Smart cities

A literature review and business network approach discussion on the management of organisations

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Received 15 June 2015
Revised 13 November 2015
18 June 2016
18 February 2017
25 May 2017
Accepted 21 June 2017

Abstract

Purpose – The smart city idea refers to new ways of organising city functions and urban life, which are believed to move production and consumption from global to local, manufacturing from competitive to collaborative, and business from a shareholder to a multiple-stakeholder point of view. Most previous research has focussed on the societal level of smart cities, while less seems to be known about the management of business as part of smart cities. The purpose of this paper is to present a literature review on the state of the art of management research on smart cities. The following research question is addressed: How has previous research captured the management of organisations in smart cities?

Design/methodology/approach – A literature review using the search term "smart city/cities" in research on business, management, and operational management was conducted for the purpose of capturing previous research. Findings were coded based on main ideas, central concepts, and theories, thematic content of the articles related to the main ideas underpinning smart cities (digitalization, urbanisation, and sustainability as antecedents, and local, collaborative and multiple-stakeholder manufacturing as indicators), and units of analysis.

Findings – The paper points to how most studies on the management of organisations as part of smart cities focus on sustainability and how digitalisation enables new businesses. Collaborative efforts are emphasised and the theoretical framing is fragmented. Issues related to the organising of business is also not problematised and the business network approach could, as discussed in the paper, provide valuable insights related to the collaborative efforts of organisations and the multiple-stakeholder perspective.

Originality/value – The paper is the first to capture and present an overview of previous research on the management of business as part of smart cities. Research on smart cities has focussed on the policy and societal levels, and so far there is a lack of problematisation on how organisations may act, and potentially change their way of acting, should smart cities become a reality.

Keywords Future, Management, Literature review, Network, Smart city, Business network approach

Paper type Literature review

1. Introduction

Smart cities, that is, new ways of organising city functions and urban life for environmental purposes and based on digitalisation and urbanisation (Katz and Bradley, 2013), are believed to move production and consumption from global to local, manufacturing from competitive to collaborative, and business from a shareholder to a multiple-stakeholder point of view (Herrschel, 2013; Saint, 2014; Marsal-Llacuna and Segal, 2016; van der Graaf and Veeckman, 2014). While the literature has shown an increased interest for smart cities, most research remains on the societal and policy levels (Öberg and Graham, 2016), which leaves the question about how business is conducted in smart cities unanswered. This paper presents a literature review on the state of the art of management research on smart cities.

The authors would like to express their gratitude to the anonymous reviewers for providing constructive comments during the review process of this paper. The authors are also greatly thankful to the readers and reviewers at the IMP Journal Seminar in Manchester 2015 for their comments on an early version of this paper.

IMP Journal
Vol. 11 No. 3, 2017
pp. 468-484

2059-1403
DOI 10.1108/IMP-06-2015-0024

The purpose of the paper is to map current research on the management of organisations in smart cities. The following research question is addressed:

RQ1. How has previous research captured the management of organisations in smart cities?

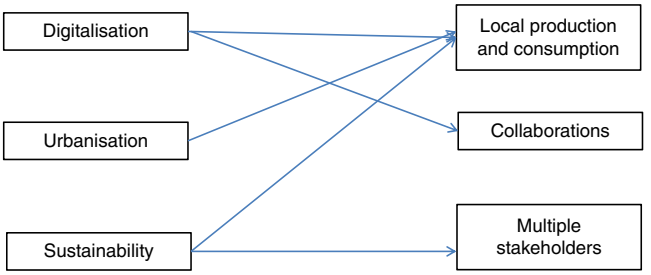
The question is important, since smart cities may change the organising of business based on their orientation to local production and consumption, collaborative manufacturing and a multiple-stakeholder focus, while most previous studies thus seem to focus on the societal and policy level. While smart cities may include many different things, the paper departs from these three ideas pointed out by Herrschel (2013), Saint (2014), and van der Graaf and Veeckman (2014) as indicators, and also links smart cities to the antecedents of digitalisation, urbanisation and sustainability, as referred to by Katz and Bradley (2013) and seen in Figure 1.

The paper contributes to previous research through presenting a literature review summarising the state of the art of previous research on the management of business as part of smart cities. This means that management research on smart cities is summarised for the first time. Based on how the organisational level is rarely considered in the smart city literature (Paroutis *et al.*, 2014; Öberg and Graham, 2016) and, as indicated in this present paper, is theoretically fragmented, the paper also contributes to research on the organising of business in smart cities through discussing the potential of integrating smart city initiatives with the business network approach, thus emphasising its consequences for business markets. Through pointing out how the organising of business may change as the result of smart city initiatives, the paper provides insight into future business studies.

The remainder of the paper is structured as follows: The next section provides a background on smart cities. The methodology section thereafter outlines how the literature review on smart cities was conducted, which is followed by a presentation of the results from the review. Findings from the literature review are then discussed and related to the business network approach. The paper ends with providing practical and theoretical implications along with topics for further research.

2. Smart cities – a background

As pointed out in the introduction of this paper, the smart city idea is linked to various suggested developments in society. But while these developments propose a direction and



Notes: Digitalisation would be a prerequisite for local production, while urbanisation and sustainability concerns would pressure for production and consumption occurring at the same location. Digitalisation would connect parties together in collaborations, while sustainability includes how multiple stakeholders' interests are considered

Figure 1. Antecedents and indicators of smart cities

move from competition, global production, and shareholder valuations (Herrschel, 2013; Saint, 2014; van der Graaf and Veeckman, 2014), the literature on smart cities still depicts the smart city phenomenon with many different meanings (e.g. Angelidou, 2015; Rochet and Correa, 2016). First of all, smart cities may refer to cities as geographical locations or as municipal administrations. The former then indicates how the researcher's focus relies on the geographical delimitation that a city constitutes (Katz and Bradley, 2013), while the latter points to how smart cities may be controlled and managed by an authority. The municipal administrations refer to societal functions (Ben Letaifa, 2015) such as health, energy, water, waste, communications, buildings, and transport, but also to their potential integration.

The "smartness" of smart cities has also come to capture different phenomena and meanings. Giffinger and Suitner (2015) point to how a smart city incorporates at least one of the following dimensions: smart economy (e.g. innovation, entrepreneurship, and productivity), smart mobility (e.g. accessibility and sustainable transport system), smart environment (e.g. pollution and sustainable resource management), smart people (e.g. level of qualification, creativity, and flexibility), smart living (e.g. quality of life), and smart governance (e.g. public and social services, transparent governance) (cf. Markendahl and Laya, 2013). Balta-Ozkan *et al.* (2014) add smart homes to this description. The "smartness" is hence referred to various phenomena (Giffinger and Suitner, 2015), and furthermore, its meaning has developed from only concerning sustainability issues (RPA World Cities Planning Committee, 2014). Herrschel (2013), for instance, points to how the smartness of smart cities has come to include "innovativeness, participation, collaboration and co-ordination".

Thus, the smart city idea has come to describe many different phenomena, but which often converge to their orientation to local production, collaboration, and a multiple-stakeholder concern. Most descriptions further refer to digitalisation (or ICT) as an antecedent for smart cities, and sustainability and urbanisation as pressuring for new ideas (cf. Deakin, 2012; Bourmpos *et al.*, 2014; Debnath *et al.*, 2014; Doran and Daniel, 2014). As an idea, smart cities could be expressed as an empirical phenomenon, which tells little about its theoretical framing. To define smart cities for this paper, point of departure is taken in it as a geographical delimited space (Katz and Bradley, 2013) with a high density of interconnected, collaborating actors (cf. Nahapiet and Ghoshal, 1998), that are also, based on local production and consumption, less connected to parties outside of the city. The city being "smart" means that the actors as multiple stakeholders (or societal initiatives guiding these actors) aim for sustainable solutions adopting digitalisation and other technological advancements.

3. Methodology

To capture the management of organisations related to smart city initiatives, a literature review on the phenomenon was conducted. The literature review was content-driven, aimed at capturing main ideas and theories from the previous research (see more below). The review utilised the Web of Science database, searching for journal articles and reviews including "smart city" or "smart cities". The review (the most recent search performed on February 7th, 2017) produced 801 articles and 36 reviews (articles and reviews defined by the database). In a second step, the articles and reviews were delimited to the research areas of management, operations research management science, and business based on the purpose of this paper: to map current research on the management of organisations in smart cities. This delimitation resulted in a total of 46 articles and reviews, with a distribution of 21 in management, 18 in operations research management science, and 11 in business (with an overlap of four articles among the research areas). To verify the search, an alternative literature search was conducted in EBSCO Business Source with a result of 352 journal articles (including reviews), and overlapping hits related to management and business. The reason for choosing Web of Science as the database relates to how the database focuses on high-ranked (ABS 3 and 4, essentially) journals, and thus would capture

the most well-spread articles and reviews. Compared to the EBSCO Business Source database, the EBSCO database contains many journals outside of ranking systems. The 352 articles in EBSCO Business Source mainly targeted the societal level of smart cities (Öberg and Graham, 2016), and were hence beyond the scope of this paper. In fact, EBSCO Business Source entailed fewer articles on the management in smart cities than did Web of Science (13 articles up to November 2015 compared to 23 articles in Web of Science for the same time period).

The abstracts of the 46 articles and reviews from Web of Science were first read to create a tentative understanding of the various articles and their content. The initial analysis of the articles resulted in the exclusion of one article based on how it did not deal with smart cities (but rather smart cars). The remaining 45 articles were analysed. The intention with the methodological approach was thus to capture the content of the articles, while also allowing comparisons among the articles. As a means to answer the research question about how previous research has captured the management of organisations in smart cities, key themes (what the articles were about), key concepts and theories (core ideas that framed the articles) and links to antecedents and indicators were captured (environmental purposes, digitalisation, and urbanisation, Katz and Bradley, 2013) as antecedents, and a local production, collaborative manufacturing, and multiple-stakeholder focus (Herrschel, 2013; Saint, 2014; van der Graaf and Veeckman, 2014) as indicators. Purposes, research questions and key findings helped to capture the key themes and also link these to antecedents and indicators, while in-depth analysis of theory sections and references provided clues to identify the concepts and theories. Based on how most previous studies have suggested focusing on the societal and policy level, the level of analysis was also captured through looking at lines of arguments and actor descriptions in the articles.

The categorisation of the individual articles allowed for a comparison to develop patterns of key themes, key concepts and theories, their association to antecedents or indicators of smart city initiatives, and descriptions of their analytical levels (units of descriptions). In the next section, the cross-article analysis is presented through focusing on these various dimensions.

4. Analysis and results

Table I summarises the reviewed articles, while the findings in the table are presented in detail in the following sections (Sections 4.1-4.4). As can be read from the table, the first article was published in 2010, and the most recent in 2017, with a concentration of articles from 2014 onwards. The table also indicates a concentration of publications in certain journals (*Technological Forecasting and Social Change*, *Technology Innovation Management Review*, and *Production Planning & Control*), each having hosted special issues on smart cities.

4.1 Key themes

In terms of key themes, the articles focus on some various ideas: new product development and innovation (Lee *et al.*, 2013; Carvalho *et al.*, 2014; Cohen and Amoros, 2014; Lee *et al.*, 2014; Tukiainen *et al.*, 2015; Bifulco *et al.*, 2016; Diaz-Diaz and Perez-Gonzalez, 2016; Khomsi, 2016; Ojasalo and Kauppinen, 2016; Ojasalo and Tahtinen, 2016; Scuotto *et al.*, 2016), issues related to traffic (Calderoni *et al.*, 2014; Ylipulli *et al.*, 2014; Wang *et al.*, 2016), and energy planning (Caponio *et al.*, 2015; Pena *et al.*, 2016), the role of citizens in data capture and adaptation of new technology (Balta-Ozkan *et al.*, 2014; Burnes and Towers, 2016), adaptation to information technology systems by firms and other actors (Ahmad and Mehmood, 2015, 2016; Melnyk, 2015), and the design of supply chains and networks as the result of smart city initiatives (Tachizawa *et al.*, 2015; Kumar *et al.*, 2016; Öberg and Graham, 2016).

In the articles covering innovation aspects, collaboration is emphasised as is smart technology (Ojasalo and Kauppinen, 2016; Ojasalo and Tahtinen, 2016). The city is

Article	Journal	Key themes	Key concepts/ theories	Relates to (antecedents/ indicators)	Analytical level
Ortiz-Fournier *et al.* (2010)	*Knowledge Management Research and Practice*	Integration of the educational institutions' initiatives and the municipal government strategic plan in Caguas	Knowledge production and knowledge sharing	Sustainability	Societal level
Lee *et al.* (2013)	*Technological Forecasting and Social Change*	Road-mapping to develop new products and services in Korea	Road-mapping; quality function deployment	Innovations	Organisational level
Galdon-Clavell (2013)	*Science and Public Policy*	Potential, limits and risks of the proliferation of smart technologies	Smart solutions	Smart technologies	Societal level
Calderoni *et al.* (2014)	*Expert Systems with Applications*	Innovative approach to urban traffic management	Traffic systems as networks, urban actors	Innovation	Societal level
Carvalho *et al.* (2014)	*Expert Systems with Applications*	Territorial innovation potentials of born global	Knowledge-based firm; knowledge-based city	Innovation	Organisational level
Paroutis *et al.* (2014)	*Technological Forecasting and Social Change*	Smart city technology as strategic option for firms in recession	Smart city technology; strategic option	Innovation; stakeholder	Organisational level
Ylipulli *et al.* (2014)	*Technological Forecasting and Social Change*	Adaptation of public infrastructures in Oulu	Adaptation	Technology	Societal level
Lee *et al.* (2014)	*Technological Forecasting and Social Change*	Public and private actors coordination of activities and resources on open innovation platforms to accomplish smart cities	Coordination; actors, activities, resources	(Stakeholder)	(Organisational level)
Balta-Ozkan *et al.* (2014)	*Technological Forecasting and Social Change*	Smart homes and adaptations by households	Public perception	Sustainability	Societal level
Cohen and Amoros (2014)	*Technovation*	Companies' issues with developing and commercialising sustainable technology	Adaptation; diffusion	Sustainable innovation	Societal level
Marsal-Llacuna, *et al.* (2015)	*Technological Forecasting and Social Change*	Monitoring the smart city initiatives	Principal component analysis	Sustainability	Societal level
Ahmad and Mehmood (2015)	*Supply Chain Management*	Adoption of sustainable enterprise and supply chain management systems in a smart city setting	Enterprise systems; supply chain management systems; adoption	Sustainability	Organisational level (supply chains)
Tachizawa *et al.* (2015)	*Supply Chain Management*	Impact of smart cities and big data on supply chain management	Integrative framework	Digitalisation	Organisational (supply chains/ networks)

Table I.
Articles reviewed (listed in order of publication from oldest to newest)

(*continued*)

Article	Journal	Key themes	Key concepts/ theories	Relates to (antecedents/ indicators)	Analytical level
Georgescu *et al.* (2015)	*Transformations in Business & Economics*	Smart cities in emerging economies	Literature review; emerging economies	Digitalisation	Societal level
Dameri and Ricciardi (2015)	*Journal of Intellectual Capital*	Intellectual capital approach to study smart cities	Intellectual capital	Sustainability	Societal level
Melnyk (2015)	*Marketing and Management of Innovations*	Economic systems in 3rd industrial revolution	Economic system	Digitalisation and sustainability. Local production.	Societal level
Veeckman and van der Graaf (2015)	*Technology Innovation Management Review*	Bottom-up smart city initiative and their management	Ecosystems	Stakeholders	Individual level
Ben Letaifa (2015)	*Journal of Business Research*	Strategies for building smart cities	Methodological framework for the implementation of smart cities	Sustainability	Societal level
Tukiainen *et al.* (2015)	*Technology Innovation Management Review*	A city as an orchestrator for innovation	Communities	Collaborative	Societal level
Markkula and Kune (2015)	*Technology Innovation Management Review*	What makes regions smarter?	Ecosystem orchestration	Collaborative; digital	Societal level
Marine-Roig and Clave (2015)	*Journal of Destination Marketing & Management*	Big data analytics to support smart destinations	Big data	Digital	Societal level
Kraus *et al.* (2015)	*Creativity and Innovation Management*	Innovation in smart cities	Entrepreneurial	Sustainability; stakeholders	Organisational level
Caponio *et al.* (2015)	*International Journal of Engineering Business Management*	Energy planning of residential buildings	Policy makers; energy planning	Sustainability	Societal level
Scuotto *et al.* (2016)	*Business Process Management Journal*	The use of internet of things and the implementation of the open innovation within smart cities	Internet of things; open innovation	Innovation	Organisational level
Öberg and Graham (2016)	*Production Planning & Control*	Supply chain management in smart cities	Supply chain management; networks	Innovation	Organisational level
Li *et al.* (2016)	*Production Planning & Control*	Digitised infrastructures	Infrastructures	Digital; local production	Societal level

(*continued*)

Table I.

Article	Journal	Key themes	Key concepts/ theories	Relates to (antecedents/ indicators)	Analytical level
Ahmad and Mehmood (2016)	*Production Planning & Control*	Critical success factors approach for the implementation process to establish a success predictive model for the realisation of enterprise system benefits	Enterprise systems	Digital; sustainable; local production	Organisational level
Burnes and Towers (2016)	*Production Planning & Control*	Inhabitants in smart cities; fashion clothing industry	Inhabitants; omni-channel environment	Technology	Individual level
Fletcher *et al.* (2016)	*Production Planning & Control*	Prototyping future high streets	Creative prototyping	Stakeholder	Individual and societal level
Harrington *et al.* (2016)	*Production Planning & Control*	Operational design level of urban systems	Consumer choice portal-package consolidation centre solution	Stakeholder	Organisational level (supply chain)
Bifulco *et al.* (2016)	*International Journal of Public Sector Management*	The connections between smart city features and new technologies as tools, and sustainability as the goal	ICT; sustainability	Sustainability; digitalisation	Organisational level
Kumar *et al.* (2016)	*International Journal of Production Research*	How smart city production systems can change supply chain design	Supply chain; design	Collaboration; stakeholder	Organisational level (supply chain)
Srai *et al.* (2016)	*International Journal of Production Research*	Distributed manufacturing challenges and opportunities	Distributed manufacturing	Local production	Organisational level
Pouke *et al.* (2016)	*Computers Environment and Urban Systems*	Simulation of virtual pedestrians	Crowd; simulation	Digital	Individual and societal level
Wang *et al.* (2016)	*Transportation Research Part E*	Road lane management system	Simulation	Digital	Societal level
Rochet and Correa (2016)	*Revista de Gestao e Secretariado-Gesec*	Modelling the smartness of smart cities	Ecosystem	Sustainability	Societal level
Diaz-Diaz and Perez-Gonzalez (2016)	*Journal of Organizational and End User Computing*	Social media for value co-creation in smart cities	E-governance; social media	(Stakeholder; collaboration)	Societal level
Pena *et al.* (2016)	*Expert Systems with Applications*	Method to solve energy inefficiencies detection problem in smart buildings	Energy efficiency	Sustainability	Societal level
Sun and Axhausen (2016)	*Transportation Research Part B*	Analytical framework to deal with high-dimensional human mobility data	Big data	Digital	Societal level

Table I.

(*continued*)

Article	Journal	Key themes	Key concepts/ theories	Relates to (antecedents/ indicators)	Analytical level
Khomsi (2016)	*Technology Innovation Management Review*	The smart city of Montreal as a model of innovation	Ecosystem; collaboration	Collaboration; stakeholder	Organisational level
Paganelli *et al.* (2016)	*IEEE Systems Journal*	Framework to support developers in modelling smart things as web resources	Web of things	Digital	Societal level
Ojasalo and Kauppinen (2016)	*Technology Innovation Management Review*	Collaborative innovation in cities	Public-private-people partnership; platform; open innovation	Collaborative	Societal, organisational and individual level
Ojasalo and Tahtinen (2016)	*Technology Innovation Management Review*	Open innovation platform into public sector decision-making processes	Open innovation; platform	Collaborative	Organisational level
Artto *et al.* (2016)	*Technology Innovation Management Review*	Collective goals in collaborations	The cuckoo's nest approach; business ecosystem	Collaborative; sustainability	Organisational level
Yang *et al.* (2017)	*Computers Environment and Urban Systems*	Tabular framework as a guidance to leverage cloud computing for big data solutions	Big data	Digital	Societal level

Table I.

described as a party organising the innovation processes (Tukiainen *et al.*, 2015), or as the place in which innovation is adopted (Khomsi, 2016; Scuotto *et al.*, 2016). This in turn implies that the city is important as coordinator, and hence functions as an actor (an administrative function, Ben Letaifa, 2015; cf. Marsal-Llacuna and Segal, 2016) or is given a geographical meaning (cf. Katz and Bradley, 2013).

The articles on traffic and energy planning are mostly descriptive, focusing on specific IT solutions or cities. Ylipulli *et al.* (2014), for instance, focus on infrastructure adaptation in Oulu, while Wang *et al.* (2016) describe road lane systems. The citizens in smart cities are described in terms of how they provide data (Burnes and Towers, 2016) and how they adapt to new technology (Balta-Ozkan *et al.*, 2014), hence indicating roles of both enabling smart city initiatives and being the users related to such initiatives.

The information technology system adaptation refers to organisations' adaptations to specific systems, including enterprise systems and economic systems (Ahmad and Mehmood, 2015; Melnyk, 2015; Ahmad and Mehmood, 2016). These systems are supportive rather than enabling in the smart city initiatives, indicating that the literature focuses on their functions as part of the smart cities, rather on them as antecedents to the smart city initiatives. The articles on supply chains, lastly, imply how smart cities will change the supply chain design and processes (Tachizawa *et al.*, 2015; Kumar *et al.*, 2016; Öberg and Graham, 2016), thus suggesting how smart cities may include shifts to local production and increased collaborations (cf. Herrschel, 2013; Saint, 2014; van der Graaf and Veeckman, 2014). Supply chain networks are emphasised as part of that literature.

In most articles, it is suggested that it is the business organisations that adjust to various initiatives, while the initiatives are largely introduced on a societal level. Furthermore, the

citizens are often forwarded as actors providing input, though generally as aggregates and through big data analytics. The articles though imply an increased focus on networks – either of individuals or of companies – and as suggested in the articles on supply chains, how smart cities may lead to the reorganising of business towards local production, while the examples of such reorganising are few.

4.2 Key concepts and theories

As for key concepts and theories, the articles are generally oriented toward descriptions of various smart city phenomena and their adaptation, and less focussed on theoretical descriptions or developments. The knowledge management lens is used (Ortiz-Fournier *et al.*, 2010; Carvalho *et al.*, 2014), and a few articles relate to supply chain research (Tachizawa *et al.*, 2015; Kumar *et al.*, 2016; Öberg and Graham, 2016), while largely treating the supply chain as an empirical phenomenon. Institutional theories (e.g. DiMaggio and Powell, 1983) are referred to when elaborating on the unilateral adaptation of organisations to societal-level initiatives. Furthermore, the innovation management literature is quite frequently taken as a point of departure, including open innovation descriptions and literature on communities and crowds (Ebner *et al.*, 2009; Stieger *et al.*, 2012), while not problematising whether and how such ways of organising innovations would be challenged or changed as the consequence of smart city initiatives. The articles focusing on various IT solutions connect with the literature on information systems, and mostly do so in a descriptive manner.

Since the articles provide descriptive examples of various solutions, in addition to the organising of innovations, the articles rarely discuss whether or how the organising of business would change as a consequence of the smart city initiatives. The main exceptions to this are the articles focusing on supply chain design. These articles refer to how supply chains may be broken up as the result smart cities, while not problematising the impact on the management of organisations. As a result of how the articles describe different phenomena and their adaptation to smart city initiatives, the theorising of smart cities and the management of organisations as part of smart cities remain fragmented, also indicated by the how various theories are used in the literature.

4.3 Antecedents and indicators

This paper departed from Katz and Bradley's (2013) antecedents to smart cities (digitalisation, urbanisation, and sustainability), and linked these to the indicators of smart cities as referred to by Herrschel (2013), Saint (2014), and van der Graaf and Veeckman (2014) (local production, collaborative manufacturing, and the multiple-stakeholder inclusion), see Figure 1. In the reviewed articles, these various variables come forth, with most of the articles focusing on sustainable issues as drivers for new solutions (e.g. Ortiz-Fournier *et al.*, 2010; Balta-Ozkan *et al.*, 2014; Dameri and Ricciardi, 2015; Kraus *et al.*, 2015). Additionally, collaborative organising of primarily innovation processes is described (Markkula and Kune, 2015; Khomsi, 2016; Kumar *et al.*, 2016; Ojasalo and Kauppinen, 2016; Ojasalo and Tahtinen, 2016), linking this to stakeholders but also emphasising collaborations related to individual innovations rather than the overall way of organising business. Digital solutions are described, either in terms of how various IT systems are adapted to, or in how big data provides a means to analyse, for instance, traffic (Calderoni *et al.*, 2014; Wang *et al.*, 2016).

In addition to the antecedents and indicators referred to by Katz and Bradley (2013), Herrschel (2013), Saint (2014), and van der Graaf and Veeckman (2014), many of the articles describe innovations which could be connected with digitalisation or collaboration, but mostly only refer to how smart cities would introduce some kind of newness, or how smart

city initiatives are underpinned by new ideas. The local production is not extensively elaborated on, and urbanisation is only mentioned in passing.

4.4 Analytical levels

As indicated in the introduction of this paper, most publications on smart cities refer to the societal level of these initiatives (cf. Öberg and Graham, 2016). The literature discussed in this present paper therefore departs from articles covering management, operations research management science, and business, according to the Web of Science database. Still, as indicated by Table I, several of the reviewed articles indeed focus on the societal level. As indicated, this either refers to the city administration or the city as a geographical space, where the former makes the city an actor that initiates new solutions.

In addition to the societal level, some articles thus focus on the citizens of the cities (Veeckman and van der Graaf, 2015; Burnes and Towers, 2016). These articles are interesting since they add a level and also, for instance, describe citizens as actors initiating new ideas or providing input data. Individuals hence suggest becoming increasingly central for the organising of business in smart cities. In addition to individuals receiving new services, it indicates how companies are replaced with, or complemented by, communities, self-employed individuals, etc. The so-called freelance economy is suggested as being on the rise (cf. Öberg, 2015), and the community or crowd idea is integrated into the literature (cf. Ebner *et al.*, 2009; Stieger *et al.*, 2012).

While few articles, and as indicated in Table I, refer to the organisational level, these mostly indicate how companies adapt to the smart cities, and the bottom-up approach of initiatives is rare (cf. Veeckman and van der Graaf, 2015). The companies become a stakeholder among others and the literature hence implies that the organisations are not those initiating new solutions, but rather follow pressures from societal levels.

5. Discussion

This paper asked following research question:

RQ1. How has previous research captured the management of organisations in smart cities?

Linking the research questions to the key themes, key concepts and theories, and unit of analysis, the literature review indicates themes related to change: product development and innovation, traffic and energy planning, the role of the citizen, adaptation to information technology systems, and the design of supply chains and networks. While the literature review specifically focussed on management, operational management, and business research, these themes emphasise changes on the societal level, while also introducing the citizen as an actor in the cities. Companies are thought to adapt to city initiatives unilaterally, but how they will go about doing so or the impact of such adjustments on the management of organisations is not emphasised in the literature. The review shows how the literature is quite fragmented theoretically, largely descriptive through introducing new solutions and their implementations, and rarely problematises the management of organisations as part of smart cities. Key focus remains on the changes that smart cities may entail, while not concerning their solution for companies.

While not focusing extensively on the management of organisations, the described changes include some clues on how business is thought to be organised in the future though: the focus on networks, and as a consequence of collaborations (though largely connected with innovations) the multiple-stakeholder involvement. Furthermore, digitalisation may shift production to local manufacturing, hence redrawing present supply chains. Table II summarises the key themes, key concepts and theories, antecedents and indicators, and the unit of analysis of the reviewed articles. Table III then presents links between the various categories.

Dimension	Categories
Key themes	New product development and innovation
	Traffic and energy planning
	The role of citizens in data capture and adaptation of new technology
	Adaptation to information technology systems
	Design of supply chains and networks
Key concepts and theories	Knowledge management
	Supply chain research
	Institutional theories
	Innovation management
Antecedents and indicators	Sustainability
	Collaborative organising
	Stakeholders
	Digital
	Innovation
Unit of analysis	Society
	(The organisation)
	Citizen

Table II.
Summary of review

Key theme	Key concepts and theories	Antecedents and indicators	Unit of analysis
New product development and innovation	Knowledge management Innovation management	Sustainability Collaborative organising Stakeholders Innovation	(The organisation) Citizen
Traffic and energy planning	Largely descriptive	Sustainability	Society
The role of citizens in data capture and adaptation of new technology	(Institutional theories) Innovation management	Collaborative organising Digital Innovation	Society Citizen
Adaptation to information technology systems	Largely descriptive	Digital Innovation	Society (The organisation)
Design of supply chains and networks	Supply chain research	Collaborative organising Stakeholders	(The organisation)

Table III.
Links among categories

Based on how the management research on smart cities indicates collaborations and multiple stakeholders, the business network approach may help to theorise the unproblematised issues of the management of business as part of smart cities. Platforms would follow from digitalisation, and the increased localisation of production and consumption to the same city could be expected to increase, rather than decrease, the number of interconnections among parties, and thus increasingly emphasising those characteristics that are taken as a point of departure in studies adopting the business network approach (Håkansson and Snehota, 1989).

The business network approach emphasises how a company cannot pursue its ideas independent of others (Håkansson and Ford, 2002; Baraldi *et al.*, 2007), something that would become increasingly clear when multiple stakeholder concerns and collaborations increase. According to the business network approach, the context of the organisation consists of directly or indirectly connected organisations, thus indicating how actions and reactions are

reflected through parties rather than faceless events coming from the outside (Gadde and Mattsson, 1987; Freytag and Ritter, 2005). The dynamic of the network – the parallel activities of others and their reactions to ideas of the company – means that a decision taken by one organisation may not (necessarily) be realised based on reactions, and based on how the context has changed in the meanwhile (Chou *et al.*, 2014; Öberg *et al.*, 2016). The literature has pointed to how strategising (or the management of firms) is difficult for organisations based on their network embeddedness (Baraldi *et al.*, 2007; Waluszewski *et al.*, 2009).

The business network approach would further, and based on how companies are interdependent actors, introduce thoughts on mutual adaptation. Rather than it being the societal pressure alone that impacts organisations, organisations could also expect to affect one another in the collaborations and based on multiple-stakeholder concerns, as well as based on reactions and how the various parties act in parallel when such interconnectivity is present. These are issues that the business network approach stresses (Hallén *et al.*, 1991; Havila and Salmi, 2000; Chou *et al.*, 2014; Öberg *et al.*, 2016), and that would extend the understanding and problematisation of the organising of business in smart cities.

The business network approach, with its emphasis on interconnectivity (rather than one-sided social pressure) (Håkansson and Snehota, 1995), wider embeddedness (beyond specific collaborations), and difficulties actually pursuing a strategy in a network, could thus help to problematise collaborations and multiple stakeholders, and would introduce new aspects to the smart city literature and the impact of smart cities on the management of organisations. Specifically, the business network approach would point at the consequences of the ways of organising businesses that have not been considered in previous research on smart cities.

But with that said, the business network approach gives few answers to how the organising of business should be accomplished. Researchers mean that networks and relationships cannot be managed; organisations need to learn how to manage in them instead (Håkansson and Ford, 2002). Seen that way, the management of business includes taking other parties into account, anticipating how they might react, calculating for changes, and/or sharing strategies with other organisations. Öberg *et al.* (2016) describe, based on empirical findings, five different ways in which organisations strategise/manage in business networks: without considering other parties, through challenging current network structures, by adjusting to them, by copying other parties, and by creating strategies together with other organisations. Reactions would be strongest if the organisation fails to include how other parties act and react, while the adjustment to others would meet the least resistance (Öberg *et al.*, 2016), the outcomes, however, not necessarily being the intended ones since other organisations act in the meanwhile. These different ways of strategising/managing in business networks emphasise that although a strategy may be shared among collaborating parties, it would still challenge parties outside of the collaboration. Furthermore, the collaboration as such may entail parties with different interests and goals and thereby be challenged also internally. Further research is needed that exposes new challenges for businesses and their organising in smart cities, but with interconnectivity, embeddedness and difficulties in pursuing strategies of individual firms as potential guiding starting points. The business network approach would give a theoretical framing of the collaborations, while providing theoretical tools to enable the study of changes to network structures, and of changes to various dimensions of interactions (cf. Håkansson and Snehota, 1995).

6. Conclusions and managerial implications

This paper presented a literature review on the state of the art of the management of business in smart cities, and asked:

RQ1. How has previous research captured the management of organisations in smart cities?

According to this paper's literature review, the current knowledge on smart cities describes them in many different ways, and provides more empirical illustrations on what smart cities could look like than it theorises around their existence. Most descriptions concern the societal level – the city as such or specific administrative functions. Societal pressure is expected to lead to increased focus on environmentally-friendly solutions, while digitalisation/ICT may emphasise collaboration and also lead to localised production.

The business network approach helps to problematise issues related to the management of organisations as part of smart cities through specifically pointing at interdependencies, dynamics, and mutual adaptations between societal and business levels. This would create an improved understanding for the consequences of smart cities on organisational levels, while giving limited answers to how the companies should manage in the smart cities.

6.1 Research implication

The paper contributes to previous research through presenting a literature review summarising the state of the art of management research on smart cities. The paper further makes a first attempt to discuss smart cities by means of the business network approach. Based on how smart cities and the research describing the organising of business in smart cities deal with an empirical phenomenon, the business network approach complements this and becomes a means to theoretically frame the organising of business in smart cities. Specifically, it does so based on its ability to problematise businesses in networks, and thereby introduces new aspects to the smart city literature. The business network approach turns focus to interconnectivity (rather than one-sided social pressure), wider embeddedness (beyond specific collaborations), and difficulties actually pursuing a strategy in a network. The smart city literature on the organising of business has not problematised such interactions, but rather focussed on organisations (and individuals) as developing ideas resulting from societal initiatives.

The smart city literature, in turn, points out how individuals (in addition to organisations) could expect to increasingly take part in business activities. Furthermore, the literature suggests how digitalisation may change the way in which business is organised – allowing for on-line collaboration and local production through 3D-technology, for instance. The smart city idea thus provides some ideas on how the organising of business may change in the future. These conclusions provide new insights to business studies on smart cities and to studies on business networks.

6.2 Managerial implications

For managers, regardless of type of organisation and its size, it is important to consider what consequences various development trends have for the organisation. This would be the case for new ideas realised as innovations, new parties being introduced in the current organisational sector, and new ways of organising business among young and incumbent firms. The analysis needs to extend beyond present interaction parties, sectors, and uses of products and services, and allow for new combinations and interaction patterns.

The smart city idea specifically highlights how individuals may start to collaborate with organisations, and how digitalisation may change connections among organisations (and individuals) as well as production. While smart cities may or may not become a reality, new ways of organising including communities, crowds, freelancers, etc. have indeed emerged in the organising of business, and digitalisation is certainly progressing technologically, while it has still not resulted in production becoming local.

6.3 Further research

While some signs may at present be in line with the smart city idea, much is still based on future-oriented assumptions rather than present practices. For further research, it would be

interesting to follow that development to capture whether and how ideas about smart cities become reality, what has been overlooked in present studies on smart cities, and what would eventually lead to such a development. If smart cities become a reality, they would constitute an interesting arena for studying business and interaction change. Such studies may, as discussed here, be based on the business network approach, but social network analyses also create interesting lenses to grasp network changes, collaborative formations, and challenges and opportunities that occur as a consequence of the digitalisation and when individuals engage in networks.

One interesting way to elaborate on smart cities would be to study history. Medieval cities, for instance, where local production was quite frequent, could be interesting to study in terms or network structures and the organising of business. Such studies would depart from historic data (cf. Ford and Redwood, 2005) and maps, for instance.

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