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# Urban crowdsourcing: exploring the role of citizens in co-creating smart cities

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**ABSTRACT**

More than ever, cities are facing complex challenges due to an increasing number of residents and due to the scarcity of natural resources. As a possible solution to these challenges, the concept of "smart cities" has emerged pointing out that cities need to become intelligent in order to enhance their efficiency and to improve their competitiveness. A Smart City is characterized through six common indicators: smart economy, smart people, smart governance, smart environment, smart mobility, and smart living (Giffinger et al., 2007). Despite some recent research examining the role of citizens in smart cities, work in this area is still at a nascent stage. Our research suggests considering citizens as a driving force for the development of smarter cities and thereby encourages the emergence of new methods of design, construction and management of the city. More particularly, crowdsourcing has been suggested as an innovative approach of interaction between a city and its residents (Renault &Boutigny, 2014). Crowdsourcing practices draw on citizens' resources, ideas and creativity to support the urban development. Thereby, crowdsourcing uses the Internet to attract users who are willing to provide their inputs and insights. This conceptual research contributes to the smart city and crowdsourcing literature by providing an integrative overview of crowdsourcing practices considered as a useful digital tool to complement traditional participation practices for governance. From a managerial perspective, we provide guidance in designing successful smart cities for a better future.

**Keywords:** Smart cities, smart citizen, crowdsourcing, urban development

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## 1. INTRODUCTION

Today, more than 54% of the world's population lives in cities (United Nations, 2011). This proportion should move to 66% in 2050. Cities will face complex challenges concerning performance, competitiveness and sustainability (McKinsey & Company, 2013). Allocation and intelligent planning of resources (e.g., water, transport, energy) became a priority dueto the risk of scarcity.

Several scholars emphasize the importance of adopting new and different strategies of city transformation (Letaifa, 2015). Indeed, the rapid growth of the Internet and digital platforms made the communication between public organizations and citizens easier and faster. Like it is the case in the private sector, the innovation strategy of many public organizations is therefore increasingly based on the contributions of its citizens (Santonen et al. 2011). Many public sector organizations have been asked to move from top-down strategies (i.e., from companies to individuals) to bottom-up initiatives (i.e., co-creation with customers) to drive innovation for cities' development. Therefore, many leaders choose to transform cities into "smart cities," "intelligent cities," or even "creative cities" (Letaifa, 2015).

In 2007, the term "smart city" was coined by Giffinger et al. to describe a city performing well in a forward-looking way and built on the 'smart' combination of endowments and activities of self-decisive and independent citizens (Giffinger et al., 2007). A smart city is characterized by six common indicators: smart economy, smart people, smart governance, smart environment, smart mobility, and smart living (Madakam and Ramaswamy, 2014; Giffinger et al., 2007).

Over the last decade, there has been a growing interest toward the concept of smart cities both at an international policy level and at the level of scientific research (Albino et al. 2015). However, despite its ongoing popularity, the concept of smart city is not sufficiently known inorganizations' and citizens' minds. Indeed, citizens are little aware of smart projects, which are implemented in their cities even though they play a central role in the development ofinnovative and sustainable living areas (Paskaleva, 2011). This lack of knowledge and awareness is explained by the lack of consensus on a universal definition of the smart city (Cocchia, 2014). The concept implies that citizens are able to identify but also suggest solutions to public problems. They become "partners of the global city innovation". For example, it is the case Fixmystreet (UK), a participatory geolocation platform, which allows users to declare an anomaly (e.g., accident, infringement) and follow its status.

In this context, previous researchers highlight that crowdsourcing seems to be a promising strategy of integrating citizens in the innovation process (Roth, 2010). Scientific research on smart cities is at an embryonic stage, especially in the field of management and marketing. The main recent publications are limited to describing cases of smart cities or trying to define the concept of the "smart city", but do not pay particular attention to the perceptions, representations and behaviours of citizens in these processes. For example, the cities of Aarhus (Snow, Håkonsson and Obel, 2016), Ghent (Van den Bergh and Viaene, 2016), Vienna, London or Chicago (Visnjic et al, 2016) have recently been analysed by researchers as examples of smart cities. Given the scarcity of scientific research on smart cities, decision-makers do not hold all the keys for understanding the benefits, factors of success and failure of these projects, even if the involvement and "empowerment" of citizens in the process seems an inevitable priority (Morrongiello, N'Goala and Kreziak, 2017).

The remainder of this article is organized as follows: We review the relevant literature on smart cities and briefly describe the concept of crowdsourcing. We then highlight the link between smart cities and crowdsourcing. We conclude with a presentation of main challenges and issues that public organizations face when it comes to involve citizens in the innovation process.

## 2. DEFINING SMART CITIES

The concept of smart cities was first used in 1994 (Dameri, &Cocchia, 2013). Despite the growing use of the term, there is no universal and common definition of the concept (Ponting, 2013) and many practitioners claim that their cities are smart without meeting a particular standard (Hollands, 2008).

The authors use interchangeably a number of related terms such as "intelligent city", "knowledge city" or "digital city" (Nam & Pardo, 2011; Albino et al., 2015;Schaffers et al., 2011). Even tough, the term is used inconsistently throughout the literature (Tranos&Gertner, 2011), the use of information and communication technologies (ICTs) is cited in many definitions of smart cities (Chourabi et al., 2012).

Giffinger et al. (2007) describe "smart cities" as a city performing well in a forward-looking way, which is built on the 'smart' combination of endowments and activities of self-decisive and independent citizens.

In order to understand the concept into depth, Nam and Pardo (2011) distinguish three pillars of smart cities. These pillars are composed of:

**(1). Technology**, based on the use of ICTs. This pillar helps smart cities to improve and transform citizens' lives within a city in a more efficient and effective way. The terms widely used and which focus on the technological aspects include: digital city; virtual city, city information, wired city, ubiquitous city and intelligent city.

**(2). Human**, based on people, education, learning and knowledge. This pillar isconsidered as essential to the development of a smart city. They include the concepts of "learning city" and "knowledge city".

**(3). Institutional**, based on governance and politics. This pillar highlights the cooperation between stakeholders and institutional governments as an important factor to implement smart city initiatives. It includes the concepts of "smart community", "sustainable city" and "green city".

## 3. THE ROLE OF CROWDSOURCING IN SMART CITY DEVELOPMENT

In 2006, The term "crowdsourcing" was coined and popularized by Howe to describe 'the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call'. Although this term was introduced only a decade ago, the concept was utilized centuries ago in 1714, when the Britain's Parliament launched an open call for all individuals to find a solution for locating ships at sea by offering them rewards (Afuah and Tucci, 2012; Jeppesen and Lakhani, 2010). According to Brabham (2010; 2013), the use of ICTs has become a central element of crowdsourcing (Estellés-Arolas and González-Ladrón-de-Guevara, 2012).

More specifically, the particularity of crowdsourcing lies in the use of the Internet and the weight of the virtual communities, allowing the company to have quick access to the crowd (Estelles-Arolas and Gonzalez-Ladron of Guevara, 2012, Afuah and Tucci, 2012).

Nowadays, crowdsourcing (CS)activities are widely used, covering a variety of needs: CS of sample tasks that do not require special skills from the crowd, CS of informational content, CS of creative tasks such as artistic design and CS of complex tasks (i.e., Innocentive) (Burger-Helmchen and Pénin 2011, Schenk and Guittard, 2011). Another taxonomyis suggestedby Howe (2008) and consistsof distinguishing four categories including crowd creation, crowd voting, crowd wisdom and crowdfunding. These types of CS activities are briefly outlined in the following paragraphs:

- *Crowd creation*: *when the crowd is asked to work*

Howe (2008) emphasizes the creative energy that the crowd has. Thus, companies

successfully delegate missions to the crowd, which require their creative and innovative thinking (i.e., creation of advertising campaigns)

- *Crowd creation*: *when the crowd is asked to vote*

For Howe (2008), this form of crowdsourcing uses the judgment of the crowd to collect, sort and organize information. The author gives the example of Google's classification system, in which Google ask users to classify responses to queries by ranking them according to their popularity.

- *Crowd wisdom: call for the wisdom of the crowd*

In his book "The wisdom of crowds", Surowiecki(2004) is based on the principle of collective intelligence, which states that "under the right conditions, large groups of people are smarter than the minority elite when it comes to solving problems, stimulating innovation, making wise decisions or anticipating the future".In this type of crowdsourcing, the crowd is asked to perform a series of tasks, which aim to provide solutions to a given problem.

- *Crowdfunding: call for the crowd's financial support*

According to Howe (2008), crowdfunding solicits the funds from large groups of people which replace banks and other financial institutions.

## 4. URBAN CROWDSOURCING: SITUATING SMART CITIZENS IN CROWDSOURCING INITIATIVES

Crowdsourcing can be used in citizen science research projects, where citizens – usually members of the public crowd– provide inputs and valuable contributions despite not being formally trained experts. Whenever practitioners are willing to involve citizens in the innovation process, the acceptance and success of smart projects will increase.

Applied to the public sphere, "citizen crowdsourcing" describes the actofoutsourcingtasks, which are traditionally exercised internally or by an identified provider, to citizens. (Renault&Boutigny, 2014). The creativity, the knowledge, the opinions or the money of citizens can thus be mobilized. The concepts of citizen crowdsourcing or urban crowdsourcing remaininsufficiently known by academics (Hilgers and Ihl, 2010; Lukensmeyer and Torres, 2008; Torres, 2007). Nam (2012) acknowledges that only few authors use this term. According to this same author, urban crowdsourcing might be explained by three factors:

Citizen engagement: The author indicates that citizen crowdsourcing is based on the principle that it involves people and is built with these people. It benefits from the development of digital platforms.

The willingness of public organizations to benefit from the collective intelligence: The digital development has largely enabled the private sector to benefit from the wisdom of a crowd of experts or amateurs. The public organizations alsostartusing skills and resources of the citizens to co-create smart cities.

- A government 2.0: For the author, urban crowdsourcing is a form of governance based on the interaction with citizens, and represents thus a fundamental condition to the development of crowdsourcing initiatives.

## 5. INVOLVING CITIZENS IN CROWDSOURCING PROJECTS: MAIN CHALLENGES &ISSUES

*The issue of lurking*

Despite the importance of the citizen participation in crowdsourcing projects, the literature acknowledges the existence of a lack of participation (Schelton&Lodato, 2013). While crowdsourcing relies on the participation of a large crowd of people (Santonen et al., 2011), authors highlight that the contributions of citizens in public discussions and decision-making efforts remain marginal.

In contrast with traditional crowdsourcing projects, urban crowdsourcing presents the particularity of involving not a majority of skilled and knowledgeable participants in a particular domain, who participate in these initiatives for financial (e.g., rewards) or intrinsic reasons (e.g., willingness to evaluate one's skills) (Renault &Boutigny, 2014).

Instead, citizens are mainly driven by their willingness to contribute to their own and other co-citizens' well-being and show thus greater involvement. As the literature on human participation in crowdsourcing has focused on intrinsic and extrinsic motivations (Kaufmann & Schulze 2011, Majchrzak et al 2006), intrinsic motives should become a focal aspect for future studies in citizencrowdsourcing. Another characteristic lies in citizens' involvement in these projects. In contrast with traditional crowdsourcing initiatives, in which participants contribute to other companies' managerial issues, citizens should show more important and different implication levels when contributing to the development of their own living spaces.

*The selection of the best proposals*

Despite these intrinsic motivations, and according to Renault and Boutigny (2014), public organizations face two limits or issues when it comes to launch crowdsourcing initiatives: too much or too small contributions from the citizens (Renault &Boutigny, 2014). The number of participants is linked to the number of new ideas for smart city development initiatives. Even though the key success factor of any crowdsourcing strategy is the participation of a large mass of individuals, another challenge for organizations remains the selection and implementation of the best proposals. On this aspect, urban crowdsourcing differs from traditional crowdsourcing projects in three ways. First, citizens' suggested ideas to improve their city risk being biased by wishful thinking and lacking of feasibility regarding the public constraints. More specifically, cities are constrained by a larger amount of external factors (e.g., political, environmental, legal, financial constraints), which are limited for companies in the context of specific markets. This results in a higher rejection rate of citizens' ideas and risk frustrating citizens due to high rate of the non-applicability of their suggestions.

Second, the implementation of most ideas undergoes a longer process than managerial projects since the implementation of an idea involves a greater number of decision-makers and external obstacles.

Third and finally, the solutions provided by participants (most of them being highly involved citizens willing to participate in the initiative) are likely to not reflect the general opinion. In order to advance the development of smart cities in the most relevant direction, public organizations have to consider the lack of "representativeness" of these ideas regarding the overall population. This becomes even more problematic in the context of online crowdsourcing as this practice needs citizens to feel comfortable with new technologies, and more generally with the Internet and interactive tools. Public organizations have therefore to adopt strategies and best practices, which help facing these challenges.

## 6. CONCLUSION

Our paper contributes to better theoretic understanding of the role of citizens and their involvement in smart city projects. We identify and discuss the main challenges that public organizations face when it comes to involving citizens in the innovation process and the development of smarter cities. From a managerial perspective, the review provides guidance on the successful consideration of citizens in cities' smart development by benefiting from the advantages of crowdsourcing initiatives. We also warn about the major challenges that have to be considered (e.g., variation of citizen types and motivation or biased contributions).

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