

Smart Governance in Practice

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Smart Governance in Practice

Smart governance in de praktijk
(met een samenvatting in het Nederlands)

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With much enthusiasm I applied for this research position since it concerned a theme wherein I had been for quite some time interested and involved: partnership among diverse actors to improve the quality of life in cities. And the exploration of this theme in different geographies made this position even more fascinating, together with a new element: the use of technological means. It sounded fascinating since digital technologies had started to be increasingly seen as golden opportunities to encourage cooperation between citizens and governments to improve society, that is, “smart governance” - the topic of this dissertation. As these optimistic ideas were scarcely examined in the urban reality, plunging into this study was a captivating journey of discovery. These four years of exploring, reflecting and learning have expanded my views on this subject and granted me a splendid time. It enabled me to thoroughly immerse in activities where my passion lies: doing empirical research, interacting with a lot of different people, while seeking to contribute to society. During this inspiring period I could build and strengthen capacities and evolve this dissertation for which I am indebted for the invaluable support of others.

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1. INTRODUCTION

1.1. The smart city

The idea of the smart city, with its promise to address the swiftly accruing societal challenges in cities through the use of technology, has over the past decade increasingly gained in popularity and appeal. Local governments have consequently taken to incorporating smart city approaches into their development strategies (Camboim, Zawislak, & Pufal, 2019; Caragliu & Del Bo, 2019). The smart city theme has also generated interest among academics, resulting in a rapidly growing body of literature accompanied by conferences, organisations, articles, and special issues. The literature presents a cacophony of perspectives on the smart city, among which two major streams stand out: the technology-driven smart city and the human smart city.

The first focuses on technology- and data-driven urban management steered by governments, often in alliance with corporations, aimed at creating smarter cities *for* inhabitants (Gabrys, 2014; Kourtiti, Nijkamp, & Steenbruggen, 2017; Meijer & Thaens, 2016). A prominent example is the South-Korean “smart city” of Songdo, built completely from scratch. A ubiquitous computing environment is achieved through the extensive integration of information technologies to provide state-of-the-art urban supervision (Hollands, 2015; Shelton, Zook, & Wiig, 2015; Yigitcanlar & Lee, 2014). Computerization can also be implanted in existing cities. For instance, Singapore has established a solid technology base to optimise urban infrastructures and public services: it has a widespread data-driven sensor network for transport and energy, a fibreoptic network the length and width of the island, robot hospitals, autonomous – driverless – taxis, as well as vertical gardens and farms that regulate the temperature by absorbing and diffusing heat while collecting rainwater (Anthopoulos, Janssen, & Weerakkody, 2015; Berrone, Ricart, Duch, & Carrasco, 2019).

The second major stream of literature emphasizes the human smart city, a concept that has evolved more recently, partly in response to critiques about the technocratic smart city, seen as so devoid of people’s voices and capacities (De Oliveira & Santos, 2018; Meijer, 2017; Trencher, 2019). The human smart city maintains a more holistic approach, based on the understanding that, a rigorous ICT-based urban architecture notwithstanding, smart cities can only be created *together with* citizens. This concept, as its name suggests, centres on human demand, with as guiding principle the fact that the human smart city needs to be built on the

demands and perspectives of its people. At the same time, it clearly signals that human smart cities must be jointly created in collaboration with citizens, which is in the recent literature alluded to as smart governance and is discussed in the next section. Advocates of community empowerment, people's self-government, and the participation of civil society in public matters (Lister, 2015; Michels, 2012), ideas with which the human smart city is aligned, favour this concept over that of the more technology-driven, rational smart city (De Oliveira, Campolargo, & Martins, 2015; de Waal & Dignum, 2017).

The idea of the human smart city is slowly penetrating local government thinking, as illustrated by the left-wing, green coalition of Barcelona elected in 2015. It transformed its predecessor's smart city strategy by prioritizing citizens over technologies as city managers. The new administration has re-envisioned the smart city as an *"open, fair, circular and democratic city"* (Cardullo & Kitchin, 2018 p.19), where, to address societal challenges, control is shifted away from technology enterprises, private interests and the state toward the grassroots, civic movements and social innovation. To that end, it has established the digital participatory platform Decidim ("We decide" in Catalan), where inhabitants can contribute to any city issue with proposals, in debates and through voting (March & Ribera-Fumaz, 2018; Van den Bosch, 2018).

But do citizens exploit the opportunity this presents, and if so, how do they liaise with the municipality and what is their input? And who are these engaged citizens seeking to improve their city? In what ways do technologies like the Decidim platform support residents in becoming involved in shaping their city for the better? And does digital citizen-state collaboration in one city resemble that in another city and why (not)? Answering these questions presents a challenge, as state-citizen collaboration supported by technologies has remained scientifically underexposed. Shedding more light on this topic is the core focus of this dissertation.

1.2. Smart governance

Cities increasingly face societal challenges such as deteriorating air quality, socioeconomic polarization, health concerns, rapidly aging and ethnically diversifying populations, and

weakening public transport systems (Pereira, Parycek, Falco, & Kleinhans, 2018; Stratigea, Papadopoulou, & Panagiotopoulou, 2015). As the problems of the cities mount, they have outstripped the abilities of local governments to address these, leading these local authorities to seek collaboration with non-state actors (Allam & Newman, 2018; Yigitcanlar et al., 2018). In particular, tapping into civil society's unexploited energies is considered vital for public value creation (Baccarne, Mechant, Schuurma, De Marez, & Colpaert, 2014; Hajer, 2011).

Citizen-state collaboration offers a way to better meet inhabitants' demands in urban transformation processes and to provide local governments with additional resources, such as knowledge, time, finances, services. It can also contribute to aligning diverse societal demands to prevent future objections and thus delays in urban processes (Kubicek & Aichholzer, 2016; Sørensen & Torfing, 2016). These aspirations notwithstanding, forging collaboration has remained difficult: a broad layer of the citizenry never participates, there is a growing apathy among people in politics and public issues, state-citizen exchanges are modest and often entail unidirectional information provision instead of the joint city-making aspired to (Leyden et al., 2017; Wilson, Tewdwr-Jones, & Comber, 2017; Yetano & Royo, 2017).

The urban and collaboration challenges mentioned above explain the rising attention for and optimism concerning the use of technologies to collaborate on urban and policy development, in what has come to be called smart governance - the focus of this dissertation. Smart governance is understood in this study in line with the definition by Meijer & Bolívar (2016 p. 392) delineating it as *"crafting new forms of human collaboration through the use of ICTs to obtain better outcomes and more open governance processes"*. Smart governance is organically related to the idea of the human smart city as it offers a *modus operandi* that emphasizes its *"community-based"* (Tapscott & Agnew, 1999, p.37) and *"truly citizen-centric"* (Bătăgan, 2011, p.85) nature: citizens becoming vital drivers of urban transformation by actively engaging in, deciding about and shaping collective issues (Rodríguez Bolívar & Alcaide Muñoz, 2019; Ruijter, Grimmelikhuijsen, Hogan, et al., 2017). This definition demarcates the major components of smart governance: citizens, local governments (and hence citizen-state collaboration), technologies, and societal objectives.

The smart governance definition applied in this study reflects a more comprehensive understanding of this concept compared to elsewhere in the literature, where it tends to be explained in a narrower sense; examples include such descriptions as effective urban management by governments and other organizations, the restructuration of decision-making processes or the internal transformation of the local administration (Batty et al., 2012; Meijer & Bolívar, 2016). The definition used in this research is broader as it also underscores the innovative transformation of the external organization, i.e., the relationship and cooperation with non-state actors in the city, and specifically citizens, in the pursuit of societal purposes.

The potential for smart governance to deliver a breakthrough in the aforesaid urban and collaboration challenges is ascribed to the wide availability, easy accessibility and multifunctionality of technologies. They are not merely seen as tools to optimize city management but also as enablers of interactions, citizen engagement, and novel collective practices (Castelnovo, Misuraca, & Savoldelli, 2016; Sengupta et al., 2017). This optimism relates, on the one hand, to active citizens as they may well opt to grasp the available technological opportunities to bolster and expand their existing activities in the public domain (Aylett, 2013; de Vries, Boon, & Peine, 2016; Seyfang & Longhurst, 2013). On the other hand, using technology may also prod hitherto quiescent segments of the citizenry into taking part in initiatives, fostering a more intensive, innovative and diversified citizen-government collaboration (Charalabidis, Koussouris, Lampathaki, & Misuraca, 2012; De Oliveira & Santos, 2018; Meijer, Gil-Garcia, & Bolívar, 2016). It is therefore not surprising that these prospects have roused many city governments to launch collaboration projects, although smart city strategies often still focus on material facilities such as energy, mobility or security (Albino, Berardi, & Dangelico, 2015; van Winden & van den Buuse, 2017).

Beyond this highly optimistic strand of the literature, there is a growing body of studies expressing scepticism and criticising smart governance. Sceptics refer to prior studies on urban e-planning and e-participation that have exposed a low level of technology-enabled citizen engagement (Ertiö, 2015; Tambouris, Liotas, & Tarabanis, 2007). They doubt that the use of technologies can galvanise people into taking interest or action in public matters. Another critique refers to the position of citizens in the emergent smart city and in smart governance, stating that they are primarily steered by capitalistic agendas and computerized regulation.

According to this argument, citizens thus merely become consumers of novel smart products and services or/and data points in the extensive web of high-tech urban management (Cardullo & Kitchin, 2018; Datta, 2015; Joss, Cook, & Dayot, 2017).

A further disagreement in the literature refers to the prevalent universalist approach to smart governance. This universalism is disputed due to its “one best smart city” narrative that imposes a contextless perspective and requirements on the real-life, place-specific dynamics of cities (Meijer, 2016; Meijer, Gil-Garcia, & Bolívar, 2016; Raven et al., 2017; Walters, 2011). Between and within cities dissimilar social, economic, historical, geographic, and politico-institutional circumstances exist, which can shape smart governance regarding the ways in which citizens and local governments fulfil their roles, how technologies are applied, and the types of societal outcomes desired. Contextual aspects are thus increasingly recognized as probable factors, especially since smart governance is seemingly differently configured in different settings (Ruhlandt, 2018; Scholl & Alawadhi, 2016; Taylor Buck & While, 2017). This is apparent in the aforesaid case of Barcelona, where politics have substantially influenced smart city choices: the municipality’s paradigm shift emphasises citizens’ contributions over its predecessor’s tech-driven design and this has also prompted alternative uses of technology (Angelidou, 2017; van Buren, 2016).

1.3. Omissions in smart governance research

The concise literature review discussed above illustrates the increasing interest in smart governance, despite this topic having so far remained a niche within the broader field of smart city research. That the domain of smart governance has not yet established itself as a distinct research area is particularly evident from the large gap between the impressive number of smart city studies and the modest amount of work on smart governance (Bolívar, 2016; Ruhlandt, 2018). Therefore, this gradually accruing body of literature still displays theoretical and methodological research omissions that hinder a better understanding of the societally significant issue of smart governance.

A first – methodological - research inadequacy is the paucity of empirical reflections on smart governance, since studies in this field mostly encompass conceptualizations, assumptions, and

suggestions. Although some studies have recently emerged that examine governmental policies, they do not reveal how smart governance intentions on paper actually work out within the real-life urban system as a whole (Cardullo & Kitchin, 2018; Cowley, Joss, & Dayot, 2017; Vanolo, 2016). This empirical deficiency makes it difficult to position the contradictory perspectives on the beneficial - as the optimists claim - and the detrimental - as the critics argue - aspects of smart governance and to evaluate the “one-size fits all” versus the “context matters” narratives. Hence, the growing amount of attention notwithstanding, it is unclear to what extent smart governance is actually happening and if so, in what ways and under which conditions.

The second – theoretical – research omission relates to the failure to sufficiently consider the roles of citizens. As previously discussed, the role played by citizens in smart governance is very much a part of the debate about its benefits and drawbacks. Citizens are variously seen as the core of smart governance, or as irrelevant elements, data units or simply consumers in smart governance and smart city processes (Kourtiti et al., 2017; Nam & Pardo, 2011; Shelton & Lodato, 2019). However, studies are lacking that dive more deeply into the actual ways in which citizens provide input to technology-mediated initiatives, which in turn also relates to the aforesaid dearth of empirical research. This omission leads to puzzlement about the roles actually played by citizens in smart governance processes. It furthermore obscures how such “smart” citizen engagement occurs on the urban level, or in other words, how the participation performance of the city as a whole is impacted by its residents’ technology-enabled contribution to public issues: can a change in or expansion of citizen engagement citywide be ascribed to the use of digital resources? This urban-level understanding of citizen contribution is all the more interesting as local governments usually promote the “smartness” of the entire city, while the assumptions made about smart governance – whether positive or otherwise – are indicative of an overall pattern with respect to citizens’ position in the smart city.

A third, substantial – theoretical – lack in the research landscape refers to the role of the contextual setting. As previously mentioned, the context and its potential influence have been included in a number of studies (Meijer et al., 2016; Nam & Pardo, 2011; Raven et al., 2017; Ruhlandt, 2018; Walravens & Ballon, 2013). These authors argue that smart governance processes can be affected by local situational characteristics, such as societal, economic,

cultural and physical conditions that “*interact with a series of political, administrative, and technological choices regarding the use of new technologies for urban governance*” (Meijer, 2016 p.75). They identify the structure and degree of autonomy of local governments as probable determinants of smart governance, which are shaped by transnational, international, national, regional, and local levels of regulation (Batty et al., 2012; Scholl & Alawadhi, 2016; Taylor Buck & While, 2017; Walravens, 2012). A further factor relates to community characteristics, i.e., societal actors’ willingness and capabilities to contribute to technology-facilitated joint problem-solving (Meijer, 2016; Ruhlandt, 2018). Despite these few studies, little knowledge is available about the impact of context on smart governance due to the absence of adequate theoretical and empirical research into this relationship. As a result, context is mainly referred to in the debates as a likely factor in smart governance and as a future research avenue (Haarstad, 2017; Roche, 2016; Ruijter, Grimmelikhuijsen, & Meijer, 2017; Walters, 2011).

Finally, a fourth - methodological - research deficit concerns the systematic approach - or more specifically, the striking lack thereof - in the few empirical publications available on smart governance. These are mainly centred on single case studies, which points to a lack of multiple cases and of an (internationally) comparative perspective. While single cases might produce rich details in specific aspects, they are not appropriate for conducting cross-country or cross-case assessments of smart governance. This precludes the possibility of identifying and comparing both the evolving practices in various contexts as well as the drivers underlying their (dis)similarities (Berntzen & Johannessen, 2016; Jiang et al., 2016; Khan et al., 2017; Ruhlandt, 2018). As a consequence, it is difficult to draw more general conclusions about the most important tendencies of smart governance, which similarly impedes theory development.

These research deficiencies thwart efforts to get a grip on the complex phenomenon of smart governance and make it difficult to check the accuracy of the theoretical formulations in practice. It is therefore unclear whether the initiatives unfolding in cities indeed embody smart governance as envisaged by the optimists or fulfil the prophecies of the doomsayers. Nor is the role of context understood. These blank spaces call for more enquiry, in order to deepen the empirical knowledge of the societally vital, though contested, issue of smart governance. Additional study will also aid in theory development. This is the central mission of this dissertation; it seeks, beyond the optimistic and the critical streams of literature, to contribute

to the small body of empirical works on smart governance by addressing the aforementioned research inadequacies.

This study, therefore, sets out to delve more deeply into the empirical details of smart governance on the ground. To this end, it zooms in on actual practices from multiple cases and cities situated in different countries to grasp real-life implications from a broader, comparative perspective. Practice is understood in this study as a phenomenon that helps to get closer to practical activities and direct experiences vis-a-vis conceptual assumptions (Orlikowski, 2010). Practice thus serves here as a research lens to bridge the said gap between theory and the lived reality. That practice matters for understanding or improving the reality of intricate social processes is demonstrated by the emergence of evidence-grounded theory (Corradi, Gherardi, & Verzelloni, 2010; Orlikowski, 2010; Stoll, Poon, & Hamilton, 2015). This reveals a gap regularly identified between practice and theory, namely between what is actually happening and what researchers or others claim is happening through their models, frameworks and prospects. In particular, studies about human-technology interactions, a theme clearly related to this research, have verified the usefulness of recognizing what is happening in practice, namely that abstractly inscribed features and effects of technology use in human exchanges have been overhauled by alternative insights from practices deviating from concepts, plans and designs (Baskerville & Myers, 2004; Orlikowski, 2010). Practices of smart governance will be scrutinized in this dissertation by focusing on the two theoretical aspects that have remained unexplored: citizen engagement, and the influence of the context. This empirical and multifocal approach surpasses the conceptual perspectives prevalent in the literature and scrutinizes vital, interconnected aspects that have hitherto remained largely uncharted, to seize the actual dynamics of smart governance and to refine its theorisation.

1.4. Theoretical background

1.4.1. Building blocks: citizen engagement and the contextual influence

The previous section argued that a thorough understanding of smart governance necessitates a more empirical, and broader perspective, particularly in view of important dimensions which have hitherto been overlooked. Hence, this dissertation sets out to empirically examine smart governance by inspecting its practices in relation to two central issues: 1) the role of citizens,

which is cited as a crucial element in building human smart cities, and 2) the context, which potentially plays an influencing role in shaping smart governance processes. Since these issues are not or only sporadically addressed in research on smart governance, this section explores the literature on adjacent topics, to discover whether it can offer conceptual support for the examination of these issues.

Citizen engagement

Although the notion of smart governance puts great emphasis on citizens' roles in shaping public issues, the relevance of civic engagement has been globally recognized and urged since the 1970s (Guaraldo Choguill, 1996; Michels & De Graaf, 2017). Citizen participation is considered vital for various reasons, including democratic renewal, societal justice, for restoring citizens' diminishing trust in politics, lending more legitimacy to public decisions, enhancing citizens' social and democratic competences, and for community cohesion. In addition, incorporating citizens' resources into urban planning, policymaking or co-producing public services is commonly mentioned as means to improve the socio-spatial quality of cities (Boonstra & Boelens, 2011; Kubicek & Aichholzer, 2016).

The literature on citizen engagement has grown exponentially in the last decades and covers a broad range of aspects, such as the different types of cooperation, the scope and content of civil contribution, the motives and socioeconomic background of contributing citizens, participants' satisfaction, authorities' responsiveness, and - to a lesser extent - societal outcomes (Kubicek & Aichholzer, 2016; Loeffler & Bovaird, 2018; Yetano & Royo, 2017). These insights can be relevant for this dissertation, as the newer studies make various claims about citizens' roles in smart governance, without further analysing these in detail. Also, these claims are usually based on assumptions arising from policy documents that expose the intentions but say little about the implementation in practice (Berntzen & Johannessen, 2016; Cardullo & Kitchin, 2018; Cowley et al., 2017; Vanolo, 2016).

Two major categories of civic involvement emerge in the literature on citizen participation, namely 1) the top-down engagement of citizens in governmental projects, and 2) the bottom-up initiatives launched by citizens (Agger, 2010; Hargreaves, Haxeltine, Longhurst, & Seyfang, 2011). Both are discussed in more detail in the following paragraphs.

Top-down citizen engagement

In top-down participation processes, municipalities involve citizens to complement decision-making in governmental projects in various ways, such as statutory hearing procedures for land use planning, legal provisions for petitions and referenda, as well as all kinds of local, theme-specific participation processes such as urban development, citizen budgets, neighbourhood revitalization, and environmental protection (Chu, Anguelovski, & Carmin, 2016; Hambleton & Sweeting, 2014; Krenjova & Raudla, 2017; Michels, 2017). In these processes, citizens can have a variety of roles with differing levels of influence, depending on the preferences and attitudes of the local government. This is shown in Arnstein's (1969) well-known ladder of participation, which explains non- or passive participation as the result of manipulation and tokenism by local authorities and attributes citizen control to an empowering attitude on the part of the local government.

Although citizen participation has in some cases resulted in positive processes and societal outcomes, the literature regularly makes mention of modest citizen roles that take the form of one-way information provision or consultation (Hong, 2015; Loeffler & Bovaird, 2018; Michels & De Graaf, 2017). This is explained by various limitations such as the aloof mindset of local governments, the laborious and time-consuming nature of participation processes, the usual overrepresentation of well-educated, socially involved and politically interested citizens, and the general decline of people's interest and trust in politics (Gaventa & Barrett, 2010; Kubicek & Aichholzer, 2016; Wilson et al., 2017).

Top-down citizen engagement is interesting for the study of smart governance practices, as such initiatives are commonly launched by municipalities in the hope that technology use will help to overcome these limitations in participation procedures and to intensify citizen-state collaboration. This confidence in technology stems from a versatility that allows more accessible and clear information provision, easier communication that is not bound by time or place, and more in-depth exchanges between participants (Leyden et al., 2017; Pereira et al., 2018; Stratigea et al., 2015). Technologies facilitating collaboration are manifest in diverse forms, such as Big Data, Cloud community services, crowdsourcing platforms, open data portals, social media, online participatory platforms, civic hackathons, smart energy appliances,

and geo-referenced participatory planning systems (Geertman, Ferreira, Goodspeed, & Stillwell, 2015; Ruijter, Grimmelikhuijsen, Hogan, et al., 2017; Webster & Leleux, 2018).

Various studies on the use of technology in government-led participation processes have given rise to disappointment, when such use failed to result in the hoped-for intensification of citizen participation and two-way exchanges between policy-makers and inhabitants (Mukhtarov, Dieperink, & Driessen, 2018; Wehn, Rusca, Evers, & Lanfranchi, 2015). At the same time, other studies report encouraging outcomes in terms of improving multiparty communication, unleashing a stronger public voice, civil mobilization, and learning (He, Boas, Mol, & Lu, 2017; Pelzer, Geertman, & van der Heijden, 2016). These mixed research results are still provisional and lack sufficient empirical evidence. They are therefore inconclusive: using technologies remains in the literature as a prospect still to be effectuated in participation processes (Chiabai, Paskaleva, & Lombardi, 2013; Kleinhans, Van Ham, & Evans-Cowley, 2015; Kubicek & Aichholzer, 2016).

Bottom-up citizen initiatives

The other main strand of the literature on citizen participation deals with bottom-up initiatives, and illustrates how citizens' self-propelling actions have gradually gained ground in the public realm (Magnani & Osti, 2016; Peterson & Bentley, 2017; Wampler & Avritzer, 2016). Such agile citizenship has traditionally been researched within the context of social movements of high politics challenging the state (Grabs, Langen, Maschkowski, & Schöpke, 2016; McCarthy & Zald, 2017). However, the focus has gradually expanded to the "*micro-political participation*" (Bang, 2004 p. 2) of citizens engaged in "*the small politics*" (p.27) of everyday, pragmatic concerns of their living environment. This has generated a growing body of literature about active citizenship, otherwise known as self-governance, Do-It-Yourself democracy, bottom-up governance, civilian initiatives, grassroots movements, social and community entrepreneurship (Bang, 2004; Blanchet, 2015; Crossan, Cumbers, McMaster, & Shaw, 2016; Edelenbos, Van Buuren, Roth, & Winnubst, 2017).

Active citizens are self-reliant, capable people who try to make a difference in contemporary lifeworlds by seeking solutions for common societal issues. They mobilize resources, create social capital and build trust to take care of either particular local needs (e.g. creating a green

space, more safety, playground within their own neighbourhood) or broader societal concerns (e.g. climate change) (Bang, 2004; Hatzl, Seebauer, Fleiß, & Posch, 2016; van Dam, Duineveld, & During, 2015).

Active citizens organize themselves and operate in different ways, which is reflected in the various types distinguished in the literature. One type is represented, for example, by expert citizens who are knowledgeable and rational professionals from civil society. They pursue vertical networking with other professionals across all sectors including governments, businesses, and civil society (Bang, 2004; Tritter & McCallum, 2006). By contrast, the group of “everyday-makers” is made up of lay people addressing, on a daily basis, the shared issues of their locality. These ordinary citizens try to make a difference in their contemporary lifeworlds, by adhering to the following basic principles: *“do it yourself; do it where you are; do it for fun, but also because you find it necessary; do it ad hoc or part-time; do it concretely, instead of ideologically; do it with the system, if need be”* (Bang 2004, p. 26). Another example are the social or community entrepreneurs operating either outside or as part of the market. They create innovative solutions for direct community challenges, but can also mobilize ideas and resources for sustainable societal transformations (Alvord, Brown, & Letts, 2004; Fortunato & Alter, 2015).

The reason citizen initiatives can catalyse smart governance practices is probably because these self-motivated actors have the ability to creatively exploit technologies to reach their goals. This has recently become a subject of academic interest, producing studies exploring how individuals and communities experiment with technologies and diffuse novel socio-technical practices in society (de Vries et al., 2016; Niederer & Priester, 2016; Seyfang, Hielscher, Hargreaves, Martiskainen, & Smith, 2014). Examples are local communities in open source software, renewable energy cooperatives, the movement of transition towns or online neighbourhood fora (Aylett, 2013; de Jong, Von Hippel, Gault, Kuusisto, & Raasch, 2015; van der Schoor & Scholtens, 2015).

These civil initiators can become emerging forces in societal change, as they not only tinker with technology, but try to embed this into their wider business, social and community context (Chiabai et al., 2013; de Vries et al., 2016). This energetic torrent from civil society is thus

frequently perceived as a substantial addition to government-led participation processes to address urban challenges. Hence, local governments may be willing to stimulate and facilitate bottom-up initiatives, something that in some cases is even explicitly requested by citizens, although conversely, activists may in some situations reject support in order to sustain their autonomy (Bang, 2004; Frantzeskaki et al., 2016; Hajer, 2011; Osborne, Radnor, & Strokosch, 2016).

These details from the literature provided useful insights into the range of issues concerning citizens' contribution to collective matters, which can orient the thinking about citizen roles in smart governance. At the same time, this concise literature review also identified a gap between the theme of citizen engagement and the recent notions of smart city and smart governance. This hiatus precludes an understanding of the actual manifestation of technology-enabled citizen engagement, not only of how and the forms in which this is realized in the urban landscape, but also whether and the extent to which citizens employ technologies to launch bottom-up initiatives considered to be valuable contributions to collective matters. This research gap is addressed in this dissertation.

The contextual influence

The other essential - yet neglected - dimension in smart governance is context. Next to citizen engagement, this is another major focus of this dissertation. Context can be depicted as an omnipresent factor that encircles and possibly influences smart governance practices. The impact of context emerged from a number of contextual studies dating from the late 1970s that highlighted the importance of complex interactions between societal actors and their environments. After all, *"a context-free theory is unlikely to produce powerful explanations or accurate predictions"* (Berman, 1980, p.206). This explains yet again why the context-free nature of existing conceptualizations of smart governance require the kind of in-depth investigation aimed at in this dissertation.

The relationship between context and social interactions has been investigated in different fields of study – e.g. organisational studies, policy implementation, collaboration, and urban studies- that relate to and are therefore insightful for the present scrutiny of smart governance practices (Steinberg, 2015). These studies explore how actors, organisations and their activities

in specific local settings are both part of and influenced by their broader historical, social, economic, political, geographical, cultural, policy and institutional contexts.

The aforesaid dimensions show how widely context, as a factor in collaboration processes, is defined. This broad definition forms the backbone of various concepts, such as contingency theory, community coalition action theory, contextual interaction theory or the national specificity argument, among others (Danese, 2011; Rungtusanatham, Forza, Koka, Salvador, & Nie, 2005; Sousa & Voss, 2008). These concepts employ different approaches to specify the contextual environment in order to study its influence. For instance, a constraint might be the national context and culture, which is in some cases operationalized on the basis of Hofstede's (1994) classification: power distance, uncertainty avoidance, individualism-collectivism and masculinity-femininity (Flynn & Saladin, 2006; Rungtusanatham et al., 2005; Sousa & Voss, 2008), and in others as the country's development level in terms of its economy, politics, culture, and demography (Mersha, 1997). Other studies delimit the broader context using additional variables such as community characteristics (e.g. size, heterogeneity, knowledge, motivation, collaboration history), the problem and policy context in question, or the availability of natural resources (Bressers & de Boer, 2013; Kegler, Rigler, & Honeycutt, 2010; Ostrom, 2005).

Of the aforesaid contextual determinants, the institutional milieu is presumably a vital determinant in smart governance practices as it is an oft-cited factor in shaping human interactions, public policy formation, collaboration, and organisational procedures (Helmke & Levitsky, 2004; Lijphart, 2012; March & Olsen., 1996; North, 1990). Here, the overarching schemes of rules, traditions, norms, and practices define the landscape within which individuals and organizational actors interact and how they pursue societal development. As such, institutions give social exchanges in public matters meaning, direction, and legitimacy, thereby constraining or stimulating them. Hence, variations in institutions across places create opportunities for variations in policy-making, cooperation processes, and assumedly also in smart governance practices (Ansell & Gash, 2008; Pierre, 1999).

How formal institutions - e.g. legal frameworks, political systems, constitutions, and regulations - can guide smart governance practices can be gathered from Lijphart's renowned work about

public policies, governance and societal development (Ansell & Torfing, 2016; Bryson, Crosby, & Bloomberg, 2014). His institutional classification divides modern democracies into two major models - consensus and majoritarian - that are held to determine the entire socio-political landscape in which actors and organisations operate and interact (Lijphart & Crepaz, 1991). These different democratic systems have been found to produce variations in interaction patterns in respect of purpose, means, stakeholder composition and societal outcomes. Since these patterns also apply to smart governance practices, the impact of formal institutions is of particular relevance for the present dissertation. For instance, citizen engagement and citizen-state deliberation have been found to be contingent on the formal institutional context, particularly the legal provisions, power distributions, and the administrative traditions (Abelson & Gauvin., 2006; Kubicek & Aichholzer, 2016; Loeffler & Bovaird, 2018). The extent to which citizens contribute to policy-making, and hence potentially, too, to smart governance practices, is likely to be greater in consensus democracies, as these are power-sharing systems operating on ideals of inclusiveness, broad representation, and the distribution of power. By contrast, majoritarian democracies may well deter citizen engagement, as these are power-concentrating systems that are built upon ideas about the importance of decision-making by the actual powerholders (Kittilson & Schwindt-Bayer, 2010; Lijphart, 2012; Powell, 2000).

Beyond formal institutions, informal factors such as customs, conventions, codes of behaviour, cultural values and beliefs are emphasized in the literature as essential factors guiding policy-making and urban governance processes and thus may also affect smart governance practices (Follador, Duarte, & Carrier, 2018; Helmke & Levitsky, 2004; Pierre, 1999). They represent societal norms and principles that affect policy choices, and collaboration patterns, such as structure, objectives, stakeholder composition, and outcomes (Hansen & Coenen, 2015; Pierre, 2005a; Raven et al., 2017). These patterns are comparable to those in smart governance practices, making it plausible to assume that there, too, informal institutions play an influencing role. This impact on urban governance, as well as, in all likelihood, on smart governance practices, is evidenced by the role ascribed to market forces in society: the forms of cooperation and eventually, a city will evolve differently if business interests prevail over community demands in urban development (Kantor, Savitch, & Haddock, 1997; Pierre, 1999).

Finally, the interplay between contextual conditions on urban, national and global scales can also influence smart governance practices. This multiscale perspective on (smart) city development has been triggered by the realities of globalisation (Brenner, 2009; Engelbert, van Zoonen, & Hirzalla, 2019; Mälgand et al., 2014; Shelton et al., 2015). It emphasizes that urban governance is produced through engagements with *“parts of elsewhere”* (McCann & Ward, 2010, p.177), which cannot be seized through a single-locale focus (McGuirk, 2012; Ward et al., 2011). Therefore, any kind of urban governance needs to be understood as global-local assemblages: global pressures and opportunities provoke responses at the urban level, which eventually make up local politics, spatial restructuring and governance patterns in cities (Castells, 2012; Jacobs, 2012; Prince, 2017). This perspective may be equally valid in relation to the smart city and smart governance, as both are globally circulating concepts that are adopted locally in different cities around the world.

These insights show the variety and complexity of the issue of how context shapes urban politics, and city development. These processes are similar to smart governance practices making it plausible to posit that such practices may also be affected by the contextual factors discussed. This complexity stems from the broad repertoire of context, which consists of a highly diverse range of dimensions such as demography, economy, spatiality, politics, history, “hard” and “soft” institutions, which, moreover, exist and interact on multiple - i.e. project, urban, national, and global - scales. These exogenous contextual factors have been regularly found to be of influence in organisational and collaboration practices; it is, however, hard to generalize their impact mechanisms, as the themes and contextual aspects examined in the various studies are very diverse.

These literature insights reveal how important it is to take the context into account when striving for a better understanding of smart governance and its actualization forms. At the same time, the variability and complexity emerging from these insights also show the difficulty of determining the impact of the context on collaboration processes. Similarly, this complexity makes it challenging to find appropriate methods to examine the working of context. These difficulties probably go a long way towards explaining why the issue of context has remained unexplored in studies about smart governance, thus hindering a deeper understanding of how technology-enabled collaboration between citizens and the state are affected by specific

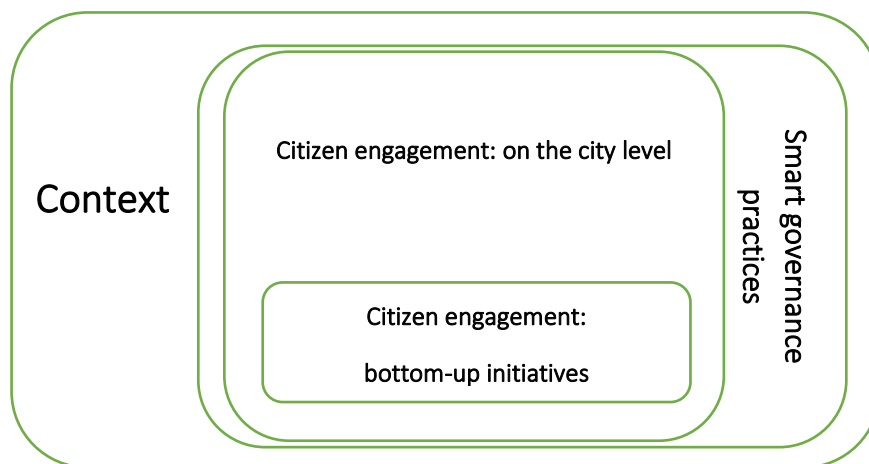
contextual circumstances. This research gap makes it imperative to investigate more systematically the relationship between context and smart governance – an academic black box that this study intends to unlock.

1.4.2. The smart governance framework

Based on the literature insights presented in the previous section, a conceptual framework is developed, which structures the main research themes in this dissertation. This structure has been inspired by the Institutional Analysis and Development (IAD) Framework that is widely used in the policy studies literature to explore collaboration in societal problem-solving, such as the local management of common-pool resources (e.g. fisheries, forests, water), infrastructure governance or policy-making (Clement, 2010; Polski & Ostrom, 1999). The framework provides a useful approach to structuring research on smart governance, as it offers a decomposable scheme that allows a complex phenomenon to be analysed by breaking it down into several components and handling them as layers of a larger system (Auer, 2006; Ostrom, 2005).

The customized framework used to investigate smart governance in context is visualized in Figure 1.1. It builds on two core components that represent the topics of this dissertation: 1) smart governance practices centring on citizen engagement, and 2) the influence of context on these practices.

Figure 1.1: The smart governance research framework



The “smart governance practices” component represents the action situation wherein participants provide input reflecting their positions, roles, and resources - e.g. knowledge, information, power, technologies, skills – to share and achieve joint objectives within the wider community (Ostrom, 1994; Polski & Ostrom, 1999). This component is specifically dedicated to citizen engagement, which will be examined in terms of two distinct aspects: 1) its city level manifestation, and 2) bottom-up initiatives. The first relates to the analysis of citizens’ roles in smart governance practices in the city as a whole. This is a useful approach for two reasons: urban governments usually talk about the “smartness” of their city as a body; and because the different - optimistic or critical - ideas in the literature indicate a general pattern of the function of citizens in the smart city. The other aspect - bottom-up initiatives - is relevant because civil initiators are perceived as emerging forces to address urban challenges and to bring about societal change. Less is known, however, about whether or how they utilize technological opportunities to support activities or innovations contributing to public value creation.

The other core component signifies the “context”, which is shown as an omnipresent factor encompassing smart governance practices. The context consists of the broader complex of social, cultural, institutional, political, economic and physical conditions that construct the environment within which smart governance practices, and, in particular, citizen engagement, occur. This suggests an influencing relationship wherein the contextual setting impacts the ways in which actors (inter)act and their smart governance practices evolve.

This conceptual framework, incorporating the main research issues and their potential relationships, has guided the conduct of this dissertation research. The research objectives and questions are outlined in the next section.

1.5. Research aims and questions

As discussed in the previous sections, it is important to focus on the *issue of smart governance* because:

- cooperation between government agencies and citizens is repeatedly emphasized as being vital to solving the manifold challenges rapidly accumulating in cities; challenges which may substantially addressed by using technologies;

- smart governance offers a promising approach to create “human” smart cities that build on people’s aspirations and ideas;
- despite its societal significance, it has not been sufficiently researched.

Furthermore, it is relevant to examine the *materialization of smart governance – i.e. smart governance practices* - in cities because:

- urban regions worldwide are increasingly formulating ambitions and strategies to promote the use of technologies for collaboration between local governments and citizens to address public issues;
- these ambitions have resulted in technology-enabled collaborative initiatives in many cities, yet insight into whether and how they materialize in practice, and thus how they relate to the polarized debate about their benefits or disadvantages, is lacking.

In addition, the previous sections made it clear that giving special attention to *the role of citizens* in smart governance practices is of relevance because:

- citizens’ active engagement is considered to be a core part of the human smart city and hence of smart governance;
- citizens’ engagement is argued to be essential to building more sustainable cities and addressing societal problems as it helps to identify and consider people’s demands for urban development and to tap into additional resources such as inhabitants’ knowledge, time, and inventiveness in finding innovative urban solutions;
- the use of technologies is expected to contribute meaningfully to citizen engagement in public matters;
- next to optimistic views on citizens’ roles in smart governance, there are also pessimistic perspectives, a contradiction that is currently unresolvable due to the lack of empirical evidence.

The final aim discussed was the decision to examine the *role of contextual factors* in shaping smart governance practices because:

- the context is apparently responsible for the varied patterns of smart governance practices in different circumstances. This is something, which is increasingly being pointed to in the literature as a potential factor;

- despite the growing recognition of the contextual influence on smart governance, there is little theoretical and empirical exploration and support for this idea.

These summarizing reiterations lay bare the main research theme of this dissertation, namely the issue of smart governance practices. This is divided into two sub-themes: 1) citizen engagement actualizing on the urban level and through bottom-up initiatives, and 2) the role of the context in shaping smart governance practices. In view of the aforementioned insights, the inquiry was guided by the following overarching research question:

What are the roles of citizens in smart governance practices and how does the contextual setting influence these practices?

This question can be broken down into two lines of empirical enquiry and their corresponding sub-questions:

RQ 1: What roles do citizens play in smart governance practices? The first step taken to find an answer for this question was to conduct a systematic literature review (Chapter 2) in order to map the existing theoretical and empirical knowledge on smart governance. Citizen engagement - a main component of smart governance - received specific attention, too, to learn about its current status in the research landscape. Based on the insights gathered in the review, the study could pursue this research question by investigating technology-enabled citizen engagement manifesting on the urban level and in bottom-up initiatives.

The city-level focus of this question sought to reveal what types of citizen roles are taking shape in the city as a whole. This approach goes beyond the level of single cases or projects found in most studies so that a wider view could be gained of how smart governance and smart city development evolve within the urban landscape. It enabled empirical reflections to be set against municipalities' statements and scholars' claims about citizen roles in the smart city in general. To that end, Chapter 4 offers an overview of how citizens contribute to collective matters within the city of Utrecht. Similarly, Chapter 5 examines what is happening city-wide by conducting an international comparison that assesses patterns of smart governance

strategies in three cities located in different countries, in which the contributions of citizens form one of the focus areas.

Answering the other part of the question required analysis of bottom-up initiatives: how individual actors or communities, with the support of technology, voluntarily take action on collective matters. This focus is intriguing, since much has been written about committed citizens and the grassroots initiatives contributing to their living environments, yet how these actors make use of technologies to realize their ambitions still remains largely unknown. In Chapter 3, an in-depth case study of a bottom-up sustainability initiative is provided. And although Chapter 4 and Chapter 5 emphasise other aspects of smart governance practices, they also offer sufficient insight into the movements of active civil actors dedicated to upgrading their living environment through technological applications.

RQ 2: How does the contextual setting influence smart governance practices? The goal of this question was to explore the role of the contextual environment in smart governance practices. This enquiry is crucial since the context apparently shapes smart governance practices, although the ways in which it does so have hitherto remained unexplored. One way to study the influence of the context is through a systematic focus on a specific factor. This approach was followed in Chapter 5, where the institutional context is examined in three urban environments in three different countries. A second, more explorative and open method is employed in Chapter 2, where evidence of the effect of any conceivable contextual dimension on smart governance is sought. Finally, in a more indirect and inductive manner, Chapter 3 and Chapter 4 also provide insights into the ways in which contextual factors affect smart governance practices.

The research questions and how they are addressed in the various chapters are depicted in Figure 1.2 at the end of this Introduction.

1.6. Research design

This section introduces the international academic collaboration that formed the research background of this dissertation and provides a chapter-by-chapter outline of the research design.

1.6.1. The “SmartGov” research partnership

The research approach in this dissertation was shaped by the context of an international research collaboration entitled ‘Smart Governance for Sustainable Cities (2015–2019)’. This transnational, multi-disciplinary project examined the value of technologies for engaging citizens and for state-citizen collaboration in public issues such as urban development and societal challenges. The project involved research teams from the Netherlands (Utrecht University), United Kingdom (Stirling University) and Brazil (Fundação Getulio Vargas in São Paulo).

These three cities were selected because they demonstrated ambitions and practical technological applications for participatory and societal objectives. Utrecht is recognized as a strongly competitive EU region in terms of innovation, quality of institutions, infrastructure (including digital networks) and measures of health and human capital (the EU Joint Research Centre 2013). The city of Curitiba was a top-ranked city on the IPCT Brazilian Index of Digital Cities 2012. In addition, Curitiba has been acknowledged as a pioneer in innovative transportation solutions and responses to climatic changes (Mercier, Duarte, Domingue, & Carrier, 2015). Glasgow has become a designated ‘smart city’: it beat 29 other cities in 2013 to win the £24m Future Cities grant from the UK government to develop a showcase of how cities can improve the lives of citizens by making the most of new technologies (Wakefield, 2013). Although the cities of Utrecht, Glasgow, and Curitiba differ in population size, they can each be considered mid-sized urban areas within their wider metropolitan settings (Brinkhoff, 2019). The distinctive institutional, economic, political, socio-cultural and spatial contexts of each city made it possible to study and trace the relationship between context and smart governance and to build a context-sensitive theory.

The research methodology of the collaborative “SmartGov” project implied a diversified agenda: the conduct of a systematic literature review to map existing knowledge about smart governance and its relationship to sustainable development; the set-up of a comparative analytical framework to enable an analogous empirical approach in the three cities; and, in support of the empirical research in each city, the study of different cases, organizing interviews with diverse stakeholders involved in the cases selected, field visits and other events related to

the research theme; in addition, based on the research insights, the implementation of a knowledge management system where government officials, scholars, experts or anyone interested in smart governance could exchange ideas and experiences.

The “SmartGov” collaboration put great emphasis on increasing the practical and societal relevance of this international research project, especially to ensure its value for policymakers. To that end, the “SmartGov” researchers established close relationships with the municipal governments of the three cities during the four-year trajectory. This engagement with practitioners was vital for mutual learning. It helped the academics to gain insights into governmental questions, demands, and dilemmas concerning smart governance and the smart city that are hot issues for public servants. These insights were utilized to formulate research themes that are actually relevant for policymakers. Moreover, the narrow liaising between the researchers and the municipalities was useful in keeping governmental officials updated on the research findings and for receiving their comments and suggestions.

The practical value of the SmartGov project was also enhanced by annually organising a virtual conference that was attended by numerous urban actors, including governmental officials, societal organisations, professionals, businesses and citizens. These yearly sessions aimed to stimulate discussion between the participants and to share lessons from smart governance case studies from Curitiba, Utrecht and Glasgow - to learn about these cities’ encouraging and disheartening experiences (e.g. which approaches worked well and which did not?); to recognize the differences and similarities within the three cities concerning the ambitions, strategies and implementation of smart governance practices; to understand how the lessons learned could be used in the three distinct urban contexts (e.g. what could and what would not work in another context?). The conferences also gathered the opinions, ideas and recommendations of non-academic participants on the cases discussed and the research outcomes.

1.6.2. Chapter outline

This dissertation is based on a qualitative research design. Chapters 3–5 discuss a series of case studies that apply different yet complementary approaches that help to create a more

thorough understanding of smart governance practices. The data for these studies was collected from October 2015 - December 2018.

Chapter 2

This chapter presents the systematic literature review which was conducted to provide the conceptual and empirical fundament for this dissertation. The aim was to achieve conceptual clarity with respect to smart governance by identifying its major components, as well as to explore the link between smart governance and urban sustainability and how this is influenced by contextual factors. As such, the review inventories knowledge gaps and conceptualizes context-sensitive smart governance to guide the direction of the empirical research in this dissertation. This study followed the Prisma Systematic Literature Review Method (www.prisma-statement.org), which consists of various methodical steps including developing a protocol and clear criteria for the selection of publications (Moher, Liberati, Tetzlaff, & Altman, 2012). This led to the selection of 114 journal articles at the interface of multiple disciplines such as Public Administration, Urban Studies, Spatial and Planning Science, Computer Sciences/IT, Management and Economics, among others. These articles were systematically encoded and analysed.

Chapter 3

This chapter presents an in-depth examination of a single case through which to analyse the evolution of a specific type of bottom-up smart governance. It combines the literature on citizen participation, grassroots initiatives, entrepreneurship and innovation studies to develop a new, i.e. the local entrepreneurial concept of technology-based bottom-up initiatives. To illustrate and refine this novel concept, it has been empirically applied to a best practice case of a citizen initiative: the Smart Solar Charging project, a community-based sustainable energy and mobility system launched by a local entrepreneur in Utrecht. The data collection comprised various methods, including extensive desk research, which involved analysing different types of off- and online documentation (a total of 52); semi-structured interviews (a total of 14) with members of public, civil and commercial organizations; and attending gatherings and events (a total of 6).

Chapter 4

In this chapter, a nested multiple-case study design was adopted to better understand how citizen engagement in collective matters is actually enabled by the use of technologies on the city level. This study draws on a combination of citizen participation and smart city literature, on the basis of which citizen engagement is reclassified. This classification is employed to define the roles that citizens play in technology-facilitated urban projects in the city of Utrecht. Utrecht was selected because it exemplifies many other cities around the globe: as a midsize municipality it faces the sustainability challenges associated with urban expansion, which the city seeks to solve by promoting the alignment of societal actors with technologies. Within Utrecht, twelve initiatives were selected based on specific criteria. The data collection process comprised various methods, starting with detailed desk research covering all manner of traditional and online documents (a total of 49). This was followed by in-depth interviews (a total of 36) with the city officials in charge of the projects selected, as well as in some cases with other actors, such as citizens, external professionals, and companies. To enrich the data that was collected, field observations were added (a total of 8) and a number of events were attended (a total of 13).¹

Chapter 5

In this chapter, a comparative multiple-case study design was used to reveal how smart governance practices take shape in different cities and the role of the institutional context herein. Three cities with dissimilar institutional contexts were selected: Glasgow, Curitiba, and Utrecht. For the purpose of this research, initiatives in each of these cities reflecting the smart governance strategy of the cities were chosen for study. The result was a heuristic framework that helps to understand smart governance in diverse urban environments in relation to their institutional context. The data collection process started with thorough desk research to analyse a broad range of documents and online media (a total of 83). It included a specific

¹ As part of the data collection the author of this dissertation also participated in a 4-month living-lab experiment initiated by the Municipality of Utrecht. This experiment aimed to collectively design a technological tool for participatory urban development that would enable the collective design of the emerging “smart” district Merwede Kanaalzone. This joint city-making process was enriched by insights from this academic research, while the experiences acquired from the living-lab experiment contributed to the content of this chapter and the dissertation as a whole.

literature review to identify the institutional context of the three cities, on the basis of which expectations were formulated. Next, in-depth interviews (a total of 58) were organized with a variety of actors representing the public, commercial, and social sectors. The interviews were held per city by the research team sited at that location. In addition, data were also obtained during field observations (10) and events (30) in the three cities. The data collection process was further bolstered through participation in the Merwede living-lab experiment mentioned in the outline of Chapter 4.

1.7. Academic and societal relevance

1.7.1. Academic relevance

The rise of the “smart city” as a potential remedy for societal challenges has generated considerable interest in its “how” dimension: the ways in which cities can actually be made smarter (Baccarne et al., 2014; Camboim et al., 2019; van Winden & van den Buuse, 2017). This has given rise to the notion of smart governance that lines up social interactions and technologies as a means to make cities more liveable, improve public services or co-design urban developmental plans (Allam & Newman, 2018; De Oliveira & Santos, 2018; Giffinger et al., 2007). Nevertheless, the field of smart governance is still immature, mainly as a result of the academic omissions identified in Section 2. Therefore, the scientific relevance of this dissertation lies in addressing some of these knowledge gaps, paying particular attention to the following issues:

1. *Empirical investigation*: The dissertation aims to contribute to the emergent field of study of smart governance and to the broader smart city research domain by conducting exhaustive empirical research. By doing so, it would surpass current research practices that address smart governance mainly based on conceptualization and assumptions (Gil-Garcia, Pardo, & Nam, 2015; Meijer & Bolívar, 2016; Scholl & Alawadhi, 2016; Wiig & Wyly, 2016). This study explores whether and how smart governance is actually materialising in cities by zooming in on smart governance *practices* based on rich empirical data collection from divergent urban and policy settings. In addition, it gains empirical depth and breadth by examining smart governance practices from different viewpoints: 1) the urban patterns of citizen engagement, also from an international outlook, through a comparison of several cities, 2) the bottom-up contributions

from citizens, and 3) the impact of the contextual background on these processes. The evidence-based knowledge thus acquired also helps to depolarize the ongoing debate about whether smart governance should be embraced or rejected.

2. Focus on the roles of citizens: An important contribution of this dissertation to the research community is its focus on a key issue of smart governance, which has hitherto remained marginalized in the literature: the roles of citizens. It specifically concerns the ways in which citizens, facilitated by technology, cooperate on and contribute to public issues. While citizen empowerment is an oft-cited argument for smart governance, counter opinions underlining citizens' restricted positions are also on the rise (Cardullo & Kitchin, 2018; Ghose & Huxhold, 2001; Joss et al., 2017; Sengupta et al., 2017). Surprisingly, this issue has to date not yet prompted enough curiosity - not even in the extensive literature on citizen participation - to undertake to empirically capture the reality of how inhabitants become involved in smart governance. This step is taken in this dissertation, in which citizen engagement in the urban system and in bottom-up initiatives is explicitly examined in diverse contextual settings. This study offers both a fuller, more colourful image and theory development of citizens' tech-mediated contributions to their city.

3. Focus on the contextual influence: The other key research theme in this dissertation refers to context, and more specifically, whether contextual factors influence the course and patterns of smart governance and if so, which and in what ways. It is a valuable academic effort, as the subject of context has persistently remained a black-box in the literature on smart governance. At the same time, context has been increasingly pointed to, though in a vague manner, as a vital determinant (Batty et al., 2012; Franz, Tausz, Thiel, & Yunus, 2015; Meijer & Bolívar, 2016; Taylor Buck & While, 2017). This black-box has been opened with the present research, with at its core, for the first time, systematic enquiry into contextual influence. On the one hand, an explorative study of the impact of context on smart governance via a systematic literature review was carried out; on the other hand, a methodical analysis of the effect of the institutional context in three cities in different nation states was performed. This novel approach enables a contextualized concept of smart governance to be articulated, lending this dissertation meaningful scientific relevance.

4. *An (internationally) comparative approach*: In the emergent field of smart governance, attaining more versatile and generalizable knowledge has been hampered by the prevalence of single cases that are scattered and handled in isolation. This dissertation has sought to advance this nascent research field by employing a multiple-case comparative approach that is applied for both intra-city and international inter-city analysis. Such a comparative approach has the added value of more widely exploring the research question, illuminating differences and similarities between the cases, and analysing the data both within each situation and across situations (Eisenhardt, 1989; Gustafsson, 2017). Hence, the comparison-based method applied in this study brings to the literature a more multifaceted and contextualized perspective on smart governance, which contributes to more general conclusions on its most important tendencies and thus to theory evolution.

1.7.2. Societal relevance

As cities increasingly face challenges such as socio-economic polarization, ecological degradation, overpopulation, or insufficient service provision, the question of how to address these challenges is becoming more and more urgent (De Oliveira & Santos, 2018; Kourtiti & Nijkamp, 2018; Yigitcanlar et al., 2018). Smart governance has been hailed as a promising approach. As this is the central theme of this research, this study can also offer societally relevant insights.

In smart governance processes, local governments are considered as one of the key actors: they are more or less pushed to take advantage of modern technological infrastructures to create interactive, information-based urban environments to generate a higher quality of life (Bolívar, 2016; Dameri & Rosenthal-Sabroux, 2014). Although many municipalities have heeded the beguiling message of “urban smartness”, the initiatives taken often fail to live up to their ambitions (Fernandez-Anez, Fernández-Güell, & Giffinger, 2018; Van den Bosch, 2018; Wehn et al., 2015). In the switch from classical, hierarchical forms of public administration to open, responsive, collaborative and technology-enabled networking, they therefore recklessly seek ways to fulfil their new roles in smart governance (Bakker, Deters, Oude Vrielink, & Klok, 2012; Rodríguez-Bolívar, 2015). Hence, the knowledge gained from this dissertation can have constructive consequences for local governments by:

1. *Providing insights to local governments on the human element of smart governance:* This study offers public servants a conceptual clarification of smart governance, providing a more focussed understanding amidst the manifold definitions, explanations and debates concerning this idea. In particular, the importance of the social component of smart governance can be highlighted for local governments: while technology has long been viewed as the main benefactor in creating smarter cities, this study emphasizes partnership with citizens as a vital facet in technology-supported urban development.

2. *Demonstrating smart governance practices in multiple contexts to public servants:* This study offers concrete insights into real-life practices of smart governance for local governments. This is a tangible benefit for governmental employees, because the rich empirical material of the case studies transcends the realm of strategic documents and city hall gatherings, which are the typical ways in which smart city and smart governance are dealt with by local governments. In addition, these case studies analyse practices evolving in various cities, countries, and policy areas. This makes it possible to provide public servants with insights into different smart governance approaches, particularly in relation to their specific contextual settings.

3. *Inspiring local governments to systematically reflect on their smart governance strategies:* Complementary to the aforesaid practical “helicopter” view bolstered by abundant empirical material, the conceptual analytical approach illustrates to local governments the possibility of a more systematic approach to their own smart governance ambitions and strategies. In particular, the study could open the eyes of urban managers to the multidimensional and context-reliant nature of tech-mediated cooperation between state and citizens. This understanding could spur urban governments to evaluate and reformulate their approach to smart governance if they truly intend to tap into the energies of society to jointly address city issues.

This study is also relevant for citizens and communities since their role in smart city making forms a key element in the ambitions and debates:

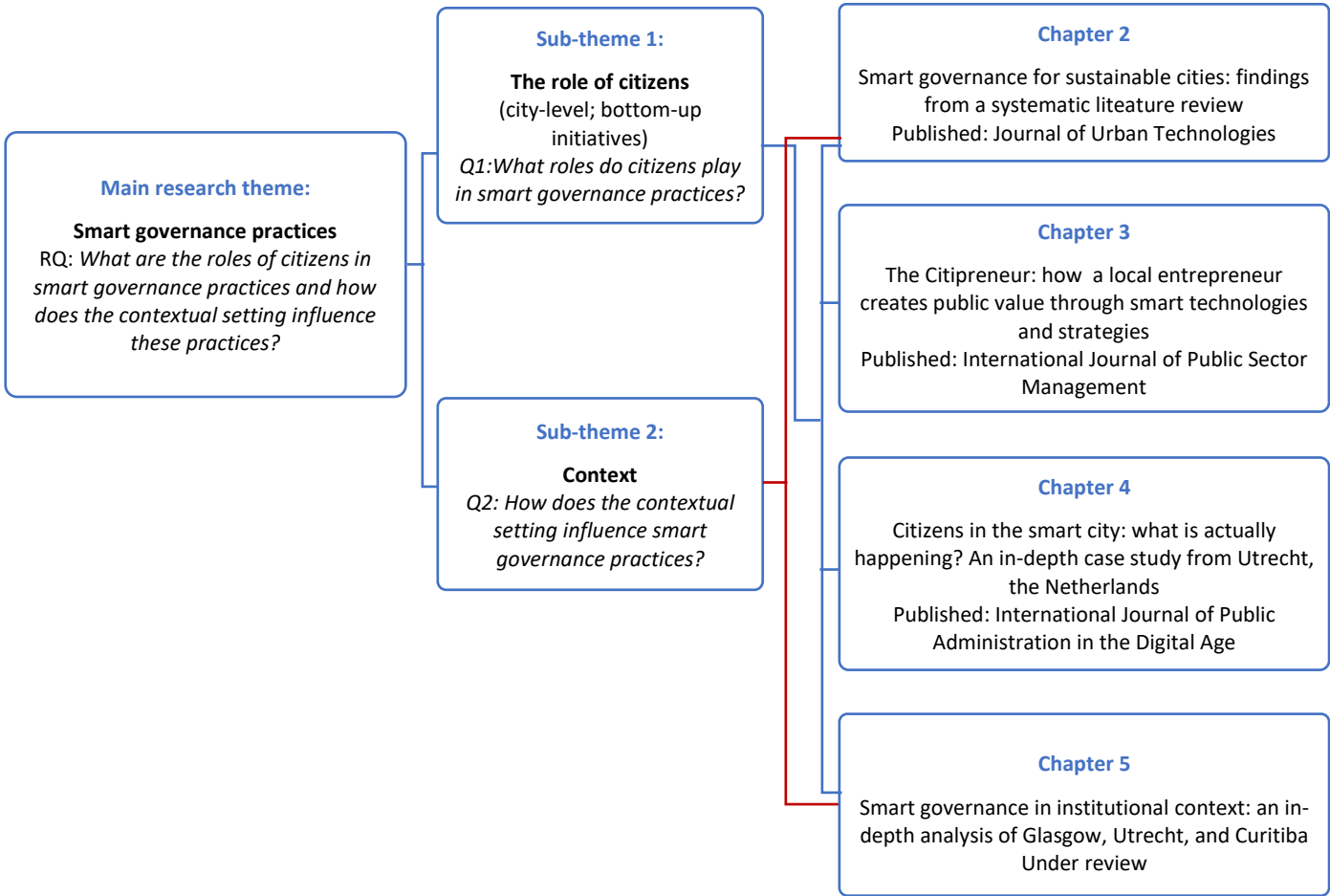
4. *Acquainting citizens with the idea and practice of smart governance:* The cases in this dissertation offer citizens the possibility to learn about the idea of smart governance. The various chapters can make citizens more aware that the smart city is not an abstract idea

exclusively belonging to governments and companies - instead, it is a joint effort to create the city based on the aspirations of the people themselves. The cases offer citizens real-world insights into how smart governance actually transpires and this can inspire them to (re)claim their role in urban transformation by utilizing their day-to-day technological gadgets.

1.8. Outline of the thesis

This PhD dissertation consists of six chapters, of which four were written in the form of articles submitted to peer-reviewed scientific journals. Three (Chapter 2, Chapter 3, Chapter 4) of these articles have been published, and another (Chapter 5) is currently under review (Figure 1.2). The findings of these articles can be conjointly applied to respond to the research questions posed in this dissertation. Chapter 2 introduces the concept of smart governance and conducts a systematic literature review on smart governance based on its building blocks, its relationship to societal outcomes and the influence of contextual factors. Chapter 3 considers a specific type of active citizen, the citipreneur, who seizes technological opportunities to create collective practices enhancing public value. Chapter 4 explores the varied roles that Utrecht citizens, supported by technologies, actually play in contributing to the development of their city. Chapter 5 compares smart governance practices in the various city settings of Utrecht, Glasgow and Curitiba whereby the impact of institutional factors are systematically examined. Chapter 6 formulates responses on the various research questions posed in this Introduction and concludes with a synthesis of the findings.

Figure 1.2: Outline of the thesis



2. SMART GOVERNANCE
FOR SUSTAINABLE CITIES:
FINDINGS FROM A
SYSTEMATIC LITERATURE REVIEW

Summary This chapter presents a systematic review of the literature on smart governance, defined as technology-enabled collaboration between citizens and local governments to advance sustainable development. The lack of empirical evidence on the positive outcomes of smart cities and smart governance motivated us to conduct this study. Our findings show that empirical evidence for the alleged sustainability benefits is sparse. In addition, the emerging picture is ambiguous in that it reports both positive and negative effects in respect to the sustainability achievements of smart governance. The study identifies contextual conditions of smart governance as crucial to understanding these mixed outcomes. Our paper points up the need for more empirical work and develops an agenda for researching the relationship between smart governance and sustainability outcomes.

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2.1. Introduction

In their efforts to address pressing urban challenges, local governments around the world have embraced smart city agendas. They promote digital technologies for optimizing urban management and interactions between state and non-state actors in the pursuit of sustainable development (Aichholzer, Kubicek, & Torres, 2015; Bolívar & Meijer, 2016; Chourabi et al., 2012; Gil-Garcia et al., 2015).

The role of citizens in the transition to a more sustainable socioeconomic system has been widely acknowledged (Alusi, Eccles, Edmondson, & Zuzul, 2011; Goh, 2015; Osella, Ferro, & Pautasso, 2016; Royo, Yetano, & Acerete, 2014a, 2014b; Stratigea et al., 2015). Public engagement in urban development not only fosters a more democratic, and hence legitimate decision-making process, it also serves as an intelligence-gathering tool. Citizens are the bearers and users of local knowledge and expertise, which—together with the strategic knowledge of organizations—is essential for defining priorities and allocating scarce resources (Charalabidis et al., 2012; Misuraca & Rossel, 2011; Voorberg, Bekkers, & Tummers, 2015).

At the same time, gaining the participation of citizens has proven to be an elusive goal, leading cities to explore the potential of new information and communication technologies (ICTs) as a means of enhancing public engagement. ICT-enabled participation is considered by many to offer an obvious and viable route to creating a dialogue tool between the local authorities and urban inhabitants for the collective advancement of urban sustainability. We, therefore, view smart governance as a sociotechnical approach, which aligns technological potential with novel forms of collaboration between local government and citizens with the aim of tackling urban issues based on the principles of sustainability (Bakici, Almirall, & Wareham, 2013; Caragliu, Del Bo, & Nijkamp, 2011; Ertiö, 2015; Hollands, 2015; Meijer & Thaens, 2016; Paskaleva, 2013; Roman & Miller, 2015)

Although sustainable development has manifold conceptualizations, our definition relates to that posited in the Brundtland Report: development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). According to this definition, sustainable development is pursued on

the basis of the “triple bottom line” (Elkington, 1998) which emphasizes the need for balanced development of ecological, socio-cultural, and economic values (Bifulco, Tregua, Amitrano, & D’Auria, 2016; Inayatullah, 2011). Yet, the strong belief that sustainability can be achieved through ICT-enabled co-creation with citizens, notwithstanding scepticism, abounds about the power of technology to enhance citizen engagement (Hollands, 2008; Roman & Miller, 2015; Torres, Pina, & Acerete, 2006). A range of studies refutes the ability of state ICTs to radically transform citizen-government relationships in public affairs. In addition, both academics and professionals question whether ICT applications can reverse people’s apathy towards public affairs and their distrust of political representatives (Edelmann, Hoechtl, & Parycek, 2009; Yetano & Royo, 2017). The use of ICTs also raises questions about exclusion, as deployment of these tools limits participation to those with access to digital devices (Molinari & Ferro, 2009; Yigitcanlar & Lee, 2014).

The bulk of smart city research focuses on conceptualization—on mapping the meanings, components, and goals of the smart city from the perspectives of particular fields of study, such as public administration, information science, and urban development (Bifulco et al., 2016; Hollands, 2015; Krenjova & Raudla, 2017; Meijer & Bolívar, 2016; Meijer & Thaens, 2016). Although these studies consider interactive governance to be an essential component of smart cities, they fail to examine this in any great depth (Gil-Garcia et al., 2015; Hamza, 2016; Lin & Geertman, 2015; Paskaleva, 2009). This paucity of knowledge prompted the present attempt to contribute to smart city discussions by exploring smart governance at the interface of different study areas.

A systematic analysis of the literature offers a means to map what is known about smart governance and its effects, and thus to provide a more realistic perspective on the value of this approach for cities. To that end, the present study is guided by the following research question: *What relationships exist between ICT-enabled citizen-government collaboration and sustainable urban development and how do contextual circumstances influence these?* The contribution of this study to the discussion is in the first place conceptual: we aim to identify the various components and dynamics of smart governance to develop a rich understanding of this ICT-supported collaboration mode. Secondly, this paper contributes to the literature by broadening our understanding of the relationship between smart

governance and outcomes in terms of its contribution to urban sustainability. While the literature describes many opportunities and threats in this relation, we still know very little about the environmental, societal, and economic outcomes of ICT-supported collaborative governance (Aichholzer et al., 2015; Hollands, 2015; LazaroIU & Roscia, 2012; Scott, 2015; Winters, 2011).

Finally, this study enhances our understanding of the role of context. Governance dynamics are mediated through multiscalar variables and moderated by contextual features of the local urban setting. Contextual aspects include external place- or domain-specific circumstances, such as physical, political, institutional, societal, economic, and cultural conditions, as potential influences in digitalized governance processes. Although widely recognized, a systematic overview of the influence of contextual factors on smart governance processes is still lacking (Gupta, Pfeffer, Hebe, & Ros-Tonen, 2015; Hong, 2015; Meijer, 2016; Sampson, 2017; Walters, 2011; Zheng, 2017). This study fills this gap by opening the black box of the context-reliant nature of smart governance.

In sum, the major objective of this study is to generate a factual basis for debate by providing an overview of what is known about the context-dependent contribution of ICT-enabled citizen-government collaboration to urban sustainability. The article is structured as follows: in the next section, we introduce our research methods, followed by the section wherein we examine the main building blocks of smart governance. Then we present what the literature reveals about the (sustainability) outcomes of smart governance, while the section after that highlights the major contextual factors. In the last section, we discuss policy implications and suggest a future research agenda.

2.2. Literature review: methods and the corpus

In order to address the research question formulated above, we conducted a systematic literature review. Cooper & Hedges (2009) formulated six stages for a systematic literature review, i.e., problem formulation, literature search, data evaluation, data analysis, interpretation of results, and public presentation. Our problem formulation has already been presented in the Introduction, and this paper

represents the presentation of our review to the public. The remaining steps can be grouped into two main categories: the literature search, and the data evaluation, analysis, and interpretation. We will elaborate on these two phases below.

For our literature search, we established a set of rules describing the study and report eligibility criteria, and the search strategy:

- *Topic and search terms:* To cover all dimensions of our research topic in an integrated way, we used the following combinations of search terms: e-governance participation, e-governance sustainability, citizen e-participation urban sustainability, smart city participation sustainability, city participation ICT sustainability, governance e-collaboration citizen sustainability, smart city citizen sustainability, e-participation co-creation sustainability and collaborative e-governance. Our aim was to find articles dealing with the topic in its entirety, and addressing, in particular, the relationship between smart governance and sustainability, rather than its distinct elements separately (such as collaboration, governance, innovation, e-government, participation, sustainability, etc.).
- *Study and research design:* We included all types of research designs (case studies, questionnaires, experiments, literature review, comparative research) with a goal of covering the full breadth of the research field to compensate the identified shortcomings in scope and depth in the scientific literature.
- *Year, language, and publications status:* Studies were retrieved which were published in the period 2006–2016, as smart cities and the use of ICTs for participatory/collaborative governance are recent phenomena (Harrison et al., 2010). Only publications written in English language were considered. In order to assure the quality of our literature review, we only included international, peer-reviewed (conference, proceedings) papers and books, and book chapters from well-known academic publishers.

We started the search process by using established scientific databases, such as Scopus, PiCarta, and Web of Science. In the first round, we used the terminologies “e-governance” AND “participation and e-governance” AND “sustainability” as titles, abstracts, and key words in the query entry. Based on the above detailed search and eligibility criteria and their accessibility, we could identify only 11 relevant publications. To expand the results and to build up a robust body of relevant literature, we then used Google Scholar. While we are aware that the algorithm of Google Scholar is not transparent, we opted for its use as this yielded many more relevant publications. Since the more general search terms (such as “e-governance”) on Google Scholar generated a huge number of irrelevant articles, we formulated specific combinations of terminologies, targeting our research scope (as listed above). Each combined search term delivered more than 40,000 hits. The selection took place by identifying appropriate articles from page one by reading their titles, abstracts, and introductions. Beyond the defined search criteria, the records were also assessed according to additional quality indications (journal, edited book by renowned scholars) and impact (number of citations). Each search term was assessed to about page 10 or 12, up to a point where either irrelevant or previously identified papers were exposed. This resulted in an additional 83 articles.

Our search through digital databases produced a total of 94 articles. In addition, we included further studies in the analysis from other sources, namely recommendations from academics and peer reviewers. Systematic literature procedures, such as the PRISMA method, allow the use of documents from sources other than database searching (Moher et al., 2012). The extensions we used provided additional perspectives, both as regards updating and the inclusion of other fields of study (public administration, urban issues, etc.) important for our theme. This resulted in 20 additional papers.

Table 2.1 provides a quantitative overview of the examined articles (a total of 114, listed in the Appendix), classified according to the specific research field in which they were published. As this table shows, our paper is a multidisciplinary synthesis of various strands of literature (e.g., public administration, urban studies, planning, computer

sciences) related to smart cities and smart governance that aims to pave the way for an integrative understanding of these concepts. Almost half of the examined studies originate from specialized areas that deal with the application of (information) technologies in human-related interactions by connecting issues of government, technologies, collaboration, citizen participation, and sustainable development. At the same time, the number of articles that precisely match our topic—namely, the effect of technology-enabled collaboration between citizens and local governments on sustainable development—is small. This confirms that our review is a valuable contribution to understanding how technologies affect and are effected by urban environments.

For our data evaluation, analysis, and interpretation, we worked with a structured spreadsheet. For each main variable (i.e., smart governance, outcomes, and context) we identified sub-variables as a starting point for the analysis since the main variables are often not explicitly mentioned in the papers and because these broad concepts consist of multiple components.

Table 2.1: Number and percentage of articles per research field of the source (i.e. journal, conference, book)

Research field	Number of articles	Percentage
Public Administration	17	15%
Specialized Fields, combining (Information) Technologies with Human Interactions such as Government, Participation, Governance etc.)	47	41%
Urban Studies	10	9%
Spatial and Planning Studies	10	9%
Computer Sciences/IT	10	9%
Management and Economics	8	7%
Topic-Related (i.e. Sustainability, Buildings, Water, Energy etc.)	12	10%
Total:	114	100%

As sub-variables of smart governance, we identified governance actors, organizational characteristic, types of ICT-use, citizen participation, and the (spatial) scale of collaboration. The sub-variables of sustainability outcomes were defined as the desired and adverse social, economic, and ecological outcomes and their impact on various societal and spatial levels. The third group of sub-variables referred to the context and entailed culture and democratic tradition, policy domain, trust, socioeconomic characteristics, demographic characteristics, spatial characteristics, and Internet penetration. Given the explorative nature of the review and the preliminary character of these components, we iteratively further developed these sub-variables throughout the research.

Based on the demarcation of the main and the initiatory sub-variables, we created an Excel factsheet for encoding the articles. Three researchers encoded each of the articles independently from one another. In order to guarantee inter-coder reliability, the three researchers discussed the results and the work methods, and refined the analytical factsheet. The analysis and interpretation of the results were performed qualitatively, since the perspectives on the topics as presented in the various papers varied considerably in scope, nature, and depth. A follow-up assessment of evidence for certain relations was not possible at this stage, due to the low number of empirical evaluations of smart governance. To arrive at an overview picture, we aimed to map this variation and identify the various conceptualizations and mechanisms. We summarized the overview in the spread-sheets to highlight the main patterns in the literature. This resulted in an overview of the literature that formed the basis for a more systematic examination of smart governance.

2.3. The components of smart governance

We first explored the literature to enhance our understanding of smart governance by revealing details on its structure. To this end we examined the main components of smart governance that are—in line with our definition—governmental organization, citizen participation (and, consequently, government-citizen collaboration), and the use of technology.

Governmental organizations

The first building block of smart governance is the organization of government. This term entails a whole range of sub-facets such as motivation, vision and strategies, attitudes, decision-making, process coordination, and roles and responsibilities, as well as the provision of financial, regulative, technological means and human resources, knowledge management and organizational culture, etc. (Przebylowski, Cunha, & Tomor, 2017). It emerged from our analysis that three organizational characteristics are critical for smart governance: (1) commitment, (2) responsiveness, and (3) operational management.

The first organizational characteristic, commitment, refers to the extent to which local government is motivated to engage in sustainable development through ICT-supported urban collaboration. According to a large number of papers, smart sustainability governance will not ensue without the cooperation of local governments (Islam, 2008; Chiabai et al., 2013; Portney and Berry, 2010; Royo et al., 2014b; Nam and Pardo, 2011; Sørensen and Torfing, 2016; Hendriks, 2014).

The second organizational characteristic regards the responsiveness of government. A longstanding relationship between government and citizens requires governments to become a receptive partner towards inhabitants (Alusi et al., 2011; Ertiö, 2015, Chiabai et al., 2013; Estevez et al., 2013; Engelken-Jorge et al., 2014; Santos et al., 2014). In order to continuously improve the effectiveness of e-participation programs, government leaders should report on the level of e-participation to major stakeholders and solicit feedback. This aspect is important in sustaining fruitful online collaboration since the degree of satisfaction of e-participants with the responsiveness of their government has a direct and positive association with their perceptions of individual development, their perceived influence on decision-making and their trust in government (Kim and Lee, 2012; Zheng, 2015; Royo and Yetano, 2015).

The third organizational characteristic is operational management. This classic organizational feature provides the operational basis to equip technology-supported collaborative governance arrangements with whatever is needed for their running, and covers all facilitative types of measures, actions, and preconditions. Many articles

emphasize that this requires an integrated approach combining infrastructural, technological, social, and political systems, as well as cross-sectoral bridging between policy domains and urban priorities (Molinari, 2010; Nam and Pardo, 2011; Janowski, 2015; Paskaleva, 2014; Laspidou, 2014; Karlsson, 2012). Process management and coordinated leadership as well as a well-crafted reiterative participation process with clear guidelines for the interlaced elements of strategic planning, design and implementation phases, are vital. Likewise, flexible institutional designs based on networking among interdependent public, private, and civil actors will support ICT-supported collaborative forms of co-initiation, co-design, and co-implementation, which may lead to creating novel public services (Yetano and Royo, 2015; Cruickshank et al., 2014; Lee et al., 2014; Sørensen and Torfing, 2016; Cimander, 2016).

A large strand of literature identifies a plethora of other organizational aspects for stimulating smart governance between citizens and their local administrations, such as financial resources and funding; time; the provision of technological training and guidance; the evaluative monitoring of processes and outcomes; supportive and protective (privacy) legislation (Certomà et al., 2015; Capra, 2016; Al Hujran et al., 2013; Lang and Roessl, 2011; Kingston, 2007; Schröder, 2014).

Hence, what is needed is clear. However, the literature tells us that the ambitions often remain within the realm of rhetorical phrasings. Despite the verbal adulation of sustainability and technology-enabled stakeholder participation, this does not often result in the implementation of significant changes in these areas (Aichholzer et al., 2016; Portney, 2013; Washington, 2014; Krenjova and Raudla, 2017; Wehn et al., 2015; Álvarez-Crespo, 2014; Molinari and Ferro, 2009; Santos and Tonelli, 2014). Sustainability policies, therefore, often tend more to resemble “greenwashing” than actual commitment with digital technologies primarily being applied for administrative and transactional efficiency instead of, for instance, in support of dialogue (Cruickshank et al., 2014; Roman and Miller, 2013; Janowski, 2015; Royo et al., 2014a; Wolfram, 2012; Loorbach et al., 2016; Gabrys, 2014; Washington, 2014). Urban governments still regard the public as mere recipients of information, often failing to consider citizens’ various perspectives in decision-making or to provide feedback on ICT-supported participation processes (Edelmann et al., 2012;

Coleman and Blumler, 2009; Ferro and Molinari, 2009; Verdegem and Verleye, 2009; Charalabidis et al., 2012; Lee and Kim, 2014; Yetano and Royo, 2015; Zheng, 2015). This is mainly due to the municipalities' lack of understanding, capacity, and expertise. In addition, many articles point to the reluctance of local governments to share power with citizens and to give up their autonomy (Gabrys, 2014; Royo et al., 2014a; Santos and Tonelli, 2014; Paskaleva, 2014; Bifulco et al., 2015; Roman and Miller, 2013; Janowski, 2015).

Citizen participation

The second building block of smart governance, and one according to the literature that offers huge potential, is citizen participation. Citizens can offer useful and helpful suggestions for government agencies to arrive at better informed policy decisions (Al Hujran et al., 2013; Stratigea et al., 2015; Anttiroiko et al., 2014; Singh Kalsi and Kiran, 2013). Relevant components are (1) the degree to which these forms of citizen participation in urban governance are interactive (Arnstein, 1969), (2) the representativeness of the participating population, and (3) motives for citizens to participate.

Concerning the level of citizen participation, the findings indicate that technology-supported governance initiatives have modest outcomes. The literature mainly referred to non-participative and non-deliberative activities such as political support-seeking, consultation, or one-way information provision (Cruickshank et al., 2014; Molinari, 2010; Edelman et al., 2009; Molinari and Ferro, 2009; Royo and Yetano, 2015). The review shows that authentic e-participation, leading to policy changes through citizens' authority in decision-making, is nearly absent in practice (Wehn et al., 2015; Capra, 2016; Royo et al., 2014a, 2014b; Tikka and Sassi, 2011; Roman and Miller, 2013). According to some, better governance through digitally facilitated cooperation between citizens and governments is a myth, since very few empirical studies could offer evidence of improvement in this area (Roman and Miller, 2013; Bekkers and Homburg, 2007; Paskaleva, 2014; Chiabai et al., 2013). In that respect, many papers cast doubt on the value of ICT tools in participation by arguing that digitization has not resulted in broader and deeper civic involvement.

The findings are more diverse regarding citizens' capacity and willingness to engage in smart governance. In this regard, questions on the issue of the representativeness of citizen

participation in smart governance abound. Numerous papers stated that pre-existing participation patterns, including socioeconomic and technological segregation, have been strengthened as a result of applying new technologies in government–citizen relations (Neirotti et al., 2014; Neubauer et al., 2012; Karlsson, 2012; Nam and Pardo, 2011). The reason for this is twofold: on the one hand, the technology has enabled the emergence of a group of very active participants who are usually better educated, more affluent, technologically more competent, and who know more about urban policy issues (Lee and Kim, 2014; Karlsson, 2012; Wehn et al., 2015; Stratigea et al., 2015; Hanna, 2010; Neirotti et al., 2014; Portney and Berry, 2010). For instance, the US cities most noted for environmentalism and a sustainability ethic are characterized by a youthful, idealistic, and prosperous citizenry that have strongly influenced municipal sustainability policies (Washington, 2014). On the other hand, the emerging technology also created a group of “unplugged” citizens who do not participate, typically made up of people with low incomes, insufficient schooling, and/or a marginalized status (immigrants, disabled, elderly), or living in isolated/rural locations (Molinari and Ferro, 2009; Yigitcanlar and Lee, 2014; Gabrys, 2014; Yetano and Royo, 2015; Sun and Nakata, 2011; Molinari and Ferro, 2009; Kingston, 2007; Neubauer et al., 2012). Although members of the older generations are usually more engaged and interested in politics and public affairs, they are digitally less skilled, and prefer traditional (face-to-face) participation (Wijnhoven et al., 2015; Yetano and Royo, 2015; Tikka and Sassi, 2011; Åström and Granberg, 2008). Young people have considerable experience in using computers, the Internet, and smart phones, but they predominantly tend to lack the eagerness to engage in policy-making processes or urban development (Ertiö, 2015).

The motivations to engage in smart governance received far less attention in the literature than the other two components. What information there was suggested that intrinsic motivation and intangible rewards were far more decisive factors in the decision to participate in collaborative technology-supported governance than extrinsic motives (e.g., monetary reward). Civil actors were found often to be motivated for reasons of solidarity, altruism, and the felt need for problem-solving in environmental and community issues (Royo and Yetano, 2015; Kim and Lee, 2012; Zait, 2017). However, the examined studies also confirm that despite civic voluntarism by knowledgeable and active inhabitants,

citizens' interest and involvement in public affairs exhibit a general decline (Krenjova and Raudla, 2017; Sørensen and Torfing, 2016; Roman and Miller, 2013; Deakin and Allwinkle, 2007; Chiabai et al., 2013; Wehn et al., 2015).

The use of technologies

The final building block of smart governance is the use of technology, in particular ICTs. We mapped how digital technologies are applied in participatory governance processes aiming at sustainable urban development. We identified the types of technologies used and the aims they are applied for, as well as their limitations.

The literature showed a growing diversity of devices, tools, and technologies that are deployed for diverse engagement (Islam, 2008; Royo and Yetano, 2015; Anttiroiko et al., 2014; Estevez et al., 2013; Álvarez-Crespo, 2014; Engelken-Jorge et al., 2014). One intention technologies serve is one-way communication with examples as web portals (including e-mail service) and different kinds of visualizations (Augmented / Virtual Reality), which aim at building support for intended policies. Openly available tools serve to lower the barrier to entry into the policy realm for the average citizen, allowing him / her to make connections and enhancements to often available, but not easy to leverage information from municipality websites (Gano, 2013). By soliciting ideas and gauging opinions through these channels, municipalities can test the level of public agreement on their proposals beyond the more conventional e-voting and e-petition tools. Other applications commonly employed for information receive-only purposes are the collection of geo-data by sensors and collaborative mapping, monitoring greenhouse gas emissions, or localized diversity in energy use (Wehn et al., 2015; Laspidou, 2014). Mobile phones, growing more than other types of communication, are in particular frequently deployed in these kinds of participatory sensing that enables citizens to collect a wide array of data in situ (Ertiö, 2015; Wehn et al., 2015; Das Aundhe and Narasimhan, 2016; Nam and Pardo, 2011; Krenjova and Raudla, 2017; Singh Kalsi and Kiran, 2013). Mobile phones were seen as becoming increasingly important in developing regions, as they grant a viable alternative to computers and hence access to resources that might be a step towards bridging the digital divide and eradicating poverty (Islam, 2008; Hanna, 2010; Singh Kalsi and Kiran, 2013; Kim and Lee, 2012). The use of mobile phones is also expected to attract more

youngsters to participatory processes, as these tools are much more appealing to them (Ertiö, 2015; Zheng, 2015).

Technological applications, such as discussion forums, electronic town hall meetings, wikis, and blogs, are also employed in two-way communication processes, wherein participants can productively interact with each other (Cleland et al., 2012; Royo et al., 2014b; Stratigee et al., 2015; Tikka and Sassi, 2011; Termeer and Bruinsma, 2016). The increased use of Web 2.0 and social media tools favor citizen-created content, which not only enhances the free flow of information but fosters diversity of opinions, socio-political debate, and freedom of expression while creating an environment conducive to crowd-sourcing initiatives (Royo and Yetano, 2015; Chiabai et al., 2013; Karlsson, 2012). The literature also found that data platforms and software tools that allow for the retrieval, storage, modelling, analysis, and visualization of data play an increasingly important role. These applications are often used jointly with the aforementioned information gathering and communication support technologies and entail instruments such as Public Participatory Geographic Information Systems (PPGIS), Planning Support Systems (PSS), and Decision Support Systems (DSS) (Macintosh, 2004; Kokkinakos et al., 2012; Geertman et al., 2015).

Although these technological applications play an increasingly important part in governance processes, they also have limitations in use, mainly due to a lack of technological infrastructure and/or ICT knowledge on the part of both public officers and citizens (Lee et al., 2014; Karlsson, 2012; Islam, 2008). According to the literature, the level of technology intensity is inversely related to the intensity of civic participation: projects with less dependence on technologies and data deliver more involvement of participants and vice versa. This is because ICT-facilitated collaborative projects with a strong technological and data-driven nature hinders citizens' understanding of complex issues and policies (Capra, 2016; Deakin and Allwinkle, 2007; Yigitcanlar and Lee, 2014; Charalabidis et al., 2012; Evans and Campos, 2013).

In this aspect it is not surprising that the reviewed articles also indicate that, despite the ongoing increase of online involvement, much citizen–government cooperation still happens through face-to-face interactions, since this is what citizens prefer (Capra, 2016;

Abu-Shanab and Al-Quraan, 2015; Yetano and Royo, 2015). Citizens choose rationally between different participation methods. Whether they opt for offline or online engagement depends on which is more convenient, efficient, and cheaper. The functionality of e-participation applications affects a user's choice: websites that are difficult for citizens to navigate or from which it is difficult to extract information, discourage participation (Coleman et al., 2008; Zheng, 2015; Hong, 2015). Compared to citizens' offline public activities, digital participation showed lower engagement levels and higher drop-out rates. Online cooperation projects are easily abandoned due to the referred causes, including low entry, transaction, and opportunity cost. The wide net of online activities of many people breeds shallow attention, time shortage, and transitory involvement (Lee and Kim, 2014; Yetano and Royo, 2015; Zheng, 2015; Bifulco et al., 2016).

Critiques revealed in the literature highlight other limitations, for example how apps-based participatory sensing transforms citizens into operative units for data-collection (Roman and Miller, 2013; Gabrys, 2014; Yigitcanlar, 2015). Also, various studies claim that the technologies available, rather than the users' needs and expectations, guide the design of online service infrastructures (Gabrys, 2014; Roman and Miller, 2013; Chiabai et al., 2013; Laspidou, 2014; Royo and Yetano, 2015). Governments assume that the sheer presence of online channels will automatically lead to more participation (*"if you build it they will come"*) (Molinari and Ferro, 2009, p. 6).

2.4. What are the outcomes of smart governance?

The aspired substantive outcome of smart governance is sustainable urban development integrating social, economic, and environmental values. These aspects are discussed in this section to provide an answer to the second guiding question: what are the outcomes of smart governance?

A first observation is that the effects of smart governance on sustainable urban development have remained strongly understudied. This is confirmed by the strand of the investigated corpus arguing that the way smart governance contributes to a more sustain-

able society is largely unknown (Paskaleva, 2014; Voorberg et al., 2015; Osella et al., 2015; Aichholzer et al., 2016; Meijer, 2016). Although both academics and practitioners commonly associate the potential of smart governance with creating greener, healthier, more equitable, economically and culturally thriving communities (Portney, 2013; Meijer and Bolívar, 2016; Bifulco et al., 2016), verification of this was difficult to find in the examined literature. Despite the profusion of promises and expectations, the extent to which these were actually realized remained largely unexplored. Some papers initially stated an intention to examine in depth the actual contribution of smart governance and the use of ICT tools in collaboration in terms of public values and sustainable development. However, they tended not to venture beyond the discussion of either public service transactions and related administration efficiency or the presentation of collaboration and project objectives (Osella et al., 2016; Singh Kalsi and Kiran, 2013; Bifulco et al., 2016).

A second observation is that the studies were mixed regarding the effects on sustainable urban development. The few papers (listed and discussed in the following two paragraphs) that addressed the effects of ICT-supported cooperation on sustainable development in its integrative concept including economy, social issues, and environment offered varying perspectives. We found skeptics/pessimists, and optimists. The optimists—who were, granted, limited in number—did report observing sustainability benefits from ICT-enabled cooperation projects (Estevez et al., 2013; Hanna, 2010; Scott, 2015). Estevez et al. (2013) analyzed EGovernance for Sustainable Development (EGOV4SD) initiatives, and showed that these contributed to a range of sustainable development goals. The authors mentioned that the most common sustainability problems, effectively addressed in these projects, were empowerment (social), business opportunities (economic), man-made activity (environment), and capacity building (institutional).

The skeptics and pessimists held that smart governance has not yet yielded long-term sustainability outcomes (Royo et al., 2014a, 2014b; Yigitcanlar and Lee, 2014; Deakin and Allwinkle, 2007; Singh Kalsi and Kiran, 2013; Washington, 2014; Royo and Yetano, 2015). They mostly rejected the idea that digital co-creation could have value from the

perspectives of political and social impact, scalability, and sustainability (Paskaleva, 2014; Voorberg et al., 2015; Prieto-Martín et al., 2012). They pointed to the growing techno-economic divide between tech haves and tech have nots as a negative effect, as well as to a range of unfavorable ecological outcomes. The South-Korean smart eco-cities of Songdo and Incheon, for example, were established on precious wetlands, destroying the habitat of some of the rarest species on the planet (Yigitcanlar and Lee, 2014).

A third observation is that studies frequently focus on sole elements of sustainability such as only the social or only the environmental outcomes of ICT-supported state-citizen collaboration. In view of the environmental outcomes researchers found that smart governance could produce decreasing emissions of carbon dioxide on both the individual (household) and the collective level. They emphasize that only a multitude of multidisciplinary actions, activating citizens on different scales, can trigger behavior changes and fossil energy reductions for environmental protection (Cimander, 2016; Cimander et al., 2016). However, adverse effects have also been found such as those partially produced in a European smart governance project targeting the reduction of CO₂ emissions. While significant savings were achieved in respect of heating energy and electricity, in some cases increased emissions occurred in the fields of nutrition and consumer goods. The mobility domains of private and public transportation and flights also exhibited heterogeneous tendencies (Cimander, 2016). The social aspect of sustainability, which was covered by studies, partly refers to citizen participation that has been detailed in the previous section “The components of smart governance.” Citizen participation here may also be termed democratic governance when considering the specific goals targeted by citizen participation: enhanced transparency, democracy, improved legitimacy, and efficiency of public service delivery (Wolfram, 2012; Ertiö, 2015; Zavadskas et al., 2010; Roman and Miller, 2013; Curwell et al., 2005; Engelken-Jorge et al., 2014; de Araujo and Taher, 2014). However, whether these participation goals have been achieved are not examined in the articles selected. Rather, the various characteristics of citizen participation (e.g., the types, roles, and number of participants, the level and intensity of involvement, citizens’ satisfaction with the project) are considered by the majority of the articles as the main outcomes of ICT-supported collaborative governance (Chiabai et al., 2013; Capra, 2016; Wehn et al., 2015). This solitary focus in the

bulk of the articles suggests that civic engagement was assessed for its own merit and much less for its contribution to urban sustainable development through democratic governance (Meijer and Thaens, 2016; Aichholzer et al., 2016; Osella et al., 2016).

Another social aspect of sustainability, which was addressed in the articles, refers to participants' learning capacity about which the literature is more hopeful. Much is made of the beneficial features of online citizen participation in terms of learning. Citizens' experiences in the policy-making process are thought to be able to serve as a "school of democracy," since it may help participants become more informed citizens. In addition, information technologies can positively affect citizen participation by enabling participants to become more knowledgeable about governmental and public affairs and sustainability challenges and also become more skilled in communication. These interactions make citizens more prepared and interested in engaging in collective policy-making and urban development (Hong, 2015; Termeer and Bruinsma, 2016; Hanna, 2010; Nam and Pardo, 2011; Paskaleva, 2014; Yetano and Royo, 2015; Anttiroiko et al., 2014; Neirotti et al., 2014; Laspidou, 2014).

The examined articles provide examples. For instance, learning and sharing experiences between living labs—user-centered, experimental areas in a realistic territorial context—have triggered additional expressions of interest from potential user organizations and a significant growth in demand for related e-services (Cleland et al., 2012; Schuurman et al., 2012). Similarly, hackathons—time-limited, venue-based events, where ICT professionals, civil servants, interested citizens, and the private sector develop tech-based solutions for societal challenges—engendered the bridging of physical, cognitive, and social boundaries between stakeholders from wide-ranging domains (e.g., agrarians, politicians, civil partners, etc.). App feedbacks have advanced the identification of shared values and joint problem-solving, resulting in pilots by government agencies as well as by public and private stakeholders (Termeer and Bruinsma, 2016; Washington, 2014; Wang and Feeney, 2016; Das Aundhe and Narasimhan, 2016). Furthermore, the collective use of ICT instruments in spatial planning processes resulted in learning as the most crucial added value (Pelzer et al., 2016). Learning in these cases positively influenced the

governance process and the achievement of the objectives by different mechanisms. Learning—by becoming more conscious, informed, and aware—fostered the removal of mutual prejudices, the increase of partners' reciprocal understanding and trust, and a deeper knowledge of the issues at stake. Stakeholders' enhanced interest in the specific project and policy domain not only enabled the initiation of collaboration, but also allowed this to be sustained. Intellectual capital has been found to be a critical success factor in ICT-led government projects through multi-party collaboration. It refers to collective knowledge, largely in tacit form, embedded in governance actors' shared experiences during problem solving (Krenjova and Raudla, 2017; Das Aundhe and Narasimhan, 2016; Wehn et al., 2015; Sørensen and Torfing, 2016).

These encouraging effects notwithstanding, a recurrent theme in many articles was the insufficient learning capacity of local government and the negative effects this has on participation and urban co-production (Coleman and Blumler, 2009; Molinari and Ferro, 2009; Verdegem and Verleye, 2009; Charalabidis et al., 2012). To increase the outcome-effectiveness of their policies and of smart co-creation, city governments must themselves become learning organizations before formulating and implementing smart governance (Anttiroiko et al., 2014; Certomà et al., 2015; Capra, 2016; Termeer and Bruinsma, 2016; Hanna, 2010; Karlsson, 2012). However, in practice, less priority is given to drawing up a knowledge agenda of governance arrangements that could help advance process-management (Paskaleva, 2014; Stratigea et al., 2015; Meijer and Thaens, 2016).

2.5. Contextual factors influencing smart governance

Finally, we explored the literature to learn about (expected) major contextual factors and how these influence ICT-supported, citizen-government governance aiming at sustainable urban development. The analysis resulted in a context-sensitive operational framework and a list of expectations that can be tested in further empirical research.

Policy domain

The core themes tackled and the characteristics of the problems within a policy domain are considered to be decisive for technology-enabled, citizen-government governance for sustainable urban improvement (Stratigee et al., 2015; Wolfram, 2012; Estevez et al., 2013; de Araujo and Taher, 2014; Royo et al., 2014a; Chiabai et al., 2013; Wehn et al., 2015). The salience, urgency, the socio-political intensity or sensitivity of topics may influence (enhance) the commitment of both governments and citizens to smart governance. For instance, the generally acknowledged importance of environmental protection, climate change, or the safeguarding of cultural heritage has heightened smart policy agendas and joint online or offline activities across the world (Krenjova and Raudla, 2017; Royo et al., 2014a; Chiabai et al., 2013; Portney and Berry, 2010; Vanolo, 2013). These strategic, collaborative agendas are frequently incited by external political pressure on governments to collectively find solutions.

Also, certain policy domains were seen to be more conducive than others to collectively taking sustainability measures and reaching the objectives through the support of digital technologies. This was illustrated by online participation projects such as the smart governance project aimed at reducing CO₂ emissions: while significant reductions were achieved in respect to heating energy and electricity, emissions failed to decrease or were even augmented in the fields of nutrition, consumer goods, and mobility (Cimander, 2016; Cimander et al., 2016).

Finally, some articles stressed that the complexity level of policy issues is critical for citizen-government relationships (Royo et al., 2014b; Certomà et al., 2015; Ertiö, 2015; Capra, 2016; Cleland et al., 2012). Complicated issues may be expected to have a negative effect on both online and offline citizen engagement, as tasks that are too specific and demand too much expertise can hamper citizens in the development of an informed opinion and discourage continued involvement. Simplicity also stimulates governments to facilitate ICT-supported collaboration, as it does not drastically increase workload (Krenjova and Raudla, 2017; Gabrys, 2014; Yetano and Royo, 2015).

Trust

Although trust can be an individual characteristic, the literature reveals that the general condition of trust within society is a vital factor in digital cooperation between public and civil actors (Ertiö, 2015; Molinari, 2010; Lee and Kim, 2014; Capra, 2016; Abu-Shanab and Al-Quraan, 2015; Certomà et al., 2015; Wehn et al., 2015; Meijer, 2016). Trust relates to the image people have of their government regarding existing policies, what they can expect from governments, and their own perceived influence in technology-facilitated decision-making.

Many scholars refer to the positive influence of trust, as it increases the probability that citizens will invest their resources, time, and knowledge in ICT-based participatory alliances (Royo et al., 2014b; Cruickshank et al., 2014). These scholars consider trust as a reflection of citizens' willingness to comply, cooperate, adopt, and support government policies and innovative programs. By contrast, others state the exact reverse: that trusting citizens are less likely to engage in ICT-enabled, government-citizen participation, as trust decreases citizens' motivations to monitor government. It may well be that, although a lack of trust in politics motivates citizens to start collective actions, maintaining such initiatives necessitates the presence of trust. A third group of researchers argue that citizens' trust or distrust in mainstream representatives do not make them alienated from politics and their life communities. In that respect, political disappointment or satisfaction shows no effect on people's willingness to engage in smart governance practices (Wijnhoven et al., 2015; Edelman et al., 2012; Torres et al., 2006).

These paradoxical findings display that technology-facilitated citizen participation can be triggered by either trust or distrust in governmental policy solutions though the endurance of citizen engagement necessitates trust in the procedural fairness of government (Lee and Kim, 2014; Sun and Nakata, 2011; Gano, 2013; Kim and Lee, 2012; Sørensen and Torfing, 2016).

The political and institutional environment

It further emerged from the literature that both the formal and informal facets of the wider political and institutional environment play a major role in smart governance. A rather obvious factor here is the strength of democracy. A strong democracy can be expected to result in more ICT-accommodated citizen engagement and to stimulate the top-down digitalization of citizen participation (Santos and Tonelli, 2014; Coleman and Blumler, 2009).

Many articles pointed to the existing political system as a conditioning factor in the outcome of smart governance arrangements (Gano, 2013; Santos and Tonelli, 2014; Coleman and Blumler, 2009; Paskaleva, 2014; Sieber, 2006; Roman and Miller, 2013). Berry and Portney (2013) underline that sustainability policies mostly prevail in cities that are politically liberal (progressive), while Tikka and Sassi (2011) trace the relations between political liberties, electoral rights, and (online) political participation.

Several authors referred to the innovative atmosphere of a place as an influence on digitally-supported open government and cooperative governance (Voorberg et al., 2015; Correljé et al., 2015; Hearn et al., 2005; Alusi et al., 2011). Lee et al. (2014) mention the typical San Francisco culture of creative participation for software applications development and discovering new service areas. Another example is the municipality of Tartu, the adoption-initiator of online participatory budgeting in Estonia. The innovative and creative characteristics of Tartu, along with its reputation as “*the city of good thoughts*” and “*the intellectual capital*,” drove other municipalities to follow and to implement their own public innovation programs (Krenjova and Raudla, 2017, p. 17).

The literature also suggested that the political legacy of a country may influence ICT-empowered citizen involvement. Various studies (Santos and Tonelli, 2014; Santos et al., 2014; Cornwall, 2002) demonstrated how colonial exploitation and oppression, long-term slavery, military repression, and a patrimonial, centralized government long discouraged grassroots movements.

Inherited institutional frameworks also influence the evolution of smart governance between citizens and governments (Lang and Roessl, 2011; Janowski, 2015; Islam, 2008; Molinari, 2010; Azad et al., 2010; Ricciardi and Lombardi, 2010). Administrative culture, in particular, rooted as this is in political traditions and societal value orientation, would seem to be an important factor. More formal, hierarchical cultures and highly centralized public administration may therefore be expected to result in less either face-to-face or technology-driven citizen engagement (Portney and Berry, 2010; Torres et al., 2006; Roman and Miller, 2013; Santos and Tonelli, 2014; Schuurman et al., 2012; Hong, 2015). The literature also contained references to informal institutional dimensions that might shape the evolution of e-government, as well as the propensity for electronic co-production between civil and governmental stakeholders and the forms this could take (Al Hujran et al., 2013; Meijer, 2016; Janowski, 2015; Correljé et al., 2015; Tikka and Sassi, 2011; Álvarez-Crespo, 2014; de Araujo and Taher, 2014). These factors cover issues of customs, traditions, religion, and routines within a given society or community, although their effects are not clear.

Internet reach and use

The literature was unanimous on the fact that the Internet and the pervasiveness of digital infrastructures are transforming traditional governance and stimulate online public-citizen collaboration to reach more urban sustainability. A higher intensity and developmental level of online participation was shown to be strongly linked to countries with widespread Internet penetration, broadband availability, and high technological development.

Researchers have also found evidence of a correlation between the availability of ICTs, open-source technologies and the proliferation of technology-based participatory programs, including civil efforts to reverse existing geometries of power (Royo et al., 2014b; Certomà et al., 2015; Torres et al., 2006; Al Hujran et al., 2013; Azad et al., 2010; Edelman et al., 2009; Schröder, 2014; Hanna, 2010).

Many authors (Islam, 2008; Royo et al., 2014a, 2014b; Certomà et al., 2015; Santos et al., 2014; Stratigea et al., 2015) stress that Internet dissemination and widespread ICT use have changed citizens' expectations regarding governmental actions. By gaining online access to

a large number of resources, the public has become used to taking part in online or offline decision-making. It is a cumulative technological effect - a process in which attitudes are gradually being adjusted to the available means (Åström and Granberg, 2008). As the level of Internet infiltration increases, municipalities are feeling an even greater push from citizens and from societal and business organizations to provide (environmental) information, implement sustainability measures, and to include multiple stakeholders in policy processes and online services (Azad et al., 2010; Cleland et al., 2012; Al Hujran et al., 2013; Gabrys, 2014; Yigitcanlar and Lee, 2014; Paskaleva, 2014; Meijer, 2016; Twinomurinzi et al., 2012; Álvarez-Crespo, 2014).

In developing countries and in disadvantaged areas in developed regions, the absence of or limited access to the Internet is a significant obstacle in achieving civic empowerment, public-civil collaboration and sustainability (Islam, 2008; Abu-Shanab and Al-Quraan, 2015; Al Hujran et al., 2013). Moreover, the digital socio-cultural and economic gap impedes the migration of public services and citizen-government cooperation to the World Wide Web (Neirotti et al., 2014; Molinari and Ferro, 2009). The lack of accessibility to various ICT applications hampers collaborative, technology-based urban planning as well (Stratigea et al., 2015).

Socio-spatial characteristics

The (human-) geographical features of a city can influence electronic public services and ICT-supported governance practices. For instance, the topography may render specific locations vulnerable to natural disasters (flooding, earthquakes). Such threats may invoke societal pressure and highlight the vital need for collective public-civil actions by making use of new technological applications (Wehn et al., 2015; Royo et al., 2014a; Abu-Shanab and Al-Quraan, 2015; Lang and Roessl, 2011; Meijer, 2016; Tikka and Sassi, 2011; Neirotti et al., 2014).

It was unclear from the articles we examined whether and to what extent the size of an urban area affects the evolution of smart governance. Although big cities are not always more innovative, they have more staff and management resources, facilitating the development of novel instruments, service delivery options, and online interactions with citizens (Torres et al., 2006). The efficiencies associated with larger geographical size,

together with greater numbers of constituents can thus provide local authorities with the motivation to employ technologies (Saglie and Vabo, 2009; Cruickshank et al., 2014; Krenjova and Raudla, 2017). On the other hand, citizens in smaller or rural communities have been found to have higher frequencies of ICT-enabled participation, regardless of their relatively poor Internet-connectivity (Cruickshank et al., 2014; Cimander, 2016). Neirotti et al. (2014) also argue that smart city initiatives are not correlated with the size of a city in terms of population, but rather with the population density.

Table 2.2: Expected influence of the context on smart governance

Context factor	Expectations
Policy domain	
Sense of urgency	The urgency of the topic within a policy domain results in greater governmental and citizen commitment towards smart governance
Complexity of issues	Complexity of issues has a negative result on citizen engagement and public-civil collaboration
Trust	
Trust within society	Both a high and low level of citizens' trust in government may kick-start citizen engagement. The presence of trust is needed in the continuation phase of collaboration.
Political and institutional environment	
Strength of democracy	A stronger democracy results in more citizen engagement and public-civil collaboration
Political legacy	A recent authoritarian past is negatively related with citizen engagement and public-civil collaboration
Administrative culture	More formal and hierarchical administration styles result in less citizen engagement. Nationally centralized public administration and government leads to a lower level of collaboration between citizens/communities and local governments.
An innovative and progressive political and business milieu	A political and economic environment with an innovative and progressive atmosphere nourishes both top-down and bottom-up innovation, citizen participation that contribute to smart governance.
Internet reach and use	
Internet penetration	A higher intensity and developmental level of e-participation is strongly linked to countries with widespread Internet penetration and technological proficiency.
Socio-spatial characteristics	
Vulnerability to disasters	Vulnerability to disasters and natural forces results – through pressing societal needs – in high levels of governmental and citizens' commitment to smart governance.
Social cohesion	Social cohesion positively correlates with citizen engagement in smart city arrangements.

Finally, social cohesion is expected to be positively related to digitally-enabled citizen engagement. Citizens' local embeddedness and place- and community-identity are significant for mobilizing resources to organize collaborative (online) activities in the public domain. In line with this, several studies demonstrated that in order to establish successful urban development, smart governance planning processes should fit the distinct community context (Castelnovo et al., 2015; Álvarez-Crespo, 2014; Zait, 2017).

Table 2.2 summarizes the expectations we found for the influence of context on smart governance. Finally, Figure 2.1 recaps our findings concerning the elements of and the relationships between the main variables—smart governance, its (sustainability) outcomes, and the contextual influences.

2.6. Conclusions

The highly optimistic accounts of sustainability outcomes of technology-enabled government–citizen interactions, that, however, were generally not based on empirical evidence, triggered us to conduct this literature review. Filling these knowledge gaps was the main goal of our analysis as we sought an answer to our central research question: *What relationships exist between ICT-enabled citizen-government collaboration and sustainable urban development and how do contextual circumstances influence these?*

The first conclusion of our review is that smart governance, in the sense of ICT-enabled government-citizen collaboration to advance urban sustainability, is still rare. Despite the increasing variety of collaboration-based digital instruments, the literature reveals the dominance of a one-way information supply in citizen–government interactions. Although governments promote online and offline citizen engagement and civic empowerment, in practice they do not encourage deliberation or any broad-based public–civil interactions. Therefore, ICT-supported government–citizen cooperation for collectively shaping public matters seldom occurs. The reason for this lies in the lack of capacity and willingness to genuinely engage in smart governance for urban sustainability, both on the part of government and that of citizens. Old structures, patterns, and routines still dominate.

Evidently, the mere availability of technological infrastructure is no guarantee that any radical attitudinal change will occur in public administration and the civil sphere regarding the development of co-creative collaboration to create more sustainable cities.

The second conclusion is that the evidence that smart governance contributes to sustainability is sparse and mixed. Notwithstanding all expectations in this direction, the literature fails to elucidate whether smart governance activities lead to more livable cities, i.e., cities with less social deprivation, more ecological diversity, and enhanced economic prosperity. The limited number of articles dealing with these aspects deliver mixed results. There are some indications for positive sustainability effects, although a significant number of adverse consequences also emerged. Smart governance often increases the gap between the haves and have nots rather than generating more equal societal structures. It may also boost public consumption or jeopardize ecological values, rather than contribute to a city with a balanced program of development along economic, social, and environmental dimensions.

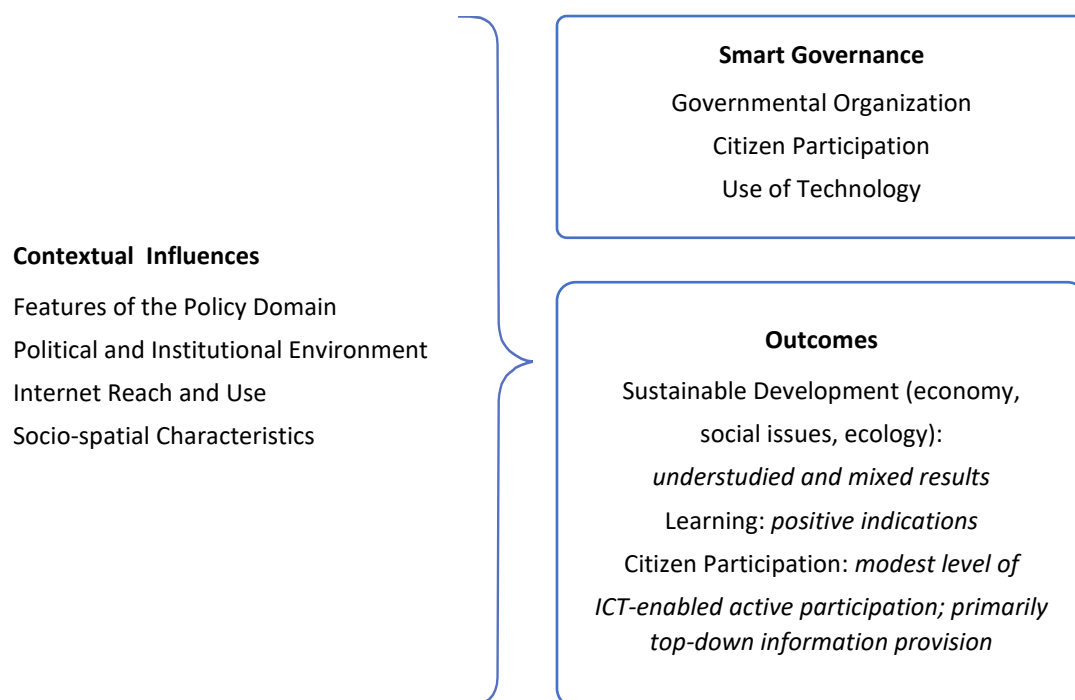
The third conclusion is that there is more evidence for the process effects of smart governance. This is because the majority of the examined articles focuses on solitary, particularly the social, aspects instead of assessing sustainability in its integrative—economic, social, and environmental—outcomes. Hence, scholarly attention centers on activities such as civil engagement and learning as primary outcomes of smart governance. Citizen participation and learning can indeed be (achieved) goals as social aspects of sustainable development. However, many studies seem to treat ICT-facilitated citizen participation as a merit in itself—engagement for the sake of engagement without questioning its benefits for the society. The review also revealed that, while the broad range of online collaborative experiments were often seen to contribute to social learning, surprisingly little attention was paid to their contribution to sustainable urban development.

The fourth conclusion is that context matters. We identified specific contextual factors such as the policy domain, politico-institutional (e.g., democracy, innovation, administration styles), societal (e.g., Internet reach and use in the society, trust), and

socio-spatial (e.g., topography of the city, local-specific social cohesion) dimensions. These contextual factors influence the distinct components of smart governance (the role of governments and citizens as well as ICT use) and define how local governments and citizens collaborate through new electronic resources, which, in turn, determine the potential of advancing urban sustainability. Based on this literature review, we may expect specific governance approaches only to work in similar contexts. Our list of context-related expectations will support future empirical research on this domain.

These outcomes sketch the contours of some essential scope conditions for successful smart governance activities. This success can be understood in terms of the initiation and endurance of broad-based collaboration by means of technologies, which contributes to urban sustainability. For this, the major scope conditions lie at the interface between the human factor and the specific contextual circumstances. While the human factor implies both governmental and civil competences such as commitment, willingness, and capacities the context conducive to effective smart governance refers to the circumstances summarized above.

Figure 2.1: Summary of the research findings with the key variables



Our review demonstrates that there is certainly no reason for having blind faith in smart governance. We need a deeper understanding of the forces acting as a hindrance or encouraging local governments and citizens to engage in digitally-supported collaboration in order to accelerate sustainability transition in cities. In addition, more in-depth case studies in various regions and cities are required to develop and test contextualized smart governance models that facilitate theory building about their effectiveness in public administration. We particularly need to gather more empirical facts about the relationship between smart governance and sustainable development. Future research should depart from a contextual understanding of smart governance, as different spatial settings have different urban priorities and circumstances that produce different dynamics of ICT-supported collaborative governance. We hope this research delivers some evidence that is needed for appropriate smart governance to reach the intended population and address the problems of urban unsustainability.

3. THE CITIPRENEUR:
HOW A LOCAL ENTREPRENEUR
CREATES PUBLIC VALUE
THROUGH
SMART TECHNOLOGIES
AND STRATEGIES

Summary This chapter explores the role of local entrepreneurs, embedded in both the civil and the business arena, in creating public value by establishing strategic collaboration around smart technologies. It suggests a novel – the local entrepreneurial – type of smart bottom-up initiative between civil grassroots and market-based initiatives. This idea is further evolved in the chapter to define the patterns of this alternative type of smart bottom-up initiative. For this purpose, the chapter conducts a case study of a community-based sustainable energy and mobility system launched by a local entrepreneur in Utrecht, the Netherlands. The findings show that the local entrepreneur has played a catalysing role in public value creation by initiating and upscaling cooperative practices around smart technologies. This success has been mainly achieved due to the entrepreneurial attitudes of pioneering and risk-taking as well as the capability to bridge between the state, the market and society to accelerate urban sustainability transition. The study offers a practical illustration of the potential of local entrepreneurs to evolve cooperative practices with smart technologies for societal change. It also shows the vital role of local governments in the achievement of bottom-up initiatives contributing to urban smartness. However, in the case of commercializing initiatives, governments also need to take a balancing role to safeguard the needs of all citizens based on fairness and equity, which is at the core of public value creation. The study adds to the citizen participation literature by revealing a novel type of active citizen grasping technological opportunities to mobilize networks to cooperate for the collective good. The research also contributes to a better understanding of the bottom-up smart city as a form of governance, and its advantages as well as drawbacks concerning public value creation.

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3.1. Introduction

Local governments are facing sustainability challenges (e.g. climate change, socio-economic inequality, multicultural tensions, ecological degradation) and increasing public demands for improved services while state resources are shrinking (Das, 2017; Johansson, 2018; Peyroux, Scott, Baud, & Jameson, 2014; Sampson, 2017). Addressing these urban issues fits municipalities' permanent quest for public value creation targeting societal results collectively desired by the public. Public value creation implies socio-economic welfare on both the individual and societal level based on the principles of fairness, equity and justice (Benington & Moore, 2010; Bryson et al., 2014; Cordella & Bonina, 2012; Marres & Lezaun, 2011; Moore, 1995). For this pursuit of public value creation local governments need societal support, and operational capacities and they are also required to constantly adapt to their changing environment and innovate if conventional approaches do not work anymore. Therefore, they seek linkages to societal actors to deliberate on what public value is and to co-design and co-implement corresponding policies (Coats & Passmore, 2008; Crosby, Hart, & Torfing, 2017; Meynhardt, 2009; O'Flynn, 2007; Page, Stone, Bryson, & Crosby, 2015; Smith, 2004; Stoker, 2006).

To respond this demanding task of public value creation many city governments consider the notion of smart city governance as a promising policy option (Hui & Hayllar, 2010; Meijer, 2015; Nam & Pardo, 2011; Rodríguez Bolívar, 2017). Smart city governance is understood in this study in its comprehensive form that links the use of technologies and man-made, collaborative actions to generate public value in the sense of sustainable development (Caragliu et al., 2011; Cosgrave, Tryfonas, & Crick, 2014; Ferro, Caroleo, Leo, Osella, & Pautasso, 2013; Fontana, 2014; Viale Pereira, Cunha, Lampoltshammer, Parycek, & Testa, 2017). This is also reflected by the definition by Meijer and Bolívar (2016, p. 398): *"The smartness of a city refers to its ability to attract human capital and to mobilize this human capital in collaborations between the various (organized and individual) actors through the use of information and communication technologies."* This, on the one hand, highlights the relevance of smart technologies that manifest themselves in tools and applications such as Big Data, Cloud Computing, Internet of Things, crowdsourcing platforms, open data portals, microblogging, social networking, multimedia sharing, virtual worlds, online participatory platforms, civic hackathons or smart energy and mobility systems (Madeira, Guimaraes, & Mendes, 2016; Mechant, Stevens, Evens,

& Verdegem, 2012; Oni, Ayo, Oni, & Mbarika, 2016; Ruijter, Grimmelikhuijsen, & Meijer, 2017; Webster & Leleux, 2018). On the other hand, these smart technologies are seen as enablers of human interactions, and in particular, the enhancement of citizen participation that often remains at a modest level in the form of one-way information provision, consultation and selective representation (Binnema & Michels, 2016; Kitchin & Lauriault, 2018; Kokkinakos et al., 2012; Molinari & Ferro, 2009; Saarikko, 2014; Yetano & Royo, 2017).

The transforming power of technologies in accommodating collaborative public value creation – the main focus of this Special Issue – is not only recognized by local governments (March & Ribera-Fumaz, 2018; Meijer et al., 2016; Pang, Lee, & DeLone, 2014; Pelzer et al., 2016; van Winden & van den Buuse, 2017) but also by citizens. They are self-activating, resourceful citizens who try to grasp technological possibilities to improve the socio-economic and ecological conditions of their city. These urbanites explore how socio-technological arrangements can solve urban challenges and generate public values such as alternative transport, clean energy or supporting disadvantaged communities (Breuer, Walravens, & Ballon, 2014; Buijs et al., 2016; de Vries et al., 2016; Joss, 2014; Lister, 2015; Loeffler & Bovaird, 2018). Such smart bottom-up movements are considered to have a unique capability in fostering transformative innovation as they start out from the community logics and needs (Aylett, 2013; Feola & Nunes, 2014; Hatzl et al., 2016; Niederer & Priester, 2016; Seyfang et al., 2014).

These kinds of smart bottom-up initiatives are extensively discussed in the literature. Herein, attention is paid to the different types of agile citizens striving for public value generation (Crossan et al., 2016; Mälgand et al., 2014; Niederer & Priester, 2016; Osborne et al., 2016; Paulos et al., 2008; Richardson, Nichols, & Henry, 2012). They are labelled in diverse ways such as active citizens, every day makers/fixers, civic/public entrepreneurs, exemplary practitioners and civic evangelists (van Hulst, de Graaf, & van den Brink, 2011).

Despite the ample amount of literature on smart bottom-up initiatives, up till now little attention has been given to a specific type of active citizen: local entrepreneurs who are embedded in both the local civil community and the business realm. This in-betweenness together with their inventive and risk-taking attitude allow local entrepreneurs to play a constructive role in employing smart technologies and strategies to enhance public value (Di

Domenico, Haugh, & Tracey, 2010; Fayolle, 2007; Hall, Daneke, & Lenox, 2010; Hitt, Ireland, Sirmon, & Trahms, 2011; Lyons, Baruch, Audretsch, & Darline, 2012). These unique capacities make local entrepreneurs able to align various actors and networks into cooperative processes and to arrive at a scale where the widespread adoption of smart solutions can have a societal impact (Boyer, 2015; Huarng & Yu, 2011; Korsgaard & Anderson, 2011; Seyfang & Longhurst, 2013). Learning about these prospects of local entrepreneurs fits the profile of this Special Issue aiming to provide a broad perspective on the possibilities of smart technologies to foster the co-creation of public services and the generation of public value in management processes. Especially the ways technologies facilitate citizen participation and co-production with the public sector and how these activities create public value is here of relevance. Therefore, this study focuses on the potential of local entrepreneurs to generate public value by forging strategic partnerships around smart technological solutions. This can also strengthen our understanding of the role of smart bottom-up initiatives in collaboratively creating public values. The research question associated with these objectives is: *What role can local entrepreneurs, positioned between civil society and the market, play in creating public value through smart technologies and strategies?*

To answer this question, the chapter first develops the idea of a new type of bottom-up initiative and its corresponding governance. This idea is based on two major sorts of bottom-up initiatives for sustainable development, which can be found in the literature: civil grassroots initiatives and market-based technological innovation niches. On their intersection a third – local entrepreneurial – type of initiative/governance is proposed. This third possible type is assumed to facilitate productive cross-overs among civil society, the market and the state, which enables to reach heightened public value. To refine the idea of this new governance type it is empirically applied to a case. This helps to reveal the patterns of this new concept and thus to arrive at its more elaborated form.

For the empirical part of this concept development, the paper examines the Smart Solar Charging (SSC) project in Utrecht, the Netherlands: a community-based, smart and sustainable grid-to-vehicle energy system launched by a local entrepreneur. This case is valuable for the purpose of this paper as it is illustrative for the new type of initiative and governance proposed by this paper. The SSC is a widely recognized best practice case due to its achievements so far:

the pioneering use of smart technologies, establishing strategic relationships with companies, local authorities and citizens, and the onset of regional upscaling (Alföldy, 2016; Energiekaart, 2016). The SSC has been embraced by the Municipality of Utrecht targeting sustainability and energy transition for which it urges the active involvement of all actors in the city (Municipality Utrecht, 2017).

The paper is organized as follows. The next section develops an analytical frame based on two types of bottom-up sustainability-oriented initiatives. Here, details are also provided about local entrepreneurship since this paper suggests that it can arouse an alternative model of smart bottom-up initiative/governance. Then, the research methods are presented which is followed by the analytical section. This section also presents the new concept advanced through the case study. The final section entails the discussion and conclusions and proposes future research pathways.

3.2. Smart bottom-up initiatives

In smart bottom-up initiatives citizens, third sector organizations, firms, and knowledge institutes experiment with novel technologies and practices to address societal challenges and to enhance the collective good. These socio-technical assemblages (Kitchin, 2014) mostly evolve on the outskirts – niches – of mainstream systems and are subject to constant stabilizing and disrupting influences (de Vries et al., 2016; Frantzeskaki et al., 2016; van Winden & van den Buuse, 2017). Before a novel socio-technical constellation becomes ingrained within the wider context and oust dominant (unsustainable) structures it evolves through multiple phases: the generation of an idea targeting the transformation of current practices; idea testing aiming at practical feasibility and overcoming organizational, technological and institutional barriers; scaling up; and diffusion to implement the novelty on a larger scale and within other contexts (Kemp, Schot, & Hoogma, 1998; Meijer, 2014; Rauschmayer, Bauler, & Schöpke, 2013).

Smart bottom-up initiatives aiming at public value creation exist in many forms of which two major types stand out: civil/community grassroots initiatives and market-driven technological niches (Bomberg & McEwen, 2012; Forrest & Wiek, 2015; Raven, Schota, & Berkhout, 2012).

These two types of bottom-up initiatives will be described on the basis of four major components that indicate and determine their development. These four components are: actors, goals, organization structure and external linkages (Aylett, 2013; Bomberg & McEwen, 2012; Frantzeskaki et al., 2016; Seyfang et al., 2014). This knowledge about civil grassroots initiatives and market-driven technological niches will be applied to develop a new type of smart bottom-up initiative: the local entrepreneur. This will enable to understand local entrepreneurs' role in public value creation through smart technologies and strategies.

Actors involved

Initiators. Grassroots projects are initiated by citizens or communities driven to apply their expertise and technological opportunities in public affairs (de Jong et al., 2015; de Vries et al., 2016; van Hulst et al., 2011; von Hippel, 2005). On the contrary, market-driven technological niches are initiated by a select group of frontrunners consisting of knowledge institutes, entrepreneurs, system builders and companies (Raven et al., 2012; Seyfang et al., 2014; Wittmayer, van Steenberg, Rok, & Roorda, 2016).

Participants. Grassroots movements are rooted in community building and therefore involve citizens – and their skills, ideas and commitment – in an early phase to collectively develop the activities (Aylett, 2013; Bomberg & McEwen, 2012; Walker, Hunter, Devine-Wright, Evans, & Fay, 2007). Similarly, market-based technological projects require civic engagement since societal acceptance of novel methods is fundamental for a systemic shift to more sustainable practices. However, market-based technological niches contrast grassroots initiatives in that they target the broad inclusion of citizens only in the last phase of societal diffusion (Raven et al., 2012; Wittmayer et al., 2016). Small local companies occasionally ally with civil grassroots projects while local societal organizations are frequent partners. However, in contrast to market-based technological niches, large corporations and manufacturers are usually absent in civil initiatives (Hoppe, Graf, Warbroek, Lammers, & Lepping, 2015; Kemp et al., 1998; Rogers, Simmons, Convery, & Weatherall, 2008). Since existing political and regulatory regimes influence the fate of bottom-up initiatives, local governments are vital for both innovation types. Local governments fulfil diverse – sometimes competing – roles (Bakker et al., 2012). For instance, they increasingly facilitate bottom-up initiatives to stimulate active citizenship and multiparty collaboration to evolve smart approaches for urban sustainability. This facilitative support entails financial (e.g. subsidies, grants, loans), in-kind resources (e.g. technical or administrative advice,

partnership, networks) and institutional measures (Bomberg & McEwen, 2012; Hufen, 2016; Warbroek & Hoppe, 2016). At the same time, as soon as local initiatives take a business-like character or become financially independent governments may choose a laissez-faire approach treating them as “usual” firms (Hoppe et al., 2015). Finally, local governments retain their classical regulatory and law-guarding role, for instance in licensing procedures where they balance between various values and interests (e.g. the landscape, the environment, health or safety) (Hufen, 2016; Klinkers, Bosboom, Königs, & Robertus, 2014).

Organizational structure

Being engrained in civil society, grassroots initiatives have an open and democratic structure although they are usually maintained by a core group of citizens. This participatory character brings about a non-strategic management and, due to members’ differing views, internal conflicts as well (Beermann & Tews, 2017; Seyfang & Haxeltine, 2012; van der Schoor & Scholtens, 2015). On the contrary, the selective circle of pioneering participants in market-based technological niches has a close-knit, less transparent and less democratic structure. This though breeds a more consensual and streamlined organization fostering the strategic upscaling of innovative approaches (Roorda, Frantzeskaki, Loorbach, Van Steenberghe, & Wittmayer, 2012; Shove & Walker, 2010; Witkamp, Raven, & Royakkers, 2011).

Goals

Although both civil grassroots initiatives and market-based technological niches strive to generate public value by promoting more sustainable societies, their goal realization differs. Grassroots initiatives prioritize community benefits by coupling their target with addressing local issues and needs. This local framing can address barriers such as information asymmetry, deficient awareness and capacity of households to switch to sustainable lifestyles (Doren, 2018; Ornetzeder & Rohrer, 2006; Rogers et al., 2008). To achieve these goals grassroots initiatives innovatively combine social, (off-the-shelf) technical and business assets. They opt to either operate on the local scale or to grow beyond it to spread new methods within society (de Vries et al., 2016; Middlemiss & Parrish, 2010; Seyfang & Smith, 2007). Conversely, market-based technological niches aim to enact systemic transformation by means of radical technological innovation. The invented technologies are pushed to the whole society through the market,

which requires a profitable business model (de Jong et al., 2015; Mizuguchi, Ohta, Beers, Yamaguchi, & Nishimura, 2016; Raven et al., 2017).

External networks

The lack of scaling up smart bottom-up initiatives and, thus, their limited societal impact is widely recognized as a major problem. That many initiatives remain small and experimental or fade out after a demonstration phase is attributed to issues of technology, economic viability, organizational capacity and demand (Arentsen & Bellekom, 2014; Doren, 2018; Paulos et al., 2008; Roorda et al., 2012; Seyfang & Longhurst, 2013; van Winden & van den Buuse, 2017). Therefore, a growing amount of research emphasizes the need of connecting to external actors and networks. Novel partnerships between state, community and private actors can boost and solidify innovation projects by accruing varied resources (Aylett, 2013; Boyer, 2015; Doren, 2018; Seyfang & Smith, 2007).

Nevertheless, grassroots initiatives face internal pressures to scale up, become mobile and transferable. They struggle with the dilemma between their core values and autonomy on the one hand and pragmatic system-building on the other hand. This latter requires them to link to mainstream structures and become part of situations they wish to transform (Aylett, 2013; Frantzeskaki et al., 2016; Meijer, 2014; Roorda et al., 2012; Wittmayer et al., 2016). On the contrary, market-based technological niches apply a different strategy for systemwide transformation. They overtly seek to connect to external networks to invade and internally convert existing structures (de Jong et al., 2015; Geels, 2010; Hargreaves et al., 2011; Seyfang et al., 2014)(de Jong et al., 2015; Geels, 2010; Hargreaves et al., 2011; Seyfang et al., 2014)(de Jong et al., 2015; Geels, 2010; Hargreaves et al., 2011; Seyfang et al., 2014)(de Jong et al., 2015; Geels, 2010; Hargreaves et al., 2011; Seyfang et al., 2014)(de Jong et al., 2015; Geels, 2010; Hargreaves et al., 2011; Seyfang et al., 2014)(de Jong et al., 2015; Geels, 2010; Hargreaves et al., 2011; Seyfang et al., 2014).

Between these two types of bottom-up initiatives, in this study a third type is proposed: the local entrepreneur, which will be elaborated upon in the following section.

3.3. Local entrepreneurs

While local entrepreneurs are overlooked in the participation literature as a type of active citizens, their potential for creating public value has been recently exposed by economy and business studies. These argue that entrepreneurship is an essential conduit for public value creation since entrepreneurs are better equipped than other actors to detect and even spearhead subtle shifts in societal values. Moreover, entrepreneurs can ignore and revolutionize existing practices by being creative, open to new technologies, capable of divergent thinking and belonging to distinctive social networks (Meek, Pacheco, & York, 2010; Moore & Westley, 2011; Pacheco, Dean, & Payne, 2010).

Local entrepreneurs aiming at socio-technical solutions for public value creation are driven by ethical considerations of societal improvement. This motive can stem from spatial influences, namely, entrepreneurs' socio-economic and emotional embeddedness within a specific place. This is termed in the literature community entrepreneurship striving to give the community something back. Community entrepreneurs innovatively use the tools of the markets to address challenges and unmet needs within their community (Fortunato & Alter, 2015; Hall et al., 2010; Lyons et al., 2012). Another motivation is their opportunity recognition of societally relevant market failures (Dean & McMullen, 2007; Hall et al., 2010). As innovators they *"face needs that will be general in a marketplace but face them months or years before the bulk of that marketplace encounters them"* (von Hippel, 1986, p. 796) and expect high benefits from their solutions for unfulfilled market and societal demands.

Local entrepreneurs focusing on public value creation can strategically ally with large incumbent players. This can commercialize their invention and thereby providing new incentives and competitive positions in existing economic systems (Hockerts & Wüstenhagen, 2010). As a result, entrepreneurs can entrench their innovation within dominant structures and drive alternative practices across society. Hence, entrepreneurs are not only able to discover but also to create opportunities by coercing institutional altering (Hall et al., 2010; Pacheco et al., 2010; Wampler & Avritzer, 2016; York & Venkataraman, 2010).

These insights suggest that local entrepreneurs, positioned between the civil society and the business realm, have the potential to develop innovative approaches to address urban challenges.

Their in-betweenness together with their entrepreneurial capacities empower them to forge co-creative practices around smart technologies and strategies for societal enhancement. This idea of the local entrepreneurial smart bottom-up initiative will be further developed to identify its major components – the actors, organizational structure, goals and external linkages (Table 3.1).

3.4. Methodology

To give the idea of the local entrepreneurial type of smart bottom-up initiative more flesh and blood this research analyzed the case of a prominent local entrepreneur in his search for innovative solutions for sustainable energy. This enables to evolve the idea into a full concept explaining the role of local entrepreneurs in public value generation by smart approaches, which aids to respond the research question.

3.4.1. Case selection

For the case study informing about the characteristics of the local entrepreneurial type of smart bottom-up initiative in practice the SSC project in Utrecht was selected. This choice is motivated by the illustrative character of the project, namely, the substantial – initiating – role of a local entrepreneur aiming to advance society by a novel socio-technical configuration (i.e. a renewables-driven energy and mobility system based on neighborhood partnerships). Moreover, the SSC is widely recognized as a successful flagship project given its potential for radically converting the regional energy system, which is based on its accomplishments so far: a pioneering technology, a private-public alliance including global corporations, and the onset of regional upscaling (Engel, 2016; Venderbosch, 2016).

Beyond concept-development, examining such a best practice case can provide constructive insights for policy making and community practice as positive examples can propose the adoption of critical ingredients in other contexts while undesirable outcomes identify paths to avoid. In addition, the SSC project has been progressing in Utrecht where the municipality aspires to become a smart, sustainable and a completely climate-neutral city within the next two decades (Municipality Utrecht, 2017). Therefore, this study can aid to learn how technology-enabled initiatives from society emerge in an environment that stimulates the collective input of all actors in the city and the use of new technologies.

Table 3.1: Types of smart bottom up initiatives

DIMENSIONS	COMMUNITY-BASED GRASSROOTS INITIATIVES	LOCAL ENTREPRENEURIAL INITIATIVES	MARKET-BASED TECHNOLOGICAL NICHES
Actors : Initiators: Participants	<ul style="list-style-type: none"> • Citizens , communities • Citizens (from an early stage): <ul style="list-style-type: none"> - Ownership / management - Co-developers /co-deciders - Users / consumers • Local organizations (schools, service providers) • Small, local “green” companies • Local governments: facilitating, regulatory, reticent when commercializing 	Investigated in this research	<ul style="list-style-type: none"> • A select group of frontrunners: knowledge institutes, firms, entrepreneurs • Citizens (only later diffusion phase): • Users / consumers • Knowledge institutes • Large and start-up companies, entrepreneurs • Local governments: encouraging, regulatory, reticent
Organization	<ul style="list-style-type: none"> • Open, participatory, transparent, democratic • Non-strategic • Internal conflicts 	Investigated in this research	<ul style="list-style-type: none"> • Close-knit, selective, less transparent and democratic • Strategic, consensual and streamlined management
Goals (public value creation)	Sustainable development <ul style="list-style-type: none"> • Community needs and benefits • Dissemination (local or for whole society) • Socio-technical innovation (often off the shelf methods) 	Investigated in this research	Sustainable development <ul style="list-style-type: none"> • Systemic breakthrough through the market • Pushing radical technologies to the whole society Market and innovation opportunities
External networks	Modest linkages to locality-surpassing networks	Investigated in this research	Strong connections to resource-rich actors across sectors and spatial scales

3.4.2. Data collection

To collect the data needed to identify the aforementioned characteristics of the SSC, the development of the project was followed between January 2016 and September 2017. This period was chosen because the project by then already passed the embryonic stage that would have insufficiently informed about the project details sought by this research. Therefore, a time span was selected, which already displayed some project history to reveal important patterns but which still was initial enough to observe the onset and unfolding of crucial activities (e.g. the social diffusion of the smart scheme). In addition, a research period spanning a longer time can better disclose the project evolution in motion than a one-moment snapshot.

The data collection entailed varied forms (Table 3.2) to better understand the project dynamics and to be able to identify the characteristics of the four major components – the actors, organizational structure, goals, external networks – of the initiative. These characteristics were needed to enrich the preliminary concept of the local entrepreneurial type of smart bottom-up initiative and to position it in relation to the two well-known types of bottom-up initiatives (i.e. civil grassroots projects and market-based technological niches).

The first step of the data collection was an exhaustive on- and offline document analysis to gain insights into the project history. The online documents were gathered by making use of search terms related to the SSC project in the Google search machine. This was carried out in both Dutch and English language to maximize the number of relevant articles. This search-process generated distinctive types of documents: online newspapers or magazines, PowerPoint presentations, governmental (policy) documents, announcements, research documents, social media outlets and websites. Besides, offline material such as brochures/folders and articles in local newspapers concerning the initiative was also gathered. Altogether, 52 documents were collected and used. Their relevance was determined on the basis of their information content regarding the initiative in view of the major dimensions – actors, organization structure, goals, external networks – of the analytical frame (Table 3.1).

The second step entailed semi-structured interviews with people from public, civil and commercial organizations who in one way or another are/will be related to the project. Besides enquiring the initiating local entrepreneur, the interviews involved representatives from

public institutions (schools, municipalities, knowledge institutions, economic development agency), companies as well as societal and civil organizations (housing associations, community cooperatives). External respondents (experts and academics) were interviewed too to clarify the project trajectory from the viewpoint of their work-field. All these interviewees were selected based on their close involvement in the project development. A total of 14 persons were approached for an interview, who all willingly agreed to contribute. The interviews lasted on average about 80 min per interview. The interview questions targeted the major project components – namely, the actors, organizational structure, goals and external networks – in line with the analytical frame. The interview questions were embedded in three overarching themes: the collaboration aspects including the role of the actors, the role of citizens, the diverse patterns of cooperation and the use of technologies, the (in)tangible outcomes achieved and the factors that stimulated or hindered the development of the initiative. These overarching themes helped to gain a general overview of the project progress and its surrounding environment besides the aforementioned issues specifically targeted.

Third, six gatherings were attended, which were organized by universities, civil organizations or by the project management in relation to the SSC project. Some of these events were neighborhood gatherings introducing the new energy and mobility arrangement of the SSC to community residents. Both the interviews and the events were recorded and transcribed.

For the data analysis, the research team first set up a coding scheme. This entailed the definition of distinct themes according to the analytical frame (Table 3.1): actors, goals, organizational structure and external networks. In addition, further themes in relation to chronology were determined to identify the various development phases of the initiative: idea generation, idea-testing, scaling up and diffusion. Following, this coding scheme was applied to classify the rich information content gathered by rendering the data to the various themes. This enabled to establish the major dimensions of the SSC in its various evolution stages. For the purpose of reliability and validity in this research use was made of research triangulation for collection and cross-checking of data from various sources and perspectives. This, as indicated above, implied mixed methods consisting of desk research/ literature review, interviews and the observing attendance at events.

Table 3.2: Data collection

INTERVIEWS		
Participants	Position	Type of organization
R1	Owner	The local entrepreneur
R2	Domain manager	Regional economic developmental agency
R3	Owner	Company
R4	Program manager	Local government
R5	1)Sustainability organizer 2)Advisor	Energy cooperative association
R6	Rector	School
R7	Co-founder	Company (start-up)
R8	Researcher	University
R9	Manager real estate & development	Housing association
R10	Researcher	University
R11	Director	University/research institute
R12	Policy advisor	Local government
R13	Advisor strategy and sustainability	Local government
R14	Project manager	Local government
EVENTS		Organizer
E1. New energy lab		Utrecht Sustainability Institute
E2. Neighborhood information evening		LomboxNet
E3. Utrecht Sustainability Conference		University Utrecht
E4. Circular Economy Lab		Utrecht Sustainability Institute
E5. Utrecht Energy Match		Energie-U
E6. Conference Smart Governance for Sustainable Cities		University Utrecht and Municipality of Utrecht
E7. Guided tour for the Lombok Smart Solar Charging and We Drive Solar system		Utrecht Sustainability Institute
DOCUMENT ANALYSIS		
Document type	Quantity (D1-D52)	
Policy documents	9	
Newspapers, magazines	9	
Presentations	4	
Research documents, reports	7	
Press release	5	
Websites	5	
Social media channels	5	
Folders, information leaflets	3	
Audio-video recordings	5	

Following the establishment of the major components of the SSC in the various developmental stages, the findings were related to the two other models of smart bottom-up initiatives serving the base of the analytical frame (Table 3.1). This means that each component in each developmental phase was classified based on whether it features a civilian grassroots initiative or rather a market-based technological niche. In this way, the peculiarities of the third type of smart bottom-up initiative – the local entrepreneur – can be identified between civilian grassroots initiatives and market-based technological niches. Finally, the analyzed material is synthesized into the full-fledged conceptualization of the local entrepreneurial bottom-up initiative employing smart technologies and strategies for public value creation.

3.5. Findings

This paper started with the idea that there is a third – local entrepreneurial – type of smart bottom-up initiative positioned between civil grassroots and market-based technological niches. This idea was further evolved by empirically exploring an illustrative case of a neighborhood-based clean energy project launched by a local entrepreneur.

Overall, the study has found that the local entrepreneur has been determinant in successfully developing a collaborative smart strategy for public value creation, namely, sustainable energy transition. This success essentially derives from the local entrepreneur's ability to transform the community-based activities into a professional organization, which facilitates the scale-up and diffusion of this *"local energy revolution"* (Hosselet, 2017). This development is noteworthy given that most smart city projects fail to survive or grow and become transferrable, which restrains their societal impact (Doren, 2018; van Winden & van den Buuse, 2017).

The main research findings are summarized in Table 3.3 displaying the major project components – actors, organization, goals, external networks – in the various developmental stages of idea formation, idea-testing, scaling-up and diffusion. The initial phase demonstrates a community project set out by Lombok resident and entrepreneur Mr. Robin Berg evolving a prototype of a sunpower-based bidirectional charging station in his backyard. This smart technological scheme charges cars with solar fuel while at night depleting the car battery for loading the community's electricity network. This invention was preceded by the local entrepreneur's enduring involvement in neighborhood improvement (Venderbosch, 2016; R11). Among others he organized collective procurements of solar panels for local schools and residences so that community members can benefit from clean and cheaper energy (Alföldy, 2016; Utrecht Sustainability Institute, 2016; R6). This sustainability-oriented activism of Mr. Berg is triggered by the environmental degradation harmfully influencing the community: *"It frustrates me that my son's classmates from a poorer, traffic-intensive zone get regularly sick due to polluted air"* (R1). At the same time, this initial stage also exposes patterns deviating from civil grassroots initiatives: citizens' absence in the organization, the early emergence of business objectives, and the streamlined management style. These patterns reveal the entrepreneurial perspective of the initiating citizen embarking on the economic prospects of addressing socio-ecological deficiencies.

This entrepreneurial perspective becomes obvious in the second phase of idea-testing wherein the local entrepreneur links to important partners such as global (e.g. Renault, General Electric) and Dutch companies, start-ups, infrastructural providers and public authorities. These connections result in a closed public-private consortium converting the neighborhood into a living lab shielded by the municipality's *"3-year supervision holiday"*: *"we businesses, citizens and the governments, will work together on a result-oriented basis involving only limited risks how a new energy system such as this one will work in actual practice"* (Economic Board Utrecht, 2015; Municipality of Utrecht Economic Board Utrecht, Last Mile Solutions, Stedin, Vydin, & Lomboxnet, 2015). This strategic collaboration technologically refines the prototype by developing system-conform electric cars and the car-sharing scheme *"We Drive Solar"* (R8; E1; E4; R7; R2; R11; De Ingenieur, 2015). While these activities are still spatially bound to the experimental lab in the neighborhood the project increasingly heralds a universally applicable and marketable socio-technological system.

The third stage of *"scaling up in the region"* demonstrates that the structural consolidation of the project brings about a change of the guard in leadership. The leading role is taken over by a knowledge organization – the Utrecht Sustainability Institute – transforming the initiative into a regional, EU-funded project. This results in the increased ambition to implement the SSC within the entire Province of Utrecht: 1,000 electric cars coupled to 10.000 solar panels through 1,000 bidirectional charging stations (Middelweerd, 2017; R11; smartsolarcharging.eu, 2017; R12; R4). This upscaling shift impels further organizations in the region, such as municipalities, companies, societal and civil entities, to join the SSC project. It also results in four additional neighborhood labs experimenting with the new energy system within different socio-spatial contexts (Lammers, 2017; smartsolarcharging.eu, 2017; R11; R9; R5; R11).

Table 3.3: Patterns of the local entrepreneurial initiative (Smart Solar Charging)

<i>PANEL A: Actors involved</i>			
Idea and prototype	Idea-testing: strategic alliance	Scaling-up in the region	Ambitioned diffusion on (inter)national level
<ul style="list-style-type: none"> The local entrepreneur (initiator) Local public institutions: <ul style="list-style-type: none"> schools (roofs, education, events) municipality: facilitating; regulatory (licensing) Community citizens (spectators) <p><i>Civil-based grassroots but limited inclusion of citizens</i></p>	<ul style="list-style-type: none"> The local entrepreneur (leader) Consortium formation: <ul style="list-style-type: none"> global and national corporations the municipality: facilitating, regulatory (licensing) economic development agency network provider Knowledge institutes (research) Community citizens: (test) users Regional public entities / schools (solar panels) <p><i>Market-based technological niche attached to the local community; strongly facilitating local government</i></p>	<ul style="list-style-type: none"> Knowledge institute (leader) The private-public consortium Municipalities (from the region) Launching customers (public, societal and private organizations) The local entrepreneur (expert, business owner) Citizens: (potential) users / consumers Regional public entities / schools (solar panels) Societal or sustainability-oriented organizations Local governments: facilitating, regulatory, increasingly reticent <p><i>Market-based technological niche; facilitating government</i></p>	<ul style="list-style-type: none"> The local entrepreneur (?) Corporations Public organizations/ governments (?) Citizens/communities: potential users/customers <p><i>Market-based technological niche</i></p>
<i>PANEL B: Organization</i>			
Idea and prototype	Idea-testing: strategic alliance	Scaling-up in the region	Ambitioned diffusion on (inter)national level
<ul style="list-style-type: none"> Streamlined steering by the local entrepreneur Transparent Closed- actors selected for resources Local in scope and partners <p><i>Civil-based grassroots but less participatory / open and more streamlined</i></p>	<ul style="list-style-type: none"> Steering by the local entrepreneur Closed public-private consortium of selected partners Targeted and strategic <p><i>Market-based technological niche</i></p>	<ul style="list-style-type: none"> The initiative becomes an EU project Streamlined coordination More open, participatory, consensual (new lab locations; societal dispersion) <p><i>Market-based technological niche</i></p>	<p>Market mechanism – exporting companies</p> <p><i>Market based technological niche</i></p>

PANEL C: Goals

Idea and prototype	Idea-testing: strategic alliance	Scaling-up in the region	Ambitioned diffusion on (inter)national level
<ul style="list-style-type: none"> Through a radical socio-technical innovation: <ul style="list-style-type: none"> Environmental and social community benefits A viable business model 	<ul style="list-style-type: none"> Technological evolution in the experimental living lab of the community Climate-neutral, healthy city /region Economic and innovation opportunities Upgrading energy infrastructures Systemic breakthrough Participating citizens: sustainability, lack of space, innovation 	<ul style="list-style-type: none"> Regional upscaling in the whole province: <ul style="list-style-type: none"> 1000 electric cars, 10.000 solar panels, 1000 bidirectional charging stations Adjustment in varied contexts incl. deprived neighborhoods 	<ul style="list-style-type: none"> Standard protocols for further roll-out on national and global scales (global energy transition) A competitive Dutch export product
<i>Civil-based grassroots & market-based</i>	<i>Market-based technological niche</i>	<i>Market-based but also some focus on community-based social improvement</i>	<i>Market-based technological niche</i>

PANEL D: External networks

Idea and prototype	Idea-testing: alliance	Scaling-up in the region	Ambitioned diffusion on (inter)national level
Local linkages	Linking the community living lab to external partners from different sectors and scales	Expanding regional and national linkages to actors in diverse sectors	Nationally and globally expanding connections
<i>Civil-based grassroots</i>	<i>Market-based technological niche but tied to the locality as experiment</i>	<i>Market-based technological niche</i>	<i>Market-based technological niche</i>

The fruitful progression of the SSC project can also be ascribed to the support of the municipality connecting its own priorities of climate adaption and economic competitiveness to the project objectives. This support manifests itself in various state resources such as financing, flexible/enabling rule-making and licensing, networking, education, administrative support and political lobbying. This governmental commitment gives the initiative of an enthusiast though solitary local entrepreneur a more legitimate and reliable character, which eases the connection with strategic partners (R4; R11; E6; E1; R13; R12; Municipality of Utrecht, Economic Board Utrecht, Last Mile Solutions, Stedin, Vydin, Lomboxnet, 2015; Economic Board Utrecht, 2015). At the same time, the municipality is becoming vigilant as a result of the gradual commercialization of the initiative. Therefore, it refrains from overtly publicizing the project to evade serving specific private interests. Instead, it shifts to institutional support to remove barriers of renewable energy schemes in general (Province of Utrecht, 2016; PwC, 2017, R11; R4; R12; E6; R13; R14; E6).

Another important factor to successfully spread this smart technological scheme within society is the collaborative contribution of citizens. However, the findings reveal that citizens here fulfill different roles than the ones often found in civil grassroots initiatives. Citizens participating in the SSC are primarily appealed to as customers buying new services (i.e. car-sharing lease) and providing user-feedback to refine the system. These participants consist of the better educated, more affluent and societally engaged citizens (wedrivesolar.nl 2017; E4; R11; R8; R5; R1; R3; R2). The non-inclusion of citizens in the organization and design of this smart energy infrastructure is explained by its technological complexity (R2; R4) as *“not interesting and relevant for people”* and by *“the infrastructure is insufficiently developed to present it to the public”* (R3).

These findings have resulted in Table 3.4 that displays the refinement of the preliminary frame and the novel type (Table 3.1) by adding the characteristics of its major components identified in the case study. This new type of smart bottom-up initiative is positioned between civil grassroots and market-based technological initiatives and labeled as citipreneurial initiative and its corresponding governance. Citipreneurship refers to simultaneously being a local citizen and an entrepreneur acting in the pursuit of societal benefits. This dual embeddedness complemented by entrepreneurial competences indicates the potential to align social networks

and technologies into collaborative public value creation, here in the form of a society-wide renewable energy system.

Table 3.4: The smart citipreneurial initiative

DIMENSIONS	COMMUNITY-BASED GRASSROOTS INITIATIVES	CITIPRENEURIAL INITIATIVES	MARKET-BASED TECHNOLOGICAL NICHES
Actors : Initiators Participants	<ul style="list-style-type: none"> • Citizens, communities • Citizens (from an early stage): <ul style="list-style-type: none"> - Ownership / management - Co-developers /co-deciders - Users / consumers • Local organizations (schools, service providers) • Small, local “green” companies • Local governments: facilitating, regulatory, reticent when commercializing 	<ul style="list-style-type: none"> • <i>The citipreneur</i> • <i>Citizens (diffusion phase):</i> <ul style="list-style-type: none"> - <i>Contributors (solar panels)</i> - <i>Users/consumers</i> - <i>Producers (green energy to grid)</i> • <i>From local to global organizations:</i> <ul style="list-style-type: none"> - <i>Schools</i> - <i>Infrastructural providers</i> - <i>Knowledge institutes</i> - <i>From small to giant businesses</i> - <i>Local governments: facilitating, regulatory, reticent when commercializing</i> 	<ul style="list-style-type: none"> • Knowledge institutes, firms, entrepreneurs (select group of frontrunners) • Citizens (only later diffusion phase): users / consumers • Knowledge institutes • Large and start-up companies, entrepreneurs • Local governments: encouraging, regulatory, reticent
Organization	<ul style="list-style-type: none"> • Open, participatory, transparent, democratic • Non-strategic • Internal conflicts 	<ul style="list-style-type: none"> • <i>Close-knit, selective → more open and transparent</i> • <i>Strategic, consensual management</i> 	<ul style="list-style-type: none"> • Close-knit, selective, less transparent and democratic • Strategic, consensual and streamlined management
Goals (Public value creation)	Sustainable development <ul style="list-style-type: none"> • Community needs and benefits • Dissemination (local or whole society) • Socio-technical innovation (often off the shelf methods) 	Sustainable development <ul style="list-style-type: none"> • <i>Departing from community logics</i> • <i>Systemic breakthrough through radical technologies and the market</i> Market and innovation opportunities	Sustainable development <ul style="list-style-type: none"> • Systemic breakthrough through the market • Pushing radical technologies to the whole society Market and innovation opportunities
External networks	Modest linkages to locality-surpassing networks	<i>Strong connections to resource-rich actors across sectors and spatial scales</i>	Strong connections to resource-rich actors across sectors and spatial scales

3.6. Discussion and conclusions

This study has sought new insights into smart bottom-up initiatives by focusing on the question *“What role can local entrepreneurs, positioned between civil society and the market, play in creating public value through smart technologies and strategies?”* For this purpose, a new concept was constructed based on the idea that the in-between position and the pioneering skills enable local entrepreneurs to forge technology-enabled, co-creative strategies to address societal issues and thus generate public value. This conceptualization was evolved by empirically studying the case of the SSC – a community-based energy project launched by a local entrepreneur.

The resulting concept, furnished by the specific patterns of the citipreneurial type of smart bottom-up initiative, shows the important role local entrepreneurs can play in creating public value by smart technologies and their affiliated cooperative strategies. This role is manifest by how the citipreneur – being both a local citizen and an entrepreneur – has been a catalyst in inventing and upscaling a socio-technical arrangement to advance the energy transition. This constructive role in generating public value emerges from the citipreneur’s cross-boundary position and enterprising skills. These capacities contributed to establish productive state-business-civil linkages around smart technologies, which resulted in technological innovation, organizational consolidation and institutional altering. These outcomes also demonstrate local entrepreneurs’ competence to drive systemic change with a societal impact, which contrasts most smart bottom-up initiatives that remain isolated and small-scale.

The contribution of the local entrepreneur, however, should be understood in its connection to other actors. Especially the facilitative role of the local government has been found critical in successfully progressing this technology-enabled collaborative public value creation. This role is crucial but also difficult since the government has to deal with tensions between private and public interests. These tensions moved the municipality to shift its focus from one specific project to institutional intervention (e.g. barrier-removing rules, lobbying) to aid the widescale adoption of smart sustainability arrangements. By this, the municipality aimed to create an equal level playing field for all potential stakeholders rather than endorsing a small circle of market actors.

The insights gained in this study have useful implications for urban managers. It shows that local governments, in their pursuit of realizing urban sustainability, do not necessarily need to kick-start smart initiatives themselves. Rather, governments can tap into the city dynamics and interfere constructively so that bottom-up initiatives evolve and reach public value on a wider scale. Local governments can strategically select and support promising local initiatives that are capable to grow and are run by resourceful and bridge-building actors trusted by the local community.

However, state support for this kind of initiatives also holds risks as it can propel the rise of smart city islands that can both hinder the societal dissemination of innovative systems and reinforce inequalities within and between neighborhoods. This can occur if only a small and select – frequently the more affluent – group of citizens takes part and when citizens are mere consumers of services developed by others, as observed in this case study. Such a limited participation contradicts the aspirations of sustainable development and public value creation, which aim at collectively desired societal outcomes distributed on the principles of fairness, equity and justice. Therefore, supporting smart (marketable) bottom-up initiatives requires governments to watch over public values and incentivize the inclusion of all citizens in the design and delivery of smart infrastructural schemes.

This study is a first step to bring local entrepreneurs into vision and their potential contribution to public value creation with the strategic adoption of smart technologies. It can deepen our theoretical and empirical knowledge on citizen participation in the smart city though this initial undertaking asks for much more subsequent research. In this regard, the concept developed may need refinement, particularly due to the limitations of a single-case study. Therefore, future research could test and validate the key findings of this analysis and whether they more generally apply to other cases. Also, future work can raise issues such as the (long-term) effects of citipreneurial initiatives on the city as a whole, on various societal groups (who wins and who loses?) or how such smart strategic collaborations unfold in different urban contexts, to name just a few.

4. CITIZENS IN THE SMART CITY: WHAT IS ACTUALLY HAPPENING? AN IN-DEPTH CASE STUDY FROM UTRECHT, THE NETHERLANDS

Summary While the role of citizens in smart cities is hotly debated, there is a dearth of empirical research on the subject. This in-depth study of a European city, selected for its typical smart city ambitions, explores the roles that citizens actually play in smart city projects. The study examines twelve initiatives in the city of Utrecht (the Netherlands) using a framework that differentiates between types of citizen participation. The findings show that technology-enabled citizen participation in Utrecht is highly diverse and embraces all types of participation rather than simply taking the form of either “citizen empowerment” (as the advocates argue) or “citizen subjugation” (as the critics stress). The diversity found in the study highlights the need to conceptualize the role of the smart citizen at the micro (project) level rather than at the level of the city as a whole. The study shows that citizen participation in the smart city should not be understood as a technological utopia or dystopia but as an evolving, technologically mediated practice that is shaped by a variety of factors.

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4.1. Introduction

The core idea of smart city governance is the usage of technologies in multi-stakeholder collaboration to build sustainable cities. This inherently implies a more significant citizens' role, as through the utilization of technology citizens are able to actively contribute to public matters such as urban development, and the co-creation of public services (Ferro & Osella, 2017; Meijer et al., 2016).

Smart governance in the literature is extensively discussed and conceptualized from manifold perspectives. In this varied argumentation landscape two major views stand out: the highly optimistic views on the one hand and the critical and/or sceptic opinions on the other. The first celebrates citizen empowerment enabled by the wide availability, place- and time-boundlessness of technologies (Aladalah, Cheung, & Lee, 2017; De Oliveira & Santos, 2018; Mukhtarov et al., 2018).

These celebrative views are countered by the chorus of critical and sceptical voices decrying the position of citizens in the smart city (Cowley et al., 2017; Datta, 2015; Willis, 2019). They warn of technological determinism and highlight the potential limitations due to the insufficient socio-economic or organizational capacities of the actors (Hendriks, 2014; Ogonek & Hofmann, 2018). Others foresee the subjugation of citizens in the smart city under the dictates of data, technologies and neoliberal agendas. Such an instrumental approach, these scholars argue, eliminates the core of citizenship: socio-political reflection and activism (Cardullo & Kitchin, 2018; Shelton et al., 2015; Vanolo, 2016).

The paucity of empirical work on the actually existing citizen participation in smart cities makes it difficult to draw conclusive insights (Kitchin, 2015; March & Ribera-Fumaz, 2016). The few studies available, moreover, were found to rarely investigate tangible activities in smart, technology-based projects, focussing instead mainly on narratives, discourses and imaginaries in policy- and programme documents (Cowley et al., 2017; Engelbert et al., 2019; Fernandez-Anez et al., 2018; Vanolo, 2016). These studies often embody a strongly normative approach rooted in critical theory and concentrate on the stark contrast between a sloganized concept of "citizen empowerment" and the realization of "citizen subjugation". Hence, it is problematic and too early to claim that citizens are principally passive, subjugated and marketable actors in

the smart city. This is all the more doubtful when surveying the upsurge of civil grassroots initiatives across the globe (de Vries et al., 2016; Seyfang & Longhurst, 2013; Tomor, 2019). It is far more likely that citizens play a variety of roles in the development of smarter cities.

It is evident that further scrutiny of urban practices is urgently required to deepen our understanding of how citizens enabled by technology contribute to public matters. The present paper therefore looks beyond the archetypal contradictions in the literature and delves into the materialization of smart governance in the city. To that end, an in-depth case study approach has been used to analyse the actual contributions of citizens in the city of Utrecht (the Netherlands) based on the question: *What are the actual roles of citizens in smart city governance in the context of Utrecht?* This is addressed by drawing on classifications of citizen participation to construct a model and by examining twelve technology-mediated initiatives in the Utrecht practice. The case of Utrecht is relevant because this midsize city with its smart governance ambitions resembles, and thus exemplifies, many other cities in the world.

The remainder of the article is structured as follows. In the following section (4.2), a brief literature overview of extant conceptualizations of citizen participation is presented, on the basis of which an analytical model is constructed. The subsequent section (4.3) describes the research methods, which is followed by the findings (4.4). The final section (4.5) discusses the results, presents the conclusions and indicates directions for future research.

4.2. Citizens' roles in the smart city

This section first briefly discusses how citizen engagement in smart, technology-facilitated urban development is conceptualized in the literature. Based on these insights, an analytical framework is presented to study the roles citizens actually play in smart city development in Utrecht.

4.2.1. Citizen participation

Although citizens' roles in the smart city have only recently captured scholars' attention, the use of ICT in the public sector for citizen participation has been extensively studied in other

domains such as urban planning and e-participation (Ertiö, 2015; Wilson et al., 2017). These studies devised a wide range of conceptualizations and classifications of citizen participation in collective issues (Haklay, 2013; IAP2, 2007; Krabina, 2016; Macintosh, 2004; OECD, 2001; Tambouris et al., 2007).

These classifications have all tended to build on Arnstein's (1969) well-known participation ladder, which, throughout the decades, has sustained its heuristic utility to understand citizen involvement and power relations in decision-making. Its eight steps represent different gradations of citizen involvement, from non-participation to citizen power: by going up the ladder, citizens are given more power and are thus more able to alter socio-political goals according to their aspirations.

4.2.2. Citizens in the smart city

Some of the studies on citizen engagement in the smart city make use of Arnstein's participation ladder or of its revised versions (Cardullo & Kitchin, 2018; Granier & Kudo, 2016; Willems, Bergh, & Viaene, 2017). Other studies conceptualize citizen participation by drawing on urban citizenship, subalternity and urban utopias/dystopias (Datta, 2015; Grossi & Pianezzi, 2017; Vanolo, 2016), techno-social assemblages and the notion of publicness (Cowley et al., 2017; Kitchin, 2014). Others again combine democratic models with issues of policy-making and service implementation (Berntzen & Johannessen, 2016; Simonofski, Asensio, De Smedt, & Snoeck, 2017). A dichotomous view - either gloomy or cheerful - of the role of the citizen in smart cities emerges from these studies.

Table 4.1 (a and b) summarizes the viewpoints on citizens' roles in smart governance in the current studies. Arnstein's participation ladder is taken as the reference to visualize participation levels across the studies. Table 4.1a presents the more pessimistic studies, in which the roles of citizens are clustered in the lower half: non-participation and tokenism, with in between emergent consumption-based citizenship. These studies expose the gap between the citizen-centric rhetoric and reality: citizens participate barely or not at all and function as manipulated subjects, customers and data sensors (Fernandez-Anez et al., 2018; Grossi & Pianezzi, 2017; Willis, 2019). By contrast, Table 4.1b presents the more optimistic studies on the roles of citizens, positioning these at the highest level, namely citizen power. These active

citizens engender socio-technical systems to solve urban problems (Capdevila & Zarlenga, 2015; Townsend, 2015; Trencher, 2019).

Whether these participation patterns can also be traced in smart governance practices in Utrecht is the focus of this study. In the next section, a classification framework is proposed, designed to obtain empirical evidence about the roles of citizens emerging in the Utrecht context.

Table 4.1.a: Citizen roles in the smart city: gloomy views

Arnstein 1969	Berntzen & Johannessen 2016 (Norway)	Vanolo 2016 (UK)	Kudo & Granier 2016 (Japan)	Simonofski et al. 2017 (Namur, Belgium)	Cowley et al. 2017 (6 Cities, UK)	Grossi & Pianezzi 2017 (Genova, Italy)	Willems et al. 2017 (UK, London)	Cardullo & Kitchen 2017 (Ireland, Dublin)	Anez et al. 2018 (Vienna, Austria)	Willis 2018 (Chennai, India)
Citizen power								Very few: within a neoliberal frame		
Tokenism	<ul style="list-style-type: none"> One-way information Consultation 						<ul style="list-style-type: none"> Informing Consultation 	To contribute to initiatives already largely predetermined		
Emerging role: consumption		Future citizens	Restrained co-implementation		<ul style="list-style-type: none"> Entrepreneurial publicness (economic use; co-creating services) 	<ul style="list-style-type: none"> Consumers voluntarily and unconsciously involved in the ideation of new services Defining services already settled 		Consumerism		
Non-participation		<ul style="list-style-type: none"> Invisible citizens Subjugated citizens Citizens as sensors 	<ul style="list-style-type: none"> No direct citizen involvement & inputs expected Citizens required to consent to be steered 	Citizens not included	Service user	<ul style="list-style-type: none"> Citizens only share individual preferences & utility Data providers; sensors 	<ul style="list-style-type: none"> Therapy Manipulation 	<ul style="list-style-type: none"> Steered, controlled, and nudged to act in certain ways Sources of data (to turn into products) 	Civil society is not involved	Reinforcing and reproducing spatial and economic exclusion of marginalized citizens

Table 4.1.b. Citizen roles in the smart city: optimistic views

[illegible]

4.2.3. Analytical framework

An analytical framework for these insights into citizen participation is provided in Table 4.2. While this framework may apparently draw on Arnstein's original ladder of participation and the numerous adaptations of this concept, it deviates in certain aspects. It is a condensed model, distinguishing only four stages of participation, enriched by insights from recent smart city studies. Two of the stages have been renamed and reorganized (i.e. passive participation; consultation) and a new gradation has been introduced (i.e. consumerism). This condensed model is expected to provide a more straightforward manifestation and understanding of the various forms of participation. This is particularly valuable since previous models often entailed complicated or overlapping structures (Cardullo & Kitchin, 2018; Krabina, 2016; Molinari & Ferro, 2009). A further difference in this readapted framework is that it does not exclusively refer to citizens' roles in relation to powerholders' allocation of authority. This is because smart urban initiatives are increasingly being launched by non-state stakeholders such as citizens, communities, universities or businesses (Breuer et al., 2014; Niederer & Priester, 2016; Reinsberger & Posch, 2014). Hence, any form and level of citizen participation can derive from either top-down or bottom-up initiators and is thus not merely reliant on governments.

Table 4.2. The analytical framework

Participation form	Citizens' roles
Citizen power	<ul style="list-style-type: none"> Active and influential actors: negotiators; co-creators; co-deciders; bottom-up initiatives
Consultation	<ul style="list-style-type: none"> Feedback and suggestions
Consumerism	<ul style="list-style-type: none"> Purchasing & (co)creating smart products and services Data product
Passive participation	<ul style="list-style-type: none"> Invisible, silent political subjects Information recipient (e.g. to consent, change behaviour) Service user: (un)conscious data-collector Subjugated actors

Passive participation

In the literature, there is a school of thought that presents citizens as invisible and silent political subjects for whom policymakers create smart cities and smart lifestyles (Fernandez-Anez et al., 2018; Yigitcanlar & Lee, 2014). According to these studies, this leaves little space for citizens' voices and grassroots actions "*because planners and technological gurus seem to know exactly what citizens desire*" (Vanolo, 2016 p 34). Others present citizens as one-way conduits of information about development plans, through which citizens can be educated and steered, to obtain their consent (e.g. to policy proposals) and adjust their behaviour (Cardullo & Kitchin, 2018; Cowley et al., 2017; March & Ribera-Fumaz, 2016).

Another research stream characterizes citizens as service users of utilities such as transport, water, and electricity. Users catered to by smart technologies (e.g. apps and sensors) (in)voluntarily collect and provide data (Berntzen & Johannessen, 2016; Cowley et al., 2017). Examples are software-mediated traffic flow regulation, citizen-sensing for environmental monitoring and passengers' travelcard-based data provision (Wehn et al., 2015). This is viewed by Vanolo (2016) as citizenship symbolized by the smartphone, while Gabrys (2014) calls it "*computational responsiveness*" (p. 38); as such, it is more instrumental than empowering as citizens have limited access to and cannot act upon these data.

Finally, the literature offers dystopian imaginaries of smart urbanism, in which citizens are considered subjugated actors who can be monitored, controlled, predictively policed and even "cleansed" from the public space by using intelligent cameras, big data analytics, and algorithms (Datta, 2015; Engelbert et al., 2019; Vanolo, 2016).

Consumerism

An increasing number of scholars argue that the smart city discourse appeals to citizens as consumers (Cardullo & Kitchin, 2018; Grossi & Pianezzi, 2017; Taylor Buck & While, 2017). These scholars point to the neoliberal underpinning of smart city strategies, which promotes business interests. This is supported, Vanolo (2016, p.34) argues, by framing techno-solutions within an "*ambiguous politics of time*": "*past citizens*" are guilty and irresponsible, creating an environmental catastrophe for "*future citizens*", requiring "*present citizens*" to purchase eco-friendly technologies. Citizens, therefore, choose "smart" services from the marketplace,

something reserved for a select population group capable of buying smart products (e.g. buildings, meters, electric cars) or of living in a smart district. Furthermore, citizens can co-create services that produce economic value (Cosgrave et al., 2014; de Jong et al., 2015). Cowley et al. (2016) call this the “*entrepreneurial sense of the public*” (p.64), which is conjured up in commercially incentivised activities. Here, citizens can become part of service ideation by sharing their preferences and opinions about the utility. According to these researchers, such citizen roles do not boost deliberative processes but should be seen as restricted forms of co-implementation (Granier & Kudo, 2016). Finally, there are also studies (Kitchin & Lauriault, 2018; Rabari & Storper, 2015; van Zoonen, 2016) that highlight the fact that citizens function as data products by unconsciously creating marketable data through their smart appliances.

Consultation

In the literature, the various types of participation at this stage and onward are shown to have both democratic and utilitarian value (Berntzen & Johannessen, 2016; Michels, 2017). The latter refers to citizens’ resources that support better plan-forming and urban solutions. Consequently, in consultation processes citizens are invited to share their opinions and suggestions for proposed courses of action and for specific city challenges. Although consultation permits citizens to potentially reshape plans and activities, their input is not binding to decide or redirect the process (Rogers & Cook, 2016; Wiig, 2016).

Citizen power

Arnstein (1969) saw citizen power as the apex for city-making, reflecting the aspirations of its inhabitants. In her view, citizen power was about a more political discourse of rights, citizenship and urban commons. Citizen power in this framework indicates all participatory forms in which citizens meaningfully influence and (co-)decide about developmental plans (Goodspeed, 2015; Opromolla et al., 2017; Wimmer & Scherer, 2018). It therefore also comprises bottom-up initiatives in which citizens seize technological opportunities for (re)making their city (Aylett, 2013; Breuer et al., 2014; de Vries et al., 2016; Niederer & Priester, 2016).

This analytical framework positions the two main streams in the literature on citizen roles— the gloomy and the optimistic - in the smart city. The pessimistic studies are clustered in the three lower sections of the model under passive participation, consumerism and consultation.

Although the latter enables citizens to express their ideas, critics consider consultation to be a predetermined process: *"citizens are enabled to partially re-arrange the deckchairs on a ship's deck, but not to determine how the ship is run or its general course"* (Cardullo and Kitchin 2018, p.14). This analytical framework is used in the present study to assess where the actual roles of citizens in the city of Utrecht are positioned.

4.3. Research methods

This study aimed to discover whether the pessimistic versus optimistic images of citizen roles in the smart city also apply to the city of Utrecht. To that end, an in-depth case study of twelve initiatives in that city was completed.

4.3.1. The Utrecht context

The fourth largest city of the Netherlands, Utrecht is a wealthy, business-oriented community with knowledge-intensive sectors and a highly educated workforce. Like many other fast-growing midsize cities in the world, Utrecht today is facing the challenge of accommodating urban growth in a sustainable way. The city is therefore an advocate of a smart governance model in which all urban actors and technologies are aligned, enabling urban solutions to be developed (Maltha, Driesse, & de Boer, 2018; van Buren, 2016). These ambitions are comparable to those of many other cities around the globe, making Utrecht a suitable case to examine how smart governance, and especially citizen participation, fares on the ground.

4.3.2. Case selection

Initiatives were identified based on three criteria: 1) collaboration including the participation of citizens; 2) the use of technologies; 3) the aim to upgrade the urban environment. Municipality officers, citizens and intermediary professionals were consulted and desk research was carried out. This resulted in a final selection of twelve projects, which, contrary to what is usual in most studies, were not all necessarily labelled as smart city projects. Importantly, each of these initiatives fit the smart governance definition used in this paper in that they employ technologies for cooperation to achieve urban improvements. This broader definition can capture a more comprehensive image of the activities undertaken by citizens in smart city building.

4.3.3. Data collection

Data collection took place in a number of steps, the first of which consisted of detailed desk research covering policy and project documents, articles, websites and social media related to the projects selected. Next, where possible, an in-depth interview was conducted with the city official responsible for the project. In some cases, interviews were also held with other actors (e.g. citizens, external professionals, businesses). Finally, field observations were made of several projects and events such as gatherings, conferences, “city talks”, and workshops were attended. The data collection is visualized in Table 4.3.

Subsequently, a factsheet was compiled, which detailed the findings on the main characteristics of the projects: their objectives, the initiators, citizens’ roles, the role of government, the types and aims of the technologies used, collaboration features and contextual factors. This factsheet enabled the different types of citizen participation to be better understood within their contexts, which helped in moving towards an answer to the research question.

4.3.4. Coding scheme

The projects examined were organized into the different categories of citizen participation in the analytical framework in Table 4.2. For this purpose, a coding scheme was devised, which allowed the verbal expressions in the off- and online documentations and the essence and nature of participants’ actions to be analysed. The following guidelines were applied to categorize the expressions and actions in the initiatives:

Passive participation: formulations such as “informing”, “updating”, “describing”; where no feedback or one-sided data provision is requested from citizens; encouraging consent and behaviour change;

Consumerism: consuming and purchasing goods and services and the stimulation of behaviour change in this respect;

Consultation: requesting citizen feedback for predefined plans or urban issues in collective discussions, whereby the project owner promises to consider and react to input from citizens; enthusing citizens to participate;

Citizen empowerment: citizens’ co-creation and co-design of plans and activities; bottom-up activities launched by citizens.

Table 4.3. Data collection

Project name & activity	Documents	Interviews (total):	Municipality officers	Citizens	Other actors	Websites, social media	Events	Field observations
Ringpark Spatial development: creating a green park zone	2	3:	1	1		3		2
Smart Solar Charging Community-based sustainable energy and mobility scheme	10	16:	4	3	9	4	7	2
Utrecht Alert Neighbourhood safety and crime prevention	1	1:		1		7		
Johan Wagenaarkade Spatial restructuring	6	1:	1			2		1
Environmental & Planning Vision Vleuten Policy development for long-term area development	9	2:	2			2		
Amsterdamse-Straatweg Spatial restructuring	7	2:	2			4		1
Revising Traffic Lights Optimizing road infrastructure and traffic	3	1:	1			2		
Argu.nl Online discussion platform on city matters		1:		1		2		
Public Health Monitor Health status of the population	2	4:	4			1	1	
Merwede Kanaalzone Smart city area transformation	8	3:		2	1	4	5	2
IRIS Kanaleneiland-Zuid Urban transformation: a near-zero energy district	1	2:	2			4		
Wijkconnect Online neighbourhood platform		1:		1		3		
Total Citation in the text	49 D1-D49	36	17 R1-R17	9 R18-R26	10 R27-R36	37 W1-38	13 E1-E13	8 F1-F8

4.4. Findings

This section presents the findings that are summarized in Table 4.4. It shows each project together with the corresponding features: the initiator, the type(s) of citizen participation and the technologies used, including the purposes these serve. These findings are discussed per type of citizen participation.

Passive participation

The website of the municipality-run Public Health Monitor offers information about health issues to citizens *“to enhance their own insights and make well-considered choices”* (W25). It aims, according to respondents from the municipality, to inspire citizens to aim for a healthy lifestyle and to learn about the underlying public values (R28-30). Another example is the 3D screen on which the future *“Merwede Kanaalzone”* – as it will look after its smart city transformation – is displayed (W29; E9). While ostensibly employed as a face-to-face consultation tool, citizens merely function as spectators of these images and plans (E10;E11;E13;). Given the purpose of this tool, this passive role is hardly surprising: after all, the aim is *“pure information and hard data transmission to seduce residents”* (E9), allowing the municipality to achieve its main goal, which is *“not about participation itself but to funnel the processes towards realization”* (E9).

Consumerism

The summary in Table 4.4 shows that consumerism is indeed an emergent type of citizen role. It appears in two projects that promote the need for a society-wide sustainability shift, for which *“smart”* solutions are offered such as energy grids, solar panels, smart meters, and electric vehicles (W4;W6;W30;F3). These solutions stimulate citizens, in their role as consumers, to improve society. For instance, in the case of the citizen-launched Smart Solar Charging initiative, residents are informed about environmental issues and the lifestyle changes needed to tackle these (E1-4). For this to succeed, the role of citizens is vital in purchasing and producing the renewably-based services developed by a market-oriented alliance (D3-12; R19-21; W4-7). A further role of the community members participating in the initiative is that they share their experiences and put forward ideas to refine the new scheme. Such user feedback is provided via the project website and social media (Facebook, Twitter). Members operate the system through a smartphone app that serves as a reservation tool and as the key to the shared electric cars (R27-29; R31;D6-8;E1-3).

In the government-university IRIS project, the Kanaleneiland Zuid district functions as a smart living lab which is undergoing the transformation into a fossil fuel-free area (W30-31; R16). To that end, an array of smart energy, lighting and mobility technologies, open data platforms and

apps have been developed by knowledge and societal institutes, companies, specialists and planners. This technological intervention can only work, said the respondents in the present study, if citizens become enablers of this transition (R5; R17; D49). This requires the acceptance and uptake of the (market) solutions offered, for which *“co-creation sessions with neighbourhood residents, schools and pupils”* (W30) are organized aimed at changing people’s daily electricity use and behaviour. Co-creative activities are also included, although the exact role of citizens and the opportunities for participation have remained unspecified (W30-33; R16).

Consultation

Citizens have been invited to comment on and make suggestions about specific urban issues, such as the spatial restructuring of the Amsterdamsestraatweg and the Johan Wagenaarkade, the optimization of traffic flows by switching off redundant traffic lights, or developing a long-term environmental vision for the Vleuten district (W15-21). According to the government officials interviewed, the municipality in turn then undertakes to take the views and ideas put forward by citizens into consideration during the process of decision-making and to provide citizens with feedback and arguments on the choices taken (R6; R7; R9; R11; D14; D20; D38).

The technologies employed include (project) websites, social media, and a 3D tool, allowing citizen input to be given in various ways. Examples of where websites were used are online surveys (Vleuten case), *“idea maps”* (traffic lights) and urban restructuring (Amsterdamsestraatweg) (W16; D23-25; R9-11). In the latter case, the municipality switched to e-mail, as it lacked the capacity to handle the massive volume of incoming ideas (R9).

Another instance of website-enabled consultation is that of the virtual agora, Argu.nl (W 23-24). It was established by young professionals to improve argument-based deliberation by citizens and other stakeholders in collective matters such as co-designing the sustainability policy of a housing cooperation, participatory budgeting, measuring support for a new hotel in a residential district or repurposing abandoned sites and buildings (R23; W23-24). Although this platform facilitates citizen-government dialogue, city officials refrain from participating in the discussion, as to *“remain neutral and not to influence ongoing debates”* (R23).

The use of social media is exemplified by the Vleuten project, in which the municipality used Facebook to mobilize all inhabitants of the district, asking them to define the main themes to be addressed by filling out an online survey (R7; D22-26). Similarly, in the case of the Amsterdamsestraatweg, the municipality used Facebook and Twitter to react to citizen input (R9-10). A 3D iViewer in the form of an interactive geo-map was used in the “Johan Wagenaarkade” urban regeneration project. This large screen supported face-to-face exchanges between the municipality and citizens by visualizing the actual and future situation and catalysing in-depth discussions (R6;D16-17).

Table 4.4: Citizen roles in the smart city: the Utrecht realities

Project name & objectives	Initiator	Citizen roles & corresponding technologies
Ringpark Dichterswijk Spatial development: creating a green park zone	A few (professional) residents	Citizen power <ul style="list-style-type: none"> Project website and social media (Facebook): requesting and using residents' ideas, as well as mobilizing residents to realize and maintain the green city belt
Smart Solar Charging Community-based sustainable energy and mobility scheme	Local citizen-entrepreneur	Consumerism <ul style="list-style-type: none"> Solar charging station and smart grid: sustainable local energy network by prosuming residents Smart phone app: electric car sharing Social media (Twitter, Facebook) & project website: information provision on the project and services, marketing, requesting users' feedback Citizen power <ul style="list-style-type: none"> A bottom-up establishment of an energy and mobility system
Utrecht Alert Neighbourhood safety and crime prevention	A resident	Citizen power <ul style="list-style-type: none"> WhatsApp via smart phones: the platform and operational fundament (group formation, linking neighbourhoods, real-time communication and coordination) Project website: information about the aims and activities
Johan Wagenaarkade Spatial restructuring	Municipality of Utrecht	Consultation <ul style="list-style-type: none"> Municipality website: information on the plans and consultation sessions iViewer, a digital geo-screen: offline discussion with and among citizens on the plans; gathering citizens' views and suggestions; process recording
Environmental & Planning Vision Vleuten Participatory policy development for long-term area development	Municipality of Utrecht	Consultation <ul style="list-style-type: none"> Municipality website: information provision on the ambitions, the process and outcomes; residents can define topics for the policy agenda; online survey Social media/Facebook: municipality campaign to encourage inhabitants to fill in the survey E-mail: municipality responds to citizens' ideas Online, real-time discussion platform: district talks about the plans
Amsterdamsestraatweg Spatial restructuring	Municipality of Utrecht	Consultation <ul style="list-style-type: none"> Municipality website: information provision on plans and decisions; digital, non-interactive idea map for citizens' suggestions and ideas; E-mail and social media (Facebook, Twitter): responding to citizens An external online discussion platform: citizens share their experiences and ideas supported by argumentation and voting

4. CITIZENS IN THE SMART CITY: WHAT IS ACTUALLY HAPPENING? AN IN-DEPTH CASE STUDY FROM UTRECHT, THE NETHERLANDS

Revising Traffic Lights Optimizing road infrastructure and traffic	Municipality of Utrecht	Consultation <ul style="list-style-type: none"> Municipality website: a digital non-interactive idea map for citizens' suggestions and for the municipality's reactions to citizen input
Argu.nl Online discussion platform on city matters	A local start-up enterprise	Consultation <ul style="list-style-type: none"> Online agora for residents, users, companies, and city governments To launch ideas and calls concerning urban issues Argumentation and voting
Public Health Monitor Information on the population's health status	Municipality of Utrecht	Passive participation <ul style="list-style-type: none"> Municipality website : asking data from citizens concerning their health conditions; information provision on events and issues; encouraging citizens to live a healthier life
Merwede Kanaalzone Smart City area transformation	Municipality of Utrecht	Consultation <ul style="list-style-type: none"> Municipality website and digital newsletter (via e-mail): information provision and update on project course and consultation sessions Passive participation <ul style="list-style-type: none"> 3D digital virtual reality showing the future scenario: to "seduce" residents to accord the plans and to accelerate realization
Iris Smart Cities Kanaleneiland Zuid Urban transformation into a near-zero energy district	Municipality of Utrecht	Consumerism <ul style="list-style-type: none"> A living lab: smart energy, lighting and mobility solutions are integrated based on information services from the open ICT urban data platform; apps to: Make citizens enablers of the energy transition, who understand, trust and use the integrated energy and mobility solutions in their homes and district. To motivate and train the tenants for energy-saving behaviour and to use solar-powered mobility services instead of their own conventional vehicles
Wijkconnect Online platform by & for the neighbourhood	Citizens	Citizen power <ul style="list-style-type: none"> An online civil platform to contribute to the neighbourhood by : Linking demand, supply and organizations, and creating initiatives, activities, participation, chances for local economy, community feeling

Citizen power

Citizen power was found not to derive from the Utrecht municipality, but from citizens who empower themselves to address urban challenges by technological means. For instance, smart phones form the operational base of Utrecht Alert, a neighbourhood watch app that was initiated by a resident to counter rising criminality in his district (R22; W8-W11). Neighbourhood residents have created WhatsApp communities to warn each other of suspicious activity and incidents. These have since gained widespread popularity and spread to communities throughout the country, with even the police joining, as well (D13;W13-14).

Smart technologies were developed in the bottom-up Smart Solar Charging initiative, a community-based sustainable energy and mobility system. Its initiator, a citizen-entrepreneur, partnered with (global) corporations such as GE or Renault to technologically advance this new scheme. Its societal diffusion challenges the monopoly of mainstream energy providers (R19-20;D9-12;W5-7).

In the civil initiative Ringpark Dichterswijk, the use of social media (Facebook) has proven vital to stimulate joint actions to reach specific goals. Via Facebook, fellow residents are mobilized to take part in collective decision-making processes aimed at conceptualizing and constructing the 3km-long green zone (R1;R18;F1;D1;W1).

Wijkconnect is another bottom-up initiative arising from the need felt by citizens to make a tangible contribution to the neighbourhood: *"I worked, had my friends, and did the shopping outside my neighbourhood. So I added nothing to the place where I lived and the place added nothing to me. This is crazy. What can I do?"* (R 26). The solution was to create an online community platform through which citizens, companies and non-profit organizations in the neighbourhood can connect and engage with one another. The roles of the citizens are varied and crucial to keeping the momentum going: they can both start and find events and organizations and they can both ask for and offer social support. Furthermore, the strategies used in Wijkconnect, co-designed by a group of community members, have matured into a social enterprise that is expanding in Dutch cities. Funding derives from a membership fee charged to businesses joining the initiative (W34; W35).

4.5. Conclusions

This study set out to answer the question: *What are the actual roles of citizens in smart city governance in the context of Utrecht?* In addition to investigating the contradicting perspectives on the role of citizens in smart cities, the aim was to contribute to the very sparse empirical literature addressing the subject. While techno-optimists celebrate citizen empowerment in public matters, studies conducted by gloom-and-doom pessimists refer to subjugated citizens who are steered by data, technologies and neoliberal agendas. To learn whether these patterns also characterized the situation in Utrecht, twelve technology-facilitated initiatives were examined based on a framework with classifications of citizen participation.

The overall finding of this study is that citizens in Utrecht take part in smart governance in very diverse ways and encompassing all participation forms. The reality of citizen participation in the smart city can therefore not be captured in paternalistic or market-driven framings, nor is it merely about citizens' having complete control of the city. This study nuances the debate revolving around the stark contrast between "citizen empowerment" and "citizen subjugation" by exposing the spectrum of diversity between these extremes. This contributes to understand citizens' varying roles in the smart city, resulting not in a technological utopia or dystopia, but which rather should be seen as an evolving practice of technologically mediated citizen participation. These insights also show the difficulty of portraying citizen engagement in smart governance at the city level. Understanding the richness of the roles played by citizens requires a micro-level conceptualization, although different types of participation can co-occur, even within projects.

The findings reveal that "citizen power", the highest participation rung, does not stem from government but from citizens themselves. Citizens launch their own initiatives in which the collective use of technologies to address common problems in the city are experimented with. This demonstrates that citizens do not wait for the allocation of power by others to become involved in collective issues, as suggested in classical participation models. On the contrary, citizens create their own powerful position to shape their environment and these civil efforts are supported by new technological opportunities.

The findings also show that a consumerism type of citizenship is indeed manifest in Utrecht, very much like in other cities investigated in previous studies. However, this should not necessarily be strictly understood as a neoliberal, supply-driven and top-down arrangement. This is visible in the bottom-up Smart Solar Charging initiative that gained support from community members concerned about the harm being done to the environment. This community-based energy scheme challenges the monopoly of unsustainable infrastructural provisions, although it cannot survive on charity basis. The quest for a viable business model – as in the other bottom-up initiative, Wijkconnect – represents a creative tactic rather than neoliberal calculations.

It is also evident that the citizens' roles identified in the present study are not rooted in social and political citizenship, as envisaged by a number of scholars (Arnstein, 1969; Cardullo & Kitchin, 2018; Cowley et al., 2017; Vanolo, 2016). The roles described here have a pragmatic character, in that they serve real-world issues: suggestions for a development plan, using a new app or energy system, or making the neighbourhood more liveable. They do not question or resist political choices and the status quo. This also applies to citizen-initiated projects that fit local governmental strategies and therefore receive support. These outcomes may be partly ascribed to the limitation of this study, namely the optional selection of initiatives. Firstly, since several of the cases relate to spatial development, the roles of specific actors are more or less given in the Dutch setting. Here, the local state is the primary task-owner, responsible for multiple interests and legal regulations, with citizens being only one of the many stakeholders. Secondly, the case selection did not use a purposeful lens to filter socio-political struggles, as the study aimed to open-mindedly explore the actual situation in Utrecht.

This paper recognizes the value and need of critical studies illuminating the tensions and societal drawbacks of smart city development. However, the approach used in this study had the advantage of enabling a more comprehensive and a more accurate image of the actual roles played by citizens to be attained. This advantage lies in the combination of the broader definition of smart governance projects, the scrutiny of tangible activities rather than document and narrative analysis alone, and not taking normative perspectives as the single point of departure.

Future work should continue the empirical work started in this study by investigating many more cases of citizen participation in smart, technology-enabled initiatives. Especially studies comparing different cities are needed, which also scrutinize the influence of specific urban and national contexts on citizen engagement. This can help to arrive at an up-to-date and contextualized conceptualization of citizen participation in the smart city. A further interesting avenue would be to zoom in on citizens' off- and online inputs in collaborative smart governance practices: what is the content of these inputs and what happens to them? Do they support local governments and communities in urban development? This knowledge could better highlight the extent to which people actually influence policies and decisions on the course of action to be taken and whether the use of technologies stimulates or hinders these processes.

5. SMART GOVERNANCE IN INSTITUTIONAL CONTEXT: AN IN-DEPTH ANALYSIS OF GLASGOW, UTRECHT, AND CURITIBA

Summary Smart governance varies considerably across cities, allegedly due to the influence of the institutional setting. Yet, the institutional factors influencing smart governance have yet to be systematically examined. This research proposes to remedy this by exploring the role of the institutional context in shaping the configuration of smart governance. For this purpose, this study zooms in on three cities with dissimilar institutional contexts - Curitiba (Brazil), Glasgow (UK), and Utrecht (the Netherlands). The findings suggest that institutional context does indeed affect how smart governance actualizes in cities. These empirical insights result in a heuristic framework for understanding smart governance in diverse urban environments. The framework exhibits a multi-layered influencing mechanism: institutions co-existing on multiple spatial scales interact and modify – reinforce or dissolve- each other's impact on smart governance. This study opens the door to a different approach to understanding smart governance and sheds new light on how this is interrelated with the institutional context.

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5.1. Introduction

The notion of smart governance has received much attention from policymakers across the world. It denotes technology-enabled collaboration involving a wide range of actors to address societal and sustainability challenges (Dameri & Rosenthal-Sabroux, 2014; Hollands, 2015). Although smart governance is a common narrative and much-heard ambition around the globe, noticeably different configurations are seen in different urban settings (Angelidou et al., 2017; Anthopoulos, 2017; Kitchin, 2015; Lee, Hancock, & Hu, 2014). This variance manifests itself in terms of aspirations, the type of actors involved and the ways in which technologies are perceived and employed.

These differences in smart governance patterns are explained in recent studies by the specific contexts of cities (Angelidou, 2015; Meijer, 2016; Neirotti, De Marco, Cagliano, Mangano, & Scorrano, 2014; Walters, 2011). These studies explicitly refer to institutions as providing a plausible explanation for these differences, an inference supported by the apparent relevance of political choices in cities' smart governance strategies (Caragliu & Del Bo, 2019; Datta, 2015; Gupta et al., 2015; March & Ribera-Fumaz, 2016; Wiig & Wyly, 2016). Institutions had earlier been pointed out by urban scholars as vital factors in guiding urban politics. As the institutional context determines the entire structure of formal and informal practices in society, they may similarly play a crucial role in shaping smart governance. Institutions reflect the economic, political, legal and regulative frameworks (formal institutions) that are informed by the overarching norms and values (informal institutions) of a particular society (Pierre 1999; 2005; 2014; Raven et al. 2017; Hansen and Coenen 2015).

The emergent recognition of the potential force of institutions has raised awareness of the need to counter "one-size fits all" smart city narratives through in-depth research in different locales (Kitchin 2015; Grimmelikhuijsen and Feeney 2016; Meijer, Gil-Garcia, and Bolívar 2016). However, empirical evidence concerning the role of institutions in shaping smart governance is lacking. Due to this lack of empirical in-depth exploration, whether or not institutions indeed play an essential role in smart governance is unknown - and if they do, what the mechanisms are that are at play. The present study proposes to address this knowledge gap by examining how the institutional context influences the actual configuration and implementation of smart governance. It moreover seeks to advance the conceptualization of the relationship between

the institutional context and smart governance by posing the following research question: *How does the institutional context shape the actual configuration of smart governance in cities?* To answer this question, the smart governance strategies of the three cities of Glasgow (UK), Curitiba (Brazil) and Utrecht (the Netherlands) are investigated. This choice of cities was prompted by the dissimilarity between their institutional contexts, enabling comparisons to be made about the interrelations between smart governance and institutions.

This paper is divided into seven sections and organized as follows. The second section elaborates on the concept of smart governance and presents its major components. The third section identifies institutional dimensions that may influence smart governance. Having opted for the use of a comparative case study design, the fourth section presents the institutional contexts of the three cities. The fifth section describes the methods of data collection and analysis used, while the findings are presented and analysed in the sixth section. The seventh, and final section concludes with a discussion of the results.

5.2. Smart governance

This article studies how the institutional context can influence and differentiate the configuration of smart governance in cities. Smart governance is configured by various components that may be subject to its institutional milieu. These smart governance components are the focus of this section.

5.2.1. Defining smart governance

Smart governance is defined by myriad conceptualizations in the literature (Caragliu et al., 2011; Ferro & Osella, 2017; Giffinger et al., 2007; Ruhlandt, 2018). Despite this diversity, most concepts accentuate the interactions between technologies and social structures to solve societal challenges, or, in the words of Meijer and Bolívar: *“smart governance is about crafting new forms of human collaboration through the use of ICTs to obtain better outcomes and more open governance processes”* (Meijer and Bolívar 2016). This definition was formulated by the authors on the basis of a broad literature review and from it, three main components of smart governance emerge: societal goals (*“better outcomes and more open governance processes”*),

collaboration (*"new forms of human collaboration"*) and technologies (*"the use of ICTs"*). Since these components form the basis of the present enquiry, they are elaborated on in more detail in the paragraphs below.

Societal goals

The societal goals constituting the first component of smart governance are generally aimed at tackling urban challenges (Kummitha & Crutzen, 2017; Rodríguez Bolívar, 2017; Webb, Hawkey, & Tingey, 2016). In the literature, these societal goals are mainly categorized according to whether they are concerned with substance or spatial scope. A frequently used substance goal is urban sustainability, known as the triple bottom line (TBL) and aimed at establishing a durable balance between economic return, social equity and environmental preservation (Angelidou et al., 2017; He et al., 2017; Kruger, Caiado, França, & Quelhas, 2018; Yigitcanlar et al., 2018). However, societal goals, may also more simply be comprised of a single element, i.e., just social, or just environmental or economic development.

Concerning spatial scope, societal goals can serve either place-specific or more universal purposes. The latter relate to more uniform challenges and approaches across the cities of the world (Cowley et al., 2017; Viitanen & Kingston, 2014). This "one best city" perspective has raised critical discussions among academics and practitioners, which have possibly contributed to the advent of more tailor-made ambitions fitting local-specific circumstances (Castelnovo et al., 2016; Hansen & Coenen, 2015; McCann & Ward, 2010).

In sum, societal goals can be classified according to their substance, namely TBL sustainability or solitary themes, and their spatial scope, namely universal or local, city specific ambitions.

Collaboration

The second component of smart governance is collaboration. This is referred to in the literature as the engagement of diverse actors whose visions and resources are necessary to define and implement collective goals (Camboim et al., 2019; Fernandez-Anez et al., 2018). These actors can be governments, businesses, citizens, communities, knowledge institutes and other societal organizations. The extent to which these various types of actors are included or excluded in smart governance defines the composition of participants and the breadth of the

collaboration. A limited circle of stakeholders will therefore lead to a narrow base for collaboration and conversely, an extensive variety of participants will produce a broad-based governance configuration (Breuer et al., 2014; Viale Pereira et al., 2017).

The notion of collaboration emphasizes citizens' roles, which reflects the “*truly citizen-centric*” (Bățăgan, 2011 p.85) or citizen-empowering character of smart governance. It invokes the idea of deliberative citizens taking part in public matters and in shaping their life environments (Capra, 2016; Hollands, 2015; Wilson et al., 2017). Citizen participation is conceptualized in manifold ways that aid in classifying the different citizen roles in smart governance: *passive participation*, in which citizens are one-way information recipients, service users, data collectors or invisible inhabitants; *consumerism*, where citizens use, purchase or co-create commercial services; *consultation*, enabling citizens to provide feedback on planned scenario's; and *citizen power*, signifying citizens' managing or controlling role in shaping collective matters (Arnstein, 1969; Cardullo & Kitchin, 2018; Krabina, 2016; Molinari & Ferro, 2009).

In sum, collaboration in smart governance can be categorized by the number and diversity of participants (a broad or narrow base for collaboration) and by the type of role played by citizens therein (passive, consumerism, consultation, citizen power).

Technologies

The final component, the use of technologies, appears in various guises in the literature. One of the most important refers to the technological functions that optimize city management, an aspect particularly focused on in the initial studies on smart city governance. These functions serve mainly to improve the information base of local governments by enabling software-driven, integrative infrastructural systems such as the regulation of traffic flows, garbage pick-up, safety surveillance, or sensor-based street lighting (Abella, Ortiz-de-Urbina-Criado, & De-Pablos-Heredero, 2017; Alusi et al., 2011; Gabrys, 2014; Stratigea et al., 2015).

The use of technology has also been seen to enable social exchanges and collaboration on public matters, as discussed in the more recent literature (Castelnovo, Misuraca, and Savoldelli 2016; Batty et al. 2012; Witte et al. 2018), facilitated by participatory tools such as websites, community platforms, digital maps, discussion platforms, social media, smart phones, and geo-

referenced 3D visualizations (Ertiö, 2015; Niederer & Priester, 2016; Stratigea et al., 2015). These technologies can also provide a basis for new collective practices addressing societal issues. Examples are civic hackathons, community-based smart energy and mobility systems, open data, living urban labs, and maker spaces (Webster and Leleux 2018; Meijer and Thaens 2016).

In sum, two major functions dominate the use of technologies in smart governance, namely their use as urban management tools and as enablers of collaboration.

This section detailed the structure of smart governance and revealed the various patterns its separate components can assume. Whether this variance can be actually detected in the different city contexts is the core issue to be explored in this article, followed by how possible variances relate to the specific institutional contexts in these cities. Therefore, the next section elaborates on the institutional dimensions that are relevant in this paper.

5.3. The role of institutions in smart governance

This section discusses the institutional dimensions that affect urban politics and that can thus determine how smart governance is configured in cities. Three institutional factors in particular emerge from the literature that in this study are considered potential forces in shaping smart governance: the intergovernmental state structure, the system of local political power relations and the urban governance model. Smart governance could vary on these dimensions because they relate to the autonomy, the resource availability and the socio-economic and political orientation of local governments (Hodgson, 2017; Keman, 2010; Martin, 2000; Pierre, 1999). The plausible relationship between these institutions and smart governance is described in this section, followed by the formulation of a number of expectations.

5.3.1. The intergovernmental state structure

The intergovernmental state structure represents the vertical linkages between different governmental levels and can be typified as: 1) unitary-centralized 2) unitary-decentralized and 3) federal systems. These types denote various levels of functional and fiscal autonomy and

competencies of local governments in relation to the control and support of the national state (Heinelt, Hlepas, Kuhlmann, & Swianiewicz, 2018; Swianiewicz, 2014; Tavares de Almeida, 2006), and thus potentially influence the extent to which local governments can shape their smart governance configuration.

Unitary-centralized systems feature powerful state bureaucracies operating from the central to the local level. Here, local governments have a low functional and fiscal autonomy due to the determining role of the central government in agenda setting, policy coordination and funding (Pierre 2005; Sellers 2002). In unitary-decentralized states, functional and fiscal autonomy is transferred to local governments so that they construct their own policies and services. This autonomy can vary between countries, in line with the degree of decentralization. Fiscal and functional independence is not necessarily linked. In decentralized systems, city governments are in charge of urban development, which necessitates their liaising with a range of actors to identify local issues and to implement policies (Heinelt et al., 2018; Ivanyna & Shah, 2012). Finally, in highly decentralized federal states, the locus of both functional and fiscal authority sits with local governments, who bear the prime responsibility for managing local affairs and raising revenues (Keating and Laforest, 2017). Local authorities receive weak top-down support for public provisions and thus have limited capacities, which makes them dependent on society. Hence, a federal state structure requires city governments to ally with citizens, businesses, and other organizations in order to realize urban progress (Brenner, 2009; Kincaid, 1999; Mora & Varsano, 2001).

Specific literature on the relations between intergovernmental state structure and smart governance is lacking. Nevertheless, from the generic literature on the influence of the intergovernmental state system (Galvani 2018; Sellers and Lidström 2007; Goldsmith and Page 2010), certain patterns can be postulated in the light of the aforementioned insights. Accordingly, central governments in unitary-centralized state systems may be expected to influence all dimensions of smart governance. Any societal goals will probably reflect more universal and less city-specific ambitions to align with national strategies. Similarly, the substantive content of the societal goals will likely be centrally determined and consistent with the political ambitions of national policies. A narrow collaborative configuration may be expected due to the centrally organized exchanges between political and interest groups, which

also predicts a more passive role for citizens. It moreover increases the likelihood that technologies will not be used for collaboration but will instead serve urban management purposes.

In unitary-decentralized and federal state systems, where local governments are more directly responsible for urban development, smart governance strategies may be expected to comprise societal goals based on local-specific needs. This will make predicting the substantive content of these societal goals more difficult, since this will probably depend on local policy ambitions. As this local focus requires resource input from a wide range of urban actors, it can be assumed that stakeholders will form a broad collaboration platform in which citizens can also play a more active role (i.e. consultation, citizen power). This, in turn, implies the use of technologies, which will foster collaboration. At the same time, the use and design of these technologies will depend on the type of collaboration partners, and in particular, on the partner playing the dominant role in the collaboration, as the different actors will all have their own perspectives and capabilities regarding the development of tech-based applications.

Hence, various types of intergovernmental state systems may produce different configurations of smart governance. Whether and how such differences materialize in varied urban settings will be examined in this study.

5.3.2. Local political power relations

The second institutional factor refers to the horizontal power relationships between the council, the municipal administration and the mayor or city leader. These power relations define the form of local government system as well as the nature of local political leadership and thus potentially influence how the smart governance configuration in a city is constructed. These relationships are seen as essential factors in urban politics and governance, in particular when it comes to the role of the mayor. Where the mayor or city leader has a strong position his/her political interests and ambitions are likely to be a determining factor in how the city is governed (Pierre 2014; Sweeting 2002; Heinelt et al. 2018; Wiig 2016).

These power relations are classified by Mouritzen and Svava (2002), who capture the differences in mayoral strength in four ideal types of local government system: 1) *the strong*

mayor form, in which the elected mayor controls the majority of the city council and is legally and practically fully in charge of all executive functions; 2) *the committee leader form*, in which one person is clearly “the political leader” of the municipality, although the executive powers are shared between the leader and collegiate bodies; 3) *the collective form*, in which the decision centre is one collegiate body, the executive committee that is responsible for all executive functions; and 4) *the council-manager form*, in which all executive functions are in the hands of a professional administrative, the city manager, appointed by the council that has general authority over policy and is headed by a ceremonial mayor (Mouritzen and Svava 2002, p.55-56).

Based on these insights from the general literature, city leaders with a powerful position (i.e. the “strong mayor” and the “committee leader” forms) may be expected to play a decisive role in shaping smart governance. These strong city leaders will presumably define, in accordance with their political orientation, the societal goals and type of collaboration. By contrast, in more collective systems the different dimensions of smart governance are likely to be jointly shaped, although the political orientation of the cabinet may possibly also influence the choices. The use and choice of technologies will be determined by the relevant actors, with the more authoritative actors leading the way, whatever the form of local government. These assumptions show that different kinds of local power relations can produce differently configured smart governance, which will be empirically scrutinized in three different cities.

5.3.3. Urban governance models

The third institutional dimension relates to urban governance models. They are guided by political objectives and values that lead to differences in aspirations, stakeholders and instruments (Ansell & Torfing, 2016; King & Stoker, 1996), which potentially influence the evolution of smart governance in a city. Such differences were classified by Pierre (1999) as managerial, corporatist, pro-growth and welfare governance models.

In *managerial urban governance*, governmental professionals resolve collective needs and interests through efficient urban planning in which market forces are often interwoven. These solutions are made for residents, who mainly act as service users (Arts & Gelissen, 2016; Delsen, 2012). *Corporatist urban governance* reflects the idea of participatory local democracy by broad

interest representation and consensus-seeking. Its objective is the distribution of collective goods through bargaining processes between various societal interests and concerted public-private action (Hernes & Selvik, 1983; Villadsen, 1986). This governance model fits social-democratic welfare systems that promote equality and solidarity by controlling market forces. *Pro-growth urban governance* is characterized by close public-private interaction between city hall and businesses to boost the local economy (Molotch, 1976; Savitch, 1998). It draws on market-conforming instruments such as urban planning, infrastructural development or image-building of the city to attract investments (Pagano & Bowman, 1995). In this governance model, widespread societal involvement is not an option, as this would politicize strategies by bringing in competing spending options such as neighbourhood redevelopment and other distributive measures (Swanstrom, 1985). Finally, the *welfare governance model* applies to once prosperous industrial cities that have not been able to regenerate their economy. These cities are dependent on the state, with the main influx of capital coming through the welfare system. Their key governance actors are local and national government officials and bureaucrats (Parkinson, 1990).

The abovementioned generic insights from urban studies provide some indications for how the various traditions of urban governance might influence the configuration of smart governance in a city. The managerial tradition is likely to apply a top-down approach in the pursuit of city-specific sustainability goals for society: economy (cost-efficiency; inclusion of businesses), people (public services and goods), and environment (renewably-based infrastructure). Collaboration will probably comprise a narrow range of participants, due to the dominant role of governmental experts and their corporate allies. This may be expected to result in a passive role for citizens acting as service recipients. These prospects point to a use of technology that will probably concentrate on augmenting urban infrastructures and less on interactions.

In the corporatist setting, smart governance may be expected to target city-specific goals that reflect a wide array of societal interests, approaching the triple bottom line of sustainability. This presumes a broad-based collaboration consisting of varied types of actors, with more actively engaged citizens (i.e. consultation, citizen power). This participatory tradition will probably lead to the use of technologies that foster interaction, next to other types of tech-based applications.

A pro-growth governance environment is likely to generate city-specific goals that are mainly aimed at economic progress, with, as a consequence, a low degree of partnership, since in this model businesses will be the key partners, relegating citizens to the roles of passive actors and consumers. Technologies will therefore not serve to stimulate participatory and interactive exchanges but to promote the development of infrastructural systems and commercial services.

Finally, the welfare governance model may be postulated to produce smart governance configurations that would predominantly provide support to the disadvantaged. As a result, the range of collaborative partners is likely to be narrow, as the key actors will be government officials, with the citizens acting as inert beneficiaries. The use of technology may be expected to consist of tools that facilitate limited interaction, namely one-way communication towards recipients of welfare provisions.

These expectations signal potential variances in smart governance configurations in cities with different traditions of urban governance. Whether this indeed is the case in practice and in what ways is the focus of the present study.

Table 5.1 summarizes the theoretical insights discussed in the abovementioned two sections by visualizing the expectations about the relationship between the institutional context and smart governance. This summary draws attention to the contrasting expectations within city contexts. An example is the coalescence of the federal state system with a managerial mode of urban governance, which simultaneously predicts a broad and a narrow-based collaboration. Moreover, the influence of some institutional dimensions on smart governance is a salient factor (i.e. the political orientation of powerful mayors or the national strategies in the unitary-centralized state system). Formulating expectations about their exact effects is therefore a difficult task. Hence, this study proposes to scrutinize what happens with these various, sometimes contradicting, institutions in actual practice, and which of these dominates in a specific city context.

Table 5.1: Proposed relationships between institutional dimensions and smart governance

SMART GOVERNANCE	INTERGOVERNMENTAL STATE STRUCTURE			LOCAL POLITICAL POWER RELATIONS		URBAN GOVERNANCE MODEL			
	Unitary-centralized	Unitary-decentralized	Federal	Strong city leaders	Collective systems	Managerial	Corporatist	Pro-growth	Welfare
Societal goals <ul style="list-style-type: none"> • Substance: sustainability (TBL) vs. solitary themes • Scope: universal vs. local, city-specific 	<ul style="list-style-type: none"> • By national strategies • Universal 	<ul style="list-style-type: none"> • By local strategies • City-specific 	<ul style="list-style-type: none"> • By local strategies • City-specific 	Reliant on city leader ('s political orientation)	Compromise (political orientation of cabinet)	<ul style="list-style-type: none"> • Sustainability • City-specific 	<ul style="list-style-type: none"> • Sustainability • City-specific 	<ul style="list-style-type: none"> • Solitary theme: economy • City-specific 	<ul style="list-style-type: none"> • Solitary theme: people • City-specific
Collaboration <ul style="list-style-type: none"> • Composition: broad vs. narrow (citizens, businesses, universities, governments, societal organizations) • Citizens' roles: passive, consumerism, consultation, citizen power 	<ul style="list-style-type: none"> • Narrow • Citizens: passive 	<ul style="list-style-type: none"> • Broad • Citizens: consultation, citizen power 	<ul style="list-style-type: none"> • Broad • Citizens: consultation, citizen power 	Reliant on city leader ('s political orientation)	Compromise (political orientation of cabinet)	<ul style="list-style-type: none"> • Narrow (experts & businesses) • Citizens: passive 	<ul style="list-style-type: none"> • Broad • Citizens: consultation, citizen power 	<ul style="list-style-type: none"> • Narrow (businesses) • Citizens: passive, consumers 	<ul style="list-style-type: none"> • Narrow (local state) • Citizens: passive
Technologies <ul style="list-style-type: none"> • Urban management • Enablers of collaboration 	Urban management	<ul style="list-style-type: none"> • Enablers of collaboration • Actor-dependent 	<ul style="list-style-type: none"> • Enablers of collaboration • Actor-dependent 	<ul style="list-style-type: none"> • Reliant on city leader ('s political orientation) • Actor-dependent 	<ul style="list-style-type: none"> • Compromise (political orientation of cabinet) • Actor-dependent 	Urban management	Enablers of collaboration	Urban management (incl. new commercial services)	Enablers of collaboration (very limited)

5.4. Comparative case study design

The object of this study is to gain insight into the mechanism of how the institutional context of urban settings influences smart governance. For this purpose the cities of Glasgow, Curitiba, and Utrecht were selected because of their different institutional contexts (Table 5.2). These contexts are examined and compared, to allow the differences and similarities in their smart governance configurations to emerge and to elicit how these are shaped by their specific institutional contexts. In this section, the institutional context of each city is introduced, according to the dimensions identified in the former section: intergovernmental state structure, local political power relations, and urban governance model.²

Table 5.2: The institutional contexts of the three cities

	Intergovernmental state structure	Local political power relations 1. Local governmental system 2. Position & politics of the mayor/city leader	Urban governance model
Glasgow	Unitary-centralized	1. Committee-leader form 2. Strong; left-progressive	Pro-growth
Curitiba	Federal	1. Strong-mayor form 2. Strong; left-progressive succeeded by a central-right, nationalist	Managerial & market-driven
Utrecht	Unitary-decentralized	1. Collective form 2. Weak; right-liberal	Corporatist & increasingly market-driven

5.4.1. Glasgow

Intergovernmental state structure

In the UK's unitary-centralized system, the central government has the power to determine the main features of subnational governments. This also applies to Scotland that, despite gaining governmental power in 1997, still relies on Westminster for much of its budget and policy strategies (Henderson, Reilly, Moyes, & Whittam, 2018). This unitary-centralized system on the national level also relates to local-central governmental relationships within Scotland.

² To identify the institutional context of the three cities a wide range of sources were used. These sources comprise academic articles, book chapters, conference papers as well as grey material such as newspaper articles, statistics, reports, governmental websites and other relevant webpages. Finally, the information acquired during this literature review was validated by the research teams from the three cities.

Consequently, the Scottish Parliament is in charge of the structure, responsibilities, finances and working practices of the city councils (Bochel & Bochel, 2010; Campbell & Burrowes, 2016; McConnell, 2006). Although local authorities are important in delivering public services, they have a weak legal and political status as well as a low functional and fiscal autonomy (Heinelt et al., 2018; Ladner, Keuffer, & Baldersheim, 2016a, 2016b). Local governments act within central government policy and primarily rely for their finances on the central Scottish and UK governments (Dinnie & Holstead, 2017; McGarvey, 2002).

Local political power relations

Each local authority in Scotland is governed by a council headed by the Leader of the Council who is usually the front-runner of the largest political grouping (McGarvey, 2002; The Improvement Service, Cosla, & Solace, 2011). The Leader of the Council is the central figure of de facto political authority by being responsible for the strategies and overall performance of the council, and its relationship with the central government (Marsh 2013; Hambleton 2000). Although local authorities also elect a civic leader – the Lord Provost in Glasgow City- this function is ceremonial (Campbell & Burrowes, 2016). The Leader of the Council has a strong position in the local government structure, in line with the “committee-leader” form described in the former section. This position was fulfilled by Gordon Matheson of the Labour Party in the period investigated in this paper. Matheson envisioned sustainable development to create a green and socially just city to “*make life better for our most vulnerable citizens and communities*” (Brownsey-Joyce 2011). These views on solidarity designate him as a left-progressive politician (Edwards, 2015).

Urban governance model

The city of Glasgow is characteristic of the pro-growth model of urban governance owing to its business-oriented urban development, as manifested by large infrastructural projects, flagship events, and strong city marketing (Davidson, 2010; Pike, 2017). This also reflects the national context of deep-rooted liberalism (Wincott 2006; Van Kersbergen and Becker 2002; Crossan et al. 2016), although Scottish governance has widely been considered corporatist and interventionist - in contrast to the rest of the UK. This, however, is regarded by various scholars as a myth of national distinctiveness that has drawn attention away from the rising neoliberalization and the way successive ‘modernizing governments’ in both Westminster and

Holyrood have emphasized economic competitiveness as an overriding goal (Inch 2018; Gray and Porter 2015; Henderson et al. 2018). This trend will arguably continue under the Scottish Nationalist Party (SNP) governments that, their social-democratic rhetoric notwithstanding, have deepened their neoliberal commitments (Davidson, Virdee, Morrison, & Mooney, 2016).

5.4.2. Curitiba

Intergovernmental state structure

Brazilian federalism was defined at the onset of democratization by the 1988 Constitution that shifted power and resources to the municipal level. Municipalities have a constitutional status and are not subordinated to other government levels (Souza, 2015; Tavares de Almeida, 2006; Ter-Minassian & Mello, 2016). Brazilian federalism has a high degree of political, functional and fiscal decentralization compared to other countries, which bestows a high degree of autonomy on the municipalities. The very considerable municipal spending responsibilities of the Brazilian municipalities include raising a huge portion of their total revenues themselves (Ter-Minassian & Mello, 2016).

Local political power relations

In the Brazilian local government system, the executive and legislative functions, respectively the mayor and the city council, are separate branches. Brazilian mayors are directly elected and play an important political role as they have the highest legal, budgetary, and administrative authority (Rodriguez, 1997). This concentration of power in the hands of the mayor is seen by some as an impediment preventing municipal legislatures from significantly contributing to policymaking (Wampler, 2000). Some authors claim that this extensive mayoral authority has resulted in *“a Brazilian democracy plagued by a “private” state where most mayors continue to treat their municipal administrations as personal fiefdoms”* (Wampler, 2004, p.74). Nevertheless, there have also been various studies showing that Brazilian mayors from centre-left parties invest more in poor areas than those who represent traditional or right-wing parties (Souza 2015, Marques and Bichir 2002). In general terms, therefore, the governmental structure of Curitiba is exemplary of the “strong-mayor form” outlined in the former section. The office of mayor in the period examined in this article was fulfilled by two different people. At the start of the study, the mayor was Gustavo Fruet from the left-progressive Democratic Labour Party. Fruet was committed to advancing ecological, social and economic sustainability

by means of technologies and community-based participatory governance (Brittlebank, 2013; C40Cities, 2014; Martínez, Boas, Lenhart, & Mol, 2016). Fruet was defeated in 2016 by Rafael Greca, a member of the Party of National Mobilization which represents nationalistic, centre-right and conservative values (Jornal Agua Verde, 2018, IRB 2016).

Urban governance model

Curitiba is representative of the managerial model of urban governance, characterized by the longstanding top-down, technocratic approach cultivated by the military dictatorship (Irazábal, 2017). This style of urban planning is dominated by a group of well-trained specialists who control land use and transport. They provide a 'comfortable' environment for a population that returns the favour by not challenging the political status quo. Hence, it has never been the practice to consult the population during planning processes to preclude the difficulties and delays that participatory processes can cause (Follador et al., 2018). Urban development and the provision of public services in Curitiba often occur in close collaboration with businesses (Abrucio & Grin, 2015; Galvani, 2018; Lobato, 2016) to *"custom-fit to the logic of financial capitalism"* (Lavinias, Gentil, & Cobo, 2017). However, there are also scholars who feel that Brazil does not fit into the classical neoliberal mould but see it as a case of *"neo-developmentalism"* (Morais & Saad-Filho, 2012) or *"left neoliberalism"* (Saad-Filho, 2015) - a state that implements both free-market policies and social programs.

5.4.3. Utrecht

Intergovernmental state structure

The Dutch intergovernmental relations are entrenched in a unitary-decentralized state system in which the relationship between national and local governments is based on a mix of supervision, co-governance, and autonomy (Broekema & Steen, 2016). Supervision implies that the national and regional governments approve the municipalities' developmental plans and annual budget (Breeman, Van Noort, & Rutgers, 2012; Ladner et al., 2016b). Co-governance signifies that municipalities often carry out policies made at a higher, i.e., regional or national level. Consequently, the execution of these policies depends on the cooperation of local governments, which exemplifies the Dutch consensus culture (the so-called 'polder model') (Figuee, Eigeman, & Hiltermann, 2008; Ramkema, 2008). In terms of autonomy, municipalities

have a relatively large functional sovereignty since they are empowered and competent to define their own policies and service delivery (Broekema & Steen, 2016; Heinelt et al., 2018; Ramkema, 2008). Regarding financial autonomy, however, Dutch municipalities are very dependent on the central government since their income mainly stems from national resources (Feeley & Kesari, 2015; Figuee et al., 2008).

Local political power relations

The division of responsibilities between the municipal council and the municipal executive provides the council with substantial decision power, including mayoral appointments (Figuee et al., 2008). The mayor is the chairman of both the municipal council and the municipal executive, although he/she has limited executive powers. Dutch mayors are the figureheads of the municipality and stand above the political parties. They do not participate in the political game but act as managers assigned an encouraging and binding role (Allers, 2015; Ramkema, 2008). This implies that Utrecht has the “collective form” of local government with a weak mayoral office in accordance with the classification described in the theoretical section (Heinelt et al. 2018). The present mayor of Utrecht is Jan van Zanen, a member of the right-liberal VVD party against the backdrop of a left-oriented council (DUIC, 2019; Municipality of Utrecht, 2020; Stam, 2015).

Urban governance model

Utrecht is a typical example of the corporatist model of urban governance in line with the Dutch tradition of consensus democracy. This tradition stems from deep socio-cultural cleavages between Catholics, Calvinists and socialists in the past. Such a fragmented society necessitated the formation of grand coalitions, sprouting social partnership, compromise and cooperation between interest organizations, social groups and the state as a political culture (Lijphart and Crepaz 1991; Bevort 2016; Lijphart 1999). The corporatist governance model aims at the distribution of public goods across society, which fits the longstanding social-democratic welfare system in the Netherlands (Sanandaji, 2013). However, changes in societal realities are increasingly promoting a more liberal, Anglo-Saxon style of governance. This has brought about reforms such as the tightening of the welfare state and an emphasis on competition, decentralisation and individual responsibility (Arts & Gelissen, 2016; Bambra & Eikemo, 2009; Delsen, 2012).

5.4.4. Expectations

Based on the theoretical outlines of the relationships between institutional dimensions and smart governance (Table 5.1), the different contexts of Glasgow, Curitiba and Utrecht (Table 5.2) predict dissimilar configurations of smart governance.

With Glasgow's intergovernmental state structure classified as a unitary-centralized system, smart governance in Glasgow may be predicted to be aimed at societal goals of a more universal character. This institutional context furthermore predicts a narrowly composed collaboration base in which citizens have a passive role. Technology use is not likely to serve as an enabler of collaboration, but as a tool to optimize urban management. By contrast, the unitary-decentralized structure of Utrecht and the federalism of Curitiba predict societal goals with a city-specific scope. In these cities, broad-based collaboration among multiple stakeholders can be expected in which citizens also have a more active role, such as consultation and citizen power. The technologies used will most likely foster collaboration although the design and purpose of tech-based tools may also be shaped by the specific actors involved.

Based on the institutional dimension of "local political power relations", all the components of smart governance in Glasgow and in Curitiba may be predicted to be influenced by the city leaders due to the prominent positions of power they occupy. Here, however, the formulation of more precise expectations is difficult as the political orientation of the incumbent city leaders will also play a vital role. In contrast to the leader supremacy model of Glasgow and Curitiba, the collectivism of the local political system in Utrecht signifies that the actual configuration of smart governance will be the result of political compromise, although the political colour of the cabinet will likely also play a role.

Finally, the institutional dimension of "urban governance model" anticipates that Curitiba's managerial mode will generate societal goals that target the triple bottom line (TBL) sustainability - i.e., economy, environment and people – for city-specific conditions. It furthermore suggests a narrow collaboration base in which mainly experts and businesses take part, with limited input from citizens. The managerial governance model in Curitiba predicts

the use of technologies to efficiently manage the city. Utrecht, which is characterised by a corporatist model on this dimension will differ from Curitiba on some aspects, although in all probability, the societal goals will be similar. Societal goals in Utrecht are therefore likely to pursue urban TBL sustainability going beyond local, city-specific conditions. Collaboration in the corporatist model of Utrecht will tend to be broad-based, with citizens assuming more active roles. Consequently, technology use will be directed at stimulating collaboration, although other forms of tech-based instruments may also emerge, dependent on the contributions of the relevant actors involved. This institutional dimension in Glasgow (i.e. pro-growth model) envisages societal goals that link to local, city-specific conditions from a principally economic viewpoint. This also suggests a narrow collaboration base in which citizens have a passive role or function as consumers. In addition, technology use here is anticipated to focus on urban management and the development of commercial applications.

These expectations not only indicate differences in smart governance in the three distinct cities but also predict within-city contradictions. For example, in Glasgow, universal societal goals on the base of the intergovernmental state system (i.e., unitary-centralized) might be expected, whereas the urban governance model (i.e., pro-growth) suggests that goals will have a city-specific, local character. Another example is Curitiba, where the federalist intergovernmental state system would predict a broad collaboration, yet the managerial urban governance model would tend toward a narrow collaborative base. This study will therefore explore how these predicted, yet sometimes opposing, configurations of smart governance materialize in the three cities and the institutional factors that play a role in shaping these.

5.5. Data collection and analysis

This section first describes the approach applied to examine the phenomenon of smart governance in the three cities. Then, it specifies the methods of collecting and analysing the data.

5.5.1. Smart city initiatives

To study how smart governance is configured in the different cities this paper investigates smart city initiatives that illustrate the approach to smart governance in these urban contexts. Initiatives are suitable for this purpose since they feature all the major dimensions -i.e. societal goals, collaboration, technologies - that constitute smart governance. In addition, examining initiatives offers more advantages than zooming in on policy documents, since initiatives are tangible evidence of how the formulated strategies are implemented in practice.

The smart city initiatives were selected in line with the identified dimensions of smart governance. Three elements were required to be present: 1) societal goals, 2) collaboration, and 3) the use of technologies. In making the selection, the “smart” label was not an absolute criterium since many initiatives fit the abovementioned definition of smart governance without being labelled as such. In addition, it was important that the initiatives reflected the smart governance strategies of each of the cities. The initiatives chosen are briefly introduced in the below.

Glasgow

Glasgow City Council fosters an overarching, large-scale approach that it calls the “*Smart City Journey of Glasgow*” (Walker, 2018). This is reflected by the Future City Glasgow (FCG) programme that was established in 2013 after receiving £24m in funding by winning the Technology Strategy Board’s Future Cities competition. It was “*an ambitious programme to open up Glasgow like never before*” to show “*how new technologies can make life in the city safer, smarter and more sustainable*” (<http://futurecity.glasgow.gov.uk/> para 1). It was a complex programme consisting of a range of projects, activities and applications (Glasgow City Council, 2015; mruk, 2016).

Curitiba

Curitiba does not have a long-term, documented smart governance strategy. Such visions are formulated by incumbent mayors, which can significantly alter the course of successive plans, as observed in the two different mayoral eras studied here. Mayor Fruet’s directive on Curitiba’s smart city model (Municipality of Curitiba, 2016) failed to come to fruition due to his electoral defeat. Fruet’s approach to smart governance is mirrored by the Curitiba Collaborates

(CC) initiative that was introduced in 2015. It is an open data programme aimed at stimulating society to address urban problems by using city data for socio-technological solutions (Municipality of Curitiba, 2014, 2015).

Fruet's successor, Rafael Greca envisions Smart City Curitiba as innovation-driven sustainability *"to develop economically and, at the same time, increase the quality of life of the population by generating efficiency in its services and stimulating the entrepreneurship of impact"* (Municipality of Curitiba, 2018 para 3). This vision is embodied by the flagship project Vale do Pinhão (VP) launched in 2017 as *"the movement of the City Hall and the ecosystem to bring innovation to the whole city"* (Municipality of Curitiba, 2018 para 5). It aims to transform a degraded industrial area into a creative economic cluster of high-tech companies (Silveira, 2018).

Utrecht

The city of Utrecht has joined the National Smart City Strategy, which has as objective to exploit digital technologies to make Dutch cities more sustainable (Muis, 2018). Utrecht aspires to become an ecosystem of smart applications and solutions to create a Healthy Urban Living environment. However, the city does not have an overarching strategy for smart governance but a tangle of smart city activities launched by government, businesses or citizens (Maltha et al., 2018). From these activities, a range of initiatives have been selected for this study: 1) Smart Solar Charging, a community-based sustainable energy and mobility system; 2) the spatial transformation of the Johan Wagenaarkade into a park zone; 3) the design of the long-term spatial development of Vleuten; 4) the socio-economic and spatial restructuring of the Amsterdamsestraatweg; 5) the spatial restructuring of the Merwede Kanaalzone into a smart city district; 6) the spatial redevelopment of Kanaleneiland Zuid into a smart energy district.

5.5.2. Data collection

The data were collected in each city by a research team in the period between October 2016 and December 2018. The data collection focused on gaining thorough insights into the internal and external aspects of the development of the aforementioned initiatives in the three cities. It was particularly directed at gathering material about the societal goals, the breadth of the collaboration between stakeholders and the roles of the citizens therein, and about the way

technology is used in these initiatives, in order to be able to define the governance configuration in the different cities.

The first step in the data collection process entailed a comprehensive desk review of policy, project and legal documents, journal and newspaper articles as well as websites and social media. Secondly, in-depth interviews were carried out with a variety of actors representing different organizations: municipality officials, professors, citizens, communities, external professionals, businesses and members of social organizations. Finally, data were also obtained during field observations and events. The latter included (project) gatherings, conferences, public hearings, workshops and hackathons. A quantified overview of the empirical data collection is displayed in Table 5.4.

Table 5.4 : Empirical data collection

	Documents	Interviews (total):	Municipality officials	Citizens	Other actors	Websites, social media	Events	Field observations
Glasgow	23 (D65-87)	19 (incl. double interviews)	8 (R40-47)	1 (R48)	6 (R49-54)	11 (W41-51)	9 (E17-25)	2 (F10-F11)
Curitiba	23 (D42-64)	13	5 (R12-16)	5 (R22-26)	3 (R37-39)	20 (W21-40)	4 (E13-16)	3 (F7-9)
Utrecht	41 (D1-41)	26	11 (R1-11)	5 (R17-21)	10 (R27-36)	20 (W1-20)	12 (E1-12)	6 (F1-6)
Total	83	58	24	11	19	50	30	10

5.5.3. Data analysis

First, the data collected were organized in a factsheet according to the smart governance dimensions identified in the theoretical section: the societal goals, the collaboration including the types and roles of participants, and the technologies used. This classification helped to define the actual configuration of smart governance in the three cities. Second, these smart governance configurations were examined in the light of three specific institutional dimensions: the intergovernmental state system, the local political power relations, and the urban governance model. This was done by placing the outcomes in the assumption framework (Table 5.1), enabling a comparison to be made between the expectations and the findings and revealing (dis)similarities. Third, the analysis dove in more deeply to investigate the possible

institutional causes of the outcomes. It sought to identify the institutional dimensions responsible for the resulting configurations of smart governance in the three cities. These results were then contrasted with the expectations, which eventually helped to formulate conclusions.

5.6 Findings and analysis

This section presents and analyses the findings for each city according to the three components of smart governance: 1) the societal goals 2) collaboration, and 3) the technologies used.

5.6.1. Glasgow

Societal goals

Future City Glasgow (FCG) was made possible by the resources of the national competition (W44; E17). Shaped by the competition guidelines, the programme was designed to showcase how the city could advance the local and the UK's economy and citizens' lives by using data and technologies (D75; D84). These goals were specified in the themes of energy, transport, public safety and health (D80; W43). Although health deprivation is a serious issue in Glasgow (F10;W51) the objectives of FCG tended to be more universal, aiming to *"solve some of the challenges that every large city faces"* (W46) or as a governmental official phrased it: *"the key part of it was about growing economy, being smart, green"* (R40). This also became apparent in the first bidding round, where it was seen that competitor cities used a similar language, identified the same problems and barriers, and gravitated towards similar solutions (D67). FCG was also linked to the Glasgow City Council's ongoing broader reform agenda to improve public services by doing more in a cost- and time-saving way (R40;R41).

Collaboration

FCG promoted multiparty collaboration in which various roles were envisioned for various actors (W43;E20). The leadership role was assumed by Glasgow City Council, who took responsibility for managing and facilitating the programme in line with one of the tenets of the city's award-winning proposal: *"smart cities are led from the top by a strong and visionary champion"* (D84). This top-down approach was considered necessary because of the two-year

timetable set for implementation by the grant-maker, the Technology Strategy Board (D71;E18; D86; R40,41,42). At the same time, an external supervisory team of technological consultants was installed, although not integrated within the City Council. This gave some government officials the feeling that the FCG was done ‘to’, rather than ‘with’, the Council (R41).

The programme aimed to “*empower everybody -the public, voluntary, academic, private sectors, and communities- to harness, use, and combine [data and technologies] in new ways*” (W46). It emphasized the need for citizens’ contributions, described as “*putting people at the heart of the process*” (W46). Citizens of all sorts were sought, not merely the “*brainiac student programmers*” and “*hi-tech and smartphone-powered people*” but also the “*low-tech and people-powered*” ones (D78). Collaboration was considered by the coordinators to be an obvious consequence of opening city data, which would mobilize people to take societally transformative initiatives (R40; R42).

However, the broad collaboration envisioned did not materialize in practice. Instead, technological companies predominated, first by co-developing the national bid and then by creating tech-based infrastructure, services and applications. The small- and medium-sized enterprises considered crucial to the economic growth strategy of Glasgow were not sufficiently plugged in (R41). Similarly, actual citizen engagement was generally low (D69;D70;D86) as citizens mostly functioned as users of new applications or as passive data providers (D66; E21). Citizens were commonly referred to as actors *for whom* the FCG intended to design a better city, thereby rendering them service receivers rather than city transformers. Although participatory types of activities such as hackathons were organized, they were one-off events. Nor did they add an element of diversity as the participants were students and members of the IT community (D78;D67). The four hackathon events had an “*isolated*” (R41) character as only hackers attended and no council representatives. This resulted in insufficient data availability and a lack of reflection on the relevance of emergent ideas.

Further participants in the FCG project included the universities involved in the co-authorship (University of Strathclyde) of the national bid, and in research related to the programme (E18; R41;R52).

Technologies

Technology rollout was a core element of the FCG programme, which required the collection of as many datasets as possible across the council (R41;R53). These datasets created an infrastructure for the Glasgow City Management System, a scalable and modular digital city platform built on three pillars: 1) the Glasgow Operations Centre; 2) Open Glasgow; and 3) four demonstrator projects (D71;D84;R43; mruk, 2016). (mruk, 2016)(mruk, 2016)(mruk, 2016)(mruk, 2016)(mruk, 2016)The first pillar, the “Glasgow Operations Centre”, integrated city systems such as public-realm CCTV networks, traffic management services, and planning functions. The “Open Glasgow” pillar united urban systems and data to improve public services and to accommodate citizen engagement. This platform sought to enhance the existing MyGlasgow app with information about air pollution, traffic congestion cycling paths and the City Observatory. Community-engaging tools were designed for hackathons, “Future Makers”, community mapping and area regeneration, although they were orchestrated from a technical viewpoint rather than user experiences (R41).

Finally, the demonstrator projects developed applications for various policy domains (D68;E17;E20) such as: *Integrated Social Transport* with a route optimisation software in minibuses for home care services; the *Active Travel Spatial Analysis App* for walkers and cyclists; *Energy Efficiency in Buildings & Housing*, a smartphone app to collect data and to advise homeowners on energy consumption; *Sustainable, Social & Safe Street Lighting*, energy-efficient lamps (D83;D71;W48).

Throughout all its phases, the FCG programme was strongly supported by the Leader of the City Council, Gordon Matheson (D70;E18), who oversaw the bid procedure and the programme implementation, while enthusing colleagues and fronting associated public events (R40). This political commitment has continued under the subsequent leadership of the Scottish National Party, which has carried on with the achievements of Future City Glasgow and evolved activities in its wake (E21;D82).

These findings reveal that the central, UK-level strategies of the demonstrator programme were decisive in shaping all components of smart governance within the scope of the FCG project. In the first place, the entire programme was able to be implemented thanks to the

funding received from the UK government. In line with this, the goals that were set - the universal scope and the focus on both economic growth and large-scale technology rollout-echo the national programme guidelines and the UK's liberal, market-oriented tradition. Likewise, the range of collaborating partners was also predetermined by the guidelines of the national bid. This meant the designation of the City Council as leader of the FCG programme together with an exterior leading team within the local government. As may be expected, in view of the aforesaid goals, technological companies were core players while citizen engagement was modest. This narrow collaboration mode was probably also the result of the projected use of technology as formulated in the proposal submitted in the national competition, which mainly targeted urban management, infrastructural systems and commercial applications. The modest roles allocated to citizens did not prioritize the use of participatory tools.

These insights demonstrate, as expected, that the intergovernmental state system (i.e. unitary-centralized) had a pivotal role. The other institutional factor, namely the local political power relations, appears to be less important than assumed. This factor had been hypothesized to shape smart governance in conformity with the preferences of the Leader of the City Council. Yet, rather than using this leadership role to alter the direction and configuration of FCG smart governance, the Leader instead chose to provide support for the project across the board. Moreover, this support has proven not to be contingent on political orientation, as subsequent administrations with different values continue to recognize and build on the accomplishments of FCG.

5.6.2. Curitiba

Societal goals

Curitiba Collaborates (CC) is an initiative designed to tackle city challenges identified by inhabitants. The hoped-for solutions were also expected to create an innovative economic environment (R12-14; D42-44).

“Vale do Pinhão” (VP), inspired by the spirit of Silicon Valley and the Intelligent City, builds on five pillars: entrepreneurial education, technologies, re-urbanization and development, an integrative innovative ecosystem, and economic stimulation (W35;W40; E15). VP

specifically aims to regenerate a degraded industrial area and to attract technological firms and start-ups. This neighbourhood transformation is expected to bring about an innovative ecosystem and to boost the “smart” reputation and socioeconomic performance of Curitiba (W34; W37).

Collaboration

The municipality, as the initiator of the CC project, had two major motives for collaboration. First, it realized that releasing public data would not automatically lead to urban solutions; an actively engaged society was also required. Second, deprived as it was of resources, the municipality needed external knowledge about technologies and city problems (R12;R15;D48-49).

The mayor and his team therefore stimulated a collaborative milieu by various means, including providing meeting locations for urban activists. The municipality encouraged citizens, communities, universities, and local entrepreneurs to make use of the publicized data to generate applications (R13;R16;W50-53). Input from citizens was deemed crucial for mapping societal demands and devising technological solutions for these demands. This resulted in a stable community of civic hackers, software developers, and students (R12;R22; W21;W24) led by the bottom-up initiative Code for Curitiba comprising “*passionate and competent citizens who work with the government to develop technology-based solutions that solve urban issues*”, who believed that through their work they could “*foster collaboration and transparency, accelerate economic growth and revive citizenship*” (W31). Code for Curitiba took over the CC leadership and has sustained the activities despite the municipality’s post-election project exit (R1-R5;W23).

Other CC participants were “common” citizens although their engagement was limited (R12; D55-56). Furthermore, universities also participated in a number of research activities as part of the project.

VP is managed by professional planning authorities, namely the Curitiba Development Agency and the Institute of Research and Urban Planning of Curitiba (IPPUC). Their task is to create facilities and infrastructures that foster the formation of an economic cluster. They also assist companies in networking and promote this up-and-coming area to attract businesses (E15-E16;

W36). Non-governmental actors primarily consist of businesses, especially tech-based companies and start-ups, who, in the future, will be housed in the regenerated area to jumpstart the development of a new metropolitan centre (E15-E16;W37; F9). Furthermore, various universities are official partners of the programme and have a supportive role, which includes attending events and conducting research on new technological applications (W35; W39). Citizens have not been part of this alliance as the local authorities plan to inform them about the project in a more advanced phase (E15-E16).

Technologies

As part of the CC initiative, twenty-six datasets were opened to provide a basis for potential application developers (D44-R45;R13-R14). The next step was the organization of three public hackathons. Some 400 contestants took part, who mapped a number of societal problems and evolved apps to address these, including a public transport timetable and mobility support for blind people. However, to date the societal use of these apps has been limited (D55-58; E13-14).

The technologies used within the scope of the VP project primarily relate to the economic profile of the urban space under revitalization. This space represents an innovative cluster of technological companies, which accentuates the “smartness” of Curitiba (W34; E15-E16).

It is clear from the above that the intergovernmental state system, as expected, is an important influence in Curitiba. In the Brazilian federalist structure, smart governance is shaped at the local governmental level. Hence, top-down, overarching guidance with the corresponding resources provided by the federal or regional governments, as seen in Glasgow, is lacking, with, as a result, fluctuating and project-based approaches to smart governance. Moreover, the importance of the local level is also reflected by the scope of the societal goals that focus on city-specific issues.

The local political power relations (i.e. mayoral authority) dimension would appear to act as a highly pervasive influencer, as forecast. In fact, mayors were found to determine the entire course of the project. Hence, all the various dimensions of smart governance were configured in line with their (political) preferences. This became obvious in the post-election power switch

that resulted in the cancellation of all activities launched by the previous administration and a swerve in an entirely different direction. Accordingly, the focus of the societal goals also changed: whereas sustainability was pursued by Fruet through participatory governance, under Greca this has been advanced through an emphasis on a competitive economy. The type of collaboration changed as well: the CC project initially broke with the “business as usual” model of managerial urban governance, and strove for primarily allying with civil communities, which eventually seized the leadership. By contrast, Greca returned to a managerial governance tradition that positioned experts and businesses as key partners. At the same time, none of the initiatives gave rise to the type of broad-based collaboration that might have been expected due to the influence of the intergovernmental state system. Finally, the technological dimension of smart governance in Curitiba should also be understood in relation to mayoral power and the ensuing political choices, with either a focus on social interactions and collaboration (CC) or on urban management and infrastructural elevation (VP). This mechanism also affects the impact of the institutional dimension “urban governance model” on Curitiba’s smart governance development. The traditional managerial mode of governance was resisted by mayor Fruet, but reinstated under Greca. This produced differing smart governance configurations in the two mayoral eras.

5.6.3. Utrecht

Societal goals

The projects involved in this study have their own specific objectives, such as spatial restructuring, developing “smart”, low-carbon neighbourhoods or creating a long-term developmental vision. Despite this diversity, these projects have the overarching aim of promoting urban sustainability, healthy urban living, and improving the economic and innovation performance of Utrecht (E5;E12;R2;R5;R6;R8;R10). The ecological aspect of sustainability and the realization of a carbon-neutral urban environment have, in particular, been accentuated by the “green” social-democratic governing coalition (R1;W2;W17;E10).

Collaboration

The focus on spatial development in these projects shaped the range of collaboration partners and the roles of the various actors. The role of the municipality was fundamental

due to its legal, regulative and sometimes co-proprietorship responsibilities. The municipality, therefore, led the way, managing and providing resources such as staffing, knowledge, funding, technologies, networks, and actor mobilization (R1-R4; R5-R11). It has furthermore supported “smart” grassroots initiatives that accord with its policy objectives (i.e. Smart Solar Charging) (R1;R17;W2).

Collaboration in these projects targets broad societal inclusion that fits the Dutch tradition of participatory planning and consensus-seeking (W1-20; E1-E3; E8-E9). As a consequence, different stakeholders such as citizens, communities, businesses, and other organizations take part (R3;R5;R7;R20-R21;R10). There are two major ways in which citizens contribute. One is consultation, in which citizens are invited to express their opinions and make suggestions about plans such as the spatial development of Amsterdamsestraatweg, Johan Wagenaarkade and Vleuten (D11;D17;D26;D33). The other relates to citizens as consumers and users. Consumerism can trigger changes in citizen behaviour aimed at societal transformation, for example through the use of new products and services such as the Smart Solar Charging or IRIS Kanaleneiland Zuid projects (D1; D41;E1-E7).

Businesses also play a role, especially in projects labelled as being smart. They contribute to technological innovation and the development of new applications, products and services (R1;R17;R27;R11). Businesses are also essential partners in some urban transformations as project developers and/or landowners (W17;E8).

Finally, universities and knowledge institutes also collaborate in smart city-labelled (EU) projects (i.e. Smart Solar Charging, Kanaleneiland Zuid) to research the activities and to promote these in society (R30;W3; E5).

Technologies

The initiatives in Utrecht view and use technologies in different ways. For instance, in smart-labelled projects (i.e. Smart Solar Charging, IRIS Kanaleneiland Zuid) technologies form the very basis for collective practices such as smart grids, electric vehicles, smart meters, solar panels, smartphone apps and open data platforms (D5-7;W18-19; R17). These technologies form the backbone of each of these projects and are presented as essential means to reach

the societal goals, in pursuit of a healthier city. In the more “traditional” types of spatial planning, technologies serve as standard tools to support collective engagement. This technology use is therefore not heavily publicized and not framed within the urban smartness discourse. These projects utilize websites, online fora, social media, as well as 3D models such as a scenario model and a geo-referenced map (R5-R9;W5-W13).

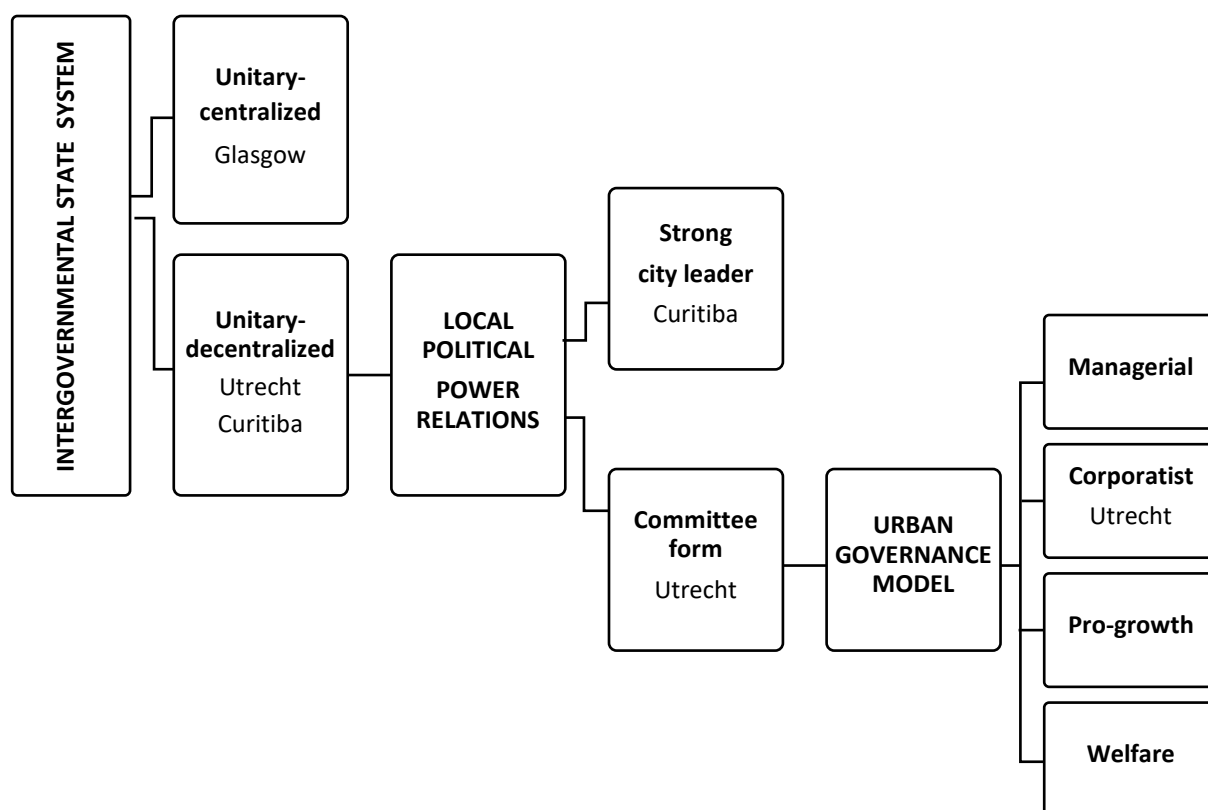
In Utrecht, just as in the other two cities and in line with what was predicted, the “intergovernmental state system” was found to have a considerable impact. Utrecht is positioned within a unitary-decentralized system that makes city governments responsible for urban development such as smart governance initiatives. This automatically translates into city-specific goals, since locally evolved smart governance initiatives target specific issues within the city confines. This institutional factor is seemingly also responsible for the fragmented character of the city’s smart governance approach, similar to that in Curitiba. Furthermore, local political power relations also play a role in Utrecht, as the joint decisions taken by the municipal cabinet set the course for the societal objectives for the city as a whole. However, contrary to Curitiba, the cabinet does not play a direct role in ongoing projects, for example, by initiating these or specifying their objectives and means. These tasks are carried out by local government officials from the relevant policy domains and their societal partners.

As a result of these two institutional aspects, the corporatist mode of urban governance in Utrecht plays a significant role in shaping smart governance initiatives. The tradition of consensus-seeking among a varied range of societal actors and the resulting multiparty cooperation have a tangible influence on the three components of smart governance. This resonates in the goal setting of the projects, in that, consequently, a more widespread societal wellbeing and the realization of public values is aspired to. The corporatist tradition is also apparent in the broad-based collaboration characterizing Dutch urban planning, in which citizens often have a consultative role and the functions of consumers and users are emergent engagement forms. This latter development and the increasing role of businesses jibe with the arguments about nascent market-oriented tendencies in Dutch urban development. Finally, the technologies used follow these smart governance patterns, conditioned by both the corporatist tradition and the increase of market forces. This means

that on the one hand, technologies are employed to facilitate exchanges and collaborative actions. On the other hand, they serve commercial purposes, urban management and infrastructural transformation.

The aforementioned findings are summarized in a heuristic framework (Figure 5.1) that helps to understand the influencing mechanism of the institutional context. It illustrates how institutional dimensions co-existing on different spatial scales affect the three cities' smart governance. The framework visualizes how each institutional factor influences the different urban contexts. Hence, the "intergovernmental state system" dimension is recognized on the national scale as the initial influence for all the three cities because it defines the locus of responsibility and decision-making for smart governance. In "unitary-centralized" Glasgow, this appears to be such a decisive factor that it overshadows the two other institutional dimensions. Therefore, in the framework, the dimensions of "local political power relations" and "urban governance model" have not been included for Glasgow. In the case of the two other cities – Curitiba and Utrecht – the national setting of "the intergovernmental state structure" defines their decentralized and federal state system. This enhances the significance of the city level and therefore that of the local political power relations in smart governance processes. This institutional aspect turns out to be a significant factor in Curitiba due to the dominance of the mayoral role. By contrast, in Utrecht, the committee-system of the local political power relations does not allow a single actor to be the ruler of urban development. This paves the way for an urban governance model (i.e. Dutch corporatism) that eventually shapes the actual configuration of smart governance in the city.

Figure 5.1: Institutions influencing smart governance in the three cities



5.7. Conclusions

This research set out to answer the question “*How does the institutional context shape the actual configuration of smart governance in cities?*”. This question arose from the growing recognition that cities’ specific institutional context produces different configurations of smart governance, which to date had not received empirical academic attention. This study proposed to remedy this through the analysis of three cities with different institutional contexts on the basis of the smart governance initiatives undertaken there.

The findings suggest that the institutional context indeed plays a role in shaping smart governance in terms of societal goals, collaboration and technology use. These empirical outcomes have resulted in a heuristic model of institutional influencing, which helps to clarify configurations of smart governance and their variance across cities. The model also indicates that this institutional influencing is not straightforward but has a multi-layered character that arises from the interactions between different institutions on multiple scales.

Consequently, institutional aspects modify - reinforce or neutralize - each other's impact on the smart governance configuration. These dynamics exhibit an influencing mechanism that seems to logically determine which institutional factors are pivotal in shaping smart governance in the different city contexts. Accordingly, the intergovernmental state system appears as a factor in each city that determines the locus of smart governance and thereby the approach to configure this. This institutional aspect turns out to be definitive in Glasgow where the UK-level smart city strategy is so imperatively manifest that it prevents the other two institutional dimensions from playing even an elementary role. In contrast, the "federalist" and "unitary-decentralized" state systems in Curitiba and Utrecht render local governments self-reliant in terms of policy-making and/or resource collection. This understandably pushes the institution of the local political power relations to the front. It emerges as the central factor in Curitiba due to its mayors' almighty status, which therefore determines whether and how the third institutional aspect -i.e. the urban governance model- can play a role. In Utrecht, the institutional dimension of local power relations has a different impact due to the city's collective system of city government. This in its turn sets the influence of the third institutional aspect in motion, namely the (corporatist) urban governance model.

The results also demonstrate that institutional aspects cannot be regarded as separate, independent items but must be examined in relation to their broader contextual setting. This is apparent in this study by the fact that the institutional dimensions are differently understood in different contexts, which is exemplified by the idea of powerful city leadership. In Glasgow, this is manifest by the general support of the Leader of the City Council and by the fact that succeeding administrations built on the smart governance policies and achievements of the previous powerholders regardless of political identity. By contrast, Curitiba's omnipotent mayors regulate the course of smart governance, including the erasure of programmes launched by politically different predecessors.

These research insights contribute to the literature in that they advance the conceptualization of smart governance by drawing attention to its context-contingent nature. This can also aid in understanding or predicting smart governance in cities. So, by gaining insight into the national policies in a unitary-centralized state structure or the

political intentions of a powerful city leader, the potential evolvement of smart governance initiatives may be foretold.

The exploratory framework developed in this study set out to link smart governance to the institutional context and to stimulate thinking about their interrelationship. Future work should build on the systematic approach started in this study to sharpen the context-sensitive conceptualization of smart governance. Future research could include additional facets such as the societal outcomes of smart governance or further institutional dimensions. With this latter in mind, it might be interesting to investigate not only how political views or the level of democracy influence smart governance but also whether specific institutional aspects work to stimulate or hinder this. In addition, much more empirical work is needed, in which actual patterns of smart governance are compared across various different places with (dis)similar institutional designs. This would enable to determine whether certain environments are more conducive than others to creating public value through smart governance and whether context-adaptive strategies can counteract institutional hindrances.

6. CONCLUSIONS

6.1. Introduction

This thesis set out to generate empirical and theoretical knowledge about smart governance. This is an important topic, as smart governance is commonly considered to be a potential solution to addressing societal challenges in cities. It offers technological possibilities that, beyond optimizing urban management, can enhance citizen engagement and thus state-civil collaboration in public affairs (De Oliveira & Santos, 2018; Geertman et al., 2015; Meijer, 2018). At the same time, however, a growing number of critical voices may be heard cautioning against citizens' waning roles and societal drawbacks in emergent smart city arrangements (Cardullo & Kitchin, 2018; Cowley et al., 2017).

The aforesaid debates, however, are difficult to resolve as empirical insights into the true state of affairs regarding smart governance in cities are lacking. Stepping into this breach, the present research aimed to investigate smart governance *practices* by examining two key aspects that had, to date, been overlooked: 1) the roles of citizens in smart governance practices, focusing on participation both at the city level and in civilian bottom-up initiatives, and 2) the influence of context in shaping smart governance practices. This objective was expressed in the main research question, which asked: *What are the roles of citizens in smart governance practices and how does the contextual setting influence these practices?*

Both the role of citizens and the contextual influence were examined in the foregoing chapters in various ways. This chapter constitutes the final part of the dissertation, and offers a synthesis of the main findings from the individual chapters to arrive at an answer to the research questions introduced in Chapter 1. In Section 6.2, the first sub-question concerning the roles that citizens play in technology-enabled collaboration in public issues is addressed. This is followed by Section 6.3., in which an answer to the question of how context influences technology-supported collaborative practices between citizens and the local state in public matters is framed. These issues are subsequently woven together in Section 6.4, where the main research question is answered, establishing the central conclusions of this study. These research results are reviewed in Section 6.5 in terms of their academic implications and how they contribute to the literature. Next, Section 6.6 presents the societal implications of the research findings for local governments and citizens, after which in Section 6.7., avenues for

future research are proposed. Finally, Section 6.8 offers a few final thoughts about the ideas and hopes attached to creating human smart cities.

6.2. The roles of citizens in smart governance: technology is not a game-changer

The first theme in this dissertation concerns the ways in which citizens actually contribute to smart governance practices. This was guided by the sub-question posed in Chapter 1:

RQ1: What roles do citizens play in smart governance practices?

To answer this question, the major findings of the relevant chapters are presented and discussed, starting with the outcomes of the systematic literature review. This provided the initial insights into the current state of affairs regarding citizen contribution to smart governance. This is followed by a summary of the findings of the empirical chapters according to the distinction made in the conceptual framework (Figure 1.1) in the Introduction: 1) citizen engagement on the city level, and 2) bottom-up initiatives launched by citizens. To conclude, the most important details and the main ideas are summarized at the end of the section.

6.2.1. Insights from the literature review

The systematic literature review (Chapter 2) demonstrated that technology-facilitated involvement of citizens and, as a consequence, government-citizen collaboration, was, in practice still modest and scarce. It showed that citizen input in government-launched projects is predominantly non-participative and non-deliberative, taking the form of, for example, one-way information provision, consultation, or political support-seeking. This modest level of state-civil exchanges stems from a lack of capacity and willingness on the part of both government and citizens. Old structures, patterns, and routines rooted in insufficient technological and organizational infrastructure, a lack of skills and ingrained attitudes, still dominate in public administration and the civil sphere.

The literature review also found that smart governance practices reinforced existing participation patterns: citizens were shown to maintain the roles they always played in public affairs, whether inert or active. Hence, on the one hand, there are the “unplugged” citizens

who have only a limited knowledge of and interest in collective matters, or limited access to tech-based amenities, and who thus hardly ever contribute. On the other hand, are the active - usually the better educated, competent, and more affluent - citizens already engaged in improving their living environment, who also seek out technological means for their endeavours. These active urbanites, as the literature review revealed, are motivated by intrinsic and intangible rewards such as solidarity, altruism, as well as by the desire to resolve environmental challenges.

It can be concluded that the existing studies bear out the more pessimistic views of the roles played by citizens in smart governance. Citizen input in technology-facilitated collaboration processes was still found to be modest, thereby reproducing the patterns seen in “offline” participation. At the same time, this also meant that the citizens traditionally volunteering in societal affairs, were increasingly discovering digital technologies to pursue their aspirations in novel ways.

These insights from the literature review were further elaborated empirically in the subsequent chapters of the dissertation, in which an analysis of both citywide patterns of citizen engagement and civil bottom-up initiatives was provided. These two perspectives and their main findings are presented in the following subsections.

6.2.2. Citizen roles in smart governance: the city level

One part of the sub-question above involved the scrutiny of citizen engagement on the urban level to identify patterns of citizen roles in technology-facilitated collaboration within the city as a whole. In Chapter 5, governmental smart governance strategies, including approaches to citizen input, were examined in three cities: Glasgow, Curitiba, and Utrecht. The patterns of citizen roles were shown to be dissimilar in all three cities.

In Glasgow, only a limited level of citizen engagement was found, despite the city council’s promoting the involvement of citizens from all walks of life under the slogan of “*putting people at the heart of the process*” (<http://futurecity.glasgow.gov.uk/data/>). The city council had forecast that publicizing city data would inevitably mobilize residents to connect with ongoing projects in the city and to take societally transformative initiatives. In reality, however,

Glasgow's smart governance strategies essentially aimed to improve the city and its public services *for* rather than *with* its citizens. The council's approach prioritized infrastructural digitalization to optimize urban management, which mostly rendered citizens merely users of new (commercial) applications or passive data providers.

In Curitiba, two major - and opposing - types of citizen roles were revealed, arising from two different mayoral eras. Under the Fruet mayorship, the city's smart governance strategy sought to achieve collaboration between the state and the citizens, also as a means to offset the municipality's own shortage of personnel and knowledge resources. In particular, citizens, communities, and local entrepreneurs were encouraged to use the city data which had been made public to develop applications for urban problems. This resulted in a stable civil community that enthusiastically engaged in technological experimentation to identify and address societal challenges in Curitiba. These civil actors incorporated this initiative in their own activity repertory and gradually took over its management. By contrast, during the subsequent mayoral period under Rafael Greca, citizens became less visible and less heard in governance processes regarding smart city building. Citizens were ousted and moved to the background, as the local administration instead increasingly relied on professionals from planning authorities, development agencies, and businesses in city development. As a consequence, the chief - passive - role of citizens has now become receiving information about the course of urban transformation.

In Utrecht, the roles of citizens in smart governance activities were discovered to be predominantly related to consultation, while an emergent sort of civil contribution, called consumerism, was found to have also developed. Citizens were approached for consultation by the municipality through social media channels, websites, geo-referenced and interactive maps to submit feedback and suggestions about policy plans. Consumerism, however, is a more recently emerging participation form connected with the smart city movement. Consumerism refers to the practice of purchasing "smart" services and products (e.g. smart meters, solar panels, electric vehicles) or the co-creation of commercially incentivised "smart" arrangements (e.g. renewable-based energy communities) to contribute to a more sustainable society. Consumerism is particularly targeted at changing people's behaviour and practices with inventive technological commodities.

Citizen engagement in Utrecht was also analysed in more depth in another study (Chapter 4) with a single-city comparative focus, in which a broader range of top-down and bottom-up projects facilitated by technologies was investigated. The study disclosed the various ways in which citizens in Utrecht take part in technology-enabled collaboration, with various roles even simultaneously co-existing within projects. This variety of technology-mediated citizen input in Utrecht actually encompasses all engagement forms identified based on the extensive literature on citizen participation and the smart city research fields: passive involvement (i.e. information-provision), consultation, consumerism, and citizen power. This latter – citizen empowerment – represents the upmost and most influential rung in Arnstein's (1969) renowned participation ladder. This is the only participation form discussed in Chapter 4, which does not stem from governmental projects but that arises from bottom-up activities: in other words, citizens making use of technologies empower themselves and proactively shape issues in the public domain.

The outcomes of citizen engagement in Utrecht provided deeper insights that informed the findings of the multi-city comparison in Chapter 5. An assortment of citizen roles was uncovered that was far wider than the homogenous, city-based patterns of participation. This indicates that, while cities display characteristic patterns of how citizens contribute to collective matters, they also shelter other – less common or still evolving – participation forms. Such latent forms of participation can function as harbingers of emergent, altering trends in the field of technology-facilitated citizen contribution. On the other hand, the aforesaid nuance regarding the outcomes in Chapter 4 and 5 also highlights the fact that studying the roles of citizens on the basis of governmental strategies alone cannot provide a full picture about the activities actually unfolding throughout the urban fabric.

These insights lead to the conclusion that, at the urban level, the diversity in type of citizen engagement is in various respects, very considerable. First, it is diverse from an international perspective: the three cities, all located in different countries, each demonstrate their own specific participation modes. Second, citizen engagement exhibits within-city and within-project diversity when expanding the focus to a wider variety of technology-enabled collaborative initiatives.

6.2.3. Citizen roles in smart governance: bottom-up initiatives

In the previous sub-section, mention was briefly made of active citizens launching bottom-up initiatives with the support of technology. This theme is further elaborated in the present sub-section, in which an answer is sought for the second part of sub-question 1: citizen engagement in bottom-up initiatives. This was explicitly examined in Chapter 3, although the empirical cases explored in Chapters 4 and 5 yielded valuable findings in this respect, too.

The general image emerging from these specific studies served to confirm the literature-based assumptions in the Introduction about active citizens seizing technological opportunities to act for societal improvement. They are indeed resourceful, creative and energetic figures who voluntarily take and manage actions, and mobilize others. These civil activists, as projected in Chapter 1, can differ in their work methods according to their organizational logic, the scope and spatial focus of their ambitions, the roles assigned to participating citizens, their linkages to local governments or their approach to technologies. Consequently, the empirical findings in this dissertation contour various types of roles played by civil actors in smart governance practices.

One such type of active citizen deploying technologies in actions in the public domain refers to the so-called everyday-makers (Bang & Sorensen, 1999), a notion familiar from the citizen participation literature. These civic actors target a local issue within their narrow life sphere. Examples include the Utrecht Alert initiative, which aimed to reduce criminality in the district; the “Dichterswijk” movement, which strove to establish a green zone in the neighbourhood; or the “WijkConnect” digital platform, a project that undertook to create a more connected and committed neighbourhood at the socio-economic level. The initiators of these projects included and enabled fellow residents to jointly decide about, and realize the objectives. Digitalizing everyday-makers do not necessarily aim to disseminate their practices, although the success and effortless replicability of an initiative can incite widespread popularity and uptake in other communities and cities, as seen in the cases of Utrecht Alert and WijkConnect. “Smart” everyday-makers usually apply social media channels to activate and communicate with fellow citizens, which provides supplementary support for their off- and online activities. Or technologies underpin the core activities, such as in the Utrecht Alert initiative, which is

based on WhatsApp. The tech-driven everyday-makers identified in the empirical studies are connected in one way or another to local governments – they seek government support for a project and are granted this – in financial, organizational or moral terms – if the project aligns with policy strategies. In other cases, linking to commercial actors can be a viability strategy for civil initiatives, which then take on a resemblance to the type of social entrepreneurship mentioned in Chapter 1.

Another type of technology-facilitated civilian role relates to the so-called expert citizens, a concept also familiar from the participation literature. Examples in this dissertation are “Code for Curitiba” (Chapter 5) and “Argu.nl” (Chapter 4), comprising technologically proficient communities consisting of civil hackers, digital start-ups, software developers, or technology students. Unlike the everyday-makers, these civic experts do not concentrate on one specific issue in their personal or neighbourhood sphere but foster a broader societal horizon, such as the revival of citizenship, economic growth, better public services, governmental transparency and urban transformation. Hence, they seek solutions for challenges within the entire city, to that end purposely using digital applications and the expertise of their tech-savvy members. Expert citizens, like those in the “Curitiba Collaborates” project, used technology to establish inventive urban solutions powered by data and digital applications. In that particular case, technologies evolved by citizens functioned as direct mechanisms to improve societal issues. A good example is a sensor-app that helps blind people to move around in the city. But expert citizens can also employ technology as a tool to facilitate and encourage cooperation around communal issues. This is the case with the open, digital forum “Argu.nl” that is professionally managed by the initiators and on which anyone can introduce a theme, discuss, argue and vote in any city-related issue. Consequently, citizens joining the platform deliver their efforts in the form of “consultation” since the outcomes of the exchanges do not directly influence policy making and urban development, but may be considered as orientational input. Finally, tech-driven expert citizens deliberately seek cooperation vis-à-vis local authorities but also other sectors and organizations, including civil society: *“we are passionate and competent citizens who work with government to develop technology-based solutions that solve civic problems”* (Code for Curitiba 2019).

Lastly, in this dissertation (Chapter 3) another type of active citizen - also playing a vital role in technology-induced public value creation - was discovered and developed. The citizen-local entrepreneur, a phenomenon that has been explicitly analysed in this research because of the way these citizens straddle civil society and the market, and one which has been hitherto overlooked in the literature. This study developed the citipreneurial model of active citizenship and the resulting type of bottom-up initiative. The novelty of the model lies in the citipreneur's in-betweenness – the civil community and the market - and the ability to take advantage of this cross-boundary position. The study showed how these resources enabled one such actor to kick off an initiative within his smaller community, which then expanded to address a widespread societal issue, such as unsustainable, fossil-based human practices. The model of citipreneurial smart governance shows the huge potential of this type of active citizen to establish productive state-business-civil linkages around alternative sociotechnical arrangements, resulting in technological innovation, organizational consolidation, spatial diffusion and institutional change. The citipreneurial role has the competence to drive systemic change with a societal impact, which contrasts with the majority of bottom-up initiatives, that tend to remain isolated and small-scale. In this initiative, technology forms the backbone of the collective practices invented - in this particular case, a community-based energy and mobility system fuelled by solar energy. Here, the role of the citizens mainly relates to the uptake of this new system, resulting in the consumption and co-production of new services (i.e. an electric car-sharing scheme supplying energy back to the neighbourhood) and providing user feedback to improve the scheme. Finally, linking to the local government proved invaluable in the evolution of this undertaking, as it provided support in terms of finances, networking, and regulation.

These insights into bottom-up initiatives lead to the conclusion that citizens can play a crucial role in establishing smart governance arrangements to shape societal and urban development. These are active citizens who do not wait for cues from the government, but willingly seize technological possibilities to independently undertake, evolve, and manage their own activities for common issues. At the same time, active citizens in smart governance do not form a homogenous group, but they take on different roles such as the everyday-maker, the expert citizen, or the citipreneur. These diverse forms of active citizenship characterize specific objectives, organizational styles, forms of co-citizen contribution (e.g. one-way information,

consultation, or consumption), technological usages, and societal impact, thereby engendering different practices and paths of collaboration.

6.2.4. Answering research question 1 (RQ1)

Synthesizing the main lessons gained about citizen engagement in the urban system and in bottom-up initiatives helps to address sub-question 1 (RQ1). The findings show that the ways in which citizens play roles in smart governance practices are greatly diverse. Accordingly, the study buttressed the idea of empowered citizens who make use of technologies to pursue their societal goals. However, it also uncovered evidence for the idea that technology is used to steer rather than empower citizens. In addition, new roles were presented that had not yet been identified in the literature. At the same time, the findings indicated that consultation remains a frequent form of engagement in smart governance practices, similar to conventional, face-to-face participation processes.

Hence, technology-facilitated citizen contributions to public issues have been shown to occupy a place somewhere between the highly optimistic and the very gloomy extremes repeatedly encountered in the literature. Thus, actually occurring citizen roles in smart governance deviate from the theories and assumptions; they reflect neither the dystopian cautions about manipulative or neoliberal strategies nor the celebrative prospects of citizens taking charge of the city. This reveals the futility of capturing citizen roles in smart governance in dichotomous framings and universal statements since they are dynamic and fluctuating, and reliant on the surrounding (contextual) circumstances. The national context is one factor - with more empowered citizenship in the Netherlands - although other conditions also play a role, since the study found additional participation forms in Utrecht.

This evidence shows that technology is not a game-changer. This, on the one hand, implies that technology does not inevitably empower citizens - as the optimists claim - or manipulate them - as the critics claim - but that it facilitates all sorts of engagement according to purpose and conditions. On the other hand, it indicates that the use of technologies in state-citizen interactions is not revolutionary, but evolutionary. In other words, technology produces no radical change in citizen engagement and state-citizen cooperation, but engenders a process of incremental adjustment and gradual absorption, which mirrors more the arduous ritual of

“muddling through” (Lindblom, 1959) policy processes rather than progression by leaps and bounds. Hence, the answer to the question about the roles that citizens play in smart governance practices seems to be identical to that to the question about citizen roles in governance practices.

6.3. The contextual influence on smart governance (answering research question 2): opening up the black box of the politico-institutional context (RQ2)

Beyond citizen engagement the other major theme in this dissertation relates to the study of context, and more particularly, how it can affect technology-facilitated collaboration between the local state and inhabitants. This enquiry was guided by the second sub-question posed in Chapter 1:

How does the contextual setting influence smart governance practices? (RQ2)

To address this question, the major findings of the relevant chapters are reviewed in the following. First, the outcomes of the systematic literature review conducted (Chapter 2) as a means to explore the relationship between smart governance and context are discussed. Next, the findings from Chapter 5 regarding the influence of the institutional context are reviewed. The relevant findings relating to contextual effects on smart governance practices from Chapters 3 and 4 are also highlighted. The section concludes with a recapitulation of the most important details and a brief summing up of the main idea in regard to sub-question 2 posed above.

The research in this dissertation commenced with a systematic literature review (Chapter 2) to assemble the existing knowledge on smart governance in which one focus was on context. This chapter demonstrated that context actually matters, presenting a list of factors that shaped smart governance practices. These factors contained features of the policy domain, the politico-institutional setting (e.g. democracy, innovation, administration styles), and socio-spatial (e.g., topography of the city, local-specific social cohesion; the extent of Internet reach; trust) dimensions. Hence, to a large extent, they match the contextual dimensions identified in Chapter 1 based on related literature about collaboration and urban politics.

These distinct contextual factors, as shown in the expectation table (Table 2.2), each affect the various dimensions - such as technology use, citizen input, role of governments - of smart governance practices differently, i.e., either in a conducive or a disruptive way. For instance, a city's vulnerability to natural forces such as flooding and earthquakes may stimulate the commitment of both governments and citizens to smart governance. By contrast, formal and hierarchical administrative cultures and highly centralized public administration exemplify factors that hinder smart governance, particularly cooperative citizen engagement. Similarly, limited Internet dispersion in a country or a low level of technological skills of the population will constitute a barrier to state-citizen exchanges through technological means.

These outcomes in Chapter 2 helped to shed light on the hitherto unknown quantity that was context and to construct a context-related operational framework of smart governance (Figure 2.1). This laid the groundwork for the empirical research in Chapter 5, where a single specific contextual factor identified in the literature review, namely the politico-institutional environment, was systematically examined in a comparison of three cities - Utrecht, Curitiba, Glasgow - in three different countries. The study analysed the impact of the politico-institutional context by scrutinizing three specific aspects, namely the intergovernmental state structure, the local political power relations, and the urban governance model, which emerged from the literature as essential factors affecting city politics and urban governance. These institutional dimensions vary between the three aforesaid cities, and within these dissimilar urban settings the study found different patterns of smart governance practices.

The intergovernmental system was discovered to be the definitive institutional factor in the "unitary-centralized" city of Glasgow. Here, the UK-level smart city strategy was so imperatively manifest that it prevented other institutional dimensions from playing a role. This eventually defined the configuration of smart governance strategies: less local and more universal societal objectives focusing on (national) economic growth and large-scale technology rollout, restricted collaboration implying a modest level of citizen engagement, and technology use primarily addressing urban management, infrastructural systems and commercial applications.

In contrast, the institutional factor of “intergovernmental state system” in Curitiba, that is part of a federal state structure, and in Utrecht, a city embedded in a unitary-decentralized state structure, unchained different movements. These state systems render municipalities self-reliant in terms of policy-making and/or resource collection, which pushes local institutions to the fore. In these two cities smart governance activities were shown to have evolved in a more dispersed way compared with the overarching, more centralized strategy in Glasgow. Apart from this resemblance there were also significant differences in the impact of local institutions in the contexts of Curitiba and Utrecht concerning smart governance strategies.

In Curitiba, the system of the local political power relations provide mayors with an almighty status that becomes the chief determinant for the evolution of smart governance strategies. The mayor’s political orientation is pivotal for defining the societal goals, the composition of societal partnership and the roles citizens play herein, as well as how technologies are utilized for urban governance processes. Consequently, the patterns of smart governance strategies were found to be significantly dissimilar under politically different mayoral regimes. During the Fruet period, with its more social-democratic and “progressive” politics, the societal objectives of smart governance strategies were aimed at sustainable development and, more specifically, at tackling the social challenges in the city. The mode of collaboration with non-state actors prioritized citizens and communities, with technology use serving to facilitate these participatory governance processes. By contrast, in the Greca period societal objectives mainly targeted economic growth and related infrastructural development, for which cooperation with professional urban planners and businesses was favoured. Technology was no longer employed to foster citizen engagement but instead to underscore the “smart” character of city development to attract businesses from the digital sector.

The same institution - i.e. the local political system of power relations - also affected smart governance practices in Utrecht, but in a different way. Unlike the tradition of mayoral supremacy in Curitiba, Utrecht has a collective governmental system. This sets another institutional dimension in motion, namely the city’s model - in this case corporatist - of urban governance. This institutional factor ultimately determines smart governance strategies: objectives focusing on widespread societal wellbeing and public values, broad-based and participatory collaboration, and technology use facilitating exchanges and collaborative

actions. These patterns and processes also indicate the enabling attitude of the municipality giving space for all kinds of - often experimental - initiatives.

These outcomes empirically verify what has been posited in the past few years in the literature, namely, that the politico-institutional context is a vital factor in shaping smart governance practices. They show that these distinct national contexts have diverse political environments that also result in variations in smart governance practices.

The outcomes also indicate that the institutional setting of a city is a multilevel actuality since its dimensions derive from different spatial - e.g. international, national, urban - scales. These distinct institutional factors co-exist on multiple scales and interact, thereby modifying each other's impact on smart governance either in a reinforcing or neutralizing way. This shows that the contextual influence on smart governance practices is not a straightforward, but a multi-layered, mechanism that seems to logically determine which institutional factors are pivotal in specific city contexts. This is evident from the international city comparison, from which it became clear that the intergovernmental state system - the vertical linkages between different governmental levels concerning fiscal and functional autonomy - is an important factor in all the three cities, as it determines the locus of and thus municipalities' approach to smart governance.

Beyond the importance of the institutional milieu, the empirical research (Chapter 3 and 4) delivered insights into additional contextual dimensions that in this study have not been systematically investigated, yet appear to influence smart governance practices. These institutional dimensions refer to the policy domain, and the socio-spatial characteristics of a city or neighbourhood, which were presented in the Introduction as possible factors and identified in the systematic literature review as such. For instance, in the policy field of urban spatial planning, the roles of specific actors are usually given, which, for instance in the Dutch setting, means that the local state is the primary task-owner responsible for multiple interests and regulations, with citizens being one of the many stakeholders. In the Brazilian setting, the local municipality also has the lead, although it primarily allies with businesses in spatial development (Follador et al., 2018; Serra, Dowall, Motta, & Donovan, 2015). Such a variance in policy domain features apparently tends to lead to differences in collaboration patterns,

objectives, technology use and societal outcomes of urban transformation. But the urgency of a specific policy area can also catalyse the initiation and progress of smart collaborative activities. This was demonstrated in the case of the Smart Solar Charging and Utrecht Alert initiatives, which address pressing societal issues - unsustainable energy schemes and neighbourhood criminality - that fit with and were therefore endorsed by local governmental strategies. The study also draws attention to the significance of the socio-spatial features - e.g. social, economic or demographic patterns - of an urban or neighbourhood community, as these features indicate the interest, skills and willingness of the inhabitants to contribute to public issues, as well as potential unintentional societal effects. While the high level of the said community features can stimulate technology-enabled cooperation, their spatially unequal diffusion can create adverse outcomes, such as the “smart city islands” initiatives from high-class neighbourhoods scattered in the urban space warned against in Chapter 3.

Based on the understandings gained from the various chapters, it can be concluded that the context functions as a crucial factor in determining smart governance practices. This provides support for the idea that thinking of smart governance in universal ways is useless, in view of the fact that the evolution of smart governance in urban spaces needs to be understood in terms of its specific contextual setting. In this regard, the national context was more thoroughly examined, which proved to play a vital role: dissimilar politico-institutional environments were shown to lead to different practices of smart governance. The research also points to the need for more work in order to further unpack the logics of the institutional influence and to identify other contextual dimensions pointed out as potential factors in this dissertation.

6.4. Answering the main research question

Having provided an answer to the two sub-questions in the previous parts, this section will now address the main question and conclusion of the research. This dissertation undertook to empirically - that is, through practices - investigate the emergent phenomenon of smart governance. This concept is presented in the Introduction (Figure 1.1) as a process consisting of two major dimensions: citizen engagement and the context. More specifically, citizen engagement on the city level and in bottom-up initiatives constitute the action situation of

smart governance practices, which is conceivably influenced by the wider contextual background. In line with this conception, the following main research question was formulated:

What are the roles of citizens in smart governance practices and how does the contextual setting influence these practices?

The two major elements of this question - citizens and context - were examined in different chapters, and their outcomes have been separately presented in the preceding sections. In this section, these two issues are brought together in a synthesis to reflect and to review their interplay, enabling a more integral understanding of smart governance to be generated and the main research question to be answered.

The study has revealed a sheer diversity of citizen roles ranging from passive to self-empowering forms varying between and within urban and policy contexts and even within projects or similar participation types. This substantially nuances the excessive - either very positive or very critical - visions but also contributes to understanding smart governance more in its entirety, as a closer look at these citizen roles inevitably reveals other, related components, such as the role of local governments, the forms of technology use, or the societal objectives aspired to. Hence, the diversity in types of citizen engagement reflects a comparable diversity in smart governance practices. While this study indicated that the use of technology facilitates varied modes of citizen-state collaboration in public issues, it also underlined that that same use is not a game-changer. Technology use in citizen engagement and collaboration processes is not a catalyst for abrupt, fundamental changes but instead fosters innovation in an incremental, “little by little” fashion.

Adding context to the study has deepened the knowledge gained about smart governance practices and the roles citizens play therein. It has revealed their interrelated dynamics that offers a good indication if, when, and how smart governance actually takes place. This creates a context-sensitive awareness that helps to better understand the intricate and diverse ways in which smart governance practices evolve in specific settings:

1. The context-contingent nature of citizen contribution and smart governance practices is reflected by the variations between and within different contextual settings. In the first place, the multi-city setting disclosed dissimilar patterns of citizen engagement in Utrecht (consultative, consumerism), Glasgow (passive), and Curitiba (mayor-reliant), thereby also elucidating the diverse modes of smart governance strategies of these distinct municipalities. Secondly, the single-city context served to complement this picture. It showed that beyond the prevalent participation patterns in specific urban contexts - in this case, Glasgow, Curitiba and Utrecht - additional latent or trendsetting types of active citizenship are also evolving. Finally, the context of bottom-up initiatives has further fine-tuned the insights into citizen roles in smart governance. It has exposed different sorts of active citizenship, in which smart collaborative strategies are employed in different ways and with different outcomes. These results also indicate that the analysis of governmental policies and strategies alone - a widespread approach in current research - is insufficient to thoroughly understand smart governance, as this provides only a limited view of the wide range of technology-enabled practices evolving in a city.

2. The research revealed that the aforesaid dissimilarities in citizen engagement and smart governance practices are shaped by specific contextual dimensions. In particular, the (national) politico-institutional milieu was found to be highly influential. Further contextual factors – e.g. the policy domain or the socio-spatial characteristics of a place - apparently also played a role in the evolution of smart collaborative practices and how citizens give their input. However, while recognised, these factors were not methodically explored in this research. Ultimately, smart governance practices were shown to reflect a path-dependent, contextualized process of *“muddling through”*, in which the institutional and other place- and situation-specific factors shape the uptake of technological applications in social interactions.

3. The research furthermore showed that the relationship between citizen engagement and the context is not static, but that it can shift over time. This was demonstrated in the citipreneurial case, in which citizen input - e.g. initiator, spectators, testers, consumers-producers - and the collaboration context - from the backyard to the international arena - changed as the initiative progressed through various phases.

4. While the research provided empirical support for the idea that context definitely matters in smart governance, it also uncovered the complex, multi-layered impact-mechanism of the politico-institutional context. This makes straightforward predictions about the implementation of smart governance - how will it work out in this city and how in that? - difficult, but also pinpoints the need for further research into the logics of institutional forces.

To conclude, the study substantially revises extant thinking about smart governance, as it reveals that it cannot be captured in extreme framings of technological utopia or dystopia, nor in universal narratives suggesting one best way of collective smart city making. Rather, smart governance should be understood as ongoing, kaleidoscopic, and context-contingent technology-mediated interactions between local states and citizens, emerging in practice.

6.5. Academic contribution

The research results ensuing from this study represent a valuable contribution to academia in a number of ways, which are discussed in this section. This academic relevance lies particularly in the fact that it addresses the major research gaps identified in Chapter 1, which have hitherto prevented more light from being shed on the emergent phenomenon of smart governance.

1. *Empirical exploration.* First, this study is gap-filling in that it conducts rich, empirical research to explore whether and how smart governance is actually happening in cities. This approach contributes to academia as it far exceeds other studies offering merely a conceptual and prospective look at smart governance (Gil-Garcia, Pardo, & Nam, 2015; Meijer & Bolívar, 2016; Scholl & Alawadhi, 2016). The present shortage of empirical evidences thwarts any understanding of the state of affairs regarding smart governance in society and hinders theoretical advancement of this nascent notion. Therefore, abundant empirical data have been collected in this study with a view to providing insight into smart governance *practices* in divergent urban and policy settings: the implementation of smart governance strategies in the cities of Glasgow, Utrecht, and Curitiba; the overview of a range of technology-enabled collaborative projects enacted in various policy domains in the city of Utrecht; and the in-depth case of a citizen-entrepreneur creating public value through technology-based collaborative strategies. These studies have proven invaluable as they provide reflections on actually unfolding smart governance practices from dissimilar yet complementary - international, city-

based, and bottom-up - perspectives. These insights also demonstrate the value of using practice as a research lens in understanding ongoing smart governance in context. The practice lens exposes the discrepancy between ideas and assumptions on the one hand and the real-life, technology-mediated human exchanges on the other, which emphasizes the benefit of exploring smart governance as an open-ended, situated co-production in practice.

2. Focus on the roles of citizens. This dissertation offers important input to the research on smart governance, smart cities and more generally to governance and collaboration studies by thoroughly examining the roles of citizens. This addition to the literature is useful since the issue of citizens' positions in smart governance processes has lately evoked scholarly attention and polarized discussion. In fact, citizens have come to function as the dividing line in theoretical arguments in defence of or against smart cities, although very few studies dive into the theme of actual "smart" citizens themselves. Therefore, the empirical fact-finding of this study provides a fuller and more colourful image about the ways in which urban residents become involved in technology-enabled public processes. The study illustrates the sheer diversity of citizen input, from passive to self-governing participation forms, which substantially nuances the extreme - either very optimistic or very critical - visions. These outcomes can also feed into the extensive literature on citizen participation, which has to date been insufficiently attuned to the more recent movements around the smart city. Hence, the insights of the study are educational, as they unveil how smart governance practices can reinforce or alter existing participation forms, or even create new ones such as consumerism or the citipreneur. The latter illustrates how citizens seize technological opportunities to propel meaningful processes of urban transformation, in which government, businesses, civil society, and knowledge institutes become allies. At the same time, the outcomes also show that in such tech-enabled bottom-up initiatives, co-citizens can also fulfil roles comparable to those in governmental projects, which Arnstein (1969) labelled non-participation and tokenism. These novel outlooks on technology-facilitated citizen roles refine the extant knowledge in the study domain of citizen participation.

3. The study of contextual influences. This dissertation is a truly pioneering addition to the literature, in that it explicitly scrutinizes the impact of context on smart governance practices. Context has recently been receiving scholarly attention, as the realisation took hold that it serves as a potential but unsubstantiated explanation for smart governance variations in real-

life cities. Hence, this study has gone beyond denoting the context as a plausible but doubtful factor and demonstrated how and why the actualization of smart governance differs in dissimilar contexts. It explicitly investigated the impact of the institutional milieu on city governments' smart governance strategies, while inductively exploring further contextual factors. On the one hand, this knowledge supports the evidence-based conceptualization of context-sensitive smart governance in the corresponding research domains. On the other hand, these insights can contribute to contextual studies and basically to any study domain that focuses on the relationship between human interactions and their wider context.

4. Comparative, multiple-case approach. The comparative research method based on multiple cases adopted here is a new element in the smart city and smart governance literature. This approach is a deviation from the way in which smart governance is commonly studied in that it builds on a sequence of cases that examine smart governance from various but connected angles, which allows comparison within and between cases. Various lessons have been learnt from this multiple-case comparative approach. It made it possible to trace the differences and similarities in citizen engagement and smart governance patterns between and within international, within-city, and bottom-up project settings. This study method enabled these differences and similarities to be (partially) explained in relation to the context, although it has also necessitated the revision of the outcomes of the individual studies. In addition, this method exposed the complicated influencing mechanism of the context, in which numerous coexisting contextual factors mutually restrict or reinforce one another, the outcomes of which can unpredictably affect the development of smart governance. Overall, the comparative method used in this dissertation has resulted in a deeper, contextualized understanding of smart governance, which is able to address the various arguments and assumptions in the literature in a way single-case studies cannot.

6.6. Societal implications and recommendations

This dissertation addresses a vital issue in contemporary society, namely how local governments and citizens can, with the supportive use of new technologies, cooperate to create more liveable cities. It is therefore evident that the findings of this research provide important societal implications that are elaborated in this section. The study offers relevant insights for local governments - one of the key actors in smart city development. They feel

pressured to create technology-based participative and interactive urban environments to increase public value, and therefore recklessly seek ways in which they can fulfil such new roles (Bolívar, 2016; Dameri & Rosenthal-Sabroux, 2014). Their quest can be aided by the following outcomes emerging from this study.

1. *Local governments are given insights into the human element of smart governance.* The insights of this research can assist local governments to realize that a focus on technology and data alone is insufficient to realise the objectives they recurrently proclaim, i.e., the realisation of a society-based smart city. Self-proclamatory rhetoric about smart participatory urban transformation, however, cannot disguise its distance to reality, as was evident in the three cities analysed in the study: while Glasgow styled itself as being “*made by people*” (<https://peoplemakeglasgow.com/>), its smart city programme rendered citizens mainly the recipients of smart solutions; in Utrecht, technologies were applied to persuade residents to agree with the plans rather than to collectively develop a smart Merwedekanaalzone; in Curitiba, the Greca administration touted the collaborating, sustainable and innovative smart city even though the main role of the citizens was to be updated about city strategies elaborated by experts. Another eye-opener emerging from the study for local governments was the finding that if they genuinely intend to work with citizens in the public domain, simply presenting data, technologies and applications in the physical or virtual space is not enough. While high-tech applications can optimize urban infrastructures, their availability alone cannot activate citizens and interactions. And without informed and motivated citizens, the technological potential of open data or other so-called participatory tools to enhance the living environment will not be adequately realised. Local governments must therefore understand that consciously incorporating the social element of smart governance - i.e. proactively appealing to citizens- from the very beginning of the process is critical. This is evidenced by the Curitiba Collaborates initiative, where the municipality purposely addressed and supported communities in utilizing public data for societal problems. Likewise, the municipality of Utrecht employed various -online and offline - tactics to alert and engage citizens in different spatial development projects.

2. *Public servants are provided with insights into smart governance practices in multiple contexts.* This dissertation provides municipality officials with a multicoloured, international

perspective on how smart governance is actually being carried out in various spatial and policy settings. This provides an opportunity for public servants to gain a knowledge of the smart governance approaches used to address pressing societal issues in Curitiba, Glasgow, and Utrecht.

This research might be particularly inspiring for local governments in addressing the issue of liaising with citizens with and around technologies. This was noticeable during the practice-driven SmartGov conferences, where public officials were very interested in learning about the kind of urban solutions the municipalities in the three cities co-designed with citizens, and how these functioned. Public servants from Curitiba and Glasgow were eager to know more about the successful Smart Solar Charging initiative. They understood that local governments, in their pursuit of urban sustainability, did not necessarily need to kick-start “smart” initiatives themselves but could also draw on the resources of society, available through bottom-up activities. At the same time, the study also provides local governments with insights about their potential contribution to specific phases of collaboration - the municipality played a role in stimulating and upscaling the societally transformative grassroots project of Smart Solar Charging (Utrecht), while the absence of city council members at the Future City Glasgow hackathons posed a challenge for civil hackers, who missed both information and reflection on their emerging solutions.

The study, especially Chapter 4 about actual citizen contributions in Utrecht, shows public servants that there are varied technology-enabled collaboration processes occurring throughout their own city. This overview was surprising and enriching for the three municipalities involved in the SmartGov project because their organisational fragmentation often obscures the view of the collective activities unfolding in their city. It also sends a clear message to public servants that dealing with the issue of smart governance from a wider and more flexible perspective, i.e. not looking at just the projects officially labelled as “smart”, but also at the different kinds of movements bubbling in the city, makes good sense.

Importantly, the international and comparative perspective of this research also helps local governments acquire a greater understanding of the influence of the broader context on the implementation of smart governance, raising their awareness of the effect of the politico-

institutional environment. The fact that political change can completely wipe out existing strategies in some environments (Curitiba), while in others (Utrecht and Glasgow) the continuity of activities is more or less assured, is forcefully brought home. Moreover, contextual insights can also open the eyes of public servants to how their own attitudes to smart governance are inherently shaped by the (path-dependent) environments within which they operate: while the centralized governmental traditions in the UK nurture a more inert citizenship the consensus-based heritage in the Netherlands makes participatory processes much more evident.

3. Local governments are urged to systematically reflect on their smart governance strategies.

The academic analysis in this dissertation provides insights for local governments to assess their strategies more methodically: how to define, design and implement technology-facilitated cooperation with citizens and communities? It shows public servants that smart governance is not merely a technological assignment, but that it needs the integral consideration of a wider range of issues - organizational, human, and contextual. This became obvious in the SmartGov project, in which the municipalities involved experienced first-hand how ineffective it was that the various departments each dealt separately with different, though interrelated, policy issues (e.g. health, safety, citizen participation, area development, technological instruments). This need for a broader approach to smart governance also applies at the project scale. For instance, in the “Amsterdamsestraatweg” project, a shortage of personnel made it impossible to respond to online citizen input and the interactions were converted to conventional mode. Or, in the case of Curitiba, the digital applications developed by the civil community might have reached a broader layer of society if the municipality had given more consideration to the possibilities of diffusion, for example, by proactively including entrepreneurs or businesses.

A more overarching approach to smart governance also necessitates a municipal mapping system. This can aid in detecting ongoing existing activities scattered around the city as shown in the aforementioned overview of Utrecht initiatives, of which the municipal authorities were largely unaware. Such activities, once identified, can be synchronized and included in order to counter fragmentation and knowledge wasting. Moreover, the municipality may intervene in promising initiatives to help them evolve and reach public value on a wider scale. This can help

to strengthen the relationship between small-scale developments and large-scale policies, thus advancing the ambition to establish a more sustainable and resilient city.

Cooperating with municipalities during this research has also highlighted the need for a monitoring apparatus that is part of a more systematic and integral approach to smart governance. This, on the one hand, can serve internally to tighten internal linkages and to exchange and evaluate experiences: which technology-based engagement strategies are used, with what results? What are the drivers leading to a meagre or high level of citizen involvement? For municipality officers, many of whom commented during the interviews on how different municipality departments all struggle to develop participatory digital tactics from scratch, reinventing the wheel again and again, this could be highly relevant. On the other hand, monitoring includes a process of external evaluation, to be carried out by the participating actors to jointly learn from experiences.

Finally, this study offers local governments insights into the context-sensitive nature of smart governance, demonstrating that no such thing as a blueprint for smart governance strategy exists. Governments need to deliberate on smart collaborative methods that fit both place- and domain-specific practices and capitalize on advantageous contextual circumstances, while circumventing those throwing up obstacles. For instance, citizens in Glasgow and Curitiba are much less accustomed to participating in urban development due to their respectively centralized and managerial types of urban governance traditions than the citizens of Utrecht, who are used to the longstanding custom of consensus-seeking in the Netherlands. Brazilian and Scottish municipalities will therefore need more laborious, and creative approaches to motivate the population to actively engage in public matters.

In this research, the roles of citizens as an indispensable part of smart governance practices have been explicitly examined. Therefore, the outcomes of this study offer interesting perspectives to citizens, as well:

4. *Citizens are given insights into the idea and practice of smart governance.* The dissertation brings the idea of smart governance closer to citizens and communities by illustrating a range of citizen-state collaborative practices evolving in urban neighbourhoods. It reveals the

importance of citizen roles in these processes and also shows specific cases in which residents, supported by technology, act in the public interest. These insights can stimulate citizens' enthusiasm and awareness of their own contributing potential to (smart) city-making, as also observed during the Citizen Summit organized in the final year of the SmartGov project. Here, participating citizens were truly curious about tech-mediated cooperation possibilities, especially how and with what results residents in other cities employed digital tools to make their voice better heard for a stronger influence in policy making.

This dissertation, therefore, could encourage citizens to have a renewed look at the technological tools they use in daily life and to detect the various ways in which they could productively apply them for public issues. These include, for example, responding to governmental appeals to provide feedback on policy and development plans through the online channels offered or making proactive use of these communication technologies to trigger feedback from and dialogue with the municipality and other citizens. Furthermore, the cases discussed in this study provide examples that illustrate that they, too, could launch and manage smart initiatives in various ways. They can deliberate about the roles they assign to co-citizens and how this might influence the progress of their initiative. For instance, enabling other residents to substantially shape and co-decide about the activities, as was the case in the Utrecht Alert or Ringpark projects, will probably produce a different course of co-creation and other outcomes than if participants merely act according to the rules laid down by the initiators, as was the case in the Smart Solar Charging initiative. The study furthermore indicates to citizens that they could obtain external support to evolve their plans, which could stir them to more actively seek resources in their living environment - for example, by connecting to the civil community, the municipality or local businesses.

The research finding about the significance of context could contribute to a better understanding on the part of citizens of why urban development evolves in a particular way in their city, while elsewhere this may be different (perhaps worse). These insights could generate more empathy towards the municipalities, as citizens come to realise that these municipalities are unavoidably subject to broader contextual factors. However, they could also prod these same citizens into inventing approaches that anticipate specific contextual aspects. For instance, in politically unstable environments, where the continuity of governmental

programmes is dependent on the whim of the party in power, civil communities may need to build up organizational resistance to ensure the continuity of their activities, as demonstrated by the hacker community Code for Curitiba.

6.7. Future research agenda

Having outlined the most important academic and societal contributions of this study, this section can now turn to delineating a future research agenda. It highlights the most pressing issues arising from the findings of this research, which offer an indication of the direction for future research avenues:

1. *Advancement of the context-based study of smart governance.* A key facet of this dissertation has been to identify the impact of context on the ways in which smart governance takes place in practice. By conceptually and empirically examining the influence of context, this study has started to dispel the mist in which this important factor was shrouded. This initial work on smart governance therefore needs to be continued in future research, so that the context-sensitive frameworks evolved in this dissertation are refined and further tested empirically. Any future enquiry might include contextual dimensions other than the institutional factors addressed in this dissertation. This is all the more recommended as additional contextual aspects have been identified, though not systematically analysed, which potentially affect smart governance processes. For instance, the level of democratic strength of a country could be an interesting contextual dimension to investigate. This factor was identified in Chapter 2 as a determinant that influences the ways in which, with the support of technology, people become engaged in collective matters. It was shown that stronger democracies indicate higher levels of citizen involvement. At the same time, the comparative study (Chapter 4) revealed that the civil hacker community in Curitiba, located in a country with a fledgling democracy and a long dictatorial past, devotedly sustained the municipality's open data initiative, while Glasgow's citizens (UK), living in one of the world's oldest democracies, displayed a low participation level.

Similarly, a study of socio-spatial characteristics could be undertaken to discover how these affect the formation of smart governance in various different places. Socio-spatial factors refer to dimensions such as natural hazards, criminality, waning air quality, social cohesion or the

lack thereof and they have been put forward in various chapters as possible catalysers of technology-enabled citizen-government alliances. So, it would be interesting to learn whether such (pressing) societal aspects could indeed accelerate the development of government-citizen alliances enabled by digital applications.

Future research should also continue the comparative work started in this study, as this helps to clarify the influence of national, urban or any other situational contexts and whether certain environments are more conducive than others to smart governance. In this regard, however, the context-sensitive understanding of smart governance raises a dilemma concerning its evaluation in terms of its underlying ideals rooted in more normative claims such as the human smart city, inclusion, self-governance, democracy, and collective ownership. The context-sensitive conceptualization of smart governance allows deviations from these principal tenets of smart governance. Therefore, further reflection is urgently needed on how to reconcile these two aspects. In other words, if citizens in a highly centralized or autocratic system are evidently only passive or non-players in collective issues, should this be interpreted as constituting one specific - i.e. contextualized - version of smart governance? Does it not then elasticize the definition of smart governance, thereby also compromising the meaning and inherent values of the so-called human smart city?

2. A study of the sustainability outcomes of smart governance. The notion of smart governance has raised substantial interest among researchers and practitioners as it is introduced as a potential approach to address sustainability challenges of cities. In this regard, smart governance has become more or less synonymous with sustainable development, aiming at striking a balance between economic return, social equity and environmental preservation (Angelidou et al., 2017; He et al., 2017; Kruger et al., 2018; Yigitcanlar et al., 2018). Yet the systematic literature review in Chapter 2 found only scant and mixed evidence for such a relationship between smart governance and urban sustainability. The empirical chapters in this dissertation furthermore present various initiatives that promise to address public issues in different domains. Their outcomes suggest that emergent smart governance practices also shape the context in many ways, such as alterations in the physical urban space (e.g. energy and mobility infrastructure; neighbourhood transformation), the institutional scene (e.g. regulations; behaviour change; new socio-technical practices), the social fabric (e.g. more

community cohesion; safer districts), the local economy (e.g. innovative entrepreneurship; alternative services) or the ecological conditions (e.g. reducing fossil-fuels; increasing green spaces and biodiversity). Therefore, additional research is sorely needed to study how smart governance practices actually affect and alter the broader context, and in particular whether and how long-term sustainability effects are achieved.

3. *Assessment of the added value of technology for collaboration.* This dissertation undertook to examine smart governance, in view of the widely divergent expectations found in the literature regarding the use of technology in pursuit of collaboration in public matters, even though very little was actually known about their tangible manifestations in the urban landscape. Hence, this study has particularly focused on actually occurring practices of smart governance, in an attempt to contrast the hodgepodge of assumptions against empirical observations. This focus, however, did not extend to assessing whether using technologies actually intensified the collaboration between citizens and local authorities, an oft-cited argument from supporters. This theme could be elaborated in future research, in which the efficacy of smart governance is evaluated by comparing technology-supported and traditional (offline) exchanges between citizens and local governments. Such a comparison could assess the development of online and offline state-citizen exchanges, and in particular, whether technologies stimulate or hinder these processes. What is more, such an evaluation might also be linked to comparisons between different contextual settings, which could reveal whether conventional or technology-mediated collaboration is more productive in specific contexts.

4. *Continue with empirical studies.* Finally, as empirical studies are still in very short supply in the niche domain of smart governance, a last recommendation would be to press on with the empirical approach undertaken in this dissertation. As shown in this study, empirical reflections are vital to generate a deeper understanding of smart governance in its context-driven complexity. Empirical work will raise new questions and expose other knowledge gaps, thereby evoking more practice-based exploration and theory development, which benefit and mature this up-and-coming research field.

6.8. Final reflections

This dissertation deals with the societally vital issue of smart governance, which has the potential to address urban challenges by blending human interactions and technologies. This promise, however, appears somewhat utopian in light of the research results, which show that technology use does not fundamentally alter state-citizen exchanges, but is incrementally and context-dependently adopted in the “muddling through” routines of social processes. And some contexts and circumstances are more conducive to the realisation of smart governance than others.

Yet, irrespective of the contextual influence, general societal trends can also influence technology-mediated collaboration. For example, the oft-cited shift in human attitudes as a result of the technological transformation can pose a challenge. It is seen to usher in a new era of shallowness and individualism (Carr, 2011) provoked by the *modus operandi* of ceaseless technology use for consuming instant information bits and entertainment, combined with loose entanglements in a net of transient relationships (Harris, 2017). The ensuing self-absorption runs counter to any smart governance ambitions that cultivate social binding, commitment and collective actions.

These socio-technological implications together with the realities of the political, institutional, historical etc. context need to be faced. That could prevent concepts of grand societal ideals, such as the human smart city and smart governance from turning into overidealized, unrealistic ambitions. Otherwise, the result will only be illusory objectives and inflexible prescriptions imposed on cities, which is already manifest by pervasive governmental rhetoric of citizen-centric smartness. Although such bombasts can function as city branding in the race for reputation and economic resources they are, as seen in this research, virtually meaningless.

If local governments truly aim at collaborative arenas in public issues, their idealistic optimism must make way for realistic optimism, with room for organically evolving, integral approaches responsive to (challenging) societal realities. By showing smart governance in contextualised practices, the present study can smooth the path towards these initial steps. Its insights into the essence of smart governance will hopefully assist policymakers and citizens to realise

effective technology-enabled partnership, in order to deal with the great concerns of contemporary societies.

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APPENDIX

Articles analysed in the systematic literature review (Chapter 2)

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SUMMARY

Over the past decade, the smart city has become a popular concept, with its promise of the use of technology as a prospective means to address the societal challenges rapidly accruing in cities. Although the initial approach was technocratic in nature, aimed at improving the urban milieu *for* citizens, more recently the realisation has grown that cities can only be made smarter *together with* citizens and communities - the so-called human smart city. Such citizen-driven urban development is embodied in the idea of smart governance: technology-enabled cooperation between the local state and citizens to collectively act in public matters, from neighbourhood development and deliberating on fossil-free energy solutions to dealing with refugees and countering the populace's unhealthy habits.

The notion of smart governance thus highlights the fact that the use of technological tools can stimulate, i.e. intensify, deepen and broaden, state-citizen cooperation in public matters. This promising prospect is attractive to local governments. Finding themselves increasingly unable to tackle societal challenges on their own, they are seeking interactive, open, technology- and information-based networking options with non-state actors. While the significance of smart governance has been progressively acknowledged, the theoretical and empirical understanding of this concept is startlingly inadequate, making it difficult to ascertain whether, and if so, how smart governance is actually part of today's urban reality.

The aim of this dissertation was to add to this understanding by means of an empirical study with a focus on two major aspects : 1) citizen engagement manifesting in the urban system and in bottom-up initiatives, and 2) the contextual influence shaping smart governance practices.

Citizen engagement in smart governance, and more generally in smart cities, has polarized the debate among researchers and practitioners. It is praised by optimists as the core part of smart governance, empowering citizens through the use of technology to substantially co-influence public issues. Beyond this optimism, more gloomy perspectives have also surfaced, which point to the manipulation of citizens by neoliberal agendas and computerized supervision, reducing them to mere consumers or data points. As these contradictory perspectives are mostly based

on conceptualizations and assumptions in lieu of empirical scrutiny, little is known about how citizens actually play a role in smart governance.

The role of context in smart governance is equally or perhaps even more vague than the role played by citizens. Context has recently been identified as a conceivable influence, which refutes the universal narratives suggesting one prototype of the smart city, regardless of historical, socio-economic, cultural, political and institutional circumstances. The fact that context is a possible factor becomes apparent when considering the variations in smart city and smart governance models around the world, and the differences in the roles played by citizens and local governments, how technologies are employed and what societal outcomes are ambitioned. Despite this increasing recognition, the scant empirical and theoretical elaboration of context as a potential effect on smart governance renders this a black box.

These omissions inspired the present deep dive into the empirical details of smart governance on the ground. To this end, smart governance *practices* from multiple cases and cities situated in different countries were scrutinised, as a means to grasp real-life implications from a broader, comparative perspective. Practice is applied in this study as a research lens to bridge the gap between theory and the lived reality. Practice is used here as a phenomenon that helps to contrast abundant ideas and assumptions of smart governance with sparsely highlighted practical activities and direct experiences. The dearth of empirical research on smart governance, combined with the lack of knowledge about both citizen input and the contextual influence, guided the aim of this dissertation and translated into the following overarching research question and corresponding sub-questions:

Main research question: What are the roles of citizens in smart governance practices and how does the contextual setting influence these practices?

- *Sub-question 1 (RQ1): What roles do citizens play in smart governance practices?*
- *Sub-question 2 (RQ2): How does the contextual setting influence smart governance practices?*

In order to generate a better understanding of smart governance and to respond to the abovementioned research questions, the present research included the conduct of a systematic literature study and applied a qualitative research design. To that end, a multiple-case study approach encompassing document analysis, semi-structured interviews, field visits and the attendance of events was adopted. The case studies employed different yet complementary methods and were characterised by an (internationally) comparative approach. This helps to better understand smart governance practices in their real-life manifestations and to describe their variations and similarities within and between cities located in different countries, particularly in view of their specific contextual settings. Empirical work was conducted in the cities of Utrecht (The Netherlands), Glasgow (UK), Curitiba (Brazil), where a diverse range of smart governance projects were scrutinised.

Chapter 2 presented a systematic review of the literature to identify the components of smart governance, to seek empirical evidence on the relationship between smart governance and sustainability outcomes and the role played by context therein. The study analysed 114 journal articles at the interface of multiple disciplines, such as Public Administration, Urban Studies, Spatial and Planning Science, Computer Sciences/IT, Management and Economics. The findings show sparse empirical evidence for the sustainability benefits frequently alleged with regard to smart governance outcomes. Moreover, the findings display an ambiguous picture in that they report both positive and negative effects in respect to the sustainability achievements of smart governance. The review also identifies contextual conditions of smart governance as crucial to understanding these mixed outcomes. The chapter points up the need for more empirical work and develops an agenda for researching the relationship between smart governance and its broader contextual setting.

Chapter 3 explored the contribution of citizens to smart governance by concentrating on a special sort of active citizen, namely the local entrepreneur. It is an interesting yet unexplored type of active citizen: a local entrepreneur is embedded in both the civil and the business arena, which may engender specific smart collaboration strategies and practices. Hence, the study suggests a novel type of smart bottom-up initiative positioned between civil grassroots and market-based initiatives, called the *citipreneurial*. This alternative model is elaborated further in a case study of a community-based sustainable energy and mobility system launched by a

local entrepreneur in the Dutch city of Utrecht. The findings show that the citizenpreneur played a catalysing role in public value creation by commencing and upscaling cooperative practices around smart technologies. This achievement mainly stems from the entrepreneurial attitudes of pioneering and risk-taking, and from the capability to bridge the gap between the state, the market and society, in order to accelerate the transition towards urban sustainability. The study also provides a better understanding of the bottom-up smart city as a form of governance, its advantages and drawbacks concerning societal results. The findings furthermore underline the vital role of local governments: while they facilitate the progress of potential bottom-up initiatives, they also need to safeguard the needs of all citizens based on fairness and equity, in particular in case of commercializing processes.

Chapter 4 was inspired by both the heated debates about the role of citizens in smart cities and the scarcity of empirical research on this subject. Therefore, an in-depth study of a European city (Utrecht), selected for its typical smart city ambitions, was conducted to explore the roles that citizens actually play in technology-facilitated initiatives in the public domain. For this purpose, twelve initiatives were examined within the scope of a framework that provided a classification of different types of citizen engagement. The findings revealed that the ways in which technology-enabled citizens contribute to public affairs are highly diverse and encompass all types of participation rather than simply taking the form of either “citizen empowerment” (as the advocates argue) or “citizen subjugation” (as the critics stress). The diversity found in the study also highlighted the challenge of describing the roles of smart citizens on the level of the city as a whole, as these are possibly better understood at the micro level of initiatives and individual actors. The study shows that citizen participation in the smart city should not be understood as either a technological boon or bane, but as an evolving process shaped by a variety of factors.

Chapter 5 systematically examined the role of context in shaping smart governance practices. It focused on the institutional setting, which, although not yet explored, is increasingly viewed as a major influence leading to substantial variations in smart governance across cities. For this purpose, the study zoomed in on three cities with dissimilar institutional contexts: Curitiba (Brazil), Glasgow (UK), and Utrecht (the Netherlands). The findings suggest that the institutional context indeed affects how smart governance actualises in cities. These empirical insights

resulted in a heuristic framework that can help to clarify smart governance in diverse urban environments. This framework exhibits a multi-layered influencing mechanism: institutions co-existing on multiple spatial scales interact and modify - reinforce or dissolve - each other's impact on smart governance. This study opens the door to a different approach to understanding smart governance and sheds new light on how this is interrelated with the institutional context.

In the concluding chapter, the most essential findings were summarized and reflected upon in line with the above-formulated research questions. This resulted in the following conclusions:

- ***RQ 1: What roles do citizens play in smart governance practices?*** The roles that citizens actually play in smart governance at both the city level and in bottom-up initiatives are greatly diverse, and this diversity is observed in different perspectives. It is manifest in the various forms of citizen engagement identified in the study. Accordingly, the research found support for (different kinds of) empowered citizens who do not wait for governmental cues but willingly seize technological possibilities to independently undertake, evolve, and manage their own activities for common issues. The research also uncovered evidence for the idea that technologies are applied to steer rather than empower citizens. What is more, new forms of citizenship were presented, which have not yet been identified in the literature. At the same time, the findings indicated that consultation remains a frequent form of engagement in smart governance practices, similarly to conventional, face-to-face participation processes.

The diversity of citizen roles was also reflected by distinct urban patterns of participation: in Glasgow, citizens were shown to play more passive roles; in Utrecht, a more participatory approach was found, in which citizens were consulted, but also increasingly acted as consumers of smart services; Curitiba showed a fluctuation in citizen roles - i.e. empowerment, consultation and passive roles - dependent on the strategies of the mayor currently in power. Beyond these typical patterns, additional, latent types of citizen contribution were also found to be evolving within the city, thus refining the aforesaid city-based homogeneity of engagement forms.

It became clear from these research outcomes that the reality of smart governance lay somewhere in the middle between the extremes of optimism on the one hand, and glumness on the other, that are recurrently encountered in the literature. Thus, the practices of citizen roles in smart governance deviated from the theories and assumptions, reflecting neither the dystopian warnings of manipulative or neoliberal strategies nor the celebrative approach in which citizens take charge of the city. This reveals the futility of capturing citizen roles in smart governance in dichotomous framings and universal statements, as they are dynamic, fluctuating, and context-reliant.

The findings also revealed that technology is not a game-changer. This implies that technologies do not inevitably empower or manipulate citizens, but facilitate all sorts of engagement, contingent on the purposes and conditions. It also indicates that the use of technologies in state-citizen interactions is not revolutionary, but evolutionary. Rather than an abrupt and radical change, these interactions are subject to a process of incremental adjustment and gradual absorption, which mirrors more the arduous ritual of “*muddling through*” (Lindblom, 1959) policy processes rather than progression by leaps and bounds. Hence, the answer to the question about the roles that citizens play in smart governance practices seems to be identical to that of the question about citizen roles in governance practices.

- **RQ2: How does the contextual setting influence smart governance practices?** The first step in answering this question involved mapping a variety of contextual factors possibly affecting smart governance practices in a systematic literature review: the features of the policy domain (e.g. sense of urgency, the complexity of issues), the politico-institutional milieu (e.g. democracy, administration styles, innovation environment) and cities’ socio-spatial characteristics (e.g. topography of a city, social cohesion; the extent of Internet reach; trust).

The empirical research systematically zoomed in on one specific contextual factor identified in the literature review, namely the politico-institutional environment. In particular, three specific aspects, i.e., the intergovernmental state structure, the local political power relations, and the urban governance model were analysed by comparing the three cities of Utrecht, Curitiba, and Glasgow. It was shown that in Glasgow, the intergovernmental state structure - the unitary-centralized system - was the most dominant aspect: smart strategies were centrally

coordinated and fostered universal societal objectives focusing on (national) economic growth and large-scale technology rollout. The levels of citizen engagement and collaboration were low, with technology use primarily addressing urban management, infrastructural systems and commercial applications. In Curitiba, the combination of the intergovernmental state system - federalism - and the local political power relations, which was shorthand for the mayors' almighty status - turned out to be significant: smart governance strategies were more diffused compared to Glasgow's centralised approach, and varied under (politically) different mayoral regimes. In Utrecht, the simultaneous working of all three institutional dimensions, namely the intergovernmental - in the form of a unitary-decentralized-state structure; the - collective form of - local political power relations; and the - corporatist - urban governance model shaped smart governance strategies: activities, unlike Glasgow, were not centrally integrated, but more dispersed throughout the urban system. The objectives were focused on widespread societal wellbeing and public values, broad-based and participatory collaboration, and technology use facilitating exchanges and collaborative actions, whereby the municipality provided sufficient space for the emergence of (experimental) initiatives.

These outcomes empirically verify the assumptions posited in the literature, namely, that the politico-institutional context is a vital factor in shaping smart governance practices. They show that these distinct national contexts have diverse political environments that also result in variations in smart governance practices. The outcomes also indicate that the institutional setting of a city is a multilevel actuality since its dimensions derive from different spatial - e.g. international, national, urban - scales. These distinct, multi-scalar institutional factors interact, thereby modifying each other's impact on smart governance in either a reinforcing or a neutralizing way. This shows that the contextual influence on smart governance practices is not a straightforward but a multi-layered mechanism that seems to logically determine which institutional factors are pivotal in specific city contexts.

Beyond the importance of the institutional milieu, the empirical research delivered insights into additional contextual dimensions which have not yet been systematically investigated, but which nevertheless appear to influence smart governance practices. These institutional dimensions refer to the policy domain, and the socio-spatial characteristics of a city or

neighbourhood, which are also identified in the systematic literature review and require deeper scrutiny in the future.

These findings demonstrate that the context, especially the political milieu, functions as a crucial factor in shaping smart governance practices. This provides support for the idea that thinking of smart governance in universal terms is useless, since the evolution of smart governance in urban spaces needs to be understood in terms of its specific contextual setting. The research also clearly demonstrates that more work needs to be done to further unpack the logics of the institutional influence and to identify other contextual dimensions pointed out as potential factors in this dissertation.

- ***Main research question: What are the roles of citizens in smart governance practices and how does the contextual setting influence these practices?*** This question brought the two major issues in this study - citizen engagement and the contextual influence - together. It aimed to synthesize the reflections separately provided on these issues and to review their interplay in order to establish a more integral understanding of smart governance.

The study has revealed a sheer diversity of citizen roles ranging from passive to self-empowering forms and varying between and within urban and policy contexts or even within similar participation types. This substantially nuances the excessive - either very positive or very critical - visions but also contributes to understanding smart governance more in its entirety, as a closer look at these citizen roles inevitably reveals other, related components, such as the role of local governments, the forms of technology use, or the societal objectives aspired to. Hence, the diversity found in the different types of citizen engagement produces a comparable diversity in smart governance practices. While the study illustrated that using technologies facilitates varied modes of citizen-state collaboration in public issues, it also underlined that the use of technology is not a game-changer. Technology use in collaboration processes is not a catalyst for abrupt and fundamental change, but instead fosters innovation in an incremental, “little by little” fashion.

Adding context to the study has deepened the knowledge gained about smart governance practices and the roles citizens play therein. It shed light on their interrelated dynamics, which

offer a good indication of whether, when, and how smart governance actually takes place. This creates a context-sensitive awareness that helps to better understand the intricate and diverse ways in which smart governance practices evolve in specific settings:

- The context-contingent nature of citizen contribution and smart governance practices is reflected by the variations between and within different contextual settings. The multi-city setting discloses dissimilar patterns of citizen engagement in Utrecht (consultative, consumerism), Glasgow (passive), and Curitiba (mayor-reliant), thereby also elucidating the diverse modes of smart governance strategies of these distinct municipalities. This picture of a more homogeneous, city-based engagement pattern is complemented by the single-city context. It shows that beyond prevalent participation patterns in certain urban contexts, additional -latent or trendsetting- forms of citizen roles also evolve within a city. Finally, the context of bottom-up initiatives has further fine-tuned the insights into citizen roles in smart governance. It has exposed different sorts of active citizenship, which pursue their smart collaborative strategies in different ways and with different outcomes. These results also indicate that merely analysing governmental policies and strategies - a widespread approach in current research - is insufficient for a thorough understanding of smart governance, as this provides only a limited view on the wide range of technology-enabled practices evolving in a city.
- The research showed that the aforesaid dissimilarities in citizen engagement and smart governance practices are shaped by specific contextual dimensions - in particular, the (national) politico-institutional milieu was been found to be significantly influential. Further contextual factors - e.g. the policy domain, the socio-spatial characteristics of a place - are apparently also at play in the evolution of smart collaborative practices and how citizens give their input. These were noted but not methodically elaborated in this research. These findings show that smart governance practices reflect a path-dependent "*muddling through*", in which the institutional and other contextual dimensions shape the uptake of technological applications in social interactions.

- The research revealed that the relationship between citizen engagement and the context is not static, but that it can shift over time. This was evident from the citipreneurial case, in which citizen input and the collaboration context mutually changed as the progress of the initiative reached different phases.
- While the research provided empirical support for the notion that context definitely matters in smart governance, it also uncovered a complex, multi-layered impact-mechanism that moulded the politico-institutional context. This makes straightforward predictions about the implementation of smart governance - how will it work out in one city and how in another one? - difficult. It necessitates further research into the logics of institutional forces.

The study substantially revises extant thinking about smart governance, as it reveals that this cannot be captured in the extreme framings of a technological utopia or dystopia, nor in universal narratives suggesting a single route to collective smart city making. Rather, smart governance should be understood as ongoing, kaleidoscopic, and context-contingent technology-mediated interactions between local states and citizens, emerging in practice.

NEDERLANDSE SAMENVATTING

Het “smart city” concept heeft in het laatste decennium aan grote populariteit gewonnen, omdat het de snelgroeiende stedelijke problemen met behulp van technologieën effectief lijkt aan te pakken. Waar de eerste “smart city”- golf voornamelijk gericht was op de technocratische strategie om het stedelijke milieu *voor* burgers te verbeteren, wordt recentelijk steeds meer benadrukt dat het slimmer maken van steden alleen *samen met* burgers en gemeenschappen kan – de zogenaamde “human smart city”. Deze burger-gedreven stedelijke ontwikkeling is weerspiegeld in het idee van “smart governance”: technologie-gefaciliteerde samenwerking tussen lokale overheden en burgers om collectief te handelen in publieke zaken, zoals wijkverbetering, het bevorderen van duurzame energiebronnen, vluchtelingenopvang of het tegengaan van maatschappelijke ongezondheidstrends.

Het idee van “smart governance” veronderstelt dus dat het gebruik van technologische middelen de samenwerking tussen burgers en de overheid in publieke aangelegenheden een nieuw leven in kan blazen, door zowel verdieping als verbreeding. Deze veelbelovende manier van besturen is aantrekkelijk voor lokale overheden, die steeds minder goed in staat zijn om maatschappelijke problemen alleen aan te pakken. Derhalve azen lokale overheden op deelname aan interactieve, open en technologie-gesteunde netwerken met andere actoren vanuit de samenleving. Hoewel het belang van “smart governance” meer en meer erkend wordt, is het verrassend hoe weinig theoretische en empirische kennis hierover bestaat. Hierdoor is het lastig vast te stellen of en hoe “smart governance” daadwerkelijk wordt toegepast in steden.

Het doel van dit proefschrift is om bij te dragen aan de theorie en de praktijk van “smart governance” door het verrichten van empirisch onderzoek gericht op twee hoofdaspecten: 1) burgerparticipatie op stadsniveau en in door burgers gelanceerde “bottom-up” initiatieven en 2) de contextuele omgeving die “smart governance” praktijken beïnvloedt.

Burgerparticipatie in “smart governance” en meer algemeen in “smart cities” heeft het debat onder wetenschappers en praktijkexperts in het veld gepolariseerd. Enerzijds wordt burgerparticipatie gezien als de kern van “smart governance”, waarin burgers door

technologiegebruik in staat gesteld worden om daadwerkelijk invloed te hebben op beslissingen in publieke kwesties. Anderzijds wordt er verwezen naar de manipulatie van burgers door neoliberale agenda's en digitale sturingsdrift waardoor burgers enkel als consumenten of datapunten fungeren. Aangezien deze tegenstellende perspectieven niet op empirische observaties, maar vooral op concepten en aannames zijn gebaseerd, is de kennis over burgerrollen in "smart governance" schaars.

De invloed die de context uitoefent op "smart governance" is nog meer betwist. Context als een mogelijk invloedrijke factor wordt in toenemende mate benoemd, tegenover de veronderstelling dat er één "smart city" model bestaat, ongeacht historische, socio-economische, culturele, politieke en institutionele omstandigheden. Dat context een potentieel invloedrijke factor is blijkt uit de "smart city" en "smart governance" variaties in de wereld, zichtbaar in de verschillen in hoe burgers en gemeenten hun rol nemen, hoe technologieën worden gebruikt en welke maatschappelijke doelstellingen geambieerd worden. Ondanks deze groeiende erkenning is de invloed van de context op "smart governance" door gebrekkige theoretische en empirische uitwerking nog onduidelijk.

Deze tekortkomingen hebben ertoe geleid dat dit onderzoek zich richt op de empirische details van "smart governance" in de realiteit. Er wordt gekeken naar de *praktijken* van "smart governance" in diverse cases en steden (landen), waardoor de werkelijke processen vanuit een breed en vergelijkend perspectief gezien kunnen worden. Praktijk fungeert in deze studie als een onderzoeklens om een brug te slaan tussen theorie en praktijk. Praktijk is hier gebruikt als een fenomeen dat de vele ideeën en veronderstellingen van "smart governance" kan contrasteren met de werkelijke activiteiten en rechtstreekse ervaringen, die zelden worden geanalyseerd. Dit gebrek aan empirisch onderzoek van "smart governance" in verband met de schaarse kennis van burgerbetrokkenheid en de contextuele invloed heeft de doelstelling van dit onderzoek bepaald. Dit is geformuleerd in de volgende, overkoepelende hoofd-onderzoeksvraag en gerelateerde deelvragen:

Hoofd-onderzoeksvraag: Wat zijn de rollen van burgers in "smart governance" praktijken en hoe zijn deze praktijken beïnvloed door de contextuele omgeving?

- *Deelvraag 1: Welke rollen spelen burgers in "smart governance" praktijken?*

- *Deelvraag 2: Op welke manier zijn “smart governance” praktijken beïnvloed door de context?*

Om “smart governance” beter te begrijpen en de bovengenoemde onderzoeksvragen te beantwoorden is er voor dit proefschrift een systematische literatuurstudie verricht en een kwalitatief onderzoeksmethode toegepast. Dit laatste betreft een veelvoudige case study-aanpak met documentenanalyses, semigestructureerde interviews, veldonderzoek en het bijwonen van evenementen. De case studies passen diverse doch aanvullende methoden toe en worden gekarakteriseerd door een (internationale) vergelijkende benadering. Dit maakt het mogelijk om “smart governance” praktijken in hun daadwerkelijke uiting te begrijpen en de verschillen en overeenkomsten in en tussen steden te beschrijven, vooral met oog op hun specifieke contextuele omgevingen. Het empirisch onderzoek vond plaats in de steden van Utrecht (Nederland), Glasgow (Verenigd Koninkrijk) en Curitiba (Brazilië), waarin verschillende “smart governance” projecten onder de loep werden genomen.

Hoofdstuk 2 bevat een systematische literatuurstudie die de componenten van “smart governance” identificeert, empirisch bewijs zoekt aangaande de relatie tussen “smart governance” en duurzaamheidsuitkomsten en kijkt naar hoe de context hierin een rol speelt. Dit onderzoek analyseert 114 wetenschappelijke artikelen op het snijvlak van diverse disciplines, zoals Openbaar Bestuur, Stedelijke Studies, Ruimtelijke Wetenschappen, Computer /IT Wetenschappen, Management en Economie. De bevindingen tonen aan dat er onvoldoende empirisch bewijs bestaat voor duurzaamheidswinsten, waar een balans gezocht wordt tussen ecologische, economische en sociale waarden, die vaak worden aangehaald in verband met “smart governance” uitkomsten. Bovendien laten de bevindingen een dubbelzinnig beeld zien, omdat ze zowel positieve als negatieve effecten omtrent duurzaamheidsuitkomsten van “smart governance” aangeven. De literatuurstudie benoemt ook contextuele voorwaarden van “smart governance” die cruciaal zijn om deze gemengde resultaten te begrijpen. Het hoofdstuk wijst naar de behoefte aan meer empirisch onderzoek en ontwikkelt een agenda om de relatie tussen “smart governance” en diens bredere contextuele omgeving dieper te analyseren.

Hoofdstuk 3 verkent de bijdrage van burgers aan “smart governance” door te focussen op een specifiek soort actieve burger - de lokale ondernemer. Het is een interessant, maar onderbelichte type burger; lokale ondernemers zijn ingebed in zowel de maatschappelijke als de zakelijke arena, hetgeen bijzondere strategieën en praktijken van “smart governance” teweeg kan brengen. Derhalve introduceert deze studie een nieuw soort “smart” initiatief, de citipreneurial, gepositioneerd tussen burger- en markt-gedreven activiteiten. Dit alternatieve model is verder ontwikkeld door het bestuderen van een illustratieve case van een wijkgericht duurzaam energie- en mobiliteits-systeem dat is opgezet door een lokale ondernemer in Utrecht. De bevindingen laten zien dat de “citipreneur” een aanjagende rol speelt in het creëren van publieke waarde door het starten en opschalen van collectieve praktijken rondom “smart” technologieën. Deze prestatie is grotendeels te danken aan de pionierende en risiconemende houding van de lokale ondernemer, alsook zijn bekwaamheid om overheid, markt en maatschappij te verbinden om stedelijke duurzaamheid te bevorderen. Dit onderzoek biedt een beter begrip van de “bottom-up” gecreëerde slimme stad als een specifieke vorm van “smart governance”, alsook de voor- en nadelen hiervan omtrent maatschappelijke uitkomsten. De bevindingen benadrukken ook de belangrijke rol van lokale overheden: terwijl ze de ontwikkeling van potentiële initiatieven vanuit de maatschappij faciliteren, dienen ze ook de belangen van alle burgers te waarborgen op basis van rechtvaardigheid en gelijkheid, met name in het geval van processen van vermarkting.

Hoofdstuk 4 is geïnspireerd door zowel de heftige debatten over de rol van burgers in slimme steden, als de schaarste aan empirisch onderzoek over dit onderwerp. In dit onderzoek wordt daarom een diepte-onderzoek uitgevoerd in een Europese stad (Utrecht), geselecteerd door haar typische “smart city” ambities, om te verkennen welke rol burgers daadwerkelijk spelen in technologie-gefaciliteerde initiatieven in publieke kwesties. Omwille deze onderzoeksambitie worden er in dit hoofdstuk twaalf initiatieven bestudeerd door het toepassen van een classificatiekader dat diverse typen burgerparticipatie onderscheidt. De bevindingen duiden aan dat de wijze waarop burgers met behulp van technologie hun input leveren aan het collectieve domein heel divers is en allerlei participatietypen bevat. Het is niet enkel “burger empowerment” zoals de voorstanders beweren, of “burgeronderwerping” zoals de critici benadrukken. Deze gevonden diversiteit toont ook de uitdaging van het beschrijven van burgerrollen op het stadsniveau, die wellicht beter begrepen kunnen worden op het

microniveau van initiatieven en individuele actoren. Dit onderzoek geeft aan dat burgerparticipatie in de slimme stad niet moet worden opgevat als een technologische zegen of vloek, maar meer als een doorgaand proces dat beïnvloed wordt door een variëteit aan factoren.

Hoofdstuk 5 is een systematische analyse van de rol van de context in “smart governance” praktijken. Het legt de focus op de institutionele omgeving die in toenemende mate wordt aangeduid als een belangrijke factor die verantwoordelijk is voor de grote variatie aan “smart governance” praktijken in steden, hoewel dit tot dusver sterk onderbelicht is gebleven. Om deze reden neemt dit onderzoek drie steden met uiteenlopende institutionele contexten onder de loep: Curitiba (Brazilië), Glasgow (Verenigd Koninkrijk) en Utrecht (Nederland). De bevindingen geven aan dat de institutionele context inderdaad bepalend is voor de wijze waarop “smart governance” zich verwezenlijkt in steden. Deze empirische inzichten resulteren in een conceptueel model dat verschillende vormen van “smart governance” in diverse stedelijke milieus kan verklaren. Het model toont een meerlaags invloedmechanisme: instituties bestaan naast elkaar op verscheidene ruimtelijke schalen en communiceren en wijzigen – versterken of neutraliseren – elkaars’ effect op “smart governance”. Dit onderzoek biedt een nieuwe benadering om “smart governance” te doorgronden en werpt licht op hoe dit verweven is met de institutionele context.

Het laatste, samenvattende hoofdstuk (6) reflecteert op de belangrijkste bevindingen in lijn met de bovenstaande onderzoeksvragen. Dit levert de volgende conclusies op:

- **Deelvraag 1: Welke rollen spelen burgers in “smart governance” praktijken?** De rollen die burgers daadwerkelijk spelen in publieke zaken op stadsniveau en in bottom-up initiatieven zijn heel divers en waarneembaar vanuit verschillende perspectieven. Dit wordt duidelijk door de verschillende participatievormen. Zo heeft het onderzoek bewijs gevonden voor (gevarieerde soorten) “empowered” burgers die niet wachten op een overheidsoproep, maar technologische mogelijkheden vrijwillig aangrijpen om eigen activiteiten te ondernemen voor collectieve zaken. Het onderzoek heeft ook bewijs gevonden voor het idee dat technologieën gebruikt worden om burgers te sturen in plaats van hen macht en zeggenschap te geven in beslissingen over stadsontwikkeling. Bovendien presenteert het onderzoek nieuwe vormen van

burgerbetrokkenheid, die eerder nog niet geïdentificeerd waren in de literatuur. Tegelijkertijd tonen de bevindingen dat consultatie ook in “smart governance” praktijken een frequente vorm van burgerparticipatie blijft, net zoals in traditionele -fysieke- participatieprocessen.

De diversiteit aan burgerrollen is ook zichtbaar in de afzonderlijke stedelijke participatiepatronen: in Glasgow spelen burgers een passievere rol; in Utrecht is een meer participatieve aanpak zichtbaar, waarin burgers geraadpleegd worden, maar in een toenemende mate ook als consumenten van “smart” diensten en producten optreden; Curitiba toont een wisselend beeld van burgerinput - “empowerment”, consultatie en een passievere rol - afhankelijk van de strategieën van de zittende burgermeester. Naast deze typische patronen ontplooiën zich aanvullende soorten burgerrollen binnen een stad, wat de eerdergenoemde stad-gebaseerde eentonigheid van participatiepatronen nuanceert.

Deze onderzoeksuitkomsten verhelderen dat technologie-gesteunde burgerparticipatie in publieke zaken plaatsvindt in zowel de optimistische als de meer sombere uitersten, die de literatuur vaak aanhaalt. De werkelijke bijdragen van burgers aan “smart governance” wijken dus af van de theorieën en de aannames, omdat ze niet enkel de dystopische waarschuwingen omtrent manipulatieve en neoliberale strategieën, of de aanmoedigende vooruitzichten over gemachtigde burgers die de stad besturen vertonen. Dit onthult de nutteloosheid van het weergeven van burgerrollen in dichotome omschrijvingen en algemene uitspraken, omdat deze juist dynamisch, wisselend en context-gebonden zijn.

De bevindingen wijzen ook uit dat technologie geen gamechanger is - het brengt geen ingrijpende verandering met zich mee. Dit behelst dat technologieën burgers niet noodzakelijk machtiger maken of manipuleren, maar dat ze allerlei typen van betrokkenheid faciliteren afhankelijk van de doelen en omstandigheden. Het duidt aan dat technologiegebruik in overheid-burger interacties niet revolutionair is, maar veeleer een geleidelijk proces van vooruitgang. Er vindt dus geen radicale verandering plaats in deze praktijken, enkel een stapsgewijze aanpassing, hetgeen dat meer lijkt op het bewerkelijke ritueel van “doormodderen” (Lindblom, 1959) in beleidsprocessen. Dit maakt dat het antwoord op de vraag over de rol van burgers in “smart governance” identiek lijkt te zijn aan het antwoord op

de vraag wat de rol van burgerparticipatie in reguliere samenwerkingsprocessen tussen overheid en de burger.

- **Deelvraag 2: Op welke manier zijn “smart governance” praktijken beïnvloed door de context?** Om deze vraag te beantwoorden zijn er allereerst door middel van een systematische literatuurstudie contextuele aspecten aangekaart, die effect kunnen hebben op “smart governance” praktijken: de karakteristieken van het beleidsdomein (bijv. het urgentieniveau, de complexiteitsgraad van vraagstukken), de politieke-institutionele omgeving (bijv. democratie, stijlen van overheidsbestuur, het innovatiemilieu) en sociaalruimtelijke kenmerken (bijv. topografie, sociale cohesie, internetbereik, vertrouwen).

Vervolgens heeft deze empirische studie één specifieke contextuele factor geëxploreerd die in de literatuurstudie werd geïdentificeerd, namelijk de politieke-institutionele omgeving. Het analyseert drie aspecten, te weten de intergouvernementele staatstructuur betreffende de relaties tussen de verschillende overheidslagen, de lokale politieke verhoudingen en de stadsbestuursmodellen (urban governance), die geanalyseerd worden aan de hand van een vergelijking tussen drie steden: Utrecht, Curitiba, en Glasgow. De analyse toont aan dat in Glasgow de intergouvernementele staatsstructuur, namelijk het op nationaal niveau gecentraliseerde systeem (“unitary-centralized”), de meest bepalende factor is: “smart” strategieën zijn centraal gecoördineerd en ambiëren meer universele maatschappelijke doelen die (nationale) economische groei en grootschalige technologische uitrol nastreven. De rol van burgers en de samenwerking is beperkt en technologietoepassing is vooral gericht op stadsbeheer, infrastructuur en commerciële applicaties. In Curitiba blijkt de combinatie van de relatiestructuur tussen diverse overheidslagen - federalisme - en de lokale politieke machtsverhoudingen, de dominante status van burgemeesters, het meest belangrijk. “Smart governance” strategieën zijn meer versnipperd in vergelijking met de centrale sturing in Glasgow en variëren sterk in overeenstemming met het politieke bewind van de regerende burgemeester. In Utrecht zijn “smart governance” strategieën gevormd door de gelijktijdige uitwerking van alle drie de institutionele aspecten, dus de decentrale (“unitary-decentralized”) intergouvernementele staatstructuur betreffende de relaties tussen de verschillende overheidslagen, het collectieve karakter van het lokaalpolitiek bestel en het op consensus-gebaseerde stadsbestuursmodel: activiteiten hebben, in tegenstelling tot Glasgow, geen

centrale integratie, maar zijn meer verspreid over het stedelijke systeem. De doelstellingen beogen maatschappelijke welzijn en publieke waarden, brede participatie van en samenwerking met burgers en technologiegebruik dat uitwisselingen faciliteert en voldoende ruimte schept voor experimentele initiatieven.

Deze bevindingen leveren empirisch bewijs voor wat recentelijk meer en meer aangenomen is in de literatuur, namelijk dat de politieke-institutionele context een belangrijke rol speelt in het beïnvloeden van “smart governance” praktijken. De bevindingen wijzen aan dat de verschillende politieke milieus in diverse nationale contexten uitmonden in variaties aan “smart governance” praktijken. De uitkomsten laten ook zien dat de institutionele omgeving van een stad meerdere lagen kent, omdat de verscheidene dimensies afkomstig zijn van verschillende ruimtelijke schalen (internationale, nationale, stedelijke). Deze afzonderlijke meerschallige institutionele aspecten hebben een wisselwerking, waardoor ze elkaars’ effect op “smart governance” beïnvloeden op een versterkende of verzwakkende manier. Dit laat zien dat de contextuele invloed op “smart governance” praktijken geen direct, maar veel eerder een gelaagd mechanisme is, dat logischerwijs lijkt te bepalen welke institutionele aspecten betekenisvol zijn in specifieke stedelijke omgevingen.

Naast de betekenis van het institutionele milieu leverde het empirisch onderzoek ook inzichten op in nadere contextuele dimensies. Deze zijn niet systematisch bestudeerd, maar lijken “smart governance” praktijken wel te beïnvloeden. Deze institutionele aspecten betreffen het beleidsdomein en de sociaal-ruimtelijke kenmerken van een stad of wijk, die ook in de systematische literatuurstudie onthuld zijn en dus diepere analyse vergen in de toekomst.

De bevindingen laten zien dat de context, vooral het politieke milieu, een belangrijke rol speelt in het bepalen en vormgeven van “smart governance” praktijken. Dit ondersteunt de gedachte dat algemene opvattingen van “smart governance” weinig nut hebben, omdat diens ontwikkeling in stedelijke ruimten met inachtneming van de contextuele setting begrepen dient te worden. Deze studie accentueert ook dat er meer onderzoek nodig is om de logica van de institutionele invloed verder te ontrafelen en de contextuele aspecten die in dit proefschrift aangekaart worden als potentiële factoren nader te analyseren.

- *Hoofd-onderzoeksvraag: Wat zijn de rollen van burgers in “smart governance” praktijken en hoe zijn deze praktijken beïnvloed door de contextuele omgeving?* Deze vraag brengt de twee centrale thema’s van dit onderzoek – burgerparticipatie en contextuele invloed – bij elkaar. Het beoogt de afzonderlijke beschouwingen van deze twee thema’s te verenigen en hun wisselwerking te bestuderen voor een meer complete onderkenning van “smart governance”.

Dit onderzoek vertoont de grote diversiteit aan burgerrollen, tussen passieve en zelf-machtigende (“self-empowering”) vormen van betrokkenheid, die tussen en binnen stedelijke en beleidscontexten en zelfs binnen hetzelfde participatiesoort variëren. Dit nuanceert de bestaande excessieve ideeën, heel optimistisch of heel kritisch, aanzienlijk, maar draagt ook bij aan het begrijpen van “smart governance” in zijn geheel, omdat deze burgerrollen andere hieraan gerelateerde componenten zoals de rol van lokale overheden, vormen van technologiegebruik en de maatschappelijke doelstellingen onvermijdelijk ook onthullen. De gevonden diversiteit aan burgerparticipatie brengt dus een vergelijkbare diversiteit aan “smart governance” praktijken aan het licht. Terwijl deze studie aangeeft dat technologiegebruik gevarieerde burger-overheid coöperatie in publieke vraagstukken faciliteert, betuigt het ook dat het geen gamechanger is. Technologiegebruik in samenwerkingsprocessen brengt geen plotselinge, radicale veranderingen met zich mee, maar vindt plaats op een incrementele wijze.

Door de factor context aan deze studie toe te voegen, heeft dit onderzoek de kennis over “smart governance” praktijken en hoe burgers hierin een rol spelen verdiept. Het legt hun verweven dynamiek bloot, wat goed aangeeft of, wanneer en hoe “smart governance” praktijken daadwerkelijk plaatsvinden. Dit creëert een besef van de context-gevoeligheid, wat leidt tot een beter begrip van de complexe en diverse wijzen waarop “smart governance” praktijken zich uitwerken in specifieke omgevingen:

- De context-afhankelijke aard van burgerbetrokkenheid en “smart governance” praktijken is zichtbaar door de variaties in en tussen verschillende contextuele omgevingen. De analyse van verschillende steden toont diverse patronen van burgerparticipatie in Utrecht (consultatie, “consumerism”), Glasgow (passief), en Curitiba aan (burgermeester-gebonden), wat ook duidt op de verscheidenheid aan “smart governance” strategieën van deze diverse gemeenten. Dit beeld van de per stad verschillende, homogene

participatiepatronen is verder verfijnd door de context van één specifieke stad. Dit laat zien dat er naast de dominante participatiepatronen binnen een stad ook andere sluimerende of trendsettende soorten burgerbijdragen, en dus “smart governance” praktijken, zich kunnen ontplooien. Tot slot heeft de context van bottom-up initiatieven de inzichten wat betreft burgerparticipatie in “smart governance” verder genuanceerd. Het onthult diverse typen actief burgerschap, die “smart” coöperatieve strategieën op diverse manieren en met diverse uitkomsten toepassen. Deze resultaten maken ook duidelijk dat enkel het analyseren van overheidsbeleid en -strategieën – een wijdverspreide aanpak in het huidige onderzoekslandschap – ontoereikend is om grondige kennis van “smart governance” te verkrijgen, omdat het slechts een beperkt inzicht geeft in het brede scala aan technologie-gefaciliteerde praktijken in de stad.

- Het onderzoek wijst uit dat de eerdergenoemde verschillen in burgerparticipatie en “smart governance” praktijken zijn gevormd door specifieke contextuele dimensies, waar met name de (nationale) politiek-institutionele omgeving als doorslaggevend werd gezien. Verdere contextuele factoren – bijv. het beleidsdomein en de sociaalruimtelijke kenmerken van een plaats – lijken ook effect te hebben op de ontwikkeling van “smart” coöperatiepraktijken en de bijdrage van burgers hieraan. In dit onderzoek zijn deze enkel gesignaleerd en niet op een methodische wijze onderzocht. Deze bevindingen geven aan dat “smart governance” praktijken pad-afhankelijk doormodderen weerspiegelen, waarin institutionele en andere contextuele aspecten mede bepalen hoe technologische middelen in sociale interacties worden aanvaard en toegepast.
- Het onderzoek laat zien dat de relatie tussen burgerbetrokkenheid en de context niet statisch is en met de tijd kan veranderen. Dit is zichtbaar vanuit de case study van de “citipreneur”, waarin de bijdrage van burgers en de samenwerkingscontext gezamenlijk veranderen afhankelijk van de diverse ontwikkelingsfasen van het initiatief.
- Hoewel het onderzoek empirische ondersteuning biedt voor de bewering dat context ongetwijfeld invloed heeft op “smart governance”, brengt dit onderzoek het complexe, meerledige effect-mechanisme van de politieke-institutionele context ook aan het licht. Dit maakt dat rechtstreekse voorspellingen over de realisatie van “smart governance” – hoe zal

het uitwerken in de ene stad en hoe in de andere? – lastig is. Dit vereist daarom nader onderzoek naar de logica van institutionele invloeden.

Deze studie vernieuwt bestaande gedachten over “smart governance” door te laten zien dat die niet in extremen van technologische utopie of dystopie te vatten is en evenmin in universele uitspraken die één beste soort slimme stadsontwikkeling suggereren. In plaats daarvan dient “smart governance” gezien te worden als in beweging zijnde, caleidoscopische, context-gebonden en technologie-gesteunde interacties tussen lokale overheden en burgers, die in praktijken oprijzen.

DECLARATION OF CO-AUTHORSHIP

Co-authorship Chapter 2

Co-auteursverklaring



Universiteit Utrecht

In overeenstemming met het Promovendireglement kunnen gepubliceerde artikelen opgenomen worden in het proefschrift. Indien dergelijke delen van het proefschrift in samenwerking zijn ontwikkeld, moeten deze delen vergezeld gaan van een verklaring van elk van de auteurs aandeel in het werk van de student.

Artikel en proefschrift

Deze co-auteursverklaring heeft betrekking op het volgende artikel:

Smart Governance for Sustainable Cities: Findings from a Systematic Literature Review (Chapter 2)

(Naam artikel)

Gepubliceerd in het volgende tijdschrift of andersoortige publicatie:

Journal of Urban Technology

(Naam tijdschrift/publicatie)

Het artikel maakt deel uit van het proefschrift met de volgende titel:

Smart Governance in Practice

(Titel in proefschrift)

Proefschrift ingediend ter verdediging van de graad door:

Zsuzsanna Tomor

(Naam promovendus/promovenda)



Universiteit Utrecht

Omvang bijdrage

Zsuzsanna Tomor

(Naam promovendus/promovenda)

Heeft op de volgende schaal bijgedragen aan het bovenstaande artikel met de omvang:

~~A. Heeft bijgedragen aan de samenwerking (0-33%).~~

~~B. Heeft aanzienlijk bijgedragen (34-66%).~~

C. Heeft overwegend zelfstandig de werkzaamheden verricht (67-100%).

C

Mogelijke aanvullende opmerkingen over bijdrage:

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Datum	Naam	Functie	Handtekening
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Co-authorship Chapter 5

Statement of co-authorship

In accordance with the Doctoral Examination Regulations, published articles may be included in the PhD thesis. If parts of the thesis have been developed in collaboration, these parts must be accompanied by a statement of each of the authors' share in the PhD's work.

Article and thesis

This Statement of co-authorship concerns the following article:

Smart Governance in Institutional Context: an In-depth Analysis of Glasgow, Utrecht, and Curitiba

(Name article)

Published in the following journal or other type of publication:

Cities (submitted and under review)

(Name journal/publication)

The article is part of the PhD thesis with the title:

Smart Governance in Practice

(Title in PhD thesis)

PhD thesis submitted to defend the degree by:

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Contribution

Zsuzsanna Tomor

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Has contributed on the following scale to the article mentioned above:

A. Has contributed to the cooperation (0-33%)

B. Has contributed significantly (34-66%)

C. Has predominantly worked independently (67-100%) ~

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CURRICULUM VITAE

Zsuzsanna Tomor was born in Budapest (Hungary), where she lived till 2001. In Hungary, she studied international business relations (Sämling Austrian-Hungarian Economic Business School) and worked for many years in the corporate domain. She was employed at various organizations, for the most part in the insurance sector, and held a number of positions. These were exciting and restless years as the collapse of “socialism” resulted in an immense social, economic, political and cultural makeover that transformed the country.

In 2001, Zsuzsanna moved to the Netherlands where she started to build a new life. After having served at different companies in various international customer relations roles, the time was ripe for a career switch. Sparked by a desire to engage more directly and more thoroughly in broader societal issues in the world, she became a human geographer: she holds a bachelor’s degree in Human Geography and Planning (BSc cum laude) and a master’s degree in Human Geography (MSc, cum laude), both from Utrecht University, Faculty of Geosciences.

Following her studies, she worked as a researcher at Telos (Tilburg University), a knowledge institute for sustainable regional development, which provides research-based advice to local and regional governments and societal organizations. Zsuzsanna thrived in this role, which married an academic methodology with a practice-oriented approach embedded in partnerships with public, business, societal and civil stakeholders.

From October 2015 until December 2019 she was a PhD Candidate at Utrecht University School of Governance. Her study was embedded in the international research project “Smart Governance for Sustainable Cities”, which investigated technology-enabled collaboration between citizens and local states in the cities of Utrecht, Glasgow, and Curitiba. Zsuzsanna currently works at the University of Amsterdam (Department of Human Geography, Planning & International Development Studies) as a researcher, where she focuses on how *urban commoning*, through art and design, can contribute to new forms of (digital) public spaces and urban development, also from a long-term historical perspective.