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The governance of smart cities: A systematic literature review[☆]

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ABSTRACT

Research on smart cities lacks a systematic understanding of the different components of smart city governance, the metrics to measure these components, their envisaged outcomes and potential contextual factors influencing both components as well as outcomes. This study analyzes the relevant body of literature and proposes conceptual insights. A research scheme is generated and used for an extensive discussion of the literature. The systematic literature review indicates that various smart city governance definitions exist. Also, this study reveals substantial variances in contextual factors, measurement techniques and outcomes among the concepts of smart city governance.

1. Introduction

Various cities across the globe see a possibility to address challenges by adopting the ‘smart city’ (SC) concept (Allwinkle and Cruickshank, 2011). However, the label SC is a fuzzy concept (cf. Appendix 1 for a selection of various SC definitions) and the absence of a commonly accepted SC definition (e.g., Albino, Berardi, and Dangelico (2015); Alkandari, Alnasheet, and Alshekhly (2012), Chourabi et al. (2012), Gil-Garcia, Pardo, and Nam (2015)) makes implementing and governing SC programs difficult. For the purpose of this paper, the working definition of SC is as follows: smart cities are a multi-dimensional “mix of human (e.g., skilled labor), infrastructural (e.g., high-tech [...] facilities), social (e.g., [...] open network linkages) and entrepreneurial capital (e.g., creative [...] business activities)” (Kourtit and Nijkamp, 2012), that are “merged, coordinated and integrated [“into the fabrics of the city” (Kitchin, 2014)] using new technologies” (Batty et al., 2012), to “address social, economic and environmental problems” (Townsend, 2013), involving “multi-actor, multi-sector and multi-level perspectives” (Paskaleva, 2009). Such a holistic definition (Mora, Bolici, and Deakin, 2017) is in contrast to a solely techno-centric focused interpretation as used by Dirks and Keeling (2009), or as criticized in Söderström, Paasche, and Klausur (2014), Greenfield (2013) or McFarlane and Söderström (2017).

Despite the substantial potential of the SC concept, associated organizational, strategic and technical challenges have made it difficult for cities to capture the promising benefits. Therefore, both researchers and practitioners have argued that many of the challenges for cities to become or to be smart exceed the scope and capabilities of their current

organizations, institutional arrangements and governance structures (e.g., Bolívar (2016), Gil-Garcia et al. (2015), Caragliu and Del Bo (2012)). Consequently, much attention has rightly been paid, for example, on governance implications of SC investments. Partly, this focus can be seen as a direct consequence of “the perceived failures or lack of impact resulting from SC investments to date” (Barns, 2017).

Although several researchers highlight the importance of a structured, all-encompassing and practical governance framework for the realization of smart cities (e.g., Dameri and Benevolo (2016), Chourabi et al. (2012), Nam and Pardo (2011a), Hollands (2008), Giffinger et al. (2007)) there continues to be an open discussion regarding what smart city governance (SCG) entails and how it is to be defined (cf. Appendix 2 for a selection of broad SCG definitions). Therefore, the purpose of this systematic literature review is to collect, analyze and outline dimensions for SCG.

The lack of appropriate governance arrangements for the majority of cities appears to constitute the most serious obstacle for their effective transformation into being smart (e.g., Manville, Cochrane, Cave, Millard, Pederson, Thaarup, Liebe, Wissner, Massink, and Kotterink (2014), Praharaj, Han, and Hawken (2018)). Moreover, technology-driven developments (e.g., ICT) are affecting all cities across the globe, “irrespective of whether they choose to invest in or incorporate the SC concept into their governance agenda”, as highlighted by Cosgrave, Doody, and Walt (2014). Consequently, of all the possibilities, SCG and its comprehension, analysis and potential modification appears to be among the most beneficial levers at the cities’ disposal.

City governance is enormously complex with the multi-faceted and multi-level ecosystem of various agencies and stakeholder groups (e.g.,

Abbreviations: SC, smart city/ies; SG, smart governance; SCG, smart city governance

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local governments, citizens, urban planners) that are often driven by conflicting interests. As a result, (smart) cities require a proper governance system for connecting all forces at work, allowing knowledge transfers, facilitating decision-making in order to maximize their socio-economic and environmental performance. Therefore, the identification of the dimensions of SCG (as discussed in this study) could be of great value. Specifically, the inductively developed components (stakeholders, structures & organizations, processes, roles & responsibilities, technology & data, legislation & policies, exchange arrangements) of SCG can be considered as innovative (e.g., covers a wide range of SCG compositions, presents a superordinate structure allowing for different SCG archetypes) and significant (e.g., mitigates lack of clarity on definitions on SCG, accomplishes comprehensive taxonomy of the existing literature), potentially fueling the debate in the nascent area of SCG.

Although some attempts to review the literature on SCG have been made in the past, they did not consider contextual factors regarding SCG (Bolivar and Meijer, 2016), did not pursue a systematic review approach (Dameri and Benevolo, 2016), were focused specifically on a selected set of dimensions of SCG (Castelnuovo, Misuraca, and Savoldelli, 2016) or missed the opportunity to include measures of SCG in the analysis (Meijer and Bolivar, 2016). Therefore, by building on the past efforts of various scholars (notably Bolivar and Meijer (2016)) the author aims to add clarity and rigor to the ongoing debate by analyzing the defining components of SCG, compiling the various metrics used to measure SCG and the potential influencing contextual factors, thereby representing the perspectives on the outcomes of SCG.

This paper is structured as follows: firstly, the author describes the purpose of this study (Section 2) followed by the literature review methodology and the results of the search (Section 3). Secondly, the author employs a SCG research scheme, consisting of categories that have emerged during a preliminary analysis, which is used to analyze the relevant body of literature (Section 4). Thirdly and finally, the author discusses the conceptualizations and shortcomings of the literature (Section 5) as well as avenues for future governance research (Section 6), followed by final remarks (Section 7).

2. Purpose and review agenda

The purpose of this systematic literature review is to collect, analyze and outline dimensions for SCG by logically classifying the relevant body of literature. For this purpose, the author compiles a conceptual frame of reference. The frame serves the dual purpose of assessing the status quo of the research and disclosing future areas of investigation. Thus far, scholars have offered differing definitions and hypothesized about the various dimensions. The author aggregates the diverse conceptualizations and identifies any possible gaps or inconsistencies. To accomplish these objectives, the author's literature review is primarily guided by four sub-areas of interest: the determining of the components of SCG, the grouping of the types of indicators used to measure SCG, the identifying of relevant contextual factors, and the classifying of the envisaged outcomes of SCG.

The first (and main) area of interest that will steer the literature review is the search for a set of components that make up the current understanding of SCG. This appears fundamental since the basic prerequisite for understanding and potentially comparing SCG is, in a first step, to precisely define the pertinent components of SCG. Conventional organizational and institutional theory applied to the SC postulates that governance represents an important building block of a functioning SC construct. However, the majority of the relevant literature does not engage in sufficient breadth on which components SCG consists of, thereby mostly concentrating on specifically selected components. The author's objectives are to identify the full spectrum of the potential components in the literature, to clarify the various formulations of components and assess how, if at all, these components are distinct from or related to each other.

In addition to the mere identification of SCG components, several SC

researchers that study SCG are confronted with the task of measuring the occurrence or non-occurrence of sets of or individual components of SCG. The composition of any metric of SCG, as a whole or its relevant components, is affected by the underlying definitions used to delineate SCG. Therefore, the author's second sub-area of interest probes the different types of indicators used to measure SCG. Given the multifaceted nature of governance or related sub-dimensions, the focus of the second sub-area attempts only to consolidate the different measurement approaches and not evaluate appropriateness.

As a third area of interest, the author attempts to conceptually integrate the studies that discuss or at least mention the role of contextual factors in SCG. Although smart governance is assumed to be affected by many factors (e.g., Bolivar and Meijer (2016)), few papers mention, theorize or examine the potential role of contextual factors in SCG. Thereby, this review is not intended to provide the much-needed systematic analysis of the contextual phenomena related to SCG, but instead serves as an initial overview of the current state of the research.

Lastly, the author tries to identify the envisaged outcomes of SCG. Considerable efforts have been undertaken to distinguish not only among the different components of SCG, but also between their different outcomes (e.g., Meijer and Bolivar (2016), Dimelli (2016)). Only recently, for example, Bolivar and Meijer (2016) have chosen a classification in terms of 'first-, second- and third-order outcomes' to describe SCG results. First-order refers to "changes to the government organization", second-order is "changes in the position of government vis-à-vis other urban actors" and third-order is "improvements to the city". Therefore, the fourth sub-area of interest tries to provide clarification on what types of SCG outcomes are covered in the literature.

3. Search and literature review methodology

3.1. Methodology of literature search

In order to adhere to the systematic literature review standards presented in Webster and Watson (2002), among others (e.g., von Brocke, Simons, Niehaves, Riemer, Plattfaut, et al. (2009)), the author follows the guidelines through the creation of a reproducible search record. In addition, the author adopts the systematic research method described by Wolfswinkel, Furtmueller, and Wilderom (2013). In general, the systematic review methodology appears fundamentally different from the narrative approach, as it clearly specifies its "criterion-based selection" process (Cook, Mulrow, and Haynes, 1997). It, therefore, seeks to avoid any possibility of partiality or prejudice that may potentially emerge if unrevealed criteria are used for the selection of the literature. The methodology was initially established in the field of medicine, but has spread to various academic disciplines since.

A systematic literature review is defined through the usage of a comprehensive search that scans the relevant body of literature with clearly stated and comprehensible search choices and selection criteria (cf. Table 01). The development of the corresponding search record makes reproduction and "assess[ment] of the exhaustiveness" of the study possible such that "scholars in the field can more confidently (re) use the results in their own research" (von Brocke, Simons, Niehaves, Riemer, Plattfaut, et al., 2009). The usage of the systematic review appears to be appropriate and reasonable, particularly in a SC domain that requires "the connection of many academic disciplines" (Mora, Bolici, and Deakin, 2017). The stage-wise methodology, as illustrated in Fig. 01 and Appendix 3, was applied to select the literature sample.

The quest for published journal articles was limited to three major databases (Business Source Complete (EBSCO), Web of Science, ABI Inform Global) which are most relevant for SC research. Initial analyses have shown that the addition of further databases would have increased the number of obtained duplicates significantly. The search was restricted to journal articles that contained carefully selected keywords ("smart city" and "governance") in order to be left with only the most meaningful literature. The subsequent selection process stage narrowed

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