

Managing Smart Cities as Collaborative Innovation Projects

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Abstract

This paper presents a research in progress within a broader discourse of innovation diffusion and adoption through public-private interaction. Smart City projects within the European context had been chosen as settings. Drawing on the concept of collaborative innovation as our point of departure, this paper attempts to shed light on the phenomena of public-private interaction as a base for disseminating innovations on a local level. In this regard, we bridge the gap by investigating the role of local governments and their initiatives to integrate new technologies in the urban context. In this study, we describe the research plan that is divided into three parts: concept, data collection and expected results. The project will expand upon the current understanding of innovation adoption through multi-stakeholder collaboration and thus has far-reaching social and economic implications.

Key words: Collaborative Innovation; Public-Private Partnership; Smart Cities.

Introduction

Large numbers of interconnected citizens and businesses, different modes of transport, complex communication networks, changing services and utilities are common features of large cities in developed countries (Neirotti, De Marco, Cagliano, Mangano, & Scorrano, 2014). Population growth and urbanization challenge city authorities to find effective solutions for complex problems under significant financial constraints. There is a need for new approaches to urban planning and living, which can ensure viability and prosperity in metropolitan areas (Neirotti et al., 2014). The concept of “Smart City” is a way for local authorities to address the problems of a modern city by committing to information and communication technologies (ICT) and cooperating with private companies. Despite promising perspectives, many aspects of public-private collaboration require further research.

Within this project we use Smart City as our field of investigations. The primary focus is placed on collaboration between private and public sectors as a foundation for innovation adoption on a local level. Current proposal provides a brief description of this PhD research project which is currently on the literature-review stage. According to the thematical and logical order, we imposed the structure of this paper which contains the following sections: introduction as a starting point; theoretical background with preliminary stated assumptions and roughly identified research questions; methodology section which indicates the research design, including the context and key approaches to gather the data; research contribution and expected results as a final section.

Theoretical background

During the last decade the concept of “Smart City” has become in vogue all over the world, being used with different meanings and in different circumstances. There is a variety of conceptual terms generated by replacing “smart” with other adjectives (Nam & Pardo, 2011), such as intelligent, innovative, wired, digital, creative, and cultural. Thus, often link technological transformation to economic, political and socio-cultural change (Hollands, 2008). Such diversity might be explained by the different points of view not only within academic literature but also in other publications.

There are already available investigations related to Smart Cities from an innovation perspective. Some of them place focus primarily on the urban context (Cassandras, 2016; Nam & Pardo, 2011; Praharaj, Hoon Han, & Hawken, 2017). Others studies identify the technological part in terms of the integration of sensors (Lindhult, Campillo, Dahlquist, & Read, 2016; Rabari & Storper, 2015). In this regard, according to the European Parliament, the foundation of an innovative concept of “Smart City” is that of a multi-stakeholder, municipally based partnership, in which a city addresses issues of public interest and relevance via ICT-based solutions (Manville et al., 2014). However, there is no agreed definition of what exactly is meant by “partnership” (Boydell, 2007). In general, there is a variety of possible forms of interaction when private companies provide services to the public sector - collaborative activities have become more prominent and extensive in all sectors (Selsky & Parker, 2005).

Partnerships in Smart City projects often involve all of these parties and establish “multisectoral partnerships” (Boydell, 2007).

In the framework of Smart Cities research, we can identify several main actors of multi-stakeholder interaction:

- local government institutions;
- technology companies;
- citizens and other end-users.

The European Parliament highlights the role of public-private partnerships (PPPs) as an important aspect for the success in Smart City projects (Manville et al., 2014). The overall concept of PPPs specifically focuses on the interrelation between public and private actors (Erik Hans Klijn, 2011). However, as we mentioned before, there is no generally accepted understanding of the concept (Hodge, Graeme; Greve, 2007; Warsen, Nederhand, Klijn, Grotenbreg, & Koppenjan, 2018). Moreover, there are unresolved debates about whether PPPs need a definition or what constitutes a PPP (Khanom, 2010).

According to Hodge and Greve (2007), it is not a simple matter to judge whether this form of co-operation is a form of privatisation. Another promise in the ongoing attempts to better define and measure public sector service performance, a renewed support scheme for boosting business in difficult times or just “a language game” (Hodge & Greve, 2007). The PPP phenomenon is all of these and in fact, all these types of interaction have been defined as “public-private mixing” (Wettenhall, 2007), which involves the private provision of public infrastructure (De Schepper, Dooms, & Haezendonck, 2014). The variety of definitions can also be a result of the many forms that PPP may take. From loosely coupled collaborations to strict contract-based partnerships, PPPs come in various shapes and sizes (Klijn & Teisman, 2003).

There is a small number of publications that focus on the process of interaction between the public sector and private technology providers to create innovation in a city. Some of them aim simply at identifying successful business models to speed up Smart City solutions (Vassallo, 2017), others refer to the priority areas of interest for local governments to implement them (Alizadeh, 2017). Another approach posits a creation of conditions, which are necessary for governance, infrastructure, and technology to produce social innovation (Kanter & Litow,

2009). In addition, there are numerous discussions about the citizen-centric approach (Aguilera, Peña, Belmonte, & López-De-Ipiña, 2017) and the significant role of society (Capdevila & Zarlenga, 2015) as a driver for collaboration with private companies.

When local governments attempt to solve infrastructure problems through ICTs, there can be a need for potential partners to develop their capacity to work together across organizational and sectoral boundaries. In this case, both individual and organizational capacity is required (Boydell, 2007), because actors from different sectors have to cooperate in a joint venture sharing resources and risks.

How local governments handle the challenge of developing and implementing “smart” solutions in practice might be seen as a process of innovation diffusion and adoption in a broad sense. To reduce potential risk and complexity, local governments tend to adopt innovations that have proven successful elsewhere (Korac, Saliterer, & Walker, 2017). In this way, Smart City technologies “diffuse” across local public institutions through the assimilation of good practices.

Individual values and attitudes have been identified as significant factors for innovation adoption (Korac & Saliterer, 2013). For instance, a higher level of education has a positive impact on total innovation adoption and, perhaps surprisingly, age is non-significant (Korac & Saliterer, 2013). It forms the foundation for examination of human factors: who manages the process of Smart City technology integration in a city and how does it influence the process of acceleration?

The Goal of the Dissertation

The proposed thesis aims to analyse the role of local governments and their initiatives to integrate new technologies in a city context and how cooperation between local governments and private technology companies can happen.

For the purpose of this project, the key focus of the concept addresses the public-private partnership in which a local government institution is interested in collaborating with private companies to adopt technological innovations, using Smart City project as settings. The additional focus is provided to understand which actors are responsible for Smart City projects implementation in the public sector and which factors are key for the initial collaboration.

The main goal of this research project is to explore the concept of Smart City by particularly addressing following questions:

- What is a suitable definition of Smart City?
- Why do some cities implement Smart City technologies, while others do not?
- Why is in some cities the process of Smart City project implementation faster than in others? What are the key drivers of technological innovation adoption?
- Who is responsible for the Smart City concept and what is the role of this actor in the process of technological innovation adoption in a city?

As we mentioned before, our concept is focused mainly on an interaction between technology companies and local government as key actors, however we cannot ignore the influence of a civil society (Aguilera et al., 2017; Angelidou, 2015; Capdevila & Zarlenga, 2015; Joss, Cook, & Dayot, 2017; Partridge, 2004; Reddy Kummitha & Crutzen, 2017), which might be also involved in a process of collaboration. This participation will be taken into account indirectly.

Methods

The structure of the research project is generally divided into three key parts: conceptual part which illustrate the main concept development, data collection through interviews with representatives of local government and private organizations and final results presentation in a form of case studies.

The conceptual part, as the first stage, as a base for the following stages. Within this part we plan to gather information which is necessary to define roughly a potential theoretical framework, a foundation of the concept.

We plan to use a relatively narrow and practice-oriented approach to find a concept of Smart City as our settings which can help to understand the processes of technology innovation on local government, such as dissemination, diffusion and adoption as well as acceleration of this type of initiatives. In order to understand better a real situation related to Smart Cities development, as an initial point we started collecting practice-oriented data about projects. As a context we have chosen a territory of European Union. We plan to provide literature and document analysis, investigating the laws, reports and web sources, information from white and grey literature sources, including government documents (Manville et al., 2014), articles, illustrating EU experience (Giffinger, 2007; Alizadeh, 2017; Capdevila & Zarlenga, 2015; Caragliu, del Bo, & Nijkamp, 2011; Neirotti et al., 2014; Palomo-Navarro & Navío-Marco, 2017; Schrenk, Popovich, Zeile, Elisei, & Szczech, 2014), Smart City websites and EU public bodies' web services, etc. In other words, we need this type of data to identify a scope of the research field in terms of dissemination of Smart City projects. The projects are used to determine whether they were based on the collaborative relations, who were stakeholders, what are their roles, which technology innovations were implemented, etc. During the process of collecting the data, there may be limitations, which we need to identify to take them into account.

In order to define the term "partnership" more precisely at an initial stage, we use an approach, that categorizes partnerships according to which sectors are involve (Boydell, 2007). In this study, we will focus on this form of cooperation between two key sides from public and private sectors. We will define PPPs in a more general way with characteristics of several approaches, including PPP as a tool of governance or management (Hodge, Graeme; Greve, 2007; E.H. Klijn & Teisman, 2003), focusing on the organizational aspects of the relationship, and development process (Khanom, 2010; Wang, 2000) emerging as a new development arrangement, which maximizes benefits for development through collaboration (Agere, 2000; Brinkerhoff & Brinkerhoff, 2011; Khanom, 2010).

We will also use a more general approach to describe the perceived attributes of Smart City innovation in universal terms, so that it is not necessary to analyse each innovation as a special case to predict its rate of adoption (Rogers, 1995). In order to identify its content, we plan to determine criteria for the process of diffusion taking into account external context, organizational characteristics and diffusion drivers (Walker, 2006). Specifically, we plant to consider contextual components which vary with the characteristics of cities. In this regard, the unique context of each city shapes the technological, organizational and policy aspects of that city (Nam & Pardo, 2011).

Our main focus aims at European context, in particular on small and middle-sized cities. In the framework of the European integration process, the differences in terms of technological changes are mitigated by similar economic, social and environmental standards and norms, forming a common market. It makes cities more similar in their preconditions and allows us to compare them more objectively. Meanwhile, the location-based characteristics and other related circumstances can be considered as the factors, which enforce competition across cities in terms of urban development challenge (Giffinger, 2007). The main focus of the study will aim on small (100,000 - 500,000 inhabitants) and medium-sized cities (500,000 - 1,000,000) with a number of population less, than 1,000,000 residents.

In terms of developing the concept, in addition to various literature about Smart Cities in a close link with innovations, we will use as a building block the concept of collaborative innovation preliminary investigating it through the analysis of innovation literature in a context of private organizations (Arora et al.,2016; Baldwin & von Hippel, 2011), in a public sector (Bommert, 2010; Sørensen & Torfing, 2012) and in light of some hybrid emerging concepts, in particular open innovation (Hagedoorn,1993; Chesbrough, 2003; Chesbrough & Bogers, 2014; Chesbrough & Appleyard, 2007; Laursen & Salter, 2006, Love et al.,2014; etc).

Based on the conceptual part, we predominantly determine through literature analysis which factors might be determined as the drivers for innovation diffusion and adoption in a city. This step is a preparation to the next stage of the data collection section.

As a next step, we plan to conduct a survey and series of interviews with representatives of local government and private technology companies. We focus on validation and complementation of the list of potential factors that are significant for the process of adoption at the implementation stage, as well as the aspects that can be considered as the key drivers for acceleration. We plan to provide half-structured interviews and surveys with private companies' representatives, who are responsible for the interaction with public sector entities, and with local government actors in key positions with a formal decision-making power in the field of technology implementation.

Based on the collected information we will select cities where local government has implemented technology innovation, as benchmarks, to compare them with the cities without "smart" solutions in order to verify the parameters, which were assumed to be the key drivers for technology innovation adoption.

Using preliminary collected data about the cases and the interviews and survey results, we plan to provide comparable case studies to examine the selected cities in terms of the existence main parameters of collaboration between stakeholders. Finally, the result analysis will illustrate the gained practice-oriented case studies and highlight the outcome of the new conceptual framework, transferring newly gained knowledge through practical recommendations for public sector representatives.

Research Contributions

This Ph.D. research provides a new conceptual framework to investigate technology integration through interaction of different actors in a city. The findings of the study will provide insight into the processes of technological innovation diffusion and adoption using Smart City projects as settings. This project expands upon the current understanding of the implementation of new technology in urban contexts and thus has far-reaching social and economic implications.

Developing a clear and comprehensive picture of the forces and drivers for public-private partnership in terms of the implementation of "smart solutions" is a vital step in bridging the gap from innovation diffusion to adoption. As a consequence, it will allow for both actors including local government and private companies to better understand the potential of implementing Smart City innovations and to organize the process of collaboration and technology adoption.

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