Track 2.3: Business models for the real-time economy

OPPORTUNITIES, VALUES, AND ADVANTAGES IN SMART CITIES – CASE OULU

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1. Abstract

Purpose: Smart cities need new approaches to governance and decision-making; thus, the purpose of this paper is to explore the potential role of the BM concept in a public smart city context.

Design: The study utilizes BM framework typologies and collects case data from the city of Oulu stakeholders. The research uses inductive case study method to analyze and create a platform BM framework.

Findings: This research finds out what kind of digital opportunities, values, and advantages there are in the city of Oulu, and how these are scalable, replicable, and sustainable.

Research limitations/Implications: Definitions for the core components of the BM (opportunity, value, and advantage) in public context. One limitation of this study is that we have one specific city as a case.

Originality/Value: For the first time this research provides definitions for BM components in the city context and thus, proposes a new business model approach for cities.

2. Introduction

Cities are expected to gather more and more people to certain areas because of the world-wide urbanization process. This attracts more attention towards cities (Solanas et al., 2014, p. 74). Dense and large cities can be highly productive and innovative, but also green, and thus desirable from the future perspective (Harrison & Donnelly 2011). However, cities today face increasing challenges when it comes to providing services to their citizens in an efficient way (Walravens 2015; Solanas et al., 2014, p. 74) as many cities are also stretched beyond the

capacity of their existing infrastructure (Belissent 2010, p. 2). At the same time, financial crises at the public sector and municipal bankruptcies are affecting cities (Belissent 2010).

Due to globalization and digitalization, the city environment is changing faster than ever. The digital age has again exposed a need for data collection, near-real-time data processing, digitally connected people, and new forces such as sharing economy and crowdsourcing are entering the city context. For these reasons, cities are becoming smart. This kind of rapid evolution creates many challenges for the development, operation, and economy of cities.

In the evolving city context, it is a fact that cities need to think how they interact with companies when offering services to citizens (Walravens 2013) as new technologies open new possibilities and multiple business opportunities to be applied in public services of the smart cities (Díaz Díaz et al., 2017). According to Vakkuri et al (2010), cities can balance their economy either by cutting costs or increasing service production, i.e., efficiency. It is typical for cities that their costs grow faster than incomes, and this mechanism should be tried to be avoided. Indeed, improving productivity and selecting effective policies in the city sector is necessary. Due to all these reasons, there is no doubt that the business model could be given a role in the field of city development.

Cities are local, national, and international. Global uncertainties have an impact on the availability of resources, local uncertainties have an impact on planning and investing actions and may cause cause polarized views. Consequently, the governance of cities plays a central role in city development (Honeybone et al. 2018). According to the IBM's Smarter Cities work (2009), after the economic crises in 2008-2009 cities have realized that they are in competition with other cities in a way that they had not ever been – they are now competing with the cities located on the other side of the world. They are not just competing for the investments and jobs, but also for the skilled workforce that can help to develop new economic strength.

The governance in the cities is at its simplest overseeing an issue and deciding what to do with it, and the practices of governance are influencing the way how our society is organized and steered. Governance includes private resources and associated practices and choices as well as collective actions of the society. Today, the attention in governance is on the urban issues and politics and urban governance is under high pressure to deal with everything from macro dilemmas to micro-dilemmas. Often, governance is under-performing to deliver results. One example of this is the increased housing costs that makes urban living unaffordable. Thus, it is highly relevant to seek improvements. Effective governance must recognize and handle traditional modes of economic activity and interaction, but also new modes such as digital citizenship and the digital economy. These new modes create new public value when they enable to solve issues in the urban context (Honeybone et al. 2018).

As we can see, governing and running a city efficiently is a complicated task. According to Cosgrave et al. (2014), cities today need the capacity to respond and lead societal,

technological, and environmental changes that are taking place at the moment. The general city population is no longer served by traditional modes of governance because citizens are adopting new behavioral patterns, and cities have to be able to respond to the changing context (Cosgrave et al. 2014). Digitalization and IT structures make it possible to understand better the real-time functioning of the smart city and help longer-term planning and policy decision making (Honeybone et al. 2018). However, the reality is not too straightforward. Cities face the challenges of exploring the economics of smart city investments, and those working in the city government must understand how these investments targeted at existing national and local political strategy levels with changing priorities. Indeed, many drivers are pushing city governments to act. Now or never, it is the time to understand what can be achieved by the cities; this is relevant to all city authorities (Cosgrave et al. 2014).

The business model can be seen as a tool to address business change, align economic value creation and technology development (Glova et al., 2014; Iivari, 2016; Chesbrough & Rosenbloom, 2002), but it also enables to bring abstract strategic theories to a practical level and into action (Ahokangas & Atkova, 2015). In the city context, the business model approach and its anchoring concepts also provide a new perspective to the organization's strategic thinking when it supports planning and implementing change (Bridgeland & Zahavi, 2009, p.25). These anchoring concepts are opportunity, value, and advantage (Amit & Zott, 2001). From practical perspective, opportunity may be defined to be something positive to be reached (Holm et al., 2015), and the business model can help to recognize those opportunities. Business model is also a source of value creation and capture (Amit & Zott, 2001), and by creating value it can act as a source of competitive advantage (Casadeus-Masanell & Ricart, 2010).

Today, there is not yet unified understanding of how the business model concept could be adopted into a public context where the major purpose is to engage public good and not to chase economic growth as such. From this standpoint, the purpose of this paper is to explore the potential role of the business model concept in a public smart city context from the city stakeholders' viewpoint. Thus, the research question of the paper is as follows: *What kind of digital opportunities, values, and advantages there can be in the city context*? The specific case from which the data for the paper is collected comes from the city of Oulu, Finland. This research aims to contribute to the business model discussions, especially from the perspective of the anchoring concepts of opportunity, value, and advantage in the context of the cities.

The theoretical framework of the paper consists of the business model, and regional planning literature with a focus on the smart city context. The data comes from an Internet survey that

has been sent to the stakeholders of the city of Oulu.

3. Theoretical background and framework of the study

3.1 City as economic space

In the 1990's the 'new regionalism' emerged into academic and policy discussions. These arguments have their starting point in the idea that the national economy is a no longer relevant level of analysis and we should rather focus on regions and cities (Herrechhel & Newman, 2002 p. 31). One of the most important factors for the emergence of the new regionalism was the intense increase of technological innovations which initially caused the decrease of the role of distance by enabling both social and business activities any place and any time (Morandi & Rolando 2016, p. 9).

In 199,7 Storper et al. claimed that a successful city's "soft" characteristics and the "untraded interdependencies" are embedded in its economic activities. Perhaps that claim formed the most significant shift in the economic understanding of cities (Herrechhel & Newman, 2002 p. 18). For Storper, cities, economies and organizations are tightly coupled. Economic geographers have used similar ideas to identify successful city regions' qualities (Herrechhel & Newman, 2002 p. 18). In addition to the economic advantages of the city region, economic geographers have researched for years institutional factors that are related to success. Flexible policy responses and flexibility in governing institutions themselves are the two core aspects of a successful city region. The flexible city region is based on the idea of networks of relationships between governance institutions and companies. The formal institutions of government are important but as important for the successful city region and its development are also the informal relationships (Herrechhel & Newman, 2002).

In the core of Storper's theory of regional development are the ideas of learning and innovation. Today's phase of globalization and digitalization drive the economic development, demand, as well as cooperative and reflective public and private sector actors who can support institutional environment (Herrechhel & Newman, 2002, p. 19). The involvement of local government and stakeholders seems to increase stability and the degree of continuity in cities (Herrechhel & Newman, 2002, p. 19). However, we cannot underestimate the role of citizens.

Today, a city can be seen as an economic space. The regional economy is a complex patchwork of local industrial districts (Herrechhel & Newman, 2002, p. 19). Urban studies are now, even more, exploring the use of networks within urban planning and geography (Lizcano 2014; Ward & Jonas, 2004). In the new economic space, the city itself and also businesses and citizens are undertaking their own digital transformations (Berman 2012). Businesses are rethinking their customer value, and how to take advantage of the opportunity to innovate, grow, and differentiate (Berman 2012). Cities are thinking how to implement new smart and digital solutions in the city context in a sustainable, responsible, and replicable way.

This can have a significant impact on traditional urban interpretations when a city can make use of data in the real-time urban analyses, monitoring, planning, and management. High-quality data can enable

the implementation of new services that are useful for citizens, companies, and public administrations (Morandi & Rolando 2016).

3.2 Toward new regional understanding – competitive city regionalism

Cities are an important part of the economic development, and in order not to sidelined from the circuit of global capital, they have to take part in the economic development by offering their public goods and services to their citizens in cooperation with companies. There is a rapid growth of academic writings about competitive city regions (Ward & Jonas, 2004). Competitiveness is the key 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 important role in the context of competitiveness. This quality consists of infrastructure, social services, growth management, and environment quality (Hannah & Walton-Roberts 2004). It is also important to notice that cities are now positioned into a world of trade relations and, thus, in order to compete with 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).

It is important to recognize different digital opportunities, values, and advantages in the cities in order to gain competitive advantage. Cities are in desperate need of tools on how to plan and govern the grooving region in a sustainable way.

4. Smart city

In a nutshell, the evolution of the smart city can be divided into four phases: starting from 1990s ICT advancement, evolving to urban spaces that attract investments, to ubiquitous technologies in the cities, and latest to solutions that support environmental sustainability (Anthopoulos & Fitsilis 2014). In the 1980's and 1990's technological advancement and economic growth triggered two phenomena: global urbanization and digitalization (Cocchia 2014). Poter (2000) popularized industrial districts in early the 1980s by starting to call them 'industry clusters' and 'technology districts,' and in the early 1990s, it was significant how urban development was turning towards innovation, technology, and globalization (Gibson et al. 1992). People also wanted to move to greater cities that could offer them more opportunities in terms of education, work, and social life (Cocchia 2014). Due to the

increasing attention, cities started to face increasing challenges when providing services to citizens efficiently (Walravens 2015 & Solanas et al., 2014, p. 74). In this kind of rapidly evolving city context, cities need to think new ways of how they can offer services to the citizens (Walravens 2013). One way to do this

could be through the digital infrastructure of the city as new technologies open new possibilities when applying public services in the cities (Díaz-Díaz et al., 2017).

After 2010, the concepts of smart and digital city have been popular research topics in many research fields, and smart and digital urban development is seen to be like a strategy to improve the quality of life in cities (Dameri & Cocchia 2013). At the same time, new technology has seen to open new business opportunities in smart cities. Now also city governments, and politicians have noted the importance of smart city solutions (e.g. Hollands 2008).

However, offering services to a bigger number of citizens is not enough anymore. Cities have quite recently realized that globalization has several consequences that affect their operations, and cities have to prepare themselves to other issues as well. According to the IBM's Smarter Cities work (2009), cities' have the desire for economic growth because after the economic crises in 2008-2009 cities have discovered that they are in a competition with other cities in a way that they had not ever been – now on a global scale. They are not just competing for the investments and jobs, but also for the skilled workforce who can be the developers of new economic strength.

Even though the concept of the smart city 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 90's the term "smart growth", which evoked new political practices for better urban planning. Later, at the beginning on 2000s, a new definition for the smart city was presented by Komninos (2006), who 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 coopetition towards a sharing economy (Perätalo & Ahokangas 2018).

As noted above, there is no widely accepted definition of a smart city. Even though, some key terms and characters are often highlighted in the definitions found in the smart city literature: 1) networked infrastructure, 2) technology as a political and social enabler, 3) business-led urban development, 4) aim to change how services are delivered and how residents are included in them, and finally 5) vision for a better future (Albino et al., 2015; Pardo et al., 2011). Also, according to Zygiaris (2012), smart cities tend to prioritize their innovation ecosystems to aim towards social and environmental sustainability via urban planning. To be able to improve environmental sustainability, there are four dimensions to take account in

urban planning: actors, priorities, resources, and policies (Schaffers et al., 2011). These four dimensions create the basis for an integrated framework that can be used to research how governments are predicting initiatives aimed at creating a smart city (Afonso et al. 2015). The smart city is about using feasible and real technologies and using sustainable business models so that to have a measurable and direct impact on businesses, service delivery and citizens (Honeybone et al. 2018).

Nevertheless, the smart city can still be considered a vague idea because of many existing definitions of which no one has been universally acknowledged (Coccia, A. 2014, p. 13; Solanas 2014, p. 75). Even though the smart city concept remains vague, it has great potential in framing the challenges that cities face today and it also provides a new way of thinking about potential future issues (Walravens 2015).

5. Business Model

The term business model has dominated in the managerial literature since ‘90s especially when it came to the emergence of the Internet (Demil and Lecocq 2010). Since then, the focus of business modelling has shifted from a single firm’s closed business model that makes little use of external ideas and technologies, to a mixed, networked model where some services are private and others are public, and again towards open, ecosystemic business model view that enjoys the benefits of a larger community (Casadesus-Masanell et al., 2011). A sharing economy became a buzzword in the urban context in 2011, and in this context, it has been called as a new frontier of economic innovation (Ferreri & Sanyal, 2018).

According to Teece (2010, p. 174), several factors of today’s world support the importance of business models. For example, he stated that “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 can be seen to be depended on the surrounding context through competitive advantages and business opportunities (e.g. Ahokangas & Myllykoski 2014). To be able to adapt to the changes in the surrounding competitive context, there is a need for continuous business model transformation (Achtenhagen et al. 2013; Doz & Kosonen 2010). The business model transformation is an essential requirement for business model sustainability (Atkova 2018, p. 19). There is an emphasis on the dynamic nature of the business model concept (Demil & Lecocq 2010).

The reasons listed above, on this paper we rely on a definition where the business model is defined 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 (e.g. Zott & Amit, 2010). We can say that in cities, 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 the business model for the city context (Teece 2010). 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.

5.1. Grounding concepts of business model

The three key aspects of the business model are opportunity exploration and exploitation, value creation and capture, and achieving competitive advantage (e.g. Amit & Zott, 2001; Teece 2010; Morris et al. 2005). As opportunity is defined to be something positive to be reached (Holm et al., 2015), opportunity is strongly dependent on the external context (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).

The business model is a source of value creation and capture (Amit & Zott, 2001). Value creation can be a source of competitive advantage, and competitive advantages are needed to become and remain competitive (Casadeus-Masanell & Ricart, 2010). Competitive advantage can be seen as an ability to create greater value for organization, shareholders, and stakeholders, and thus it gives competitive edge related to competitors (Iivari, 2016). In the setting of technology-based businesses in the smart city context, when identifying a journey towards establishing a sustainable competitive advantage the dynamic perspective is needed.

Furthermore, scalability, replicability (e.g. Giesen et al., 2010), and sustainability (e.g. Brocken et al., 2014; Evans et al., 2017) are also denominators of the business model, but they can also be regarded as an important outcome for the smart city (Alusi et al., 2011). In the smart city context, scalability can be defined as a capability to flexibly serve a changing number of citizens, replicability is a capability to copy good practices or outcomes elsewhere, and sustainability is a capability of being economically sustained and provide positive societal impact. In this research, these six components opportunity, value, advantage, scalability, replicability, and sustainability, will create together the business model framework for the smart city. The business model framework is depicted in figure 1 below.

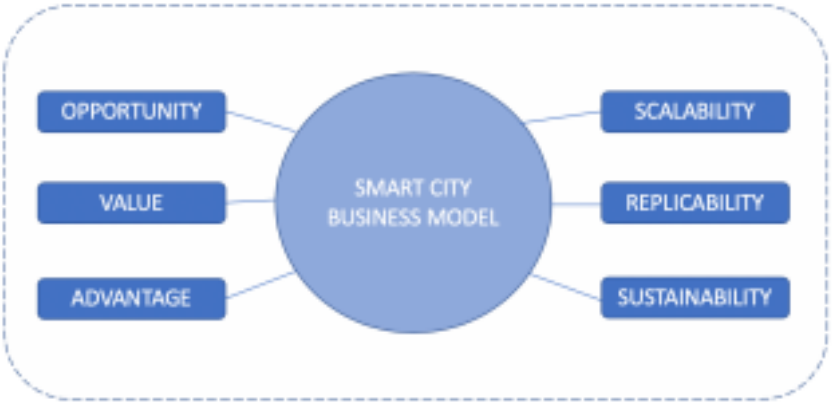

Figure 1. Research framework for smart city business models

5.2. Platform business model

The business model concept was developed in the context of a focal firm but recently the business model research has started to consider how it interacts with other players. Thus, the most recent business model literature is interested in the platform business model. The concept of platform business model is relatively new, and still lacks an accepted definition (Fehrer et al. 2018). However, we can see that platform business models are based 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). In short, platforms are empowered by digital technologies and complex software that is able to connect different actors easily. This means that platform ecosystems provide transparent infrastructure for third-parties to connect the platform (Fehrer et al. 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).

Subscribing to the above discussion, markets have become a complex network of relationships between different actors and competitive landscape have changed (Perätalo & Ahokangas 2018). The business model concept has developed from closed to mixed and again towards an open model that benefits the larger community (Casadeus-Masanell et al. 2011). A sharing economy became a buzzword in an urban context in 2011 and it has been called as a new frontier of economic innovation (Ferreri & Sanyal 2018). Digital technologies have opened up new opportunities and created platforms through which people, companies but also public utilities and cities can share their products and services (Ferreri & Sanyal 2018). According to Riley (2012), sharing or platform economies will change the way in which economic activities take place in cities. 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 & 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.

5.3. Smart city platform business model

Smart cities are becoming aware that they need new tools for delivering services to citizens and business model could provide a new perspective to the city organization's strategic thinking. However, there are several unique characteristics in smart city business model when public organization becomes an active actor in value network (Walravens 2015). First, cities major purpose is to engage for public good and not to chase economic growth as such. Second, city is a business net of services where there can be several leading actors which can influence the

business model development in case they have a critical role in performing activity (e.g. telecom operators) (Kijl et al. 2005; Palo, 2014).

We can see that both the smart cities, and the business models, have become more open (Perätalo & Ahokangas 2018) which means that the role of one single co-player is decreasing. This evolution enables co-operation and co-creation between multiple actors and thus challenges the traditional business model thinking logic (Fehrer et al. 2018). Platform business models highlights the importance of "actor-to-actor" approach (Ondrus et al. 2015), and in city context this means increasing importance of city stakeholders and companies that are working in or with the city.

For the purposes of this paper, we address the smart city as a digital business platform ecosystem. Digitalization is a technical term which relates to the conversion of analog information to digital form (Iivari, 2016). New revenue and value creation opportunities can be found via the use of digital technologies. The business ecosystem of the smart city is constant

change due to different services that are changing citizens' daily life and behavior as well as the business in a public context. The smart city as a digital business platform ecosystem includes a diversity of different stakeholders when the smart city as a concept includes a strategic course that emphasizes the ever-increasing importance of ICT in modern urban development (Zyriagis 2013; Paskaleva 2011).

6. Research method and process

The literature of smart city business models is still in an early phase and remains fragmented.

This research aims to find out what kind of digital business opportunities, values, and advantages there are in the city context by focusing the city of Oulu. The city of Oulu is a globally acknowledged smart city (e.g. Caragliu et al. 2011). According to Rantakokko (2012), Oulu has driven smart city development activities since the´90s. Oulu is the sixth largest city in Finland, and it is called as the capital of Northern Scandinavia due to its largest urban concentration of inhabitants. The population in Oulu is the youngest in Europe and Finland (34,5 years), and that is likely the reason why the city is so eagerly driving towards the future (e.g. Rantakokko 2012).

The research is based on the emerging phenomenon, and it is explanatory in nature. Therefore, this research considers the phenomenon itself to guide the theoretical approach. This research does not bind itself to any single mainstream theory, as the concepts of the smart city and business model comprise a wide set of research areas that are generally working independently. However, the common ground within the smart city and business model can be found from the strategic management, where the goal is to find out how to create and sustain competitive

advantage by exploring and exploiting opportunities (e.g. Hitt et al. 2011). In order to capture this richness, inductive qualitative interpretive case study method was found to be suitable (e.g. Eisenhardt, Graebner, Huberman, & Miles, 2007).

The data was collected through an open Internet survey, and the questionnaire was sent to the city of Oulu stakeholders. Our aim was to map what kind of digital business opportunities Oulu has, what kind of added value and competitive advantages could these opportunities bring to the city, but also how to implement these opportunities in and responsible, replicable, and sustainable way. There were 18 questions of which 12 were free text field questions, and six of them were related to keywords that describe the phenomena. Stakeholders were able to write 3 to 5 keywords related to each opportunity, value, advantage, scalability, replicability, and sustainability, so all together the maximum number of keywords per phenomena is 65. The survey was made in Finnish to make it easy as possible to answer and describe the phenomena.
The survey was sent to the stakeholders of the city of Oulu, and altogether we got 13 answers.

7. Key findings

There are multiple different digital business opportunities in smart cities, these opportunities can create a lot of added value, and increase the city's competitive advantage significantly.

7.1 Opportunities

City of Oulu's respondents see that the biggest digital opportunities are related to customer orientation, efficiency, and data. According to the respondents, these opportunities are important for the city because they increase the city's livelihood, competitive advantage, and cost efficiency. Respondents also see that the city already have the knowledge and technology ready for taking advantage of these opportunities. However, there is a need for further research for which processes and services to develop. There is also a need for opening up the city processes and making them more transparent.

Table 1 presents the keywords related to the digital opportunities in the city of Oulu. We can see that co-operation and networks (15%), know-how and ICT (11%), efficiency (11%), and customer orientation and services (11%) are the four most important themes that describe digital opportunities in Oulu.

Table 1. Keywords related to digital opportunities (N=46)

Co-operation and networks	15%	7
Know-how and ITC	11%	5
Efficiency	11%	5
Customer orientation & services	11%	5
Ecosystem	9%	4
Other (e.g. leadership, enormous)	43%	53
TOT.	**100%**	**46**

7.2 Values

The city respondents see that there are several value creators and capturers in the city, but the most important ones are companies, citizens, and the city itself. They can add value by increasing cost-efficiency, and smoothing and fastening city operations, and increasing the city's vitality. These factors are important for the city because respondents think that at the moment, the city cannot serve all due to old fashioned way of working. Added value could increase the city's competitive advantage.

Table 2 presents keywords related to the digital value in the city of Oulu. We can see that

customer services (18%) describes the digital value best.

Table 2. Keywords related to the digital value (N=46)

Customer services 8	18%
Cost-effectiveness 7	15%
Other 33	67%
TOT. 100% 46	

7.3 Advantages

Three most important competitive advantages that the city of Oulu has are technology, digital knowledge, and service design capabilities. According to the respondents, competitive advantage can be reached via co-operation with citizens and companies, but co-operation is also needed inside the city and its functions and services. Respondents sees, that competitive advantages increase the city's vitality.

Table 3 presents keywords related to competitive advantages in the city of Oulu. The most important theme is know-how (21%) that includes know-how coming from both companies, and education. A second most important theme is wellbeing (11%), that includes both citizens

and companies' wellbeing in the city. Thirdly, respondents see that competitive advantage is tightly related to the city's image (8%).

Table 3. Keywords related to competitive advantage (N=38)

Know-how 8	21%
Wellbeing 4	11%
	8%
	60%

Image 3

Other 23

TOT. 100% 38

7.5. Scalability

Scalable digital services could make city services more efficient and allow co-operation between different actors in the city. Thus, it would also increase the number of new innovations. To be able to take advantage of the scalable digital services, city of Oulu's should do more co operation with different actors in the city, but also have a common strategy on how to work. Scalable digital services ensure, that the city is at the forefront of digital development, but they also make the city functions and services more cost-efficient.

Table 4 presents keywords related to scalable digital services in Oulu. Two most important themes are easiness and fastness (38%), and customer orientation (15%).

Table 4. Keywords related to scalability (N=34)

38%
15%
6%
6%
6%
29%

Easy & fast 13

Customer orientation 5

24/7 2

Cost effectiveness 2

One-stop principle 2

Other 10

TOT. 100% 34

7.6 Replicability

Replicable digital solutions could bring cost-effectiveness to Oulu, and they could also increase the city service's easiness. In order to take advantage of the replicable solutions, Oulu should do more co-operation with different actors in the city but also co-operate with other cities. Replicable solutions also allow new business functions in the city. These solutions can create a great brand for the city but also increase cost-effectiveness.

Table 5 presents keywords related to replicable digital solutions in Oulu.

Table 5. Keyword related to replicability (N=30)

Co-operation 8	27%
Easiness 5	17%
Cost-effectiveness 3	10%
Scalability 2	6%
Other 12	40%
TOT. 100% 30	

7.7 Sustainability

Respondents think that Oulu's should think about time and place independence, maintenance, connectivity, and openness when developing sustainable digital services. Table 6 presents keywords related to sustainable digital solutions in Oulu.

Table 6. Keywords related to sustainability (N=24)

Environment-friendly 7	29%
	8%
	63%

Cost-efficiency 2

Other 15

TOT. 100% 24

8. Discussion and conclusion

Our aim in this paper has been to describe what kind of digital business opportunities, values, and advantages there are in the cities, and how these could be exploited in a scalable, replicable, and sustainable way. It is clear, that digitalization has established new business opportunities

for example by transforming and opening up traditional city context, increasing the amount of urban data, and enabling easier co-operation between different actors.

In our research model, the opportunity is defined to be something positive to be reached (Holm et al. 2015). Our data shows that in the city context, most of the opportunities can be exploited via co-operation. The importance of connectivity networks is recognized among other researchers as well (e.g. Morandi et al. 2016). Furthermore, adopting the business model in a public smart city context enables city governance to focus on the essential aspect of their responsibilities and thus, reducing complexity when the focus is on relevant information (Wirtz 2016, p.14). We can say that well-planned business model can increase the sustainability of competitive advantages and create long-term success (Wirtz 2016).

The customer-oriented view is clearly visible in the value component. Public sector organizations are meant to fulfill the responsibilities of government, they are expected to deliver services, and cooperate in policy development. In practice, the city aims at adding value for the benefit for its citizens (ref). Besides, the value can be co-created and co-captured with companies, citizens and the city. Thus, connectivity networks are important (e.g. Morandi et al. 2016). Value co-creation increase cost savings when work and resources are divided.

When it comes to the competitive advantage of the city, both companies and education play an important role. They bring know-how to the region. Satisfaction and wellbeing can be the holding forces that keep companies and educated people in the city, and thus satisfaction and wellbeing are important to take account when talking about competitive advantages in the city context.

Scalability is often understood as a capability to serve changing number of citizens (Giesen et al. 2010) and our data supports this definition by highlighting easiness, speed, customer

orientation, 24/services, cost-effectiveness, and one-stop principle. In practice, scalable solutions could enable service provision 24/7 for citizens by using digital solutions. This could also increase cost-effectiveness and make services easier and faster to use for citizens. Digital solutions could also make one-stop principle possible if a citizen could use only digital services.

In our research model, replicability is defined to be a capability to copy best practices elsewhere (Giesen et al. 2010). This demands co-operation not just inside the city, but also with third parties, but possibly with other cities as well. Replicable solutions make running errands easier for citizens, companies, and the city itself when the platform is already familiar from some other service.

In our model, we defined sustainability to be a capability to economically sustained and provide positive societal impact (e.g. Brocken et al. 2014; Evans et al. 2017). Data support this dimension by highlighting environment-friend aspect, and cost-effectiveness. Keywords

describing the six business model components in the smart city context are depicted in the research framework below.

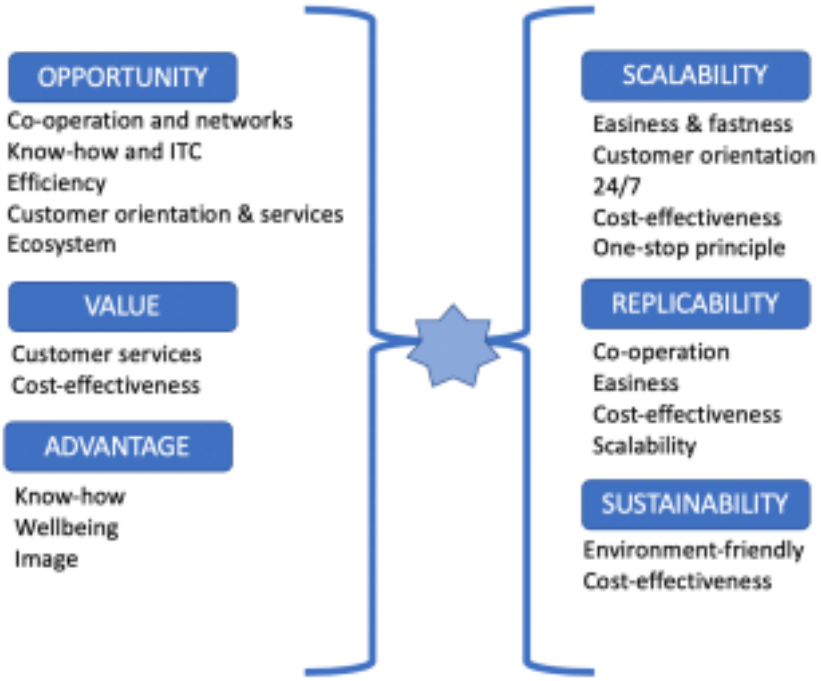

Figure 2. Smart city business model components

When taking a closer look to every business model component's keyword that are placed under the label "other", we can see that there are multiple common nominators between

opportunity, value, advantage, scalability, replicability, and sustainability keywords. Those common keywords are *challenging, up-to-date, huge, diverse, ecosystem, and management*.

The word "*challenging*" can be found in every component, whether is related to finding new opportunities, capturing value, gaining competitive advantage or creating scalable replicable and sustainable solutions. This challenge may occur, because city operations may not be up-to date, and that might be the reason why the respondents mention the word "up-to-date" in almost every component. Despite the work is challenging, by looking at the keywords, we can see, that respondents see the digital opportunities, values, and advantages as a huge and diverse. When the opportunities, values, and advantages are huge and diverse, ecosystem management becomes in a central role, and we can find those both management and ecosystem from the list of "other" keywords.

To sum up, there are several opportunities, that can create value and thus increase the city's competitive advantage. Customer orientation, co-operation, and cost-effectiveness nominate the business model components in the city context. However, these findings are

not without ambiguity. We used one specific city as a case in this study, and that is potentially limiting the validity of this study. Also, the relatively small size of samples can limit reliability. We noticed, that the concept of sustainability need clarification. For the future improvements, we are going to update the questionnaire, and send it to the bigger group of city respondents, and also to the other cities in Europe in order to get more data.

9. References

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