

Sonja Viljanen

INNOVATIONS AND ECOSYSTEMS

A Characterization of Smart Tampere Innovation Ecosystem

Faculty for Management and Business
Master Thesis
May 2019

ABSTRACT

Sonja Viljanen: Innovations and Ecosystems: A Characterization of Smart Tampere Innovation Ecosystem
Master thesis
Tampere University
Master's Programme in Innovative Governance and Public Management
Supervisor: Hanna Salminen
May 2019

The following thesis focuses on innovation ecosystem. As described in the first section, innovations are of great importance for tackling global challenges such as climate change and thus, of relevancy for the regional economic development. The growing importance of innovations has motivated numerous new approaches to innovation management, especially in the last years the approach of innovation ecosystem.

In the second section, the concept of innovation ecosystem is introduced and the most relevant concepts from the literature are discussed. It thereby compares innovation ecosystem to other concepts such as regional innovation system and other types of ecosystems. On the basis of the previous literature, a framework for characteristics of innovation ecosystem and ecosystem leadership is presented for studying the case of Smart Tampere.

The study contributes to the fragmented literature on innovation ecosystem by conducting a case study in Tampere, Finland on the city's Smart Tampere -programme and characterizing the local innovation ecosystem as well as looking at the perceived and expected role of Smart Tampere as public sector representant of ecosystem orchestrator. Smart Tampere -programme provides ecosystems in different areas of smart development. Then, the third section describes the procedure of case selection to conducting qualitative semi-structured interviews on three different groups of ecosystem actors (city officers, university, growth companies) and the approach to analysis.

The results are presented in the fourth section. The ecosystem is characterized by being strongly bound to the local context. Whereas innovation is not the goal but the mean to find solutions, each actor followed their own set of goals with the understanding of the need of collaboration. Results are then discussed and put into perspective in the fifth part of the thesis. As such, innovation ecosystem grasps the complexity of the phenomenon but is object to a lot of interpretations due to unclear definition. No matter what concept for innovation management is used, private sector actors call for long-term plans and clearer structures from the public sector.

Keywords: Innovation ecosystem, innovation management, local context, regional development, Tampere

The originality of this thesis has been checked using the Turnitin OriginalityCheck service.

TABLE OF CONTENT

1	Introduction.....	6
2	Innovations and ecosystems – old wine in new bottles?.....	9
2.1	Central concepts	9
2.2	Innovations	10
2.2.1	Innovations in regional economic development	11
2.2.2	Smart Cities.....	12
2.3	Ecosystems	13
2.3.1	Ecosystem as a metaphor	14
2.3.2	Regional development concepts.....	16
2.3.3	Different conceptualisations of ecosystems	18
2.3.4	Innovation ecosystem.....	20
2.3.5	Summary	26
3	Research Design.....	28
3.1	Introduction of the case: Smart Tampere	29
3.2	Why Smart Tampere?.....	30
3.3	Methods of data collection	31
3.4	Analytical approach.....	33
4	Results.....	36
4.1	Characteristics of Smart Tampere innovation ecosystem	36
4.1.1	Baseline	37
4.1.2	Relationships and connectivity	39
4.1.3	Actors and roles & governance	43
4.2	Perceptions of and expectations on Smart Tampere as ecosystem orchestrator	48
4.2.1	Governance	49
4.2.2	Building partnerships and platforms	51

4.3	Local conceptualisation of ecosystem	54
5	Conclusion	58
5.1	Summary of the results.....	58
5.2	Discussion	59
5.3	Limitations and suggestions for future research.....	62
	References.....	64
	Appendix.....	68

LIST OF FIGURES

Figure 1 Smart City Layers	12
Figure 2 Characteristics of Innovation Ecosystem	21
Figure 3 The role of Ecosystem leader in ecosystem genesis	26
Figure 4 List of Interviewees	33

LIST OF TABLES

Table 1 Data analysis strategy and category building.....	34
Table 2 Overview on ecosystem definitions	55

1 INTRODUCTION

“One guy from the ministry of economic affairs and employment [of Finland] once promised to tell me what the difference is of [ecosystems]. But then he left for Brussels and never had time for that”

(Interviewee)

Innovations, innovation ecosystems, smart cities, facilitators, co-creation, regional development, co-innovation, platforms, systems... The following pages are full of today’s buzzwords. The innovation paradigm is discussed widely amongst policy makers, city planners, business owners but also scientists of different fields. Innovations and their management have become a widely spread and important topic when discussing regional economic development, but also in their other fields. Innovations and ecosystems have become a regular feature in national and regional competitiveness strategies (e.g. Gobble, 2016; Russo-Spena et al., 2017). Strategies and plans are published in order to achieve the unachievable and become the next Silicon Valley. Or simply put, generate value for the company, contribute to the regional economic development or work for to the greater good.

Then, innovations are utilized and needed to tackle the complex and wicked problems of the globalized world. For instance, new solutions are required to fight climate change that requires skills and know-how from multiple fields. When challenges touch multiple areas of life, also solutions are found in multidisciplinary settings. Hence, innovations have been of interest in multiple academic disciplines. For instance, both practitioners and scientist of different fields have been looking at innovation management and the role of innovations in regional development. This has ended in a relatively thick jungle of innovation management conceptualisation as similar ideas and concepts are presented from different point of views – resulting in overlapping conceptualisations and even misunderstandings. This is reinforced by the rather young age of the discipline and the strongly increased number of publications. (e.g. Lee et al., 2016; Russo-Spena et al., 2017) In order to have an innovative environment for regional economic development to happen, it is important to understand how the interdependencies and connections in an innovative region function and how they can be supported.

Recently, the ecosystem approach has been amongst the most popular ones in innovation management and regional economic development. At first glance, ecosystem may seem just as another concept

amongst multiple theoretical approaches. Just like old wine in new bottles, as similar approaches have already been taken. However, not one approach has been proven to be the one yet. For instance, in some approaches the role of the public sector has been criticized to be too strong. (Gomes et al., 2016). The role of public sector is especially interesting in the setting of Nordic countries, which are infamous for the Nordic paradox – as despite the support of public sector, innovations are not born (Cai et al., 2018).

Innovation ecosystem takes a more natural approach to innovative regional development. The term ecosystem refers to a biological ecosystem, in which functions and activities evolve naturally. As it is used as a metaphor in the innovation studies, it highlights the bottom-up perspective and absence of a strong leader. Also, the balance and adjustments between different roles and different actors are of interest. Despite the lack of a strong leader, ecosystems in nature and in regions can still be orchestrated. Their flourishing can be ensured and strengthened by ensuring the availability of certain goods. (Gobble, 2016) As man-made actions have disturbed the balance of certain natural ecosystems, they can also ensure the availability of certain resources such as water. The preconditions that are needed must first be recognized and then maintained.

Despite its popularity especially amongst the practitioners, innovation ecosystem has faced a lot of critiques, especially in the academia (Lee et al., 2016). The literature so far has concentrated on the definition of different ecosystems including innovation ecosystem. This is mainly based on learning from best practices. (e.g. Gobble, 2016; Russo-Spena et al., 2017; Valkokari 2015) Even though there have been attempts to a common definition, there is no shared understanding in the academia. With the acknowledgement of the critiques, this study sets on the stream of the innovation ecosystem literature and takes a closer look to see how innovation ecosystem is characterized on local level. This is because the success of regional development is anchored in local economic and cultural context (Spigel, 2017). Thus, this study looks at the characteristics of an innovation ecosystem and enlightens the perceptions of and expectations on public sector taking into account the perspectives of different stakeholders. The main aim of this study is to enrich the knowledge on innovation ecosystem in a local context. By doing so, the study aspires to contribute to the fields of regional development and innovation management studies. As the focus lies in contributing to discussion of ecosystem concepts in local context, the study is conducted as a case study on Smart Tampere -programme in Tampere, Finland.

Tampere is a growing, medium-sized city with 231 853 inhabitants and one of the leaders in knowledge-based industries in the Nordic countries with strong university-industry collaboration (Tampere, 2019; Yigitcanlar et al., 2014). Tampere was chosen to form the basis for the study, as the

City of Tampere together with Business Tampere (Tampere Regional Economic Development Agency) launched a Smart Tampere -programme in 2016 as one of their efforts to create smart city services. As one of its three main areas, Smart Tampere focuses on providing ecosystem services for local actors since 2018. (Smart Cities World, 2018) This ecosystem genesis allows to concentrate on the characteristics of the innovative environment and look at the perceived role of public sector, which is represented by Smart Tampere, from different perspectives.

Based on the above, the following questions form the central research aim of this study:

- 1) How can the innovation ecosystem of Smart Tampere be characterized?
- 2) What are the perceptions of and expectations on Smart Tampere?

Despite the amount of approaches, common factors for an innovative environment such as the importance of different actors as research institutions, private companies and public sector have been recognized (Valkokari, 2015). Thus, the qualitative semi-structured interviews amongst city officers (Smart Tampere), university (Tampere university) and private growth companies (local ICT-Sector) build the empirical data for this study. Due to the complexity of the phenomenon, the method was chosen to be qualitative. As it is a case study, the results are limited to time and place and do not allow for generalisations (Masue et al., 2013). This means, the study concentrates on the Smart Tampere -programme. The aim is only to explain local characteristics of innovation ecosystem in Tampere, not to generate any common principles.

2 INNOVATIONS AND ECOSYSTEMS – OLD WINE IN NEW BOTTLES?

In this chapter, first the central concepts are presented followed by a discussion on the role of innovations in regional development. Then, central regional economic development concepts are discussed contrasting out the characteristics of innovation ecosystem to see whether it is old wine in new bottles and how the role of public sector leader is described.

2.1 Central concepts

Below, the concepts of innovation, ecosystem and innovation ecosystem are shortly introduced in order to provide an outline of the concepts that are deepened in the following chapters.

Innovations are characterized by implementation of something new and valuable and they are crucially needed to answer today's wicked problems. Also, the regional economic development can be accelerated through the development of new solutions. Innovations have been recognized to be the "result of constant and balanced fertilisation of ideas, knowledge, and technology between communities and networks". (Russo-Spena et al., 2017, 990) Hence, the collaboration between different actors such as governments, businesses and further local actors in knowledge-based and digitally smart societies increases the probability of finding a new and valuable solution (Romanelli, 2018). Since there is only the possibility to increase the probability, innovation ecosystem concept is utilized to describe and grasp how innovations can be managed and how the interactions between different stakeholders are organized and structured.

Ecosystem has its ancestors besides the biology in both, regional development literature and innovation studies (Cavallo et al., 2017; Stam & Spigel, 2016). The literature is influenced by a mix of social sciences and business studies as well as administrative sciences and geography (Stam & Spigel, 2016). By and large, ecosystem describes a phenomenon on how the collaboration between different stakeholders can be utilized to create value for all the actors involved in the process. By cooperating with other types of organisation resources can be utilized in a way that each participant gains something. This means, that for instance smaller growth companies with specified skills but a lack of financial means can collaborate with big and established companies, who are in possession of capital and infrastructure but are less agile and miss a specific skill. (Autio & Thomas, 2014)

Innovation ecosystem can be distinguished from other types of ecosystems mainly through their purpose of creating innovations. (Valkokari, 2015) As there are multiple definitions on both,

ecosystem and innovation ecosystem, in this study innovation ecosystem refers to be “where a variety of actors interact in a bounded ‘interaction space’ where socio-economic value is created through research, novelty creation, traditional market activities” (Mazzucato & Robinson, 2017, 168). However, the boundaries of ecosystem are vague due to the variety of actors (Autio & Thomas, 2014). Even though ecosystem has become a widely utilized term under both, applied and scholarly fields, there is a range of definitions. This has led to a controversy position of innovation ecosystem in the academia. Some of them call for prohibition of the term (Lee et al., 2016), many for clearer definition (e.g. Dedehayir et al., 2016), some also utilize the term without further notifications (e.g. Autio & Thomas, 2014). In addition to the unclear definition, the concept has also been criticized for its similarity to other concepts which results in little added value. (e.g. Lee et al., 2016; Dedehayir et al., 2016). However, innovation ecosystem has gained popularity and is an integral part of national and regional strategies. Also, there is a shared understanding of the need for more in-depth research on the topic. (e.g. Dedehayir et al., 2016).

The following section has the bold aim to discuss the literature of the relevant terms. First, there will be a brief introduction to the term innovation, which is closely linked to smart cities in the regional development. Following to the discussion of innovation and smart cities in regional development, the concept of ecosystem is presented and compared to similar conceptualisation in order to grasp its character.

2.2 Innovations

Europe is facing economic challenges and the regional economic differences are on the rise throughout the continent (Rinkinen & Harmaakorpi, 2018). In this context, innovations are crucial for ensuring competitiveness in global markets (European Commission, 2018a). Different strategies on innovations and innovation ecosystems are published on the supranational level as well as on local levels. The European Commission also calls for regional innovation ecosystems as there is a need for creativity and collaboration but also ecosystem thinking (European Commission, 2018a). Its creation is even formulated as ex-ante conditionalities in order to receive funding from cohesion policy funds. (Foray et al., 2014). Also, on the national level in Finland, ecosystems are seen as an answer for economic and technological challenges. All in all, ecosystem is an innovation policy tool. (TEM, 2019) For instance, the Council of Tampere region identifies itself as “one of the innovation hotspots in Europe”, in which innovation ecosystem creates value as the new model to foster innovation (Pirkanmaan liitto, 2019).

Before getting deeper into ecosystem thinking, the innovation as such is discussed. The regional development of urban areas is related to the creation of something new, for instance in topics of sustainability and digitalisation. This also highlights the close relation of innovations in regional development and smart cities, both of which will be introduced in the given order in the following pages.

2.2.1 Innovations in regional economic development

Innovations are something new that has value but through its wide use in different disciplines, the definitions differ (Cooke & Leydesdorff, 2006). They are “the result of constant and balanced fertilisation of ideas, knowledge, and technology between different communities and networks” (Russo-Spena et al., 2017, 990). Innovations are “resulting from relationships developed under the influence of the interplay of economic, social, and political factors” (Freeman, 1988, cited by Russo-Spena et al., 2017, 989). Despite the different factors, also different actors are needed. Innovations are co-created by governments, businesses, and people. Often, they are linked to knowledge-based and digitally advanced societies. (Romanelli, 2018). They are needed to answer some of the wicked problems of today’s world such as climate change, urbanization and mobility. This includes significant improvements in technical specifications, components and materials, software in the product, user friendliness or other functional characteristics. (OECD, 2019) From an innovation policy point of view, innovations are defined as part of “governmental policies and programmes, on various levels and in different fields, which could either internationally or by coincidence enhance enabling conditions of the innovation systems of the region” (Cai et al., 2018, 2410). This also highlights the importance of regions. Whereas earlier national policies were in the focus, recently the regions role has grown in fostering innovations.

Innovations can be either explorative or exploitative, which are both required to achieve a balance in innovation progress. The strength suit of exploration lies in discovering new possibilities and taking risks in order to create radical novelty. Exploitation concentrates on refining and continuously developing already existing products and services. In the latter, the development takes place incrementally. Whereas explorative innovations require multidisciplinary approaches, exploitation focuses on specific knowledge. These two types of innovations should also be considered in regional innovation strategies. Ideally, regions would balance between specialization and diversification in order to be resilient. By specializing, region can beat its competitors by becoming efficient and exploiting a certain type service. Being diversified, a region can grasp opportunities from different areas of expertise. As it is an act of balance, regions usually tend to prefer one over the other. This

can then result in just paying for experiments and never gaining the fruits out of it concentrating on exploitation which brings the risk of being trapped into one path with it. (Cai et al., 2018)

2.2.2 Smart Cities

Strongly connected with innovations are also smart cities. Smart city is understood as smart solutions in urban areas, which according to Zygiaris (2013) concern six different areas: smart economy, smart mobility, smart environment, smart health, smart living, and smart governance. Similarly to innovation ecosystem, smart cities is a lot used word without a clear definition. According to the European Commission (2018b) smart cities are “cities using technological solutions to improve the management and efficiency of the urban environment”. The central idea lies in becoming ‘smart’, which is usually connected with digitalized solutions that ease the urban challenges such as pollution or commuting. The cities are required to become ‘smart’ in order to tackle challenges such as environmental and infrastructural issues. This requires intelligence and innovative approaches as many socio-technical and socio-economic aspects must be taken into account. (Zygiaris, 2013) A smart city consists of seven different layers, as can be seen in figure 1.

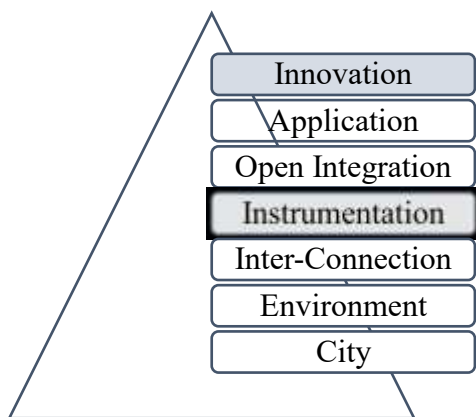


Figure 1 Smart City Layers (based on Zygiaris, 2013, 219)

On top of the layers lies innovation, which concerns economic-techno-social issues and enables growth and higher quality of life, as smart cities serve as an innovative environment also for new business ideas. In order to do so, the public services and infrastructures should meet the requirements of wanted quality needed for foster new businesses. As such, smart cities provide a basis for innovation ecosystems to flourish. The city, with its governance, people, and planning, provide the basis for a smart sustainable city. The city, amongst others, then, make sustainable choices for example concerning public transportation and housing. The next layer describes the need for broadband connection to connect cities actors with each other. After that, different instruments are utilized

to collect data, that are then available on open integration platforms, which then add value to the intelligent services and applications in the city. (Zygiaris, 2013) Smart city as an example of an urban area provides the frame in which innovations and innovation ecosystem takes place. All the layers form a basis for innovation ecosystem, as the different layers can be utilized in providing a higher quality of life for the residents.

2.3 Ecosystems

An ecosystem serves the regional economic development. However, it is still somewhat unclear how the development of an ecosystem can be nurtured. (Rinkinen & Harmaakorpi, 2018). Ecosystems have faced criticism in the academic world and the use of the term is described to be problematic. However, the concept of ecosystem and innovation ecosystem is present amongst the practitioners. By having 78 million hits on Google for only ‘innovation ecosystem’ (Google, 2019, 07/02/2019) the interest amongst practitioners pushes also for interest in the academia. This is also why the role of ecosystem in creating innovation and driving the regional competitiveness has been acknowledged and ecosystem approach is increasingly also utilized in the academia (e.g. Stam & Spigel, 2016).

Different authors have published attempts of literature reviews or definitions of ecosystems (e.g. Alvedalen & Boschma, 2017; Audretsch & Belitski, 2018; Autio & Thomas, 2014; Cavallo et al., 2018; Gobble, 2014). However, these literature reviews have not been extensive, but rather concentrated on a whole variety of perspectives and sources (Cavallo et al., 2018). This means that based on a limited number of publications, different perspectives on ecosystems are defined, and often fuzzy terms like “regional systems of innovation and entrepreneurship” are used to describe ecosystems (Audretsch & Belitski, 2018). This has led to similar concepts being found under different names (Alvedalen & Boschma, 2017).

On one hand, there is literature on regional economic development and innovation management that present concepts such as regional innovation system (RIS), national innovation system, clusters and triple helix, quadrable helix, innovation platforms, value chains, network systems and industrial districts (e.g. Russo-Spena et al., 2017). This is because a lot of different approaches have been taken to understand innovation management and the interdependencies between different stakeholders and activities are of great interest to many authors. However, in the last two decades ecosystem has become a sound part of discussion in several fields amongst practitioners as well as scientists. (Adner, 2017).

On the other hand, there are different ecosystem conceptualisation of innovation ecosystem but also of different types of ecosystems. In the scholarly literature, but also in many business journals, ecosystems come in a wide variety – innovation ecosystems, digital ecosystems, systems of entrepreneurship, entrepreneurial systems, ecosystem service, industrial ecosystems, business ecosystems are only a few names that come across. So, ecosystem is often combined with different terms such as ‘entrepreneurial’ (e.g. Stam & Spigel, 2016; Audretsch & Belitski, 2017), ‘entrepreneurship’, ‘regional entrepreneurship’ (e.g. Audretsch & Belitski, 2017), ‘innovation’ (e.g. Autio & Thomas, 2014; Audretsch & Belitski, 2017) or ‘business’ (e.g. Rinkinen & Harmaakorpi, 2018). All ecosystems are characterized by dynamic and changing aspects. “Different organisms (i.e. species in natural ecosystems or actors with complementary roles in man-made ecosystems) are necessary to keep the ecosystem balanced, and removing one can cause a chain a reaction felt throughout the entire ecosystem” (Valkokari, 2015, 20). Despite the type of ecosystem, it consists of a variety of actors and their networks and interactions. Ecosystems are self-organized and in disequilibrium. (Juceivicius et al., 2014)

Next to other ecosystems, such as business and knowledge ecosystems, each one of them accentuating a different aspect of ecosystems, this study focuses on the literature on innovation ecosystems in order to highlight the facilitation of innovations. As there is a need to refine the innovation ecosystem concept (e.g. Dedehayir et al., 2016), the ancestors of ecosystem literature are taken into account and innovation ecosystem is compared to similar concepts as well as to different ecosystem approaches. This is done from a local point of view - as every case differs and the context matters, there is a need to concentrate on local socioeconomic, informational and institutional aspects and their influence on the individual’s entrepreneurial strives (Audretsch & Belitski, 2018).

In the following, first a look will be taken into the use of metaphors in academic literature reflected on innovation ecosystems. Then, to put it a bigger picture, similar concepts to innovation ecosystem are presented that do not rely on the ecosystem metaphor. This is followed by a discussion and differentiation of different types of ecosystems, ending with the conceptualisation of innovation ecosystem with a look at public sector’s role of ecosystem orchestrator.

2.3.1 Ecosystem as a metaphor

As mentioned before, ecosystem is a multidisciplinary concept that has attracted interest from scientist and practitioners in different fields. The use of the term does not come without concerns as ecosystem is still loosely defined (e.g. Adner, 2017; Autio & Thomas, 2014; Lee et al., 2016). De facto, the ecosystem concept has its roots in biology, describing a contingent collection of natural organisms and systems or communities that are structured, apply to a same set of rules and principles

and react to common forces (Sagoff, 2003). In the literature of geography, business, innovation and administrative studies, ecosystem functions as a metaphor for a phenomenon of the interdependencies and collaborations between different stakeholders, for instance in order to produce innovations. This metaphor has faced a lot of criticism too, for being flawed as it might not grasp the character of the biological ecosystems figuratively. (e.g. Lee et al., 2016). In this study, ecosystem is related to the conceptualisation in the innovation management and regional development literature unless explicitly said otherwise. Despite the criticism, there are a few reasons in favour of using the ecosystem metaphor. These arguments improve the understanding of how the usage of ecosystem metaphor can contribute to the literature on innovation management and regional development studies.

In general, metaphors are used to explain complex phenomena in a descriptive matter (Paasilehto, 2001). In ecosystem literature, complex matters are studied from different point of views and in different scholarly fields. Publications are made not only by regional development studies, which includes scholars from geography as well as social and administrative sciences, but also by authors with business and innovation background, to name just a few. (Cavallo et al., 2018; Stam & Spigel, 2016). The interest of different academic fields and practitioners explains the variety of different conceptualisations but also hints at the complexity of the phenomenon they are trying to get a grasp. This is why metaphors are useful: to clarify complex theoretical concepts. The complex reality can be reduced into a metaphor for an improved understanding. (Paasilehto, 2001)

However, there are some issues concerning the use of metaphors in the academia. Metaphors tend not to have only one clearly defined meaning. (Paasilehto, 2001) The literature on ecosystem reflects this fact. On one hand, a metaphor is used in order to define and describe a complex phenomenon. On the other hand, the use of metaphors causes ambiguity as they grasp a phenomenon in a descriptive way. For instance, Lee et al. (2016) point out that unlike biological ecosystems, ecosystems in management literature are not necessarily self-evolved and self-evolving, and not geographically restricted. However, this does not make ecosystems necessarily a “flawed analogy” (Lee et al., 2016, 1) that should not be used. First, because biological ecosystems might be (harmed but also) nourished through man-made actions, so even in the nature they can be supported through man-made actions. And vice versa: innovation ecosystems such as Silicon Valley were created by human but not with the intention to build an ecosystem. Since human-beings have recognized the importance of ecosystems, both in nature and in regional development, the natural continuum is to support their existence and growth, also with man-made actions. (e.g. Valkokari 2015). Second, Lee et al. (2016) sees biological ecosystems as spatial restricted phenomena, which would not respond the reality of ecosystems in management literature. However, this points out why ecosystems might be such a great

metaphor for innovative regional development. Like biological ecosystems, innovation ecosystems are local phenomena but still connected to a global level. Global events influence the local ecosystems, but local ecosystems can also influence the global development. Like biological ecosystems, innovation ecosystem connects different fields and is temporally scalable. Each actor also has a certain, individual role. This role can change during an ecosystem lifecycle. (Valkokari, 2015)

By and large, one of the reasons for the take-over of the ecosystem metaphor by the above-mentioned fields of studies has been to utilize the self-organizing aspect of biological ecosystems (Valkokari, 2015). It is also of very timely matter to utilize ecological related concepts, from there the prefix 'eco' (Lee et al., 2016). This has also ended up in a discussion on whether to ecosystem can add up on the knowledge on innovation management or whether it is too bound to its biological roots for management studies. However, despite the criticism for the metaphor of ecosystem, it may grasp some aspects that are not available in other conceptualisations of the phenomena. As metaphors are not meant to be taken literally, some discrepancies between the biological and innovation ecosystems may be found.

2.3.2 Regional development concepts

Even though there is a shared understanding that regional economic development is based on knowledge, innovation and learning, there are multiple approaches to it (Tödtling & Trippel, 2011). Region, originally meaning 'to govern' (lat. = regio), has multiple definitions ranging from an administrative division to "an abstract space, a cultural area, or a military field of actions" (Cooke & Leydesdorff, 2006, 3). Basically, a region is a smaller unit than a country, but bigger than local and municipality levels, but regional development can be used as a term to describe a local development for instance even if there are no regional administration in the national systems (Cooke & Leydesdorff, 2006). Generally, the idea behind regional development is to support and manage growth in different regions as regional inequalities have been of relevancy through-out the history. The regional development is influenced by multiple factors such as economy, politics, institutions and culture. In the recent years, the interest has laid in understanding the role of governance in the regional development (Tomaney, 2016). Since there are multiple conceptualisation of regional development related to innovation, this short chapter highlight some of the important distinctions of it. Innovation ecosystem has received critiques for being just a flawed metaphor. Therefore, it is even more useful to put the concept of ecosystems in the bigger picture and shortly compare it to other similar concepts.

To begin with the comparison, temporal aspect and scholarly fields are considered. Different concepts are preferred amongst different fields that are represented in the multidisciplinary setting of innovation and regional development studies. Different approaches also always emphasize a different perspective. Also, time matters: the number of publications on innovation ecosystem is growing. The temporal and field aspect are showcased through the publication of articles as different terms are published in different journals to different times. For instance, compared to other relevant concepts, 'ecosystem' was the most used term in 'International Journal of Technology Management' and 'Technovation'. 'System' was preferred in publications made in 'Regional Science' and 'Research policy' and it was the most used term in 2011. However, already by 2013 'ecosystem' was in the forerun and covered 19% of the relevant literature, with ascending number of publications ever since. (Russo-Spena et al., 2017; Tödting & Tripl, 2011)

Until the 1990s, regional innovative development was based on a linear model, as the emphasis was on R&D as creators of innovations, large agglomerations and in the comparison of rural and urban areas. (Tödting & Tripl, 2011). Today's conceptualisations include national and regional innovation systems (respectively NIS and RIS), clusters, triple helix; followed quadrable and quintile helix, innovation platforms, network systems, value chains and industrial restricts. The most discussed are regional innovation system, cluster and networks, which are introduced in the following section. (e.g. Russo-Spena et al., 2017)

Regional innovation system (RIS) builds on interactive model of innovation and it "draws attention to the firms, clusters, knowledge organizations and institutions of a region, as well as to the innovation interdependencies within the region and beyond" (Tödting & Tripl, 2011, 455). RIS highlights the structure of the system and is based on the collaboration of policy, infrastructure and political environment. This approach is attractive to policy makers, as it is simple to implement a certain type of structural elements to develop an innovation system. (Jucevicius et al., 2016). In the discussion on the conceptualisation of regional innovation systems and ecosystems the prefix 'eco' is occasionally said to be the only difference between them, but there is no comprehensive comparison on those concepts (Lee et al., 2016). This is, as also the definition of regional innovation system is 'fuzzy'. The main distinction lies in the role of public sector: systems thinking as in RIS highlight the strong public sector as provider of framework for innovation activities. For instance, networks on local level are seen as not sufficient for innovativeness without public sector's input. (Tödting & Tripl, 2011). Public sector is in systems thinking the enabler of communication between different parties (Russo-Spena et al., 2017). However, this has also been criticized as the frame alone does not make innovations happen. The RIS approach with having a strong public sector, regulations and institutions

can be considered as insufficient to reflect the reality. Contrary to that, innovation ecosystem approach highlights the ‘golden path’ or act of balance between public and private, radical and incremental innovations, long-term and short-term plans. (Jucevicius et al., 2016) It has been criticized that the value of RIS is low since it does not include the dynamic aspects of a complex society (Jucevicius et al., 2016). This said, the eco -prefix adds a dynamic perspective and diversified view on local interdependencies. This includes the acknowledgement that actors adapt differently and that their role is dependent on the current situation. Also, structures and patterns emerge characterized by local factors. (Russo-Spena et al., 2017). In addition, as the role of public sector loses importance, the role of the private actors such as entrepreneurs gain significance in the ecosystem approach, both for creating and maintaining the ecosystem. (Stam & Spiegel, 2016).

Clusters and networks have both similarities with ecosystems, and the differences depend on the definitions. Clusters is a related concept to industrial parks and also to different ecosystems, but it concentrates on the regional development by ensuring competitiveness through beneficial mechanisms to collaborate with each other on local or regional level (Valkokari, 2015). In general, clusters concentrate on geographic proximity of particular types of industries, whereas ecosystem emphasizes different types of industries (Stam & Spiegel, 2016). Also compared to networks approach, which is emphasizes the role of information and connections, ecosystems highlight the variety of actors (Valkokari, 2015). In the research on networks, the role of the public sector has been connected to concentrate at high-technology companies and transnational communication. Thus, when speaking about networks, the role of public sector lies in improving the public policies to fit the needs of private sector companies. (Russo-Spena et al., 2017).

To sum it up, the lack of clear definitions reflects also on the complex character of what an ecosystem is – and highlights a swift in thinking. This is, because despite the similarities it at least has a different connotation to it than for instance networks and clusters have, meaning that ecosystems are not constructed in the same sense than for instance networks and clusters are. (Gobble et al., 2016)

2.3.3 Different conceptualisations of ecosystems

Coming closer to the conceptualisation of innovation ecosystem, it is once again important to draw lines between innovation ecosystem and other conceptualisations of ecosystems. This helps the understanding and eases defining innovation ecosystem structure and framing the differences to other concepts of ecosystems. As already mentioned above, inside ecosystems concepts there is a need to set boundaries between different types of ecosystems (Valkokari, 2015). In the following, the most relevant concepts with a peek in the history of ecosystem are presented: business, knowledge and entrepreneurial ecosystems.

Ecosystems have their roots in the 1980s, where the focus was moved from a Schumpeterian heroic picture of entrepreneurs to a more context dependent, complex and social perspective (Cavallo et al., 2018; Stam & Spigel, 2016). Moore introduced in 1990s the concept of business ecosystems. His idea was not to see business to be part of a certain industry, but rather participate in a business ecosystem, where they amongst other users and producers network around a central organization (Autio & Thomas, 2014). After that, peaking in the past years, the ecosystem approach has gained relevancy in the academia and amongst the practitioners. For instance, Cohen (2006) published a framework for sustainable entrepreneurial ecosystem concentrating on the role of formal and informal networks, infrastructure and culture. Isenberg (2011) created 9 step programmes for leaders in order to push the regional entrepreneurship ecosystems. Feld (2012) published a guide on building start-up communities, also seen as ecosystems. Audretsch & Belitski (2017) built a framework from entrepreneurial ecosystems based on the six factors: culture, formal institutions, infrastructure and amenities, IT, melting pot and demand. Despite the difference in terms, studies provide some useful insights for this study. For instance, one of the main results of study on entrepreneurial ecosystems was, that an ecosystem needs a stable access to the internet. This was seen as a main need of private sector actors. (Audretsch & Belitski, 2017) This highlights the local context of ecosystems, as connection to internet is a precondition for smart cities and ecosystems as seen in the chapter 2.2.2 Smart Cities. This also showcases the great importance of context in this field.

As there are different conceptualisations of ecosystems, there must also be some distinctions between those. The distinctions are often not clear, which is why this study sets on the work of Valkokari (2015), who sees different types of ecosystems as different perspectives; highlighting different aspect; such as industrial ecosystems or knowledge ecosystem – the name tells the emphasis. Thus, entrepreneurial ecosystems are meant to highlight the role of entrepreneurs (e.g. Stam & Spigel, 2016). Knowledge ecosystems, on the other hand, concentrate on exploration and the purpose of those is to provide new knowledge. For example, communities producing open source products can be seen as knowledge ecosystems. (Valkokari, 2015)

One of the most discussed distinction is the one between business ecosystems and innovation ecosystems, as their relationship is not clearly defined. Rinkinen & Harmaakorpi (2018) see business ecosystem to be part of innovation ecosystem, which according to them include political, technological and economic environment. Business ecosystems however concentrate also on the customer side environment (Rinkinen & Harmaakorpi, 2018). However, according to Autio & Thomas (2014), ecosystems in general include factors such as customers and coordinating bodies. Also, according to Gomes et al. (2016) innovation ecosystem literature has emerged from the business

ecosystem literature. In other literature, there are no distinctions between innovation and business ecosystem. This has led to increasing critiques towards the concepts. For instance, Lee et al. (2016) problematizes the role of public sector when talking about innovation ecosystems, as they understand the role of the public sector to become the same as a private sector. However, Valkokari (2015) distinguishes business, knowledge and innovation ecosystems through their different purposes: profit, knowledge and innovation, respectively. In business ecosystems, it is about the business world, where it is to have a focal firm in dependency with suppliers, distributors and customers with the main goal of exploitation. Whereas business ecosystems concentrate on exploitation, knowledge ecosystems concentrate on exploration. According to her, business, innovation and knowledge ecosystems are connected to each other and complement each other's viewpoint - innovation ecosystems to be the mechanisms that combines the exploration of knowledge ecosystems and the exploitation of business ecosystems. (Valkokari, 2015). Therefore, "innovation policymakers, local intermediators, innovation brokers, and funding organizations (such as venture capitalists or public funding agencies) are salient actors of innovation ecosystems" (Valkokari, 2015, 20). Despite other scholars, who see business and innovation ecosystem to be the same (e.g. Lee et al., 2016), this paper positions on the literature based on Valkokari (2015) and Gomes et al. (2016), differentiating innovation ecosystem from business ecosystem by its purpose and form: Whereas business ecosystems concentrate on value capture and evolve around a focal firm, innovation ecosystems look for value creation.

2.3.4 Innovation ecosystem

With the distinctions to other similar concepts of regional development based on innovations and to other ecosystem conceptualisations, it is time to finally concentrate on innovation ecosystem. However, as the literature review of Gomes et al. (2016) sums up, the innovation ecosystem is presented in multiple conceptualisations, which caused partly competitive and overlapping concepts, as researchers have utilized the term to fulfil their needs. There are no pre-made metrics that come together with the concept (Lee et al., 2016). Because of the polysemic nature of innovation ecosystems, it is of great difficulty to set common boundaries and clear definitions for the term – this, however, is common for the definitions of any system (Gomes et al., 2016).

Despite the polysemic nature, based on the systematic literature review that Gomes et al. (2016, 45) conducted, innovation ecosystem defines as following: "An innovation ecosystem is set for the co-creation, or the jointly creation of value. It is composed of interconnected and interdependent networked actors, which includes the focal firm, customers, suppliers, complementary innovators and other agents as regulators" (Gomes et al., 2016, 45). Innovation ecosystems are "networks of individual offerings into a coherent, customer-facing solution" (Adner, 2006 cited by Russo-Spena et

al., 2017). Autio & Thomas (2014, 2) define innovation ecosystem to be “a network of interconnected organizations, connected to a focal firm or a platform, that incorporates both production and use side participants and creates and appropriates new value through innovation”. Innovation ecosystems are used to describe “a range of value creating interactions and relationships between sets of interconnected organizations (Autio & Thomas, 2014). Valkokari (2015, 23) characterizes ecosystems as organizational designs, whose members share a common understanding on purpose (baseline) and operation modes (logic of action). Mazzucato & Robinson (2017, 168) understands innovation ecosystem as “where a variety of actors interact in a bounded ‘interaction space’ where socio-economic value is created through research, novelty creation, traditional market activities.” In this study, the understanding of innovation ecosystem is based on these definitions and displayed in the following figure 2. The different sections (Baseline, Relationships and Connectivity and Governance) are discussed in the following.

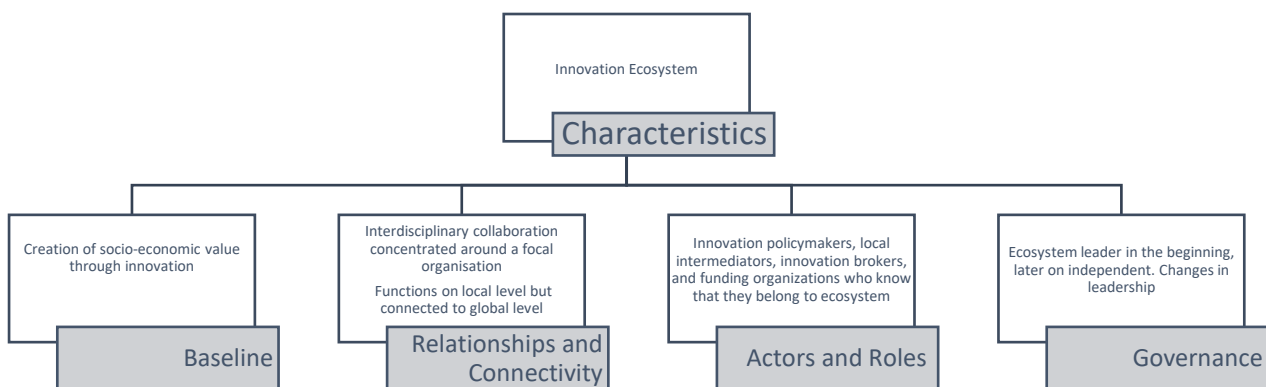


Figure 2 Characteristics of Innovation Ecosystem (based on Valkokari 2015)

Baseline

The baseline or in other words the purpose of an innovation ecosystem is to co-create value (Adner, 2017), which is done by creating innovations (Autio & Thomas, 2014). Mazzucato & Robinson (2017) see the baseline to lie in creation of socio-economic value, which is enabled through knowledge production and creation of something new, but also through activities on the traditional market. However, the baseline should be shared by the different members of the ecosystem (Valkokari, 2015). This is questionable, as the actor is not necessarily aware of its participation in the ecosystem (Lee et al., 2016). Despite different views, the above-mentioned authors all concentrate on value and innovation creation. It is however unclear, whether innovations are seen as key for value creation or if the creation of innovations is the baseline. The priority lies in the support of growth and

interaction, mainly for innovative new companies around knowledge hubs. (Valkokari, 2015) Based on the above-mentioned differentiation of innovation, business and knowledge ecosystems, the baseline here is not defined purely as production of innovations and new knowledge, but rather through socio-economic value through innovation. This is because innovation ecosystems transfer knowledge into value (Autio & Thomas, 2014).

Relationships and Connectivity

Next to the common purpose, innovation ecosystem is often characterized through terms such as collaboration, democracy, openness and co-creation. These terms contribute to the discussion on cocreation of value through boundary-crossing collaboration in order to produce innovations. (Valkokari 2015, 19) Often, ecosystems are described as a network (e.g. Autio & Thomas, 2017; Gomes et al., 2016; Russo-Spena et al., 2017). In innovation ecosystems, networks are considered from the social point of view with the concentration on value. They are also considered to be dynamic, and concentrate on diversity and interdependencies, which are characterized by local factors. (Russo-Spena et al., 2017). This includes an aspect of interconnectivity and interdependency of the actors, which are connected to or through a platform or focal organisation (e.g. Autio & Thomas, 2017; Gomes et al., 2017). This could also be described as an interaction place for different actors (Mazzucato & Robinson, 2017). The interaction space could be a firm or a shared online platform or another type of central organisation. Innovation ecosystem evolve often around a platform, but it does not require a central platform to become an innovative ecosystem. Often, public sector acts in the central position. (Autio & Thomas, 2014).

In order to be interconnected, constant flows of knowledge are required to take place to fuel co-creation and collaboration. The understanding of the need for collaboration and sharing for example data openly, is a precondition for an innovation ecosystem to function. (Gobble et al., 2016) This, however, requires the stakeholders to understand the importance of helping and receiving help. One of the main connection points is also said to be the financial network that support the companies and R&D, which also has been recognized to be part of the structure of an innovation ecosystem. (Valkokari, 2015). There are formal factors, such as ownership over a central platform, but there are also informal mechanisms used to coordinate the activities in relation to ecosystem. These are for example trust and professionalism, transparency including openness and complementarity. The informal mechanisms are used for information sharing and allow knowledge combinations to happen. (Autio & Thomas, 2014)

Ecosystem is also geographically restricted. As mentioned in the chapter 2.3.1 ecosystems are also characterized by their geographical location. In the following, the ecosystem is defined to be restricted on interdisciplinary actors on local level, but still to be connected on global level. Ecosystem consists of a web of networks, that are connected on different levels with each other. As innovation ecosystem are dynamic, the research has shown the importance of knowledge and the mechanisms behind its sharing in different geographical proximities (Russo-Spena et al, 2017).

Also, the temporal aspect plays an important role. When talking about innovation ecosystems, the life-cycle aspect of natural ecosystems is essential to take into account, starting with the genesis and ending with death. The genesis consists of three different parts, including preparation, formation, and operation. The roles, the governance, the logic of action all changes during those different phases. (Dedehayir et al., 2016). Basically, in order to understand the genesis of innovation ecosystem or to develop an innovation ecosystem, one should try to grasp the character of an ecosystem as a dynamic system, which consists of actors and relationships and forces between them, as well as to understand how political, cultural and economic parts of the social system work (Jucevicius et al., 2016). As an ecosystem is in constant disequilibrium, it is in its healthiest phases productive and robust (Russo-Spena et al., 2017)

Actors and Roles

Different stakeholders are active in innovation ecosystems, and they have clearly defined roles. Actors are universities, organisations, research institutes, large and small companies, start-ups and larger established companies. The importance of companies and their owners are also highlighted, as they have the ability to produce innovations and regional economic growth. The role of universities is to provide knowledge and they are seen as strategic partners. (Russo-Spena et al., 2017) However, the relationship between members is of both cooperative and competitive character, with the concentration on collaboration. This is because different actors are participating in the same field and are in natural competition for resources and market niches. (Gomes et al., 2016) When talking about different actors, it is of utmost importance for the actors to realize if and in which ecosystems they are participating in (Gobble et al., 2016).

Furthermore, innovation has different meanings for different actors and respectively, sectors. For the public sector, co-creation of innovation means advancing job possibilities, increasing exports, environmental sustainability and improving the quality of life on local level. The private sector then, concentrates on efficiency in terms of value chain and investor returns. (Lee et al., 2016). Lee et al. (2016) even identify the businesses as most important actors of an innovation ecosystem (or system)

and thus, exclude public sector actors from the ecosystem. This is where it gets exciting: how does the tension between private and public stakeholders look like in reality, as they, understandable, have different expectations and perspectives on both, innovation and innovation ecosystem.

The different phases of innovation ecosystem lead also to a change in the actors' role during the different phases of ecosystem. The role of different actors differs in different phases of the lifecycle. For instance, in the genesis of innovation ecosystem, the public sector can have a stronger role in the formation of the innovation ecosystem than later in the operational fields. Roles can shift, it is predictable that leading role of universities or city governance in ecosystems will change in the future, or the role of leaders can shrink. Important is, that the leader can be anyone. (Dedehayir et al., 2016). This is contrary to the view, that ecosystems evolve without a leader, as ecosystem should evolve over longer period of time based on self-organization (Jucevicius et al. 2016). Valkokari (2015) highlights the fact that formal authority cannot directly be seen in ecosystems, but that they are still not self-organized. Whereas this study acknowledges the opinion of Dedehayir et al. (2016), it is important to understand that sector from which the leader comes can be relevant due to the different set of interest. Also, due to the complexity of an ecosystem, the leadership can have unexpected effects, as for instance funding only certain type of research at the universities with the intent to increase spill-overs between academia and the market, might have negative impact on academic freedom (Jucevicius et al. 2016).

Governance

As multiple actors and organisations are involved in innovation ecosystems, the increasing complexity of social and technological problems causes also difficulties in the innovation management (Russo-Spena et al., 2017). Therefore, there is a need to look at innovation ecosystems as complex systems (Russo-Spena et al., 2017; Jucevicius et al. 2014). Furthermore, the above-mentioned interdependencies between the different actors rise questions on how the coordination and management of innovation ecosystem can be organized (Autio & Thomas, 2014) This is important, as innovation ecosystems may fail – at least in the beginnings – without having needed conditions, resources as well as activities available (Dedehayir et al., 2016).

There is a discrepancy between the different streams of literature on governance of innovation ecosystems. To some, innovation ecosystem governance requires much finer mechanisms to function than having a common purpose and defined roles. For example, innovation ecosystem is a well-structured collaboration of central and peripheral actors whose common goal is to expand links between actors. However, the complexity and multiple layers in innovation ecosystem is a challenge

when trying to describe the governance structures. In fact, these structures are mainly considered as parts of ecosystem lifecycle, and thus, stay general. The governance aspects are also called to be vague. However, the governance stands out to be a mix of relationship and activity management. The term complex describes in this case the multiple elements and parameters available. This makes it hard to measure, as the state is a constant disequilibrium and interactions cannot be predicted. (Russo-Spena et al., 2017).

To some other, public sector is seen as orchestrator of an ecosystem, who encourage the work between the actors and finds connections between them. Orchestrator's qualities are understood to be flexible and transformable, grasping the idea that it can learn from its partners and change over time. Orchestrator secures the collaboration between the key organizations who provide products and services that complement each other, protect innovations from competitors and building ties with customers. For the strategy, the roles of different actors should be defined. This includes also defining their main role and responsibilities, as well as recognizing their expertise and thereby adds on to the value creation. Orchestration, leadership and facilitation are often utilized as synonyms, but can also be defined to have different meanings. (Furr & Shipilov, 2018) For this study, the distinctions are not relevant, as the focus does not lie in them.

Even though the role of the ecosystem leader is questioned in literature, some areas of expertise for the leader have been recognized. Even though ecosystems should be self-organized, there is a need for governance and structure (Russo-Spena et al., 2017). When talking about innovation ecosystem genesis, a state in which the ecosystem is fragile, following areas of expertise have been recognized for the ecosystem leader, which is depicted in figure 3.

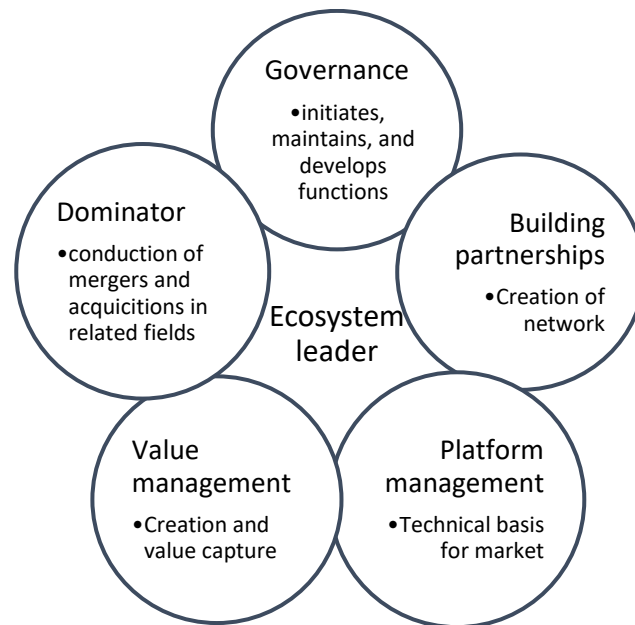


Figure 3 The role of Ecosystem leader in ecosystem genesis (based on Dedehayir et al., 2016).

As seen in the figure 3., the different roles: Governance, building partnerships, platform management and value management as well as the role of a dominator are interconnected. In the governance, initiation, maintaining and developing of following functions are described: role of the actors, coordination of interactions, orchestration of resource flows. This is followed by building partnerships including a creation of a framework, where the collaboration takes place. First and foremost, a network should be created, which requires attracting and gathering of actors through the ecosystem leader, linking and building alliances, and stimulating of different niches. Platform management builds the technical basis for the market, meaning opening a platform and orchestrating it. This can be a physical or a digital platform. Furthermore, the ecosystem leader is responsible for value management within the ecosystem. This means, that the value is created and captured by bundling offerings and supplies components as well as stimulating value appropriation. As a dominator, in the ecosystem genesis the leader can conduct mergers or acquisitions in related fields. (Dedehayir et al., 2016)

This is, however, a theoretical conceptualisation, which calls for qualitative tests (Dedehayir et al., 2016). As the local aspect is of importance when characterizing innovation ecosystems and as the question what is expected from the public sector as a focal organization in innovation ecosystem, these are studied in the following in the context of Smart Tampere ecosystem.

2.3.5 Summary

Innovation ecosystem tries to grasp a complex phenomenon of local economic, political, cultural and institutional factors that contribute to innovation management. Despite and due to the fact that

innovation and their management is a central topic in multiple scholarly fields and is popular amongst the practitioners, there is no shared understanding of concepts. The growing amount of literature on innovation ecosystem has focused on defining the concept. (Russo-Spena et al., 2017) In order to define innovation ecosystem, the approach has been to learn from best practices and contrast innovation ecosystem concept to similar regional development concepts as well as to further ecosystem conceptualisations. (e.g. Lee et al., 2016; Valkokari 2015). Even though there has been attempts for literature reviews, they all present a limited point of view (s. e.g. Gobble, 2014; Gomes et al., 2016; Valkokari, 2015). Understandings differ for instance regarding the differences and added value to regional innovation system and to business ecosystem. Despite the criticism of innovation ecosystem to be just old wine in new bottles, as it seems similar to other, partly older concepts, this study sets on the stream of literature, where innovation ecosystem is seen as a separate concept due to its characterisation as dynamic, globally bound but locally concentrated and naturally evolving system (e.g. Valkokari 2015). Due to the complexity and polysemic nature of innovation ecosystem, setting common boundaries and clear definitions is challenging – for other complex systems as well (Gomes et al., 2016). This study sets on the definitions of Adner (2017), Autio & Thomas (2014), Gomes et al., (2016), Mazzucato & Robinson (2017), and Valkokari (2015), and innovation ecosystem is understood for instance as “where a variety of actors interact in a bounded ‘interaction space’ where socio-economic value is created through research, novelty creation, traditional market activities” (Mazzucato & Robinson, 2017, 168). Based on Valkokari (2015), different aspects of innovation ecosystem are discussed under baseline, relationship and connectivity, actor and roles, and governance. The idea behind an ecosystem is to highlight the bottom-up perspective with focus on self-evolvement, but still the approach is utilized in order to create sufficient environment for innovations. Thus, the support and leadership of usually public sector plays a central role in the literature. (Dedehayir et al., 2016) Hence, the conceptualisation of innovation ecosystem seems to be ambiguous also concerning the leadership of innovation ecosystem – from no leadership to supporting functions to forcing mergers. Also, the different roles of ecosystem orchestrator have been set together from based on a literature review to include governance, building partnerships, platform management and value management as well as the role of a dominator; which call for qualitative studies to see how they are in practice (Dedehayir et al., 2016). Thus, in the following the concepts of innovation ecosystem and the role of innovation ecosystem leader in ecosystem genesis are studied on Smart Tampere -programme in Tampere, Finland to find out how innovation ecosystem is characterized in a local context and what are the perceptions on and expectation of the ecosystem leader alias Smart Tampere.

3 RESEARCH DESIGN

The following section will develop a qualitative research design for the case study. Smart Tampere serves as a research object as it represents city and public agency in Tampere, that is highly involved in innovation ecosystem genesis. The general approach to the research design of this study is to conduct a single case study. Case studies are a relevant research design, when it is to “examine a contemporary phenomenon on its real-life context” (Yin, 1981). For the purposes of this study, the single-case setting seems the most appropriate. Due to the limited resources of this thesis, the present study on the innovation ecosystem of Smart Tampere can only be conducted one case. Stouffler (1941) stated that “single-case designs [...] may provide valid tests in the same sense as can critical experiments” (quoted by Yin, 1981). The case study is conducted by using qualitative methods of data-gathering. As innovation ecosystems are complex and in disequilibrium, a qualitative approach seems to be the most appropriate to study its characteristics and orchestration (Russo-Spena et al., 2017). As the innovation ecosystem as chosen concept and lens to look through to the case is similar to the case (Smart Tampere ecosystem), a certain grade of tautology can take place. However, through the young age of the concept and unclear definition, the choice was made in order to study the conceptualisation in real-life setting and get a grasp of the local context.

For the choice of the unit of analysis, Kolehmainen (2016) provided a framework to utilize when studying innovative environments. As innovative environments such as innovation ecosystems are characterized through dynamic aspects, they might be problematic to recognize. Thus, the starting point for the study is in accordance to Kolehmainen’s (2016) proposal the central organisation. They are easier to recognize due to the limited number and wanted presence. In this case, Smart Tampere as programme but also as public agency representat fulfils these conditions and builds also the innovative urban environment to be studied. As Kolehmainen (2016) suggests, it is meaningful to limit the study to one coherent field, since different fields might have differences in their innovative functions. In this case, the field consists of areas that Smart Tampere is involved with, thus actors who have worked on smart city solutions and/or are related to finding and providing smart city solutions. To gain a deeper understanding on the topic, the study is formed from a ‘bottom-up’ or ‘inside-out’ perspective, that allows a deeper analysis. In order to do so, it is of importance to understand the characteristics of the innovation ecosystem. From the bottom-up perspective, the dynamic innovation environment is described through the connections of different actors, also on individual level. This can be done, amongst other things, by an empirical individual level look at the employees as informants. (Kolehmainen, 2016)

The first part is devoted to justifying the selection of the case and afterwards, the research object will be introduced. The section ends with a discussion of the methods that will be used for collecting and analysing the data.

3.1 Introduction of the case: Smart Tampere

The unit of analysis in the present study is a programme called Smart Tampere, which is implemented in cooperation with City of Tampere and Business Tampere (Smart Tampere, 2019a). Tampere, a city with 231 853 inhabitants and close to a half a million inhabitants in its surroundings, lies in Southern Finland and is one of the leaders in knowledge-based industries with strong university-industry collaboration (Tampere, 2019; Yigitcanlar et al., 2014). Tampere was founded in the 1800s, and its economy was heavily focused on industries from the beginning. Nowadays, it concentrates on education and on information and communication technologies (Yigitcanlar et al., 2014). For example, Tampere region, amongst a few other regions, benefited from the growth of ICT-businesses through Nokia. The volumes of R&D expenditures in Tampere and Oulu are one of the fastest growing in Finland. (Cai et al., 2018).

Tampere has been active in launching development programmes in order to boost regional economic development and innovation in different areas of economy and providing platforms for collaboration. Such areas have been for instance biotechnology from 2003 and 2009. (Cai et al., 2019, 2419)

In 2016, the City of Tampere launched Smart Tampere -programme together with Business Tampere (Tampere Region Economic Development Agency). It aims for “innovative and digital smart city solutions through cooperation between companies, organization, municipalities, and citizen (Smart Tampere, 2018a, Smart Tampere, 2018c). The Smart Tampere -programme has been on-going since 2016, and it focuses on creating smart city services, such as smart industry, smart health, smart government & citizen, smart mobility, smart infrastructure, smart buildings and smart education (Smart Cities World, 2017). In 2018, the programme refocused its efforts by concentrating in three following areas: digitalisation as part of the city services, a sustainability programme to make Tampere carbon neutral and channelling more effort in providing an ecosystem for new businesses (Smart Cities World, 2018). Basically, Smart Tampere provides six different vertical themes under the umbrella of ecosystem in the fields of Smart City: Smart Industry, Smart Health, Smart Governance and Citizens, Smart Mobility, Smart Buildings and Infrastructure, Smart Research and Education which are connected through two vertical themes AI and Analytics and Connectivity (Smart Tampere, 2018b). During the spring of 2019, the themes faced a reform and include Customer

Service and Involvement, Education and Research, Building, Energy and Infrastructure, AI and Analytics, Health and Well-being, Safety and Security, Connectivity and Smart Mobility. (Smart Tampere, 2019c [May 2019]). Through the refocus in 2018 the administration of the Smart Tampere programme takes place in both the city of Tampere as well as in Business Tampere as seen in figure 4. (Smart Tampere, 2019b). This study focuses on the ecosystem part of the programme.

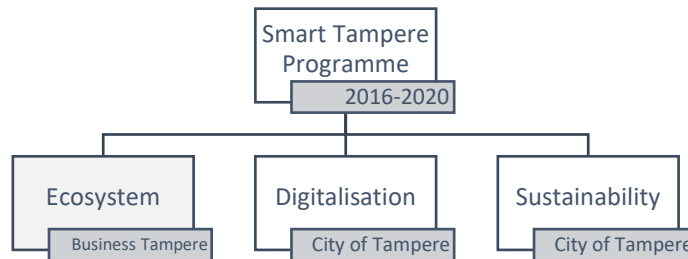


Figure 4 Smart Tampere programme (Smart Tampere, 2019b)

3.2 Why Smart Tampere?

“New ways of thinking are needed for dealing with European challenges. This means that traditional problem-solving methods are no longer sufficient. Cities and regions have become the new powerhouses for progress and societal innovation: they can and must benefit greatly from open innovation ecosystems and they need to take a new orchestrator role in this field.”

(European Commission, 2016)

As Tampere is not the only city worldwide publishing smart city or ecosystem strategies, the question arises why to study its programme. In the following, some arguments for the choice are presented.

Due to the Nordic paradox, the choice was made to study a Nordic region with a new lens of innovation ecosystem. In the Finnish regional development, knowledge and innovation play a crucial role. Finland has a highly diversified economy compared to other OECD countries but also similar to Nordic countries. For instance, Norway classifies as one of the most specified economies, and characterizes itself through concentration on exploitation of natural resources. Finland, on the other hand, has higher spending on R&D and through its diversified economy, concentration on explorative innovations. (Cai et al. 2018) On the national level, even though Finland was the first country to implement an innovation strategy, the concentration of innovation policies has been on the ICT-

sector. Furthermore, the expenditure on R&D is on decline after years of spending comparatively high amounts with less outcome, also called as the Nordic Paradox. Thus, Finland is searching for new innovation policy logics, as there is no nation-wide policy on required concentration of diversified and explorative policies. (Cai et al. 2018)

Geographic constraints and the downsizing of heavy industries required structural changes in numerous Finnish regions. The Finnish regional development plans only guide the municipalities in their planning activities (Yigitcanlar et al., 2014). However, besides a national innovation system, regions have different levels on specialization and innovation activities. The high density of knowledge and talent in city regions provide a place for knowledge-based development (Yigitcanlar et al., 2014). Despite the high amount of ICT-businesses still located in Tampere, Finland amongst other Nordic countries is searching for “a way to move to a more explorative and diversifying policy logics” (Cai et al., 2018, 2419). This is, as Tampere amongst other regions has faced difficulties of flourishing in both exploration and exploitation, as for example drastic reductions on staff of Nokia has had severe effects on the region (Cai et al. 2018). This combination of pressure to develop an innovation friendly environment in Tampere and a supportive national framework makes Tampere a very valuable case to study. In addition to that, the young institutions create a situation, that somehow can be compared to a natural laboratory: all the surrounding factors are supportive to creating an innovation ecosystem in Tampere, thus studying Smart Tampere can give valuable insights in the genesis process of an innovation ecosystem.

Furthermore, often, the research on innovation management has concentrated on large metropolises that have to fight on urban infrastructural problems and pollution, to name but a few, on a daily basis. However, solutions created for millions of people are not convertible for small and medium-sized cities. This is despite the fact that over half of the Europeans live in medium-sized cities, with usually less resources to spend on solutions. Also in this case, Tampere is a representative case for being at the top of the leader board of European medium-sized cities. (European Smart Cities, 2014) This makes Tampere with its Smart Tampere -programme an even more interesting case to look at.

3.3 Methods of data collection

In order to meet the complexity of the case, different sources of data are utilized. (Laine et al., 2007). This is done because private sector actors as in growth companies, universities as knowledge producers and city governance are central to creating innovation ecosystems, and build the Triple Helix (Markkula, undated). The aim is also to create recommendations based on the empirical data

for the Smart Tampere -programme responsible for developing their ecosystem further. Since the study method is a case study, generalisations are not possible. This is also not needed, as local context is seen as unique and the reasoning behind conducting a case study lies in recognizing the specific perceptions and expectation of the growth companies as well as to highlight the perspectives of university and Smart Tampere officers in Tampere. However, the richness of the data hopefully allows to contribute to generating added information as a basis for further research (Tsang, 2013).

This means, qualitative semi-structured interviews were conducted with different stakeholders as informants (Kolehmainen, 2016). Smart Tampere city officers, members of Tampere University as a source of new knowledge and private growth companies as both users of the innovation ecosystems services and innovation producers. Growth companies chosen work at the ICT-sector, and they were chosen due the close relationship to smart city and innovative products. As growth companies, they can reflect on their path and provide fruitful information and can possibly reflect on their perception on Smart Tampere. Growth companies were defined as businesses, that grew at least by 10% in the last ten years and employed a minimum of 10 employees, accordingly to the definition of the Finnish Ministry for Economic Affairs and Employment. The growth companies were selected based on the list published by the Finnish Ministry for Economic Affairs and Employment (which cannot be published here due to the sensitivity of the information). First, the scope was to concentrate on firms with more than 30% of growth, but as the response rate stayed low, the scope was widened to include firms with at least 10% growth.

First, four interviews were conducted with the city officers of Smart Tampere employed at Business Tampere or City of Tampere. The ecosystem programme leader as well as further programme coordinators were interviewed in order to find out the characteristics on Smart Tampere innovation ecosystem and their perspective on the role of Smart Tampere as leader of the innovation ecosystem. Then, one interview was conducted with Tampere university representant in relation to smart city services and interest in increasing the university-industry-city collaboration. This was done in order to find out the university's perspective on Smart Tampere ecosystem and perceptions and expected on the ecosystem leader. The representative of the university was chosen because of area related to Smart Tampere – programme. At last, four interviews with the local ICT - growth companies were conducted and then utilized for the analysis. Firms were contacted via e-mail and interviews were made with the first four who replied.

The semi-structured interviews took place in the offices of the interviewees in Tampere region and lasted 35-60 minutes and were conducted during March 2019. The interviews were based on an interview guideline, which can be found attached (Appendix). The topic and the questions for the

interviews were based on the figure 2 and figure 3, which describe the characteristics of innovation ecosystem and the roles of ecosystem leader. Based on the data from the interviews, first the local characteristics of Smart Tampere innovation ecosystem are studied and then, the role of Smart Tampere as innovation ecosystem leader in the innovation ecosystem.

In figure 4, the list of interviewees can be found. The acronyms City1 or Company4 are utilized in the following in order distinguish between statements from different actors and parties.

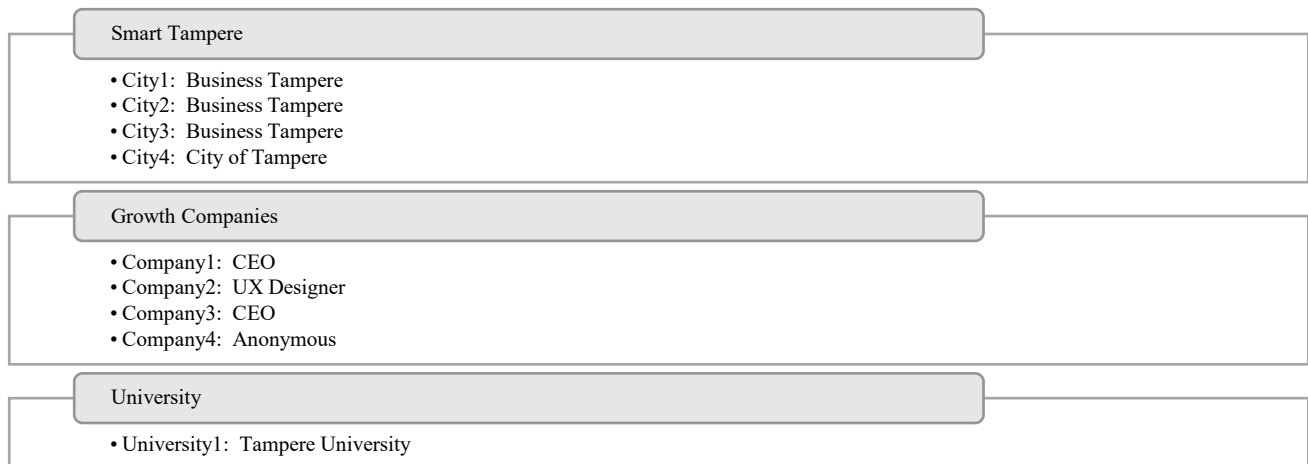


Figure 4 List of Interviewees

3.4 Analytical approach

The analysis of the data followed a holistic abstraction and category-building approach in order to carry out a content analysis. As the interviewees and the interviewer shared Finnish as their first common language, the interviews were conducted in Finnish. The data that was gathered in the interviews was first transcribed and later translated from Finnish into English as close to the original structures as possible but allowing for improved understanding in English. Translation is to be taken into account, since “interpretation of meaning is the core of qualitative research. Ass translation is also an interpretive act, meaning may get lost in the translation process” (Abma et al., 2010). However, by conducting translation and interpretation of the content at the same time, the risk was minimalized.

In order to get a first overview, interviews were analysed statement by statement, which were then given a related expression and organised in subcategories and finally main categories as seen in the table 1, where some examples of the data categorization are shown. The main categories follow the conceptual background which are represented in the figures 2 and 3.

Original expression	Related expression	Subcategories	Main category
“Climate touches us in so many ways so it has become a very strong front for city development” (City2)	Climate change is central to city planning	Climate change, Ecosystem	Baseline
“How does this differ from a normal network that is based on the idea that everyone who participates benefits from it” (City4)	Network thinking is similar to ecosystems thinking	Ecosystem, Concept	Baseline
“In this sense it has gone from eTampere to creative Tampere and open Tampere to this Smart Tampere, in which the city now has the strongest role and is in closest collaboration with the companies” (City2)	Development to Smart Tampere	Local context, Collaboration	Relationships and Collaboration
“It must be understood that city can be in certain areas a customer, or a booster, and then there is the cluster for automatic vehicles where the city does not have much of a role” (City2)	Different roles of public sector	Roles of public sector	Actors and Roles, Governance
“If we see there are skills in technology-intensive knowledge but no ecosystem, we can initiate it” (City3)	Initiation of ecosystem in a related field by public sector	Ecosystem genesis	Governance
“The city opens different challenges that has been recognized to be in need of development or has not been working and the we ask the companies for ideas and solutions how to improve it” (City1)	Based on needs public sector searches for solutions from private sector	Ecosystem genesis, Building platform	Governance

Table 1 Data analysis strategy and category building

This process allows to make some general assumption over the data. The aim was to abstract the expressions from interview responses in order to generate subcategories. These subcategories were then comparable to the main categories, which in turn allowed conclusions in relation to the research questions. Thus, the goal was to undertake a qualitative content analysis in order to gain in-depth understanding. As the analysis was based on conceptual frameworks, it followed the deductive way of content analysis. However, due to the fuzzy definitions of the concept innovation ecosystem, also abductive reasoning took place. Abductive reasoning was in place for instance as the empirical data did not always correspond the conceptual background. (Saaranen-Kauppinen & Puusniekka, 2006)

Relatively speaking, most of the data concerns the baseline of ecosystems, as in each interview the conceptualisation of ecosystem was brought up and frequently mentioned. Contrast to other concepts was utilized when making definitions, but also timely and geographically contrasting was utilized to create a sense of the local characteristics by the interviewees. Table 1 shows some examples on this process of category building. It should be kept in mind, that as a case study this does not allow any generalizations as quantitative research might; the facts are case-specific (Laine et al., 2007). This is also why it is important to conduct case-studies in this context: only on local level the character of an ecosystem can be grasped.

4 RESULTS

The following chapter presents the results and the analysis of the interview responses. The analysis follows the structure of the conceptual frameworks (figure 2 and 3) that were introduced to answer the research question. The first section is devoted to analysing the characteristics of the Smart Tampere ecosystem, and is structured according to the four categories of baseline, relationships, actors and roles and governance. Since the second research question is investigating the perception of and expectations on Smart Tampere, the last category governance will receive special attention. This category will be combined with the areas of experiences of ecosystem leadership, and therefore the respective four areas of expertise governance, building of partnerships, platform management and dominator will be discussed separately. This section ends with elaborating on the conceptualisation of the ecosystem in Tampere, which will lead to the discussion and conclusion.

4.1 Characteristics of Smart Tampere innovation ecosystem

To describe the characteristics of Smart Tampere innovation ecosystem, the responses from the interviews concerning the following topics are discussed. The themes to define an ecosystem are the baseline, relationship and connectivity, actors and roles and governance.

Figure 5 sums up the results based on the interviews to characterize the Smart Tampere ecosystem. In the following, these themes are presented from the different perspective of the three interview groups, then discussed and analysed.

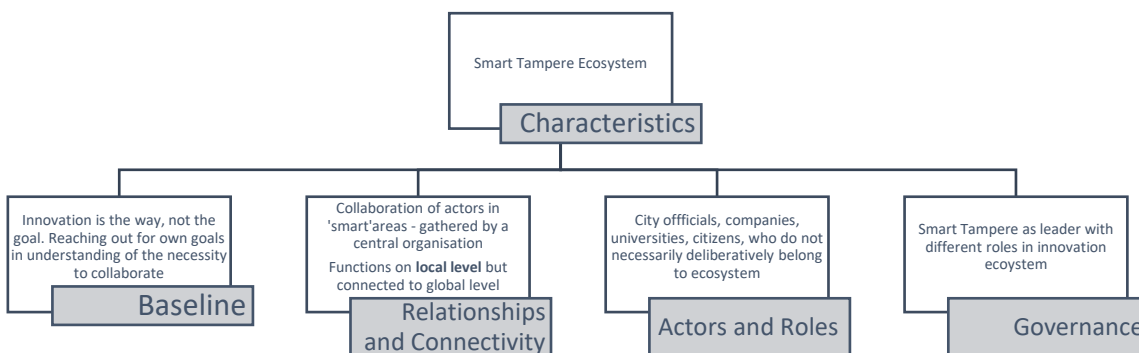


Figure 5 Smart Tampere innovation ecosystem characteristics

4.1.1 Baseline

Theoretically seen, the purpose behind innovation ecosystem is to create innovation, which creates socio-economic value. First, I will go through the role of innovation and the general purpose of the ecosystem as seen by the respondents, which is followed by individual purposes of the three interview groups to get an understanding of the baseline of Smart Tampere ecosystem.

Surprisingly, innovation seldomly played a central role in the interviews, and it was even questioned, whether innovation only is another buzzword. As the companies to be interviewed all were from the ICT-sector, the question of what innovation is was perceived as a relevant, because in the sector all the services and product are new. However, also in other parts, which have not always been ‘innovative’, innovations have grown in importance.

“Generally-speaking all ICT-projects are innovative. What is then the difference between innovative and non-innovative ICT-project?” (Company4)

“The city has so many functions, there is elderly care and building streets that have become central to the innovation policies. [...] Innovation used to be part of the strategy department but now innovations have spread out to all aspects of life” (City4)

From this perspective, innovation is not the goal to reach but a way of getting there. It is not seen as a goal but as a mean. Even though innovations play a central role in city development, performing in an ecosystem does not happen for the sake of creating something innovative, but for the personal good of the respective actor. This leads to a lack of a common baseline, which is in discrepancy to the theoretical point of view that all the ecosystem actors should share a common goal. The purpose of innovation will however be defined by the different stakeholders in a different way, as they have different goals to reach. Since other common goals did not directly appear in the interviews, the interest in a certain field could also form a common baseline. In this case, the baseline would reach from smart themes to smaller and more specialized areas of interest such as digital health care services or sustainable mobility. By and large, the only common baseline that could be found was to enable all actors to gain added value – which they in turn can define from their perspective.

“Ecosystems are used to provide added value in way or another for its actors” (City3)

For instance, the purpose of ecosystem has multiple levels in the Smart Tampere. Through the introduction of the Smart Tampere -programme, the focus has shifted. The programme has been ongoing since 2016, but it was refocused in 2018. Until then, digitalisation with its threats and possibilities was central to the programme. Through the influence of Agenda 2030, amongst others,

sustainability as focus was emphasized by becoming its own part of the programme. Also, the addition of sustainability into the Smart Tampere -programme showcases the importance of climate change related issues.

“Last summer [2018] a certain refocus of the mayor’s programme took place. This means the sustainable 2030 goals became a part of this programme” (City2)

“Climate change has become a traditional part of discussions, CO2-neutrality has become a goal for every city, which was not like that 2-3 years ago” (City2)

Hence, the policy agenda outside the ecosystem world influences the goal setting. This shows also how the innovations are used to reach a goal – for example CO₂ -neutrality - and are not treated as a goal in itself. Not only innovations but also digitalisation seem to have shifted its focus: digitalisation of services or products is not done for the sake of connecting, being innovative and technologically advanced, the goal behind it is also to be sustainable and save resources. *Ecosystem*, with a matching name, is a way of reaching those goals, as Tampere is growing, and this growth should take place in a planned manner. Also, in the area of resource efficiency, Smart Tampere highlights also the need to save financial resources. In addition, Smart Tampere interviewees mentioned the attractiveness of Tampere for a reason behind ecosystems.

“The budget of the city and the budgets of all cities are quite restricted [...] Tampere is growing, and people are moving in but we need more functions and such things, but we have to be big enough to have decent services, all kind of cultural events and stuff. (City2)

Behind all these different levels of purposes for ecosystem thinking, it comes back to serving the customer as in the local resident. In order to do that, both the local context and skills as well as needed solutions for a growing urban area were taken into account such as mobility, sustainability and improved living conditions for the residents and local industries and economic growth. These were also recognized by the university to be of central role of innovation ecosystem.

“The idea is to ease and improve the everyday life of local residents. In practice: less queueing in traffic, faster public transportation [...] I think it is smart to be able to drink water and eat healthy food” (University1)

At the same time, the university also has other self-motivated goals for example finding possibilities for its researchers or improving their network. Smart Tampere also recognized itself to be self-orientated, too. Even if running an ecosystem might not cause a direct financial gain, it is done in order to gain something for the city as well. Other than the Smart Tampere and university

representatives, the companies provided a more straight-forward view. On the first place comes the economic profit, and as second the indirect benefits such as networking or interest and personal growth.

“I would participate, if I am interested on the workshop – not because I want to become a part of Tampere ecosystem” (Company2)

“Well, at the end of the day why we do things is to make money that is the purpose of a company” (Company4)

To sum it up, the common baseline of all actors is that innovation is not a goal in itself, it is a mean to achieve something and to solve problems. There is however not a clear agreement what those goals are. Although some of the goals have been mentioned repeatedly, such as tackling climate change and easing up the urban growth in the city of Tampere, especially the companies highlighted that they pursue innovations mainly to grow their own business. While also the public actor admitted to have self-oriented rationales, the private actors were very straight forward in their answers: their main interest is it to generate money.

This also showcases the multifaceted conceptual background of innovation ecosystem. Theoretically, innovation is a common goal, but also the idea of an innovation ecosystem is to generate value for all the actors. Regarding the goal setting, the role of the ecosystem leader lies then in having the bigger picture in mind and providing the actors with the information on how through participation they can reach their own goals.

4.1.2 Relationships and connectivity

In order to move forward with the analysis, the relationships and the connectivity of the Smart Tampere ecosystem is analyzed and discussed. Theoretically seen this means that an ecosystem is an interdisciplinary collaboration, which is concentrated around a focal organization. An ecosystem functions on a local level but is at the same time globally connected. As the connectivity includes not only geographical aspects but also concerns time, the local context including path dependency becomes a central topic in this chapter. Again, the characteristics are presented from different perspectives, as there are multiple stakeholders. First, the global connectivity is presented and analysed, which is followed by the discussion on local characteristics of the connectivity of Smart Tampere. Then, the local relationships and connectivity is showcased.

“25 years ago, we discussed about Video on Demand -services and how machines could be connected to one computer. Now we have Netflix and machines are managed from China” (City4)

Global developments influence the relationships and connectivity also in Tampere. All the interviewees recognized the importance of global relationships, for some of the growth companies as a future career step, for some as a way to stay up to date in their business field. For Smart Tampere, the global connectivity is shown for once at fulfilling national goals and making Tampere attractive for companies and people to settle in, but also in recognition of competitors. Due to the global connectivity, the biggest competitors do not lie inside Finland or in the neighbor states, but cities with similarities in size and industries are the strongest competitors – despite their location. Earlier, big companies decided where to settle their offices and factories, and the employees followed. This has changed, and cities are now in competition with each other in order to attract highly skilled young talents, who are then followed by companies.

“Our biggest competitor is not Helsinki or Turku but Brighton or Auckland [...] We have to understand that we are not a capital, but we are a growth centre and we have to understand the game field” (City2)

Despite the fact that networking and learning from others are a necessity, the local aspects are also central to be taken into account. Even though the challenges, such as climate change and CO2-neutrality may be similar from one urban area to another, the unification of the solutions seem to be a bigger problem. First, when thinking about solutions for urban areas, often big cities such as New York, Barcelona or Shanghai are central to the discussion. However, these cities have a population of millions, and the solutions designed for large urban centres are not directly convertible for the needs of a medium-sized city such as Tampere – also due to the bigger budget of bigger cities. For instance, in Europe most of the people live in small and medium sized cities, which are often left out of the discussion when building smart solutions and ecosystems. Second, even though urban areas have a similar size and share a similar history, they still have local characteristics.

“Even though we have the same laws and we are about the same size with other Finnish cities, every city has its own history and systems have been built through certain decisions and patterns and locally through collaboration with companies” (City2).

The importance of the local core is also shown in the projects and events in the Smart Tampere ecosystem. Even though Smart Tampere is required by law to open their projects and challenges for competition, most of the participants are from Tampere or Tampere region. Also, amongst the companies, the local connectivity plays a central role. The distance to clients and other networks is important and was often mentioned in the interviews. Physical meetings still seem to work more

efficient and often the convenience to have contacts that have their offices in the neighbour building or in Tampere area was mentioned as something positive and worth looking for.

“Usually we concentrate our actions to Tampere region, as it is rather a long way to consult public sector officers in Rovaniemi” (Company4)

“We are well networked with other companies, this is when innovation usually happens. Collaboration is key” (Company4)

From the side of companies, they seemed to be well connected with other organisations – whether in their own area of business or with related businesses. As discussed later, in this area it is not possible to disconnect the relationships and connectivity of Smart Tampere ecosystem from connections and relationships outside Smart Tampere ecosystem – at least not from the perspective of the companies. Even if the networks are not there yet, the cooperation is of interest. However, it was partly unclear how to connect with other companies especially with companies from fields other than the companies’ itself. Also, sometimes companies collaborated with organisations beyond the regional borders such as Business Finland.

“In Tampere, we have this kind of culture with other IT-companies that we can be competitors with another Tampere software house but then we can align our forces for some offer, that happens too” (Company4)

What can be said however, is that the local context seems to have an influence on the companies. For instance, having skilled graduates from the universities was mentioned as an advantage of Tampere. Also relevant are the skilled labour of former Nokia, that contributed to the start of some companies interviewed. Nokia’s influence on the local pool of skills have also influenced to creation of Smart Tampere programme.

“After Nokia hundreds of new start-ups were born and the role of the city grew” (City2)

Further areas of expertise are recognized, both from the city and from university. All regions have specialities, and in case of Tampere the strong concentration on knowledge-intensive ICT-sector but also the history as an industry region was mentioned during many interviews. Tampere is by far not the only city to plan ecosystems or implement a smart city strategy. However, Tampere has gained practical experiences on innovation management since the 1990s. At least according to the stakeholders of Tampere and Tampere university, Tampere has the prerequisites to build around the idea of ecosystem.

“A strong business world committed city and strong university enable things to develop in Tampere” (University1)

The strong connection to the city is also shown by the language choices made by the interviewees. All three different interviewee groups felt strong connection to Tampere region. The following quotes illustrates the omnipresent awareness of the actors that the local context is important, by showing how *we* is connected with *Tampere*.

“We also have the Smart Tampere -programme” (University1)

“We here in Tampere have this kind of culture in with the companies” (Company 4).

“We here in Tampere...” (City1, City2, City3, City4)

The local connection is also showcased in the Smart Tampere - programme, which is connected to the local development of innovation paradigm inside the city governance but also amongst the practitioners outside of the city. Especially the tradition within the City of Tampere in developing strong innovation policies was highlighted by city officers as a local advantage for innovation ecosystems.

“People here had a really advanced economic policy here back in the 90s.” (City4)

“We [Business Tampere] have had innovative cities programme, funded by TEKES [Finnish innovation fund, now Business Finland], and already worked on sustainable development goals” (City2)

Thus, on one side the experiences in different programmes in the past have allowed the local city officers to learn from the mistakes and make a system that is for the best fit for the local needs. The culture of trial and error is embraced by ecosystem managers and policy makers and has been highlighted as a special positive feature in the policy development process in Tampere.

“We have recognized that program-based starting point gives leeway for this kind of agile doing and decision making” (City2)

In the learning process the connectivity to outside world has influenced also the local programmes. Policies and paradigms on many levels, from local to national and EU-wide and to global levels have influenced the development local development programs. Changes in legal and economic environments had influences on the local development of ecosystems.

“The economic-juristic framework for the city has tightened and made it more complicated to act compared to 1994, when our skills-centred programme started” (City4)

This has also allowed to learn from mistakes. As Business Tampere had had long traditions in collaborating with companies, it also influenced the organisation of the programme, as Smart Tampere was first run completely by the city of Tampere. Thus, due to the fact that Business Tampere was better connected with local companies, the structure of the programme was changed. The local activities on innovations policies, and their learning from the changes, is however not only positive, as local residents and companies are partly confused on responsibilities within the city administrative system

“When the ecosystem programme was part of the city, it was a difficult interface as the companies did not exactly know who to contact, whether they should directly contact the traffic engineers or someone through the Smart programme. There were also confusions in the inside of the city how Smart [Tampere] was located there, so there were practical challenges that cumulated to this new set-up” (City2)

Smart Tampere ecosystem consists of many different ecosystems and networks. The ecosystems are in different phases, and in the ecosystems the public sector has different roles. The different roles of Smart Tampere also influence its role as a central, connecting player. Collaboration takes place in form of experimental projects, networking events, direct contacts, help with getting funding, funding, companies doing pilots et cetera. Connectivity and relationship are of central importance for Smart Tampere.

To put it in a nutshell, connectivity and relationships within Smart Tampere Ecosystem are strongly bound to time and location. The local context is highly relevant for both, the timeline and geographical boundaries. The development of the programme and innovative activities could happen due to the historical development of Tampere, which, as every urban area, has its own characteristics. Despite being open for global connections, the roots of the actions are and take place locally. The history of City of Tampere having multiple approaches to co-create with its habitants, has allowed it to learn from the mistakes but also made the programme harder to reach as the changes created also confusion.

4.1.3 Actors and roles & governance

Innovation ecosystem is based on the idea of having multiple actors. According to the conceptual background, an ecosystem has a variety of actors including stakeholders from higher education institutions, local city governance, private companies and local residents not to mention the financing

bodies. Theoretically relevant is also the fact, that the different actors recognize themselves to be a part of the ecosystem.

In the interviews, the different actors and roles did not seem to be of central interest. However, some actors and their roles were still recognizable. Next to the analysis of the actors and their roles, the conceptual point of view is discussed, as especially in the genesis of an ecosystem the awareness of the individual participation in the ecosystem seems to be problematic. First however, the different actors and their roles are presented.

The interviewees were selected because they all fulfil the criteria to be part of the ecosystem. Based on their area of business, all the interviewed growth companies match the conditions of Smart Tampere to become a part of the ecosystem, as they all work in ICT-sector and create solutions to certain problems, e.g. health services. However, none of the firms did feel greatly attached to Smart Tampere or as a part of its ecosystems.

“I would not consider to be a part of an ecosystem, whatever it is meant by it at the end, based on participation on a workshop” (Company2).

“Smart Tampere is not familiar to me, have seen the name somewhere” (Company3)

“Smart Tampere is familiar, we have also hung around them, but it was not for us” (Company4)

This is either, because Smart Tampere was not familiar, or firms were not participating actively or not interested in participating actively in their projects. The belonging to Smart Tampere ecosystems, or any other ecosystems or network was not clear.

“I do not recognize there would be a network in Tampere in our business area. If there would be, I would know” (Company3)

“If we would collaborate with Smart Tampere, I still would not know if we would be a part of some ecosystem” (Company2)

Even though most of the companies did recognize to have networks and collaborate with other stakeholders, the recognition of belonging to a network or ecosystem or cluster was not of great importance. Mainly, it was recognized that there are networks they are participating in. The awareness of being part of something fuzzy and unconcreted proved to be problematic, as the concept of ecosystem was not clear. It was brought up by all of the firms, that ecosystems are wide and not clearly defined concepts, and therefore the companies were not able to identify themselves as part of it. Sometimes companies even expressed some frustration with the fuzziness of the concept.

“There is no one definition for ecosystems. Ecosystem thinking combines different areas and organisations together.” (Company1)

This leads to the question of whether it is possible to recognize to be a part of something, if the something as in concept is not clearly defined. However not only the term of ecosystems was unclear, but also the different types of organisations, both private and public, were often mixed. Many interviewees had little knowledge of Smart Tampere activities, as the names and responsibilities were changed frequently in the past. This also leads to one of the biggest difficulties of studying this area: How to study something that is not well defined? On one side, there is the fuzzy term of ecosystem, which makes it hard for actors to recognize to be part of it, if they do not know what it means. On the other side, Smart Tampere as such provides an umbrella around different smart areas, including independent themes, which then again can include different kinds of networks or ecosystems. This means, that some of the companies might be a part of Smart Tampere ecosystem by just being active in their area of innovative ICT-solutions or by being – maybe subconsciously – part of a certain network that locates itself under a Smart Tampere ecosystem theme. These themes, however have been a part of change in the past months.

“First it was Smart Governance, and Smart Mobility and so on, all the themes had a Smart in front of them, then they had changed them and then it was only Smart Mobility with Smart in it, but now they are once again different” (University1)

This contributes to the difficulty of being a part or member of something. Additional to the changes in Smart Tampere, there are other similar stakeholders. Thus, companies were often confused about who is the central actor within the city’s administrative system. Additional to services from Tampere – let it be Smart Tampere, Business Tampere or City of Tampere – similar services, or ecosystems are also formed by other organisations such as the national organisation Business Finland, which adds to the confusion among companies.

“The information is available at least on Smart Tampere web page – but I can’t remember which one them it was – Tampere city has so many other digital projects anyways. I can’t remember which page it was on” (Company2)

If as criteria for being a part of the ecosystem is to collaborate with Smart Tampere, the actors can also be located outside Tampere. This is because Smart Tampere is a public organisation, and its projects are required by law to be open for competition. This includes also companies outside of Tampere. However, most of the companies are from the Tampere region. The boundaries of the ecosystem cannot be defined by the absolute distance to Smart Tampere, but rather by the relative

distance – and by information flows. Even though as such everybody is able to participate in Smart Tampere projects, practically most of the participating companies were from Tampere or Tampere region. More specific there must have been companies who had found out about those projects – thus the role of communication is immense.

“We had lately over 200 companies participating in agile experiments and in different projects and from those probably the biggest part was from Tampere region” (City2)

Next to the geographical location, also the timely spectrum plays a role. As this is not the first innovation or smart city related programme, some of the interviewees showed some prejudgements but also positive expectations for the programme, due to their earlier experiences.

When talking about different roles, the role of the university is expected to lie in producing knowledge. Universities have a big role in ecosystems. In Tampere, the companies and Smart Tampere are collaborating with Tampere university, the collaboration takes place through informal channels and in different themes and their projects on different level, and it is not centrally coordinated.

“At this moment city and university are not much acting coordinated” (University1)

“We have done some small projects with university but that is more like that we finance them and then there is a report at the end” (Company1)

Even though Tampere is said to have a long tradition in university-industry collaboration, no formal frameworks around it were mentioned. It is based on individual’s efforts and ad-hoc relationships with little central planning. This reflects the bottom-up perspective of ecosystem thinking, which is now supported by the efforts of Smart Tampere -programme in order to create an additional, formal channel of communication.

Indeed, the university sees Smart Tampere as a framework provider, which has allowed the university to start a project as response to the Smart Tampere programme. The project reflects the Smart Tampere framework, including six horizontal themes such as smart mobility and vertical, cutting themes such as connectivity. In this sense, Smart Tampere provides a framework for others to respond to, allowing discussion in same terms with shared understanding to begin. This would however require sticking to certain terms for a longer period of time in order to provide a well-functioning framework.

Closely related to the actors and their roles are also their baseline for participating in an ecosystem. Thus, the university sees the citizens as customers and the city as a partner. Furthermore, the citizen's role as customer is related to the tasks of the city, who is to provide services for its residents.

"I think the city should see the local resident as customer. The city is there for its residents – it cannot be for the government of Lyly [Tampere's Mayor] or for Ilves [local icehockey team] or Tappara [another local icehockey team] but it must be for those who live here. They are to be provided by good services" (University1)

Concerning governance of the ecosystem, Smart Tampere builds the central framework to it. Basically, Smart Tampere offers funding and opens projects for instance in agile experiments for companies to develop something the city needs. Smart Tampere is also actively organising or enabling organisation of networking events by funding them, in order to create collaborations in certain areas of their interest. Smart Tampere also put its efforts into luring companies, if they for instance know that there are highly skilled developers searching for new possibilities. Smart Tampere's role is multi-faceted and reaches from being a buying customer to piloting projects and enabling dialogue with companies.

"Agile experiments enable companies to test their products or services on low level in real urban environment. At the same time the companies can get funding and references that can be used in order to support the scaling of the tested solutions. (City1)

However, the role of the city as a leader differs from theme to theme and from time to time. For example, in the area of Smart Health the organisation of activities is low from side of the ecosystem programme, as due the unknown future of the nation-wide social and regional reform less investments are made.

Smart Tampere ecosystem has different themes, which means that Smart Tampere has especially chosen to strengthen certain areas of substance knowledge, which were partly chosen based on the local strengths. Thus, Smart Tampere is active in the ecosystem genesis.

"Smart Tampere is an ecosystem, that has specific themes. Inside those themes there might also be another ecosystems such as ITS Factory in [smart] mobility. In this sense, the mobility covers the development within the city council, but can also be broader, have its own characteristics and have a stand-alone ecosystem as part of the topic" (City1)

In the area of mobility however, the city of Smart Tampere has set for a new plan of city mobility, there are testing platform such as Hiedanranta, which is done as example for future service in order to create services and study how people will live in the future.

Inside Smart Tampere a part of the employees are working for the city of Tampere and others for Business Tampere, which is the Tampere Region Economic Development Agency. At the beginning of the programme in 2016, the programme was run by the city council, but because the connections to the companies were mainly associated to Business Tampere, during the refocus of the programme the ecosystem part was moved to be governed by Business Tampere. The City of Tampere continued with proceeding with the digitalisation programme and additionally took on the sustainability programme – all part of Smart Tampere programme. However, inside the ecosystem part also ideas of digitalisation and sustainability are followed.

All in all, the Smart Tampere ecosystem governance is characterized by dynamic and multi-level interactions, and the involvement of Smart Tampere highly depends on the sector. The next section elaborates on the leadership role of Smart Tampere as ecosystem leader. Especially the discrepancy of perspective on governance between the public and private sector is highlighted.

4.2 Perceptions of and expectations on Smart Tampere as ecosystem orchestrator

The results adding to the previous chapter are presented in the following and the following five topics are discussed: Governance, building platforms, building partnerships, value management and dominator.

The role of the city has changed over time, resulting in Smart Tampere. Due to its complexity, there is a difficulty to separate different actors and service providers. The leadership role of Smart Tampere is strongly connected to the local context and it keeps evolving and developing over time. By starting the Smart Tampere -programme, it has initiated, maintained and developed activities under their different themes of smart city development. The themes were chosen by Smart Tampere based on the needs and thus, wanted development in certain areas, which are also connected to the local knowledge. Each theme has developed further in its own pace, and thus, the city officers have shown flexibility. This means, that Smart Tampere has a different role in each theme, providing the required support.

When needed, also the creation of network around different themes was a means they have initiated, also allowing actors from different fields to connect with each other. Also, networks and contacts that were established prior to the programme were utilized. Smart Tampere also provides a platform, which was developed further during the period of the interviews, to inform of its activities and offer actors the possibility to participate and for instance to find open data.

The role as value manager and dominator seemed not to be of great importance, but other than that the approach of Smart Tampere corresponds to the theoretical approach of building ecosystems. These topics were not central in the interviews. Value management took place in form of for instance offering the regional knowledge at international fairs and allowing certain companies to present their services and products. Therefore, the role as value manager and dominator are not discussed further here.

Based on the statements of the private growth companies, there are some other expectations on Smart Tampere such as communication and providing clear definitions and structures.

4.2.1 Governance

The focal point of Smart Tampere's activities lies on initiation. The programme was found with the intention of generating a functioning framework for an innovation ecosystem in the area of smart city technologies in Tampere. By doing so, Smart Tampere defined certain themes on which the activities should focus and assigned theme leaders to each themes, who could quite independently decide on how to proceed within their theme.

“When AI and analytics theme was started, the theme leader founded an advisory board that included representants of forerunner companies. Together with the theme leader they formed the first view of activities and goals of the theme” (City1)

“When planning of ecosystems, both the local know-how and the needs for solutions were taken into account” (City2)

The definition of themes allowed them on one side to assign already existing activities and functions and when necessarily support them. Also, that given framework made it easier for instance for the university to approach the city and initiate discussion on collaboration. The themes however have been subject to constant change, which makes it hard to define sectoral boundaries. Also, the definition of horizontal themes, that reflects a more interdisciplinary approach.

“We try to get also actors to network inside those themes and between them as well. The idea is to have cross-cutting themes that allow collaboration. This is how versatility is created” (City1)

Activities include organisation of multidisciplinary and open networking events around a certain topic such as AI mornings, where each time a certain multidisciplinary topic such as safety is discussed.

Also, Smart Tampere provides help to apply for funding of innovation projects. Also facilitating, forward pushing and opening of possibilities were mentioned as part of Smart Tampere's role. The rationale was that all events and actions of Smart Tampere were open for everyone, however the participating group was perceived to be rather narrow by the companies. Mainly companies with already existing ties to Smart Tampere or Business participated in their activities, as the growth companies put it.

City officers always highlighted the importance of concrete actions in ecosystem genesis. For example, in the process of creating an ecosystem it was suggested to take on much more concrete and defined actions.

“There must be stakeholders, who are committed to it and who come the ecosystem if they have a vision from it. For some it is money – the smaller the company the bigger role money has. For the universities the research networks. For the city the common good and so on. Big companies can sometimes be also interested in networks. But the bottom line is that there must be some value added visible. That if we produce something then they will order it and the order will have the size of this and it will take place in the next five years. This is enough to agree on staying on board. Too little money for us, I am out. Too risky technology for us, we are out.” (City 4)

The need for concrete actions and communication was also an expectation for Smart Tampere, as the information on where, what and who and also, how long and for what money would be relevant for them to know. However, it was often brought up, that public sector activities tend not to have a direct goal in their eyes.

“We have been in some events. It is a bit like that it is not possible to do. Public sector organizes some events and if it is not visible what could come out of that, how much money, who would buy, would anyone buy” (Company4)

“There must be both, needs and solutions, so one should buy and sell. It must be found a role for the companies why it is worth for them being a part of it” (City2)

By and large, the collaboration with public sector organisations seems to be very relevant for growth companies, when their own skills or resources of the company are not enough, for example due to lack of (financial) resources. Thus, the role of the public sector was strongly located to be in the area of finance as well as entering international markets, where the companies lacked knowledge or skills.

However, it was also recognized that these steps, where support and interest on collaboration, might be different for companies in other stages. Also, the availability of skilled labour was brought up, for that the public sector could provide assistance.

“When we started the help of [...] was of vital value to us [...] It was an affiliated company, I never exactly understood what is the difference to other organisations” (Company1)

“There is the question who takes the risk and seldom the business owner has such risk-taking ability and capital. In a certain point, I mean. This kind of collaboration with those organisations is vital” (Company1)

To sum it up, Smart Tampere did have a strong role in governing the ecosystem in Tampere. Smart Tampere’s attempts to coordinate interactions and delegation of roles followed a fragmented approach, which also reflects the ecosystem thinking. Smart Tampere consists of many ecosystems in different phases of their life cycle, and many activities took place within sectoral boundaries. As the themes and therewith also the boundaries were constantly changing, the ecosystem is characterized by some degree of instability. This, however, is what makes an ecosystem: to be in constant disequilibrium. This is shown especially by the discrepancy of perspectives on ecosystem leadership between the public and the private sector.

4.2.2 Building partnerships and platforms

Smart Tampere interviewees mentioned to put efforts into network creation. Often, networks were also said to have similarities with ecosystems per se. Next to funding networking events and organising them by themselves, also attracting and gathering of different actors was part of the plan. This included luring companies from abroad or attracting companies to stay in Tampere. Certainly, Smart Tampere also sets on stimulating different niches as in the choice of their themes. The role of the theme leaders should also be mentioned, as they decide what to do within their theme. This is also one reason why the activities differed.

“We do a lot of matchmaking - big and small firms and researchers, startups vs. capital-intensive companies. Our goal is to create a luring environment for also for big companies, so that companies such as Sandvik won’t just suddenly disappear” (City4)

“One of the central themes is export, as we collect a supply of the services from one area of knowledge or ecosystem that can then be offered outside Finland. Offered as on a plate. Or bring capital companies from abroad to visit” (City 3)

Also, the companies brought up the importance of network creation as an expectation for Smart Tampere – which was also too much to be hoped for. On the other side, networking seemed as something that companies could also do by themselves. However, it would be beneficial for them that someone would match them or create a network in their area of business.

“It would be of interest if they would collect onesliders of all the companies in the area, but for sure not all the companies would approve” (Company1)

“Networking is a huge effort and having local contacts would make it easier” (Company3)

However, companies were not eager to put too much effort into networking, as it does not generate immediate tangible benefits. The direct benefit was also something, that was mentioned in relation to participation of public-run organisations. Also, Smart Tampere organises events, workshops for businesses and they also provide an online-based platform with a list of projects. The growth companies had attended some events and workshops; however they could not identify the organiser. The scope and the target group of these events were also unclear. This reflects also the need for communication and concrete plans, as ‘open for everyone’ might indeed mean open for no-one. A number of companies mentioned, that they might think the activities of Smart Tampere were meant for smaller and younger companies, as they had close to hundred employees. This was also reflected by the city officers.

However, the public sector also did effective networking for instance when requiring collaboration. Even though companies were not overly excited to put any resources in networking, as far as the companies were required to collaborate with other companies or organisations, the results were positive. This is, for instance, if publicly run projects were opened for competition, and required collaborations from companies in order to meet the high criteria. Also, different kinds of consortia were mentioned as positive examples of networking.

“By nature, the requirements make us build alliances, we look who would be a great partner.” (Company4)

However, as the companies reported uncertainty of which public organisation is doing what, they were partly unsure what is organized and offered by Smart Tampere and where to find information. As networking with the city was of interest, they were hoping for improved communication concerning the target groups. The uncertainty about the organisation or programme or city was one of the main things that kept coming up.

“The information is available at least on Smart Tampere web page – but I can’t remember which one them it was – Tampere city has so many other digital projects anyways. I can’t remember which page it was (Company2)

Also, improved information flow was wished for in the area of city and legal procedures. As the collaboration was of interest and the city is putting efforts to its digitalisation, the companies experienced problems with understanding digitalisation projects of the city. In order to improve services, the companies would need to be able to see what is going on. Thus, for instance transparency came up as a relevant factor. Also, the understanding of legal changes and procedures was important. Transparency was brought up also in a sense that it would be nice to know whether for example certain projects are published and whether all the projects are open and up for competition.

“I remember that Tampere would also contact companies directly [...] I don’t know about the legal regulations, but there should be a register so that you could see what the companies do and whether it is even worth to contact them” (Company1)

“The page I last visited did not seem to have many projects going-on, it seemed pretty quiet. That was a red web page. That might have been from Smart Tampere” (Company2)

Concerning platforms, the results in this part are closely related to the communication and networks that were discussed in 4.2.1 above. Generally, it could be said that private companies were not interested in another form or channel of communication – rather to combine what is already there when speaking about digital platforms. For instance, projects of Smart Tampere would rather be seen on another already known project platform. Platform could also be used for opening data for researchers and companies. Platform thinking was also brought up in the interviews with city officers and the university and was also closely related to ecosystem as one of the ways to organise innovation activities.

“Platforms are a timely matter, however in five years it is going to be irrelevant. But it is important to stay on top of things even though it is not ready yet. If you just wait for the ready product the time will pass on it” (University1)

As earlier mentioned, there are some difficulties to distinguish the different actors from each other. Also, other statements on public sector leadership role were not clearly made on Smart Tampere, but rather took place on a general level.

The role of Smart Tampere in building partnerships was highly emphasized both by itself and companies. This goes in line with theoretical assumptions, that building partnerships is of great importance for the central actor.

4.3 Local conceptualisation of ecosystem

Related to the results on the characterization of ecosystem and perceptions of and expectations on Smart Tampere as ecosystem orchestrator, the local connectivity of innovation activities was highlighted and the purpose of using ecosystem as concept was part of all the interviews. In the following, the concept of ecosystem is discussed as a continuum of the regional development concepts including arguments both against and in favour of using ecosystem concept based on the results from the interviews.

“One guy from the ministry of economic affairs and employment [of Finland] once promised to tell me what the difference is to [ecosystems]. But then he left for Brussels and never had time for that” (City4)

In all the interviews, the interviewees used without asking some time on reflecting on ecosystem concept. Like the literature so the interviews, ecosystem was usually characterized through contrasting it to other similar concepts to point out the possible differences. From the Smart Tampere point of view, ecosystem approach is seen as a new perspective to look at certain phenomena and a continuum to policies that has been done since the 90s in Tampere. Ecosystem approach was perceived as a continuum for the city development and a way to stay at top of the global market. Similar concepts including smart city development were discussed during the last decades.

“I experience ecosystem to be that earlier companies tried to keep themselves in the centre and if they needed help, they used subcontractors, they told they will buy that from you. Ecosystems means that there are different actors who by communicating openly try to find common factors [...] Ecosystem is what we have seen after all these development paths to be the way of working that is useful for all the actors” (City2)

For instance, it was pointed out that similar economic policies were done in the 90s, but that at that point they were called clusters. The cluster participants were defined to be the same as today's ecosystems: City, university, big and small firms. This type of clusters was said to be characteristic only for Tampere. Even though ecosystem is a globally connected phenomenon, the characteristics can vary depending on the local characteristics. The local characteristics also influence the content of

the concept. As the locality for instance in culture, legislation and language influence the content of the concept, the concept name can be a matter of geographical location, academic discipline or time, but the content similar. Vice versa, despite the same concept name, the content may differ due to the above-mentioned factors. In today's world concepts in innovation and regional development fields are said to be strongly influenced by the United States of America, in where the local context differs from Tampere and general from the Nordic countries.

“Maybe the biggest change is that all the isms come quite America-led and that the companies nowadays are more conscious” (City4)

Also, other concepts such as platforms, smart cities, clusters and networks were mentioned as similar – but often as much of undefined concepts. In the following table 2, some of the conceptualisation – or the lack of the definitions of (innovation) ecosystem are showcased in order to get an overview of its variety.

Innovation ecosystem definitions	“Ecosystems is in a certain sense old that we have come across it every now and then, but it belongs to those badly defined variables” (City4)
	“Business ecosystems are knowledge intensive and include firms and higher education institutions” (City3)
	“We see ecosystems as development environment – we might talk about start up ecosystems, but they are meant in a broad sense to cover different actors connected to the start up environment – that promotes start-ups, is a start-up or who contribute to evolving something new” (City3)
	“Ecosystem is a broad concept, unfamiliar for many and defined in multiple ways” (City3)
	“Ecosystem highlight open innovation and skills and learning” (City3)
	“How skills and resources can be distributed as the activities are decentralized. Challenging” (City3)
	“Ecosystem is as our clusters. No difference to me” (City4)
	“Here in sustainability many heard the word ecosystems for the first time and thought about bees” City4)
	“How does this differ from a normal network that is based on the idea that everyone who participates benefits from it” (City4)
	“From the point of view of practitioner, this is a mess. Don't even start with platforms - you will get as many answers as interviewees” (City4)
“I dont see a difference. The city development is a continuum, and these are different windows, prisms to look through” (City4)	
“There is no clear definition. Ecosystem thinking brings together different areas and organisations” (Company1)	

Table 2 Overview on ecosystem definitions

As seen in the table 2 above, ecosystem as concept is questioned, but at the same some aspects that add value are recognized. Similarities to clusters and platform thinking were found, but ecosystem

world is even more globally networked and shattered. Even Smart Tampere ecosystem is characterized by having many ecosystems in different phases. On one hand, this is recognized to be a part of the challenges of using ecosystem concept. On the other hand, this is also what ecosystem concept is used for; to describe these multilevel-complex systems.

This leads to the question whether ecosystem is worth to use for in academia or in practice. In the interviews, the usefulness was connected to fundamental changes it might bring with it. Smart cities could be a fundamental change to city development paradigms. This is because they connect the regional development with IT-services, which is a fundamental change for the society. In this sense also climate change can be a fundamental change, to which ecosystem can create responses.

Despite all the confusion about the term and lack of common understanding, ecosystem term is used in Smart Tampere context. It was brought up by individuals, as well as the global discourse. Where exactly it came from, is uncertain. What is certain is that ecosystem is a big discourse today, which will affect the strategies from now on.

“We revised the economic strategy from the year 2016 - where ecosystem was not mentioned once” (City3)

“It is there and there – why not use a paradigm if it adds value for the city development?” (City4)

“We must be riding the crest of the wave, but the basic idea is the same” (City3)

En masse, it seems as if the activities would have not greatly changed since the implementation of the ecosystem thinking, but it is rather a way of keeping up with rest of the world. However, some changes have also occurred, but their origin cannot directly be said to come from either the change of terms or the change of terms come from the changes of actions. Similarly, despite concept name, the expectations of private companies were general for the public sector.

Anyhow, the question arises why to use other concepts, if the content does not change? Why is there the need to ride on crest of the wave?

By and large, the beauty of innovation ecosystem lies in the undefined characteristics and the strong local character. Hence, it is possible to define the Smart Tampere ecosystem to consist of different actors: city, companies, research institutes and citizens. In Smart Tampere case, being part of the ecosystem is not required to be literal, as there are no clear rules or structures.

At the same time the undefined character of both, the innovation ecosystem as concept and Smart Tampere ecosystem is a curse. If there are no clearly selected criteria of definition, where does the

local aspect come and where does it end? To which point is it possible to characterize something as an innovation ecosystem with local characteristics and at which point does it stop being an innovation ecosystem and a local context of innovation activities? I can either argue for Smart Tampere to be an innovation ecosystem in its genesis and include local characteristics or it can be argued not to be an innovation ecosystem as the results of the interview do not go 1:1 with the conceptual background.

5 CONCLUSION

In the following, first the summary of the results is presented which is then discussed in relation to conceptual background. Finally, the limitations of the study and suggestions for future research are presented.

5.1 Summary of the results

To come back to the aim of the study, which was to contribute to the literature on innovation management and regional economic development, the study looked at how the innovation ecosystem of Smart Tampere could be characterized and what are the perceptions of and expectations on Smart Tampere in order to find out how innovation management is conducted with the innovation ecosystem approach in local setting. In order to contribute to the literature on innovation ecosystem, the study investigated the characteristics of and the public sector role in the Smart Tampere innovation ecosystem based on qualitative semi-structured interviews with Smart Tampere city officers, local growth companies in ICT-sector and Tampere university representative. The outcomes of the study should contribute in developing the innovation ecosystems further. Next to the research questions on the characterization of Smart Tampere innovation ecosystem and its perceived and expected role also the concept of innovation ecosystem is subject to discussion.

Smart Tampere's ecosystem can be described to consist of an understanding that innovation is the way, not the goal. Different actors follow a different set of goals but share an understanding of the importance to collaborate. Collaboration between different actors in smart areas such as ICT are organized through a central organisation, where Smart Tampere -programme builds the focal point organized by Business Tampere and the City of Tampere. The collaboration takes place in different themes such as mobility or health, each to its own pace and characteristics. The ecosystem is strongly connected to local context both through geographical and temporal aspects. However, the locality is influenced by global events. Furthermore, the availability of different actors, especially companies and public sector officers, but also university, is highlighted. However, the different actors do not necessarily feel as part of an ecosystem.

In comparison to the conceptual background, the local context seemed to be highlighted in Tampere, which adds to the complexity of innovation ecosystem conceptualisation. Also, the connectivity on a global level made learning processes possible, but also affected the use of different terms, as an ecosystem is characterized by local factors. Also, the awareness of being part of something formed a

central question, as it contradicted the opinions of the interviewees but also the concept of ecosystem, where loose boundaries, self-evolvement and changing roles are highlighted.

When it comes to the governance of ecosystem, Smart Tampere takes different roles in the innovation ecosystem. Due to the different actors, also the expectations and perceptions on the central player differ. From the point of view of Smart Tampere, that was represented by City of Tampere and Business Tampere, Smart Tampere initiated, maintains and develops activities under different themes. Already by choosing to launch Smart Tampere -programme and different themes to develop, the initiation has started. Furthermore, Smart Tampere acts active in building partnerships and enables collaboration in different forms. Also, its tasks include providing a platform.

Other than suggested in the theory, the value management and being a dominator did not seem to play a role to any of the actors. The university and the growth companies shared a similar understanding of the tasks of the public sector, but due to the existence of multiple players, it was difficult to distinguish between different public sector agents, which also counts as an expectation for improved communication of public sector by the private companies. The provision of a programme and framework were central to enable discussion and collaboration, but due to changes in the framework, there was a call for clearer structures and communication including also the availability of projects and focus groups of Smart Tampere. Thus, long-run planning was highlighted, despite short-term liveliness being characteristic for ecosystem thinking. In general, the private companies expected support when taking big steps forward and appreciated help in networking. When thinking about the conceptual ambiguity of the ecosystem leader reaching from self-evolving ecosystem to the existence of a dominator, Smart Tampere's approach resembles that of an ecosystem leader, while its actions reflect the flexible and dynamic role of the central player of ecosystem. This is, as the role changes from opening agile experiments to funding events in certain field based on the needs. In that sense, the ecosystem metaphor seems also to reflect the reality – taking into account the different needs and context of the certain ecosystem. However, the activities of the public sector and the expectations from the private companies seemed not to be connected tightly to the concept of ecosystem, but rather to be general.

5.2 Discussion

For Smart Tampere, the innovation is not the goal but a way of reaching objects such as sustainable solutions for city services. The different actors from different sectors did not share the same set of goals, but everyone follows their own goals with the understanding of the advantages of collaboration.

Even though it was acknowledged by the companies that surviving alone is impossible, the direct economic profit was of more importance than putting efforts into networking and building collaborations. However, it would require to take a look at certain ecosystem to find out about the specific goal-setting.

Smart Tampere can be characterized to be the orchestrator of ecosystems for different themes such as mobility and health around Tampere. As ecosystem leader, Smart Tampere initiated, maintained and developed functions such as networking events but also the framework for discussion under different themes. Networking events and agile experiments were part of many themes. Smart Tampere offers also on its webpage a platform for interested to collaborate and inform themselves on. In the case of Smart Tampere, dominator and value management did not play a central role. From the point of view of the growth companies, many challenges in the role of Smart Tampere as a public sector programme were connected to communication and structural issues, as many changes are done and in a fast pace. Theoretically, Smart Tampere and the companies shared a view on how things should go. For instance, that nice-to-know- type of events were not considered to beneficial.

It is hard to talk about Smart Tampere as the distinctions to other (public sector) organisations are not clear. It would require not only a clearer definition of ecosystem but also from smart - without them it is hard to know whether one – the company or similar – is part of ecosystem, if it cannot be conceptualized so that is understandable. It is not possible to separate different public sector actors from each other. In general, the role of the public sector is seen from the companies' perspective as a place where to go if their own resources and skills are not enough. This would be interesting to look at how public sector services in general are considered in Finland – there might be similarities.

Smart Tampere provides a framework for the local actors to utilize. Not only, is this not the first such programme, but also the programme itself has undergone changes. After the refocus of 2018, the names and the areas their ecosystem covers has changed. Whereas sometimes “change or die” can be the motto to live by, in this sense it can create an uncertainty amongst the other participants, if the reasoning behind those changes are not communicated clearly to the actors. Also, if required to change often, the companies in question may develop of resistance for change. Change requires always work, so why put in effort, if it is predictable that the same effort must be put in over and over again?

Smart Tampere is the end-product of other programmes organized by city of Tampere, and it is strongly bound to its history and geographical location. Even though international connections are inevitable in the globalized world, most of the activities take place on the local level. Smart Tampere

as central organisation gathers actors of smart areas in order improve citizen's life. As actors are seen next to city officers, companies and universities also citizens, but they do not deliberately feel like part of the ecosystem. This also makes it to question to necessity of feeling part of an ecosystem in order to participate, but also to call for a clearer definition – how to feel part of something not clearly defined? Smart Tampere itself took flexibly different roles in different ecosystems, based on the needs and development phase. In the eyes of the companies, the public sector more as a beneficiary, to whom to turn in a case the own skills and resources are not sufficient.

In order for the other participants to utilize the set of tools and become a stand part of the ecosystem, it would require for the tools to be available for a longer period of time. However, ecosystem thinking would support the short liveliness of public sector activities. Public sector leadership seems to be important in the genesis of the ecosystem, which then could continue more self-organised. This means that in Smart Tampere the public sector is doing its job: supporting the genesis of an innovation ecosystem.

The global influence is shown through the different use of terms in different countries and in different scientific fields. Thus, whereas in Tampere, which locates in Finland with a classic strong public sector, a cluster might have already characteristics of what in other countries would be called ecosystems. When looking at the characteristics of Smart Tampere innovation ecosystem, a certain paradox appears. Whereas the literature highlights the need to look at the local characteristics and localize the concept of innovation ecosystem, as there is no general framework to implement in a region to make it innovative. However, this prevents a general framework to be made, which also explains the amount of different ecosystem conceptualisation. This also hinders the recognition process of whether the programme is an innovation ecosystem or not – as it can either be said that these are the local characteristics of the innovation ecosystem or this does not fit a certain description of innovation ecosystem and thus, is not an innovation ecosystem.

From this point of view, the concept of innovation ecosystem might be as good as it gets: it grasps some of the basic conditions and ideas that are required for an area to be innovative, but at the same time keep it as a metaphor. The use of it as metaphor allows for regional specifications. I think it is overly ambitious to try make it generally valid concept, but at the same time use only examples from the Western World.

5.3 Limitations and suggestions for future research

The results have a number of limitations, which need to be taken into account. As it is a qualitative study, the results are limited to time and place. Also, the problem has been already raised that both practitioners and scholars are using the same concept. Thus, the object of the study was created with the intention to create an ecosystem as it is discussed in the academia. It was not central to the study, whether actors in Tampere used specific authors or articles as starting point for building an ecosystem, but the global discourse around the concept has also been heard in Tampere. This bears the risk of making tautological conclusions. If the ecosystem in Tampere was build according to suggestions from the academia, it would be tautological to compare theoretical concepts from the academia with the case of Smart Tampere. As the literature is influenced by the practitioners and the practitioners are influenced by the academia, it might be to some extent an evaluation of how the real life meets the academic standards. However, there is no shared understanding in the literature neither on innovation ecosystem nor other types of ecosystems, so it is hard to judge whether such a tautologic conclusion has been made here. It is impossible to isolate the research object from the global discourse on innovation ecosystem and thus the risk of making tautologic statements can be taken. In addition to that, the literature is still rather young. This said, it seems justifiable to use the literature in the empirical world, even though there is the risk of the above-mentioned tautology. It is important to be done, as the research could show possibilities for improvement in practice, but also practice could contribute to the conceptual understanding.

Also limiting to the results was the choice of interviewees. First, the scope was to concentrate on firms with more than 30% of growth, but as the response rate stayed low, the scope was widened to include growth companies in ICT-sector with at least 10% growth. The interviews were conducted with the first one available, and thus can showcase a personal interest of the companies on the topic but also is not representative of the growth companies in Tampere. The choice of interviewees might have had also implementations on the results, as for instance companies with greater attachment to Smart Tampere would have maybe provided other responses such as sharing a common goal. Due to the changes in the ecosystem themes, it was not possible to characterize individual ecosystems, but rather take a look at the general activities around Smart Tampere, which however influenced the results. Furthermore, the distinction between different public sector organisations and officers was challenging, as it was not always possible to trace the organisations behind different events mentioned by the companies, for instance. Thus, it was challenging to isolate Smart Tampere from other programmes and organisations in the interviews.

The usage of the term ecosystem during the interviews might have also triggered certain opinions that biased the responses. Furthermore, as the interviews took place in a cross-linguistic setting, some of the meanings might have been lost in translation – both ways. Despite the literature being in English, the interviews were held in Finnish, and this thesis written in English. This can be especially problematic as in addition to complexity of concepts such as ecosystem, the term ecosystem might have a different connotation in different languages and cultural surroundings. Additionally, I am not an English native speaker.

In the future research should study innovation ecosystem in broader context. On local level, the impacts of the Smart Tampere -programme for the regional economic development and innovations should be evaluated to see how the ecosystem approach contributes to the regional development and to finding new innovations. This is of relevancy recording especially the Nordic paradox, as through the providing of structural and financial assistance might lead to – nothing. Also, it would be of importance to study ecosystems around different themes such as mobility, and see how the role of the ecosystem leader is in them.

Extensive research should also be conducted in comparing the different conceptualisation such as innovation ecosystem and innovation system and the role of leadership in them. Based on this study, it is possible to say that the needs for the public sector leadership seem to stay similar despite the name of the concept they are using– this is as the interviewed companies for instance were not quite familiar with the concept of ecosystem. However, this should be theoretically backed and for instance, compared, whether the conceptualisation of the role of leader in the ecosystem genesis differs from the theoretical role of leader in RIS or cluster genesis. This would additionally contribute to the discussions on the differences and validity of the different concepts. Generally speaking, there is a need to concentrate on the definition and comparison of different innovation and regional economic development approaches, which also calls for interdisciplinary collaboration. When reading literature on innovation ecosystems, it is clear that there are many similar concepts available, only a few mentioned here and that many researchers are giving their contribution to the field but under slightly different concepts and definitions for those. In times of open access and World Wide Web, there is a need and reason to not only look at research done at local level but worldwide in order to grasp the added value of different concepts.

At the end, only time will tell which concepts prove to be used and whether something is changing by bringing new concepts in or if the older concepts prove to more valuable. Then, “all scientific theories come and go. Some innovations reach deeper than others” (Sfärd, 1998, 4).

REFERENCES

- Abma, T., Deeg, D., Jonsson, H. & F. van Nes (2010). Language differences in qualitative research: is meaning lost in translation? *European Journal of Ageing*, 7(4), 313-316.
- Adner, R. (2017). Ecosystem as Structure: An Actionable Construct for Strategy. *Journal Management*, 43(1), 39-58.
- Alvedalen, J., & Boschma, R. (2017). A critical review of Entrepreneurial Ecosystems Research: towards a future research agenda. *European Planning Studies*, 25(6), 887–903.
- Audretsch, D. B., & M. Belitski (2017). Entrepreneurial Ecosystems in Cities: Establishing the Framework Conditions. *The Journal of Technology Transfer*, 42(5), 1030–1051.
- Autio, E. & L. Thomas (2014). Innovation ecosystems. *The Oxford Handbook of Innovation Management*, 204–288.
- Cai, Y, Normann, R., Pinheiro, R. & M. Sotarauta (2018). Economic Specialization and Diversification at the Country and Regional Level: Introducing a Conceptual Framework to Study Innovation Policy Logics. *European Planning Studies*, 26(12), 2407-2426.
- Cavallo, A., Ghezzi, A., & R. Balocco (2017). Entrepreneurial ecosystem research: Present debates and future directions. *International Entrepreneurship and Management Journal*, 1-31.
- Cohen, B. (2006). Sustainable valley entrepreneurial ecosystems. *Business Strategy and the Environment*, 15(1), 1–14.
- Cooke, P., & Leydesdorff, L. (2006). Regional development in the knowledge-based economy: The construction of advantage. *The Journal of Technology Transfer*, 31(1), 5-15.
- Dedehayir, O., Mäkinen, S. J., & Roland Ort, J. (2018;2015;). Roles during innovation ecosystem genesis: A literature review. *Technological Forecasting & Social Change*, 136, 18-29.
- European Commission (2016). Knowledge Repository. Smart Specialisation platform. <http://s3platform.jrc.ec.europa.eu/-/regional-innovation-ecosystems-learning-from-the-eu-s-cities-and-regions?inheritRedirect=true> [24.10.2018].
- European Commission (2018a). Innovation. Retrieved from https://ec.europa.eu/growth/industry/innovation_en [24.10.2018].
- European Commission (2018b). Smart Cities. Retrieved from https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en [24.10.2018].
- European Smart Cities (2014). European Smart Cities 3.0. Retrieved from <http://www.smart-cities.eu/?cid=01&ver=3> [24.10.2018].
- Feld, B. (2012). *Startup Communities: Building an Entrepreneurial Ecosystem in Your City*. Wiley.
- Foray, D., Goddard, J., Beldarrain, Xabier L., McCann, P., Morgan, K., Neuwelaers N. & R. Ortega-Argiles (2012). Guide to Research and Innovation Strategies for Smart Specialisations (RIS 3). Retrieved from: https://ec.europa.eu/regional_policy/sources/docgener/presenta/smart_specialisation/smart_ris_3_2012.pdf [27.05.2019].
- Furr, N. & A. Shipilov (2018). Building the Right Ecosystem for Innovation. *MIT Sloan Management Review*, 59(4), 59-64.

- Isenberg, D. (2011). The entrepreneurship ecosystem strategy as a new paradigm for economic policy: Principles for cultivating entrepreneurship. *The Babson Entrepreneurship Ecosystem project*.
- Gobble, M. M. (2014). Charting the innovation ecosystem. *Research Technology Management*, 57(4), 55-57.
- Gomes, L. A. de Vasconcelos, Facin, A. L. F., Salerno, M. S., & R. K. Ikenami (2018). Unpacking the innovation ecosystem construct: Evolution, gaps and trends. *Technological Forecasting & Social Change*, 136, 30-48.
- Google (2018). "Innovation ecosystem" on Google.com. Retrieved from [Engineering Economics, 27\(4\), 430–438.](https://www.google.com/search?source=hp&ei=KBpcXNqGI4OVsgHlkLOYBQ&q=innovation+ecosystem&btnK=Google-Suche&oq=innovation+ecosystem&gs_l=psy-ab.3..35i39j0i203l2j0i3j0i203l4.2559.5028..5659...1.0..0.249.2390.7j13j1.....0....1..gws-wiz.....6..0i67j0i20i263j0i10.Otk4adH53so. [07.02.2019].</p>
<p>Jucevicius, G., Juceviciene, R., Gaidelys, V., & Kalman, A. (2016). The Emerging Innovation Ecosystems and)
- Kolehmainen, J. (2016). *Paikallinen innovaatioympäristö: Kohti alueellisen innovaatiotoiminnon ymmärtämistä*. Tampere, Tampere university press.
- Laine, M., Bamberg, J. & P. Jokinen (2007). *Tapaustutkimuksen taito*. Helsinki, Gaudeamus.
- Lee, E., Oh, D-S., Park, S., & F. Phillips (2016). Innovation Ecosystems: A critical examination. *Technovation*, 54, 1-6.
- Masue, O., Swai, I. & M. Anasel (2013). The Qualitative-Quantitative 'Disparities' in Social Science Research: What Does Qualitative Comparative Analysis (QCA) Brings in to Bridge the Gap? *Asian Social Science*, 9(10), 211-221.
- Markkula, M. (undated) *Systemic Development of Regional Innovation Ecosystems – Modernizing the Triple Helix*. Retrieved from (M http://www.academia.edu/3984588/Systemic_Development_of_Regional_Innovation_Ecosystems_Modernizing_the_Triple_Helix [02.05.2019].
- Mazzucato, M. & D.K.R. Robinson (2017). Co-creating and directing Innovation Ecosystems? NAASA's changing approach to public-private partnerships in low-earth orbit. *Technological forecasting & Social Change*, 136, 166-177.
- OECD. (2019). Defining innovation. Retrieved from <https://www.oecd.org/site/innovationstrategy/defininginnovation.htm> [04.05.2019].
- Paasilehto, S. (2001). Mistä tähtikuviot kertovat? *Oikeus* 32(1), 26-36.
- Pirkanmaan liitto. (2019). Innovation ecosystem. Retrieved from <https://www.pirkanmaa.fi/innovation/?lang=en> [02.05.2019].
- Rinkinen, S. & V. Harmaakorpi (2018). The business ecosystem concept in innovation policy context: building a conceptual framework. *Innovation: The European Journal of Social Sciences*, 31(3), 333-349.
- Romanelli, M. (2018). Towards sustainable ecosystems. *Systems Research and Behavioral Science*, 35(4), 417-426.

- Russo-Spena, T., Tregua, M. & F. Bifulco (2017). Searching through the Jungle of Innovation Conceptualisations. System, Network and Ecosystem Perspectives. *Journal of Service Theory and Practice*, 27(5), 977-1005.
- Saaranen-Kauppinen, A. & A. Puusniekka (2006). KvaliMOTV - Menetelmäopetuksen tietovaranto Tampere. *Yhteiskunnallinen tietoaarkisto*. Retrieved from: <http://www.fsd.uta.fi/menetelmaopetus>. [16.05.2019].
- Sagoff, M. (2003). The Plaza and Philosophy. *Biology & Philosophy*, 18(52), 529-552.
- Sfärd, A. (1998). On Two Metaphors of Learning and the Dangers of Choosing Just One. *Educational Researcher*, 27(2), 4-13.
- Smart Cities World (2017). Nokia joins Smart Tampere Initiative. Retrieved from <https://www.smartcitiesworld.net/connectivity/connectivity/nokia-joins-smart-tampere-initiative> [24.10.2018].
- Smart Cities World (2018). Smart Tampere refocuses its efforts. Retrieved from <https://www.smartcitiesworld.net/governance/smart-tampere-refocuses-its-efforts-3340> [24.10.2018].
- Smart Tampere (2018a). Smart Tampere. Retrieved from <http://smart tampere.fi/en> [24.10.2018].
- Smart Tampere (2018b). Key elements of Smart Tampere. Retrieved from <http://smart tampere.fi/en/smart-ecosystem-themes/smart-tampere-ecosystem-verticals-and-horizontals> [24.10.2018].
- Smart Tampere (2018c). Develop smarter cities with us. Retrieved from <http://smart tampere.fi/en/join-us> [24.10.2018].
- Smart Tampere. (2019a). About Smart Tampere – Ecosystem programme. Retrieved from: <https://smart tampere.fi/en/about-smart-tampere/ecosystem-program/> [16.05.2019].
- Smart Tampere. (2019b). Smart Tampere. Retrieved from: <http://smart tampere.fi/en> [8.3.2019].
- Smart Tampere. (2019c). Smart Tampere home. Retrieved from: <https://smart tampere.fi/en/home/>. [16.05.2019].
- Stam, E., & Spigel, B. (2016). Entrepreneurial ecosystems and regional policy. In R. Blackburn, D. de Clerq, J. Heinonen & Z. Wang (Ed.), *Sage handbook for entrepreneurship and small business*.
- Spigel, B. (2017). The Relational Organization of Entrepreneurial Ecosystems. *Entrepreneurship Theory and Practice*, 41(1), 49-72.
- Tampere (2019). City of Tampere – Information of Tampere. Retrieved from <https://www.tampere.fi/en/city-of-tampere/information-on-tampere.html> [14.05.2019].
- TEM. (2019). Ecosystem policy. Retrieved from <https://tem.fi/en/ecosystems> [02.05.2019].
- Tomaney, J. (2016). Regional Development. *Oxford Bibliographies*. Retrieved from: <https://www.oxfordbibliographies.com/view/document/obo-9780199874002/obo-9780199874002-0134.xml> [02.05.2019].
- Tsang, E. (2013). Case Study Methodology: Causal explanation, Contextualization and Theorizing. *Journal of International Management*, Vol 19. 195-202.

- Tödtling, F. & M. Trippel (2011). Regional Innovation systems. In P. Cooke (Ed.), *Handbook of regional innovation and growth*, 455-466.
- Valkokari, K. (2015). Business, innovation, and knowledge ecosystems: How they differ and how to survive and thrive within them. *Technology Innovation Management Review*, 5(8), 17-24.
- Yigitcanlar, T., Lönnqvist, A., & H. Salenius (2014). Analysis of a city-region from the knowledge perspective: Tampere, Finland. *Vine*, 44(3), 445-466.
- Yin, R. (1981). The case study as a serious research strategy. *Knowledge creation, diffusion and Utilization*, 3(1), 97-114.
- Zygiaris, S. (2013). Smart city reference model: Assisting planners to conceptualize the building of smart city innovation ecosystems. *Journal of the Knowledge Economy*, 4(2), 217-231.

APPENDIX

Interview guide

- Name, position, company/working place
- Data security

- Familiarity with Smart Tampere/ ecosystem thinking
- Participation at activities/ecosystems
- Reasoning behind ecosystem/ purpose behind participation?
- Actors, Company's Role /Smart Tampere role and responsibilities
- Forms of collaboration
- Public Sector role in ecosystem
- Networking, ecosystems
- Topics from the figures below

