

Business Model Approach for Smart Cities: The Role of Opportunities, Values, and Advantages

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Abstract

Two megatrends, globalization and digitalization, affect cities and urban development worldwide. Currently, the city environment is changing faster than ever. Due to globalization, cities are becoming connected in their competition for capital, resources, and competent workforce, while also attracting more and more people into specific areas. This kind of rapid evolution creates many challenges for city development, governance, and the economy. Smarter cities need new approaches in their governance and decision making. The purpose of this research is to explore the potential role of the business model concept in a public smart city context by looking at the anchoring concepts of business models: opportunities, values, and advantages. The research findings point out that the business model approach can work as a strategic development tool in the city context and help cities to implement strategies into practice. Indeed, the business model approach can support continuing development of operations and services in cities. By using the business model approach, we can find multiple digital business opportunities in smart cities. These opportunities can create added economic and social value for cities and significantly increase their performance and competitive advantages. This research utilizes an exploratory and interpretive research approach to analyze both questionnaire based and interview data collected from different European city representatives.

Keywords: smart city, business model, opportunity, value, advantage, strategy, development

1. Introduction

The worldwide urbanization process is causing cities to gather an increasing number of people. Consequently, this has attracted more attention toward cities (Solanas et al., 2014, p. 74) as a research context. Dense and large cities can be highly productive, innovative, and green, and thereby also becoming more desirable in the future (Harrison & Donnelly, 2011). However, cities increasingly face the challenge of how to provide services to their citizens in an efficient way (Walravens, 2015; Solanas et al., 2014, p. 74). Many cities have become stretched beyond the capacity of their existing infrastructures (Belissent 2010, p. 2), and financial crises and municipal bankruptcies in the public sector have become more common (Belissent, 2010).

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Indeed, smart cities need to think about how they interact with companies when developing and

offering their services to their citizens (Walravens, 2013; Ekman, 2018). It is recognized that cities need to smarten their governance processes to be able to deal with new urban challenges in practice (Jiang, 2021). Still, majority of cities are struggling with adopting appropriate governance actions, and thus stumbling to actually transform into a smart city (Ruhlandt, 2018). New technologies open new possibilities and business opportunities for public services (Díaz Díaz et al., 2017). However, smartness in the city context means more than adopting new technologies (Jiang 2021). According to Jiang (2021), smart cities should be interested in creating better urban outcomes by using new technologies in an innovative way and obtaining effective governance processes. Indeed, improving productivity and selecting effective policies in the city sector is necessary. One of these new policies, also supported by the European Union, is to adopt a business model way of thinking into city development (Honeybone et al., 2018).

The business model can be a tool for addressing change and aligning economic value creation and technology development (Glova et al., 2014; Iivari, 2016; Chesbrough & Rosenbloom, 2002) in the city. It may also enable the translation of strategies into practical action (Ahokangas & Atkova, 2015). In the city context, the *business model approach* and its anchoring concepts - opportunity, value, and advantage (Amit & Zott, 2001) - provide a new perspective to cities' strategic thinking, as it supports planning and implementing change (Bridgeland & Zahavi, 2009, p.25). From the practical perspective, an opportunity may represent any positive goal to be achieved (Holm et al., 2015), and the business model approach can help to recognize these opportunities. The business model is also the core of value creation and capture (Amit & Zott, 2001), and by creating value, it can act as a source of competitive advantage (Casadesus Masanell & Ricart, 2010).

In reflection of the discussion above, smart cities are becoming increasingly aware that they need new tools for delivering services to their citizens - and the business model could provide a new perspective to the city organization's strategic thinking. In achieving this, a multi-actor perspective is crucial. Both cities themselves and the business models employed in the city context have become more open (Perätalo & Ahokangas, 2018). Cooperation and co-creation between multiple actors challenge the traditional business model thinking logic (Fehrer et al., 2018). Recent platform business models highlight the importance of the "actor-to-actor" approach (Ondrus et al. 2015, Ekman 2018), and in the city context, this means the increasing importance of various city stakeholders and companies working in or with the city. The business ecosystem of a smart city is continuously changing due to different services that are changing citizens' daily lives and behavior and the business in a public context. The smart city as a digital business platform includes a diversity of different stakeholders and the smart city as a concept includes a strategic course that emphasizes the ever-increasing importance of information and communications technologies (ICT) in modern urban development (Zygiaris, 2013; Paskaleva, 2011). Put differently, city markets have become a complex network of relationships between different actors, and their competitive landscape has changed.

In this research, we address the smart city as a digital business platform. Digitalization as a technical term relates to converting analog information to digital form (Iivari, 2016). Digital technologies bring new revenue and value creation opportunities; digital technologies and complex software empower the platform to easily connect different actors (Fehrer et al., 2018; Ekman, 2018). Transparency allows new information, knowledge, and service exchange between actors in the platform context. Accordingly, different platform actors can complement each other and thus increase the platform innovation (Ceccagnoli et al., 2012). Digital technologies have

opened up new opportunities and created platforms through which people, companies, public utilities, and cities can share their products and services (Ferreri & Sanyal, 2018). Sharing or platform economies will change how economic activities occur in cities (Riley, 2012).

However, there is no unified understanding of how public players such as the cities could adopt the business model concept or approach. The primary purpose of cities is to engage for the public good and not chase economic growth per se. Taking this as a standpoint, the purpose of this research is to explore the potential role of business model thinking in the public smart city context from the viewpoint of the various city stakeholders. The research question is as follows: *How do digitalization-related opportunities, values, and advantages influence each other in the city context?* For answering this question, we have adopted a qualitative interpretative research design (Eisenhardt et al., 2017), as we believe in the connection between theory and practice. Observed behavior contributes to theory development and theories and concepts can shape behavior in city contexts (c.f., Dubois & Gadde 2002). Our research aims to discuss how the business model approach could work in the smart city context and thus, shape the behavior models in city development.

The research data was collected using an open internet survey and semi-structured interviews in Finland, Sweden, and the Netherlands. Our contribution aims at converging the business model and smart city discussions. To achieve this, we begin this research with a literature review on regional planning literature highlighting smart city development and cities' role as an economic space. Next, we move to review the business model literature, also in the smart city context. The rest of the research presents the research methodology, data analysis, discussion, and conclusions.

2. Smart cities and business models

This chapter provides an overview of the smart city and the business model streams of literature. We aim at providing theoretical justification for the research objective and how the smart city and the business model discussions can be connected. This overview serves as a first step toward defining the theoretical approach for smart city business models.

2.1. Smart city development

In the 1990s, 'new regionalism' emerged into academic and policy discussions. The starting point for these discussions was that the national economy is a no-longer-relevant level of analysis; instead, the focus should be on regions and cities (Herrchel & Newman, 2002, p. 31). The emergence of new regionalism grew along with the increase of technological innovations, which initially resulted in the decreased meaning of distance by enabling social and business activities to occur anywhere and anytime (Morandi & Rolando, 2016, p. 9). Storper et al. (1977) claimed that a thriving city's "soft" characteristics and "untraded interdependencies" are embedded in its economic activities. That claim caused the most significant shift in the cities' economic understanding (Herrchel & Newman, 2002, p. 18). For Storper, there is a tight coupling between cities, economies, and organizations. Later on, economic geographers have used similar ideas to identify successful city-regions' qualities (Herrchel & Newman, 2002, p. 18). Also, economic geographers have researched institutional factors related to the success of cities. Flexible policy

responses, and flexibility in governing institutions themselves, have been found as the two core aspects of a successful city region. The flexible city region, in general, is based on the idea of network relationships between governance institutions and companies; formal institutions of government are essential, but as necessary for the thriving city region and its development are also the informal relationships (Herrchel & Newman, 2002). Today, globalization and digitalization drive economic development, demand, and cooperative and reflective public and private sector actors, who can support the institutional environment (Herrchel & Newman, 2002, p. 19). The involvement of local government and stakeholders increases stability and continuity in cities (Herrchel & Newman, 2002, p. 19). However, cities should not underestimate the citizens' role.

There has been a rapid growth of academic writings about competitive city-regions (Ward & Jonas, 2004). Competitiveness has become the critical aspect in the ongoing globalization process, and terms such as 'innovative city,' 'competitive city,' and 'entrepreneurial city' are popping up in the discourse of globalization (e.g., Lombardi et al., 2012; Hall & Hubbard, 1996; Marceau, 2008). Quality of place plays an essential role in the context of competitiveness. This quality consists of infrastructure, social services, growth management, and environmental quality (Hannah & Walton-Roberts, 2004). It is also important to notice that cities are now in a world of trade relations, and for remaining competitive against other cities, they must exploit competitive advantages (Ward & Jonas, 2004). In practice, cities can gain a competitive advantage by specializing and developing new products and services of their own (Ward & Jonas, 2004). A city is an economic space and a complex patchwork of local industrial districts (Herrchel & Newman, 2002, p. 19). Urban studies explore networks within urban planning and geography (Lizcano, 2014; Ward & Jonas, 2004). In the new economic space, the city itself, its businesses, and citizens are undertaking their digital transformations (Berman, 2012). Businesses are rethinking their customer value and contemplating how to take advantage of the opportunity to innovate, grow, and differentiate (Berman, 2012). Cities are considering implementing new smart and digital solutions in the city context in a sustainable, responsible, and replicable way. Smart solutions can significantly impact traditional urban interpretations when a city can use real-time data for urban analyses, monitoring, planning, and management. High-quality data can enable the implementation of new services useful for citizens, companies, and public administrations (Morandi & Rolando, 2016).

Extant smart city research represents four phases. Starting from the 1990s, the phases comprise 1) ICT advancements, evolving to study 2) urban spaces that attract investments, 3) ubiquitous technologies in the cities, and finally, to 4) solutions that support environmental sustainability (Anthopoulos & Fitsilis, 2014). Technological advancement and economic growth have triggered two phenomena: global urbanization and digitalization (Cocchia, 2014), while also leading to increasing challenges for the cities when they have started providing efficient services to citizens (Walravens 2015; Solanas et al., 2014, p. 74). One way to solve these challenges could be adopt new digital technologies in the city infrastructure since they open new possibilities when applying public services in the cities (Díaz-Díaz et al., 2017).

The concepts of smart and digital cities have been popular research topics, and for cities, smart and digital urban development has been a strategy to improve the quality of life for their citizens (Dameri & Cocchia 2013). Also, city governments and politicians have noted the importance of smart city solutions (e.g., Hollands, 2008). However, offering services to an increasing number of citizens is not enough today. After the economic crises in 2008-2009, cities desired economic growth as they discovered the new competition with other cities on a global scale. Cities were

competing for the investments and jobs and the skilled workforce, who can be the developers of new economic strength (IBM Smarter Cities work, 2020). Although the smart city concept is not a new thing, there is no unified understanding of the concept, and some have referred to it as a buzzword. Bollier (1998) proposed, already in the late 90s, the term "smart growth," which evoked new political practices for better urban planning. Later, Komninos (2006) presented a new definition for the smart city and argued that smart cities are constructed as multi-dimensional clusters, combining three dimensions: people, collective intelligence, and artificial intelligence. Parallel to this, a city's focus of development has changed from competition to competition towards a sharing economy (Perätalo & Ahokangas, 2018).

Smart city literature highlights certain specific characteristics of smart cities: 1) their networked infrastructure, 2) technology as a political and social enabler, 3) business-led urban development, 4) the aim to change how services are delivered and how residents are using them, and finally, 5) a vision for a better future (Albino et al., 2015; Pardo et al., 2011). Also, smart cities tend to prioritize their innovation ecosystems to aim towards social and environmental sustainability via urban planning (Zygiaris, 2012). For improving environmental sustainability, there are four dimensions to take into account in urban planning: actors, priorities, resources, and policies (Schaffers et al., 2011). These four dimensions create the basis for an integrated research framework for researching how governments predict initiatives aimed at creating a smart city (Afonso et al., 2015). Thus, the smart city uses feasible and real technologies and uses sustainable business models to have a measurable and direct impact on businesses, service delivery, and citizens (Honeybone et al., 2018). Nevertheless, the smart city can remain a vague idea because there are many existing definitions, of which none have been universally acknowledged (Coccia, A., 2014, p. 13; Solanas, 2014, p. 75). Although the smart city concept remains vague, it has great potential in framing the challenges that cities face today, and it provides a new way of thinking about potential future issues (Walravens, 2015).

Zamanifard, Alizadeh, and Bosman (2018) describe cities as places that consist of complex interactions between multiple stakeholders whose activities and decisions are affecting the city. The sharing economy has recently become a buzzword in an urban context, and it has been called the new frontier of economic innovation (Ferreri & Sanyal, 2018). Digital technologies have opened up new opportunities and created platforms through which people, companies, public utilities, and cities can share their products and services (Ferreri & Sanyal, 2018). According to Riley (2012), sharing or platform economies will change how economic activities occur in cities. Legal scholars have argued that platform economies based on sharing principles force city stakeholders to rethink what public interest and value means in the digital age and update these notions (Finck & Ranchordás, 2016). Thus, the question of opportunities, values, and advantages in the context of a wider public good is vital for understanding digital platform economies and planning a business model framework that works in practice.

2.2. Smart city and business models

Urban areas can build sustainable competitive advantage through the business model approach (Hirvonen-Kantola et al., 2016). However, there are a limited number of studies that define a smart city business model and its components (Giourka et al., 2019), and only a few researchers (e.g., Walravens, 2012 & 2015; Anthopolous et al., 2016; Giourka et al., 2019) have used theoretical frameworks to analyze business models in smart cities (Díaz-Díaz et al. 2017). There are many reasons for this. Matthews and Schulman (2005, p.233) argue that a paradox exists between the public and private sectors' competitive advantages. Often, successful private-sector

firms use their capabilities to add value for the firm's benefit rather than for its customers or competitors. In turn, public sector organizations fulfill government responsibilities, deliver services and cooperate in policy development. The public sector's primary purpose is to engage for the public good by giving away knowledge base and services (Matthews & Schulman, 2005). Individuals who exploit new knowledge by realizing opportunities benefit cities. Also, cities expect knowledge creation to substantially impact regional economic growth (Cooke & Leydesdorff, 2006).

Business model selection is about decision-making methodologies (Anthopolous et al., 2016). According to Yates (1990), there are several terms and factors to take into account in the process of decision making: for example, who is the person making the decisions, and what is their preference profile (e.g., values, experiences, characteristics of the decision-maker), and criteria meaning the value that influences the decision-making process. Hence, the decision-making process includes the decision maker's estimations about the situation and context (Anthopolous et al., 2016).

In reflection of the discussion above, there is a need for a new business model approach for smart cities. According to Schaffers et al. (2012), open ecosystemic thinking is particularly relevant for the smart city concept as cities themselves can and should act as innovation drivers. A city may strive for new market creation with the ecosystemic business model approach to enable an innovation ecosystem's evolution and adopt the rapid shift of organizational and industrial boundaries that can create new kinds of business opportunities (Hirvonen-Kantola et al., 2016; Iivari, 2015). From the innovation perspective, the players' ecosystem context renews, and new market creation occurs via co-creation activities in the ecosystem (Hirvonen-Kantola et al., 2016). When we want to study a city's business model, we should focus on the city governance (Walravens, 2013), which deals with the city's ecosystem level's strategic decisions.

2.3. Business Model as an approach

The term business model has prevailed in the managerial literature since the late 1990s, especially related to the Internet's emergence (Demil and Lecocq, 2010). Since then, the focus of business modeling has shifted from a single firm's closed business model that makes little use of external ideas and technologies to a mixed, networked model, and later toward an open, ecosystemic business model view (Casadesus-Masanell et al., 2011). Teece (2010, p. 174) argues that several factors of today's world support the importance of business models: "the emerging knowledge economy, the growth of the Internet and e-commerce, the outsourcing and offshoring many business activities, and restructuring the financial services industry around the world." Thus, the business model concept is dependent on the surrounding context through competitive advantages and business opportunities (e.g., Ahokangas & Myllykoski, 2014). For adapting to the changes in the surrounding competitive context and remain sustainable, there is a need for continuous business model transformation (Achtenhagen et al., 2013; Doz & Kosonen, 2010; Atkova, 2018).

A business model can be defined for both cities and firms as the content, structure, and governance transactions made inside an organization and between it and its external partners who support the organization's value creation, delivery, and capture (Zott & Amit, 2010). A

particular business model describes the architecture or design of value creation, delivery, and capture mechanisms it employs, even though there is no widely accepted definition or conceptualization of a business model (Teece, 2010). However, a business model can act as a tool to align economic value creation and technology development (Glova et al., 2014; Iivari, 2016; Chesbrough & Rosenbloom, 2002) in the smart city context.

The three critical business-model-related processes for smart cities are opportunity exploration and exploitation, value creation and capture, and achieving competitive advantage (e.g., Amit & Zott, 2001; Teece, 2010; Morris et al., 2005). First, as an opportunity can represent something positive to be reached (Holm et al., 2015), it becomes strongly dependent on the external context, i.e., the source of resources (Atkova, 2018, p. 20). In other words, the business model can help to recognize and exploit opportunities that exist in the external environment (Atkova, 2018). Second, the business model is the source of value creation and capture (Amit & Zott, 2001). In turn, value creation can act as a source of competitive advantage, and competitive advantages are needed to become and remain competitive (Casadesus-Masanell & Ricart, 2010). Third, competitive advantage can be seen as an ability to create greater value for an organization, shareholders, and stakeholders, thus offering a competitive edge against the competition (Iivari, 2016). In this research, the three components, opportunity, value, and advantage, create a business model framework that can be used in the smart city context. It is of importance to notice that this framework describes continuous development, meaning that the gained competitive advantages enable exploring and exploiting new opportunities. Figure 1 below depicts the business model framework.



Figure 1. A research framework for smart city business models.

The business model concept was originally developed to describe a focal firms' focal operations in a network, but it has been extended to cover how the focal firm's business model interacts with other players' business models. Recent business model literature has become interested in the platform business models. The concept of a platform business model is relatively new and lacks an accepted definition (Fehrer et al., 2018). However, we can see that platform business models build on the idea of non-hierarchical and continuously emerging collaboration among actors (Ketonen-Oksi et al., 2016). Many of the definitions also underline platform properties in open

network structures (Fehrer et al., 2018).

3. Research Method

For reaching the aim of the research, i.e., to explore the potential role of business model thinking in the public smart city context, we adopted an exploratory and interpretative research approach and paid attention to the various city stakeholders. An interpretative approach enables us to analyze the rich data collected (Eisenhardt et al., 2007). In interpretive studies, data analysis can be challenging to separate from data collection, as theory building is seen as an iterative process and heavily grounded in the data (Eisenhardt, 1989). As the specific research topics of this research emerged from the data, this research represents an exploratory research design typical for studying phenomena in the early phases of the research (von Krogh et al., 2012). Thus, in the analysis, we move between the data and the emerging theory when developing smart cities' business model approach.

The first set of data for the research was collected in 2019 through an open internet questionnaire, followed by semi-structured interviews in 2020 to deepen the insight gained from the survey and to get an in-depth understanding of the topic under research. The questionnaire was sent to the stakeholders of different European cities that are part of the European Union's Digital Transition Network to support digital transition (<https://ec.europa.eu/futurium/en/digital-transition>). Selecting the different European cities from the network allows us to control environmental variation across the cases (e.g., Eisenhardt, 1989). Our aim with the questionnaire was to map what kind of digitalization-related business opportunities cities have and how value and competitive advantages could be identified in the city context. The questionnaire was sent to the stakeholders of the European Union's Digital Transition Network cities. Answers were received from the city of Oulu (19), Finland, the city of Helsingborg in Sweden (5), the city of Eindhoven in the Netherlands (1), the city of Split in Croatia (1), one from Romania, Bucharest, and the cities of Tallinn (2) and Tartu (1) in Estonia. Altogether, we received 30 answers. There were 18 questions in the survey, of which 12 were free text field questions, and six of them were related to keywords that describe the phenomena under research. The respondents were able to write three to five keywords related to each item (i.e., opportunity, value, and advantage). The survey was made in English and in Finnish.

After the survey, an interview frame was formed based on the themes emerging from the survey results, and seven semi-structured interviews were conducted: four in Oulu, two in Helsingborg, and one in Eindhoven. All interviewees worked for their city in different digitalization-related projects. Interviews included six open-ended questions, and they were 35 to 60 minutes long. All the interviews were recorded and transcribed to text by using Scrival AI service (<https://www.scrival.com/en>) and checked for any inconsistencies between the records and the text generated.

We started the analysis by taking a closer look into the Internet questionnaire and the keywords in which the respondents have described opportunities, values, and advantages in their cities. For supporting the purposes of this research, the "Three Cs," known as the sequence of codes categories-concepts, were employed (Lichtman 2013). By coding, we grouped the keywords into categories of the theoretical framework. In line with Saldana (2016), our purpose with coding

was to summarize, distill, and condense the data, not reduce it. The codes emerged from the data (Lichtman, 2013) as keywords that the city stakeholders used to describe perceived opportunities, values, and advantages. After coding, the codes were combined into categories – for example, the concept of opportunity includes a category called citizen centricity, which includes, i.e., "*citizen-driven, customer orientation, quality of life, user involvement, services, open meeting places*" code words. In the empirical analysis, the categories described the key elements of the business model approach's concepts. The concepts and the categories were then applied to the semi-structured interview, and they formed a basis for the semi-structured interviews. In the interviews, the focus was on the interviewees' viewpoints. We compared and integrated the questionnaire findings to individual experiences and offered some conceptualizations, and drew conclusions based on our data. We identified common categories from the questionnaire and interview data and examined how they were linked with the business model concepts to present how the business model approach could be used in the city context. A model for the business model approach in a city context was formed based on the data analysis.

4. Exploring digitalization-related opportunities, values, and advantages

4.1. Internet survey results

An online survey was conducted to explore the digitalization-related opportunities, values, and advantages for smart cities. The keywords emerging from the survey provided a pre understanding of the research topic, which was used as the starting point for the next, interview based round of data collection and analysis. Table 1 presents the codewords (N=74) related to the digital opportunities in the cities. The cities' respondents said that the biggest digital opportunities were related to citizen centricity (19%), technology (17.5%), and networks and cooperation (13.5%). The three latter categories can also be seen related to platforms and ecosystems that were categorized as categories of their own. Also, efficiency and innovation were recognized as a source of opportunities.

Table 1. Opportunities in the smart city context.

CATEGORIES CODEWORDS % N Citizen centricity 14

citizen driven, customer orientation, quality of life, user involvement, services, open meeting places	19
smart city web, infrastructure, ICT know—how, free Wi-Fi, intelligent systems, robotics, artificial intelligence	17,5
quadruple helix co-operations, multiple helix, co operation, modular, connections, networks	13,5
performance, effectiveness, high	9
ambitions innovation, try new ideas,	7
digital innovation diverse, great,	7
multiple, huge, versatile	7
platform, ecosystem, joint data integration	20
platform, platform for experiments	
e.g., smart city, predictable, allowing mistakes, funding and scaling, leadership, processes	

Technology (ICT), infrastructure 13

Networks, co-operation 10

Efficiency 7 Innovation 5 Positive adjectives 5 Platform, ecosystem 5

Others 15 **TOT. 100% 74**

Table 2 presents the keywords (N= 65) related to digitalization-related sources and value types in the cities. The most important value category was quality of life (35,5%). The next most common values were related to efficiency (21.5%) and development in general (15%). In addition, sustainability- and entrepreneurship-related categories were identified by the respondents.

Table 2. Values in the smart city context.

CATEGORIES CODEWORDS % N Quality of life 23

services, 24/7, citizen centric, wellbeing, differentiated services, public services, fluency of everyday life	35,5
less costs, economical, resource efficiency, agile, growth and export, quality, forerunner, improvement, up to date	21,5 15
long term sustainability, resilience, environmental, energy	11
efficient	17
entrepreneurial innovation, integration and collaboration, ecosystem, complementing, challenging	

Efficiency 14 Development 10

Sustainability 7+ Entrepreneurship 11 **TOT. 100% 65**

Table 3 presents keywords (N= 64) related to competitive advantages in the cities. The most important category was better living environment (31%), the second category was good reputation (19%), and the third category was the involvement of companies (16%). In addition, collaboration, know-how, and leadership emerged as categories for the codewords.

Table 3. Advantages in the smart city context.

CATEGORIES CODEWORDS % N Better living environment 20

quality of life, life quality, infrastructure, satisfied citizens, wellbeing city, human driven	31
youthful, reputation, image, good example, high quality	19
business friendliness, entrepreneurs, workplaces, business development, investments, growth	16
involvement, cooperation, network of cities, partnerships high level of education, expertise	14
leadership, political will, important	6
	14

Good reputation 12 Involvement of companies 10

Collaboration 9 Know-how and education 4 Leadership 9 **TOT. 100% 64**

The codewords identified for the three concepts, opportunity, value, and advantage, were overlapping, especially regarding citizen centricity, quality of life, better living environment, networks and collaboration, and efficiency. The opportunity-specific categories highlighted the citizen-centric approach, new technologies, and innovations that make city services and functions more efficient, and networks. Value-specific categories included better living environment, 24/7-available services, well-being, fluency, cost savings, growth, improvement, entrepreneurial activities, sustainability, and resilience. Finally, advantage-specific categories comprised quality of life, the city's good reputation, new businesses, workplaces, investments and growth, cooperation with other cities, leadership, and know-how.

It might be considered that citizen centricity was seen as an opportunity that leads to increasing the quality of life, thus adding value to the citizens, finally leading to a better living environment in the cities, which can be regarded as a competitive advantage. Networks and cooperation can be considered opportunities that aim to increase collaboration, which can also be seen as an advantage for cities. Efficiency as an opportunity is connected to performance and value in terms of cost savings. The data shows us that there are a variety of different opportunities in the smart city context. However, most of the opportunities can be found in the category of citizen centricity and technology. Value, added in the smart city context, is related to the quality of life and efficiency, and competitive advantages are related to both citizens and companies and cooperation. Leadership is also one of the nominators of competitive advantage in the smart city context.

4.2. Opportunities

The next round of the analysis concerned the interview data to deepen our understanding of the codeword analysis categories. In the following, the categories that emerged will be discussed by starting with opportunity-related findings.

Many stakeholders see that citizen-centricity can be increased by implementing new technologies in the city context, but that is not an easy task. This is reflected in the notion made

by a respondent from Eindhoven. (1) *"Improving the quality of life in cities should be made much easier than it is now. Moreover, I think the situation is like this in the Netherlands; but I think that it is similar in other countries, as well as that the system is too complex"*. There also appears to be room for improvement at the attitudes observed by another respondent from Oulu (2). *"City development should be proactive and forward-looking. We should be able to serve our citizens before the actual need arises."* Thus, digital opportunities may take the form of lowering the overall costs of public services when there is the possibility to anticipate issues. In this, the role of artificial intelligence and real-time data processing is central, as the interviewed stakeholders see them increase the quality of life in the cities when citizens can be served faster and easier, but also before the actual needs arise. First, as stated by an interviewee from Helsingborg (1), *"sensors that measure things can also give you a lot of good information and good data that you need to take care of"*. Also, based on sensors, it is possible *"...to get insight into what is actually happening in your city... I think that the possibilities of using the data and the technology to really gain insight into what's happening and to make decisions based on that, there's a lot of opportunities, and also to do things more effectively"* (Eindhoven (1)). As an extension to this, one of the respondents in Oulu (4) saw that *"bringing artificial intelligence into everyday life, municipal services, and internal city operations"* is important. *"This will also later open up new possibilities that are not even known yet. Things can also start to happen automatically and in advance."* A specific area of opportunity was seen to emerge from healthcare services that constitute a significant source of cost for cities. In Oulu (4), *"Healthcare and the aging of the population bring challenges for cities. I think it would be possible to take advantage of various digital solutions here."* *"Gathering and using data, for example, health care data, can lower the overall costs of the whole healthcare sector when we can address the problems and challenges in time"* (2).

City stakeholders also highlight the role of networks and cooperation in the future city development toward a platform way of working. The respondent from Helsingborg (2) described this by saying that *"we're trying to consider things as platforms. So not solitary solutions, but platforms."* A respondent from Helsingborg (1) continued, *"a sharing economy and how we can mobilize services and people doing things together"*. For cities, this means cooperation with citizens, companies, universities, and other cities, as several respondents from Oulu tell us. *"We have a strong ecosystem here. We have a good network with the companies in the area, and we cooperate with the university"* Oulu (1).

All the city stakeholders see a strong ambition to digitalize city services, but there are also some limitations as to why this may not be happening as fast as possible. The respondent from Oulu (1) reflected that *"the possibilities are endless. The limitation is the desire and motivation to change the old ways of working in the city organization. – Change comprises 80% of the activity and new technology 20%!"*. These limitations are related to the cities' own motivation to change how working and governing the city. The respondent from Helsingborg (2) described that *"we've still got a long legacy of siloed systems."* Along the same lines, the respondent from Oulu (1) stated that *"new information is constantly being generated in the various silos of the city. This information should be integrated to the other silos, activities, and development of services in the city."* Another respondent from Oulu (4) continued this by observing that *"to take advantage of the opportunities, the city should critically look at its own structures: have they evolved in the same way as digitalization is evolving? Does the organization stay on the path of digitalization development? The city's own internal operating models should be rebuilt."* Also, the respondent from Eindhoven (1) presented similar views, *"from a governmental perspective, what's very*

challenging are the skills. The silos are still there. Mayors are still thinking in the social-spatial domain, and they see technology basically as a project." In addition, funding can also be an issue. Sometimes cities are forced to buy solutions that are not working together with the already-existing solutions because the internal systems in cities are too different. As the respondent from Helsingborg (2) commented, *"very often it is impossible to replicate already existing digital solutions into new contexts in the city. This is because many of our information systems are too different."*

4.3. Values

Digitalization and taking advantage of the opportunities can bring many kinds of added values for the cities. When asked how stakeholders describe the added value that digitalization brings to the city, the respondent from Helsingborg (1) stated, *"...it could also benefit the citizens' well being, right? If they are included on the way and feel part of the solution, it's actually good for them. I think you can raise the well-being of the citizens. And that is a good thing. That is one of the main things you need to think about your citizens that they should be at the forefront here all the time. It's for them, not for anybody else. -- A lot of people moving to the cities, to the urban areas and housing, whatever it is... And we need to come together with a plan. So, things that benefit a lot of people would always be good value."* The respondents from Oulu continued, *"the value or benefits come through the citizens"* (Oulu 1). *"Transparency of things and services for citizens. The citizen has better access to their own information about what information the city has about him/her"* (Oulu 4). The respondents from Oulu also thought that one of the values of digitalization is the efficient services for citizens. The respondent from Oulu (2) stated that *"welfare increases as the time for various transactions are shortened, and the right services are quickly accessed. Digitalization can also increase residents' awareness of their own health."* One of the respondents from Oulu also noticed that, for example, city planning is one of the important themes to be considered, that *"smart zoning can increase satisfaction and a feeling of safety"* (Oulu 4). Similarly, another respondent from Oulu (2) continued that *"this can be important, for example for families"*.

When asking about values that digitalization can bring to the cities, the second theme was effectiveness, i.e., doing things differently, both in governing the city and offering the citizens services. Respondents from both Eindhoven (1) and Helsingborg (2), respectively, stated that *"effectiveness and doing things differently!"* and *"saving resources and making better citizen services."* Both of these could bring cost savings for the city in the longer run. As the respondent from Oulu (1) described: *"digitalizing city services brings us cost savings. The benefits come through the citizens, and the services of the city should be available 24/7. Real-time accessibility and efficiency, social cost, i.e., the time spent by the customer, is shortened... Cost savings are generated in routines, and expert resources can be freed to more productive work".* An interesting notion emerging from the data was how city services could be developed to be more efficient and how the services could work better from the citizen perspective; the respondent from Oulu (2) suggested that *"citizens could develop services together with the city."*

Environmental values were also found important for the city stakeholders, and many opportunities, for example, new waste solutions and smarter transportation, could increase a city's sustainability. The respondent from Helsingborg (1) noted that *"you can have a cleaner*

environment... We have really good waste solution here." Also, the respondent from Oulu (2) described the role of smart transportation from the viewpoint of sustainability as follows: *"our aim is to make life easier for citizens using, for example, public transport route services and smart mobility services. When solutions like these are made, it is also environmentally sustainable."* Additional values that digitalization could bring to the cities included new networks and an interesting research environment. The respondent from Oulu (4) observed that digitalization *"enables cooperation between cities, which brings new perspectives to urban development and enriches thinking... Digitalization of the city makes for an interesting research environment and can bring added value to researchers and research institutions."*

4.4. Advantages

City stakeholders see competition between cities and regions, but it is different by nature than the competition in the business world. Cities are competing for investments and jobs and look for a skilled workforce that can help develop new economic strength. The respondent from Oulu (2) described this by saying that it is important *"to attract companies that bring more jobs to the city and thus also attract new residents... attraction for businesses to come and for individuals to work, study, and live"*. The respondent from Helsingborg (1) continued with the same topic regarding the advantages, *"well, they should be important once again for the citizens, I guess, because if you do it right and you attract new business to your area... that in turn gives more work opportunities here, for your citizens. And they stay because of that. So, it's a combination, I guess. But if you do it right, you attract new people moving in, and you get more taxes. You attract new businesses moving in, which could be more taxes also; but at the same time, you give more work opportunities for the citizens."*

However, it is not so straightforward to gain and then sustain competitive advantages for the cities. It requires investments for the future and the courage to develop and test new things. This can be extremely hard to execute when financial crises in the public sector and municipal bankruptcies are affecting cities. The respondent from Oulu (4) described this in more detail. *"The courage to develop and experiment creates competitive advantage; if you dare not try anything, you can never gain a competitive advantage."* However, this can be extremely hard to execute under financial hardships. The respondent from Helsingborg (2) observed that *"there's a really low level of competition because single municipalities don't have much money, so they usually have to buy cheap solutions. And then those vendors that have the cheap solution have no incentive for innovating."*

4.5. Relationships between opportunities, values, and advantages

The business model approach is a new way of thinking for city stakeholders. Nevertheless, the stakeholders saw that opportunities, values, and advantages are dependent on each other. The respondent from Helsingborg (1) described this by saying that *"they are more or less interlinked with each other. Um, for me, I look at digital solutions and digital inclusion, which is my main responsibility as some kind of a spider in a web... they are connected to each other in different ways, depending on what you are looking for. And they are also dependent on each other. I mean, if you cut one thread in a spider's web, that's not a good thing. You need to have the web"*

intact."

Digitalizing city services requires a huge amount of work and has many effects that should be considered; it is not just about technological issues. The respondent from Oulu (1) stated that *"these business model concepts form the basis of consciousness. These things can be thought of very narrowly only from the point of view of technology, but in fact, it is a very broad whole that we are talking about."* The respondent continued that the business model approach in developing city services could also make future cities more resilient. *"This [business model thinking] is questioning how things could be done smarter in the city. These themes are interrelated and take development toward the right direction."* The respondent from Helsingborg (2) continued this, *"I think the major challenges for cities in the future is resilience. These themes can help in achieving resilient development."*

5. Discussion and conclusions

Smart city business model research can still be seen to be in its infancy. Thus, in this research, we have defined the key anchoring concepts of smart city business model, aiming at finding out what kind of digital business opportunities, values, and advantages there are within cities, especially regarding the smart city, and how digitalization-related opportunities, values, and advantages influence each other in the city context. Our research puts forward a new business model approach for cities and describes the business model thinking process step by step. Thus, our research contributes to both the business model and the smart city literature. Both fields have acknowledged a need for new development actions and governance in the fast-developing smart city context (e.g., Jiang, 2021; Ruhlandt, 2018; Honeybone, 2018; Perätalo & Ahokangas, 2018). We argue that recognized opportunities in the smart city context eventually lead to value creation, leading cities to gain competitive advantages. Therefore, the conceptual advances are relevant for both business model and smart city research fields.

The collected empirical data indicates that the perceived opportunities, values, and advantages do not widely differ in the analyzed cities. Based on both Internet survey and interview data, the city of Oulu highlighted the role and importance of technology and citizen centricity; the city of Helsingborg appeared to focus more on sustainability aspects, and the city of Eindhoven underlined the use of technology to improve both sustainability and quality of life in the city. It is evident that digitalization has brought about new business opportunities, for example, by transforming and opening up the traditional city context, increasing the amount of urban data, and enabling easier cooperation between different actors in each city.

This research was started by arguing that smart cities need a new approach for governing and decision-making since new forces, such as digitalization, globalization, and urbanization, are affecting the cities more than ever, and the development is just increasing in the future. We took a look at both smart city and business model literature and found out that they both have developed from closed to open models and ways of working. Thus, in this research, we have demonstrated how the business model and its anchoring concepts (opportunity, value, and advantage) could work as a development and governance tool for future smart cities. Our research paves the way to understanding and showing how the business model approach and its anchoring concepts change the way of thinking regarding competitive advantages and how this

new approach can lead the way to more resilient, sustainable, and agile city development and governance. Our data shows that most of the opportunities are exploited and created through cooperation in the city context. The importance of connectivity networks has been recognized in earlier research (c.f., Morandi et al., 2016).

Furthermore, adopting the business model thinking in a public smart city context enables city governance to focus on the essential aspect of their responsibilities and reducing complexity when the focus is on relevant information (Wirtz, 2016). A well-planned business model could increase the sustainability of competitive advantages and create long-term success (Wirtz, 2016). Also, customer orientation is visible in the cities' values. In practice, cities aim to add value for their citizens' benefit by co-creating and co-capturing it with companies and citizens. Regarding cities' competitive advantages, both companies and citizens play an important role by bringing both know-how and income to cities. On the qualitative side, satisfied citizens having good well being can be seen as the holding force keeping companies and educated people in the city and attracting new citizens and companies.

Legal scholars have argued that platform economies that are based on sharing principles are forcing city stakeholders to rethink what public interest and value means in the digital age, and how to update these notions (Finck & Ranchord, 2016). Thus, the question of opportunities, values, and advantages in the context of a wider public good is vital for understanding digital platform economies and planning a business model framework that works in practice. Ecosystemic and platform ways of thinking enhance understanding of modern business in a smart city context, where the powers of globalization and digitalization are changing boundaries of the industries (Durst & Poutanen, 2013; Iivari, 2015). The diversity of different players, such as public organizations, citizens working together, and small and large companies, characterizes the modern ecosystemic context (Zamanifard et al. 2018 & Iivari, 2015). However, often the agendas of the different players are becoming differentiated (Zamanifard et al. 2018). An open platform approach in smart cities can create value for citizens, companies, and the city itself when different knowledge and skills are brought together via lowering the boundaries of different industries working in a city (Perätalo & Ahokangas, 2018). To successfully work, an open platform approach needs the development of capabilities to manage the knowledge processes, such as exploitation, exploration, and retention processes, which take place between the companies and their environment (i.e., Foss et al., 2013; Saebi & Foss, 2015). At the core of the platform, business models in a city context are the business opportunities born via a shift of industrial and organizational boundaries (Perätalo & Ahokangas, 2018). The business model approach presented in Figure 2 highlights the importance of continuous development in digitalization. This is relevant as open platforms based on social network systems are continuously evolving (Fehrer et al., 2018). Thus, platforms should provide transparent infrastructure for third parties to connect to the platform (Fehrer et al., 2018). Transparency allows for new information, knowledge, and service exchange between actors on the platform. Accordingly, different platform actors can complement each other and increase platform innovation (Ceccagnoli et al., 2012), thus creating new opportunities in the city context.

5.1. Managerial implications

This research aims at developing a new business model thinking framework for smart cities. The

framework can guide smart cities by digitalizing their services and processes by first recognizing different digital opportunities they have, both gaining and providing added value, and eventually achieving and maintaining competitive advantages. This could be the basis for individualized development and governance tool for smart cities.

Governance and political discussion within cities tend to be opposite from the business model approach (e.g., Honeybone, 2018; Ekman, 2018). According to our interview data, city decision makers tend to start by seeking, achieving, and maintaining competitive advantages rather than recognizing different digital opportunities that can be found from the digitalized city context. They also want to provide and gain value from citizens and companies rather than strengthen the cooperation in the city that would lead to platform development. Cities tend to generalize and diffuse digital skills rather than accelerating and adopting new digital technologies in cities. In short, governance and political discussion tend to emphasize clockwise thinking, as presented in Figure 2, while the business model thinking would emphasize counterclockwise thinking and capabilities. The business model approach in the city context represents a different way of thinking and governing the city.



Figure 2. Business model approach in city governance.

Based on the results of this research, we propose city representatives and governance follow the business model approach in the following order to reach the full potential of digitalized city services and processes. First, city governance should recognize different opportunities that digitalization can bring to the city. This means a constant evaluation of how to develop city services and processes. Second, city governance should aim at strengthening cooperation in the city. Cooperation should be strong with both the citizens and different city departments. Third, cities should accelerate and adopt digital technologies in cities. Adopted technologies must

communicate and work together well so that they make city services and processes fluent and efficient. Fourth, it is necessary to generalize and diffuse digital skills to both citizens and city representatives. This also intensifies the use of adopted digital technologies. After this, cities can provide and gain value from citizens and companies through easily accessible services. Only after the fifth step can cities start to seek, achieve, and maintain competitive advantages from adopted digital opportunities. It is important to notice that the business model approach is an ongoing process that requires commitment and cooperation at the broader city level.

In summary, opportunities, values, and advantages in the smart city context are highly interrelated, and they should be regarded in a continuum. Recognized opportunities can strengthen cooperation with both citizens and companies, thus accelerating digital technologies' adoption in the city context. This can lead to value creation for the city and its citizens through easily accessible services, which invites new companies and attracts new citizens to the city. By helping city representatives and governance develop city services and their processes efficiently, the business model thinking would lead to societal implications. It is intended to lead to a higher adaptation rate of different digital opportunities in the city and a higher success rate of implementing these opportunities in practice. This would allow more effective and efficient development of more sustainable city services and processes, highlighting the importance of citizen centricity and cooperation. This can lead to economic, social, and environmental value creation, hence increasing overall happiness in the city context.

5.2. Limitations and future research directions

However, these findings are not without limitations. This qualitative research has been done by analyzing words, "which are fatter than numbers", meaning that words can have multiple meanings (Huberman & Miles, 1994). In addition, the translation of the keywords and quotations from Finnish to English may set limitations for concluding. We carefully considered the terms and keywords collected and deepened our findings with in-depth interviews. We used specific cities as a case in this study, potentially limiting the validity of this study. These cities are part of the European Union's Digital Transition Network and thus are motivated to develop their modes of operations. Also, when the smart city itself is a fuzzy concept is implementing and adopting new strategic development tools and approaches into city context difficult. The smart city business model research is still in its infancy. Smart city business models form an emerging, quickly growing, and developing field of research. This research is one of the first attempts to understand how the business model approach could be applied to a public context. This research can be regarded as the first step towards a more in-depth examination of the smart city context's business model approach.

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