option that combines the three together in a holistic approach. According to this last perspective, urban developments should consider the interrelations between infrastructure, society and institutions. Many authors apply this concept of holistic Smart City in their research proposals (Alawadhi et al., 2012; Caragliu, Del Bo, & Nijkamp, 2011; Chourabi et al., 2012; Fernández-Güell, Collado-Lara, Guzmán-Araña, & Fernández-Añez, 2016; Giffinger et al., 2007; Leydesdorff & Deakin, 2010).

Basically, two main approaches can be identified among Smart City scientists and practitioners. On the one hand, the scientific literature seeks to go beyond sector-specific approaches by proposing a comprehensive conceptualisation of the Smart City; and on the other hand, Smart City initiatives are developed through sector-based initiatives and projects in one or a few specific areas (Fernández-Güell et al., 2016; Mattoni, Gugliermetti, & Bisegna, 2015). The implementation of Smart Cities is still related to these sector-specific and partial understanding, in part because of the limitations of governance and financing tools. It is therefore necessary to bridge the gap between the theoretical comprehensive perspective and the sector-wide implementation of the Smart City concept.

In this goal of making the Smart City a comprehensive concept, governance is gradually placed at the core (Meijer & Bolivar, 2015), and authors endorse the link between Smart governance and the need for integrated approaches (Castelnuovo, Misuraca, & Savoldelli, 2015). Stakeholder involvement and engagement in decision-making is essential for Smart governance, and the key element for becoming a Smart City (Albino et al., 2015; Giffinger & Lü, 2015; Nam & Pardo, 2011a). However, stakeholders reveal different visions of the Smart City in their discourses (Fernandez, 2015; Fernandez-Anez, 2016). There are also differences between the image of the Smart City and its implementation (De Santis et al., 2014) and between the vision of the stakeholders in Smart City development and the initiatives carried out (Alawadhi & Scholl, 2013). It can therefore be assumed that narrowing the gap between the stakeholders' vision of Smart City initiatives and the implementation of certain projects may make a decisive difference to the success of Smart City strategies.

This study has a dual objective: first, to develop a conceptual model capable of considering the most important topics discussed in this introduction: (a) stakeholders in the initiative, in relation to (b) the projects developed, and (c) the challenges they face; and second, to use this model to synthesise the opinion of the different agents involved in Smart City initiatives and compare their attitudes to a comprehensive overview of the most relevant projects implemented in a corresponding SC strategy.

After the Introduction explaining the problems and identifying the research gap, this second section focuses on Smart City conceptual models to define a state of the art on the topic. The next section (Section 3) contains the definition of the conceptual model and shows the relationship between the different stakeholders and the basic elements and subsystems of a generic Smart City. The aim of this model is to facilitate the analysis of the complex and comprehensive Smart City strategies designed by municipalities from an integrative perspective.

The next section (Section 4) describes the methodology for developing the conceptual model and its application to the case study. In the following section (Section 5), and based on this methodology, the model is used to represent both the implementation of, and discourses on, Smart City strategies. Considering these two aspects –the actual implementation of Smart City projects and the vision of the different stakeholders– it proposes a methodology to extract guidelines to bridge the gap between them. In the fifth section the conceptual model is applied to the case study of Vienna, deriving information on the strengths and weaknesses of the strategy. Vienna was selected because

of the maturity of its Smart City Strategy, with a high level of implementation and implication of the various stakeholders. Following this methodology, this section provides guidelines for narrowing the gap between stakeholders' opinions and Smart City implementation in Vienna. Finally, the sixth section ends with conclusions about the use of the model and possible further steps.

2. State of the art: Smart City conceptual models

In recent years, a range of conceptual approaches to the Smart City have led to different interpretations and thus to differences in its conceptualization.

Some authors have used the triple helix conceptual model (Deakin, 2014; Etzkowitz & Zhou, 2006; Lombardi et al., 2011) to understand the role of the stakeholders in the Smart City. The triple helix was used to examine the knowledge base of urban economies, and Leydesdorff and Deakin (2010) proposed it as an instrument to study the meta-stabilising potentials of urban technologies in Smart Cities. The work of Lombardi et al. (2011) expanded its scope to include civil society in a modified triple helix, and a subsequent work (Lombardi, Giordano, Farouh, & Yousef, 2012) crossed this concept with five city clusters (Governance, Economy, Human Capital, Living and Environment). These relations are used to structure an analysis of interrelations within the Smart City and to extract guidelines for policies.

Nam and Pardo (2011b) conceptualised the Smart City in a model that combined institutional, technological and human factors. They applied the model to formulate strategic guidelines for the success of Smart City initiatives. To explore these concepts further, some researchers (Chourabi et al., 2012) increased the complexity of the model. In their proposal, they placed Smart City initiatives at the core. They identified a set of internal factors that affected the Smart City more directly: Technology, Organisations and Policy. The external factors (Governance, People and Communities, Natural Environment and Infrastructures) were on a second level of impact. The purpose of this model was not only to explain the Smart City concept but also to develop a tool to analyse the proposals of local governments and extract guidelines for practitioners and researchers.

The proposal of Dameri (2013) highlighted the need for a theoretical approach for a concept (Smart City) developed from empirical experience, and included a multiscale focus on the goals of the Smart City rather than on the means to attain these goals. It placed a set of basic Smart City components (Citizens, Land, Technology and Governance) at the core. The spatial level was the next step, as the multiscale scope was considered essential for the Smart City, with different influences at the city, regional, city network, national and global scales. Finally, the model proposed a third level with the goals of the Smart City, defined as Environmental Sustainability, Quality of Life and Wellbeing, Participation, and Knowledge, and Intellectual Capital. The model sought to support local governments and public administrations in the implementation of Smart City initiatives focusing on these ultimate goals.

The ASCIMER Project Team also developed a model for their research as a result of experiences in Smart City projects. Based on the work of Giffinger et al. (2007), the model understands the Smart City as the confluence of the dimensions of “Governance”, “Economy”, “Environment”, “Mobility”, “People” and “Living” articulated by ICT and technology tools (Monzon, 2015), and proposes a classification of Smart City projects and their integration through a comprehensive and integrative approach.

Recent conceptual visions of Smart Cities have focused on governance as the key issue for the success of the initiatives (Meijer & Bolivar, 2015). Conceptual models such as the proposal of Castelnuovo et al. (2015) reflect this point of view and propose a citizen-centric approach to Smart governance, placing “Community Building and Management” at the centre of the model. This concept involves four additional dimensions (Vision and Strategy Formulation, Public Value Generation,

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