

Master's Thesis Internship - Sustainable Business and Innovation

The Entrepreneurial Ecosystem in a Multi-Level Perspective on Transitions

Illustrated by Case Studies of Rotterdam and Vaasa



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List of Abbreviations

EE	Entrepreneurial Ecosystem
IRIS	Integrated and Replicable Solutions for Co-Creation in Sustainable Cities
HIC	Harbor Industrial Complex
MLP	Multi-Level Perspective on Socio-Technical Transitions
R&D	Research and Development
SME	Small- Medium-sized Enterprise
SNM	Strategic Niche Management
STEEM	Strategic Transformative Entrepreneurial Ecosystem Management
TEE	Transformative Entrepreneurial Ecosystem

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Abstract

This thesis investigates the entrepreneurial ecosystem (EE) in a multi-level perspective on transitions (MLP). Because the interplay of EE and MLP is in a nascent stage, two cases, Rotterdam in the Netherlands and Vaasa in Finland, are scrutinized using a qualitative method. In Vaasa, I performed an internship at Merinova Technology Centre oy. I conducted 44 semi-structured interviews with relevant EE actors. Using an abductive method, the empirical insights of these interviews are systematically combined with case-specific information, EE, and MLP theory. Based on the findings, I developed a *transformative entrepreneurial ecosystem* (TEE) framework (Figure 6) that combines EE and MLP theory and depicts the generalizable configuration of the EE that encourages entrepreneurship across multiple niches, which subsequently support the urban transition to sustainability. By developing this conceptual TEE framework, I make theoretical and practical contributions to the interplay of the fields of EE and MLP.

Executive summary

The planet's climate is changing because industrial economies are and have been locked into fossil fuel-based energy systems through institutional and technological co-evolution driven by path-dependent increasing returns to scale (Unruh, 2000). This climate change indicates the urgency for humanity to make a transition to a sustainable and thus low-fossil society. A conducive framework to study such transitions is the multi-level perspective on socio-technical transitions (MLP). In addition, entrepreneurship has an essential function in the transition process by enabling change (Hekkert et al., 2007). The Entrepreneurial Ecosystem (EE) is a framework for creating and understanding entrepreneurship in a specific delimited space such as region or city.

This thesis, therefore, investigates the interplay of the EE and MLP frameworks. Two cases (Rotterdam and Vaasa) are studied using a qualitative method. Forty-four semi-structured interviews were conducted with the relevant actors in the two EEs: entrepreneurs, incubators, related government officials, (early-stage) investors, affiliated businesspeople, advisors, and research institutes both private and public. The empirical insights of these interviews were, adopting an abductive method, systematically combined with case-specific information and EE and MLP theory (including the EE and MLP frameworks). The result is a transformative entrepreneurial ecosystem (TEE) framework (Figure 6) that combines EE and MLP theory and depicts a generalizable EE configuration that encourages entrepreneurship across multiple niches, which subsequently support the urban transition to sustainability.

The TEE framework is based on the EE framework of Stam (2018). Besides transformative refinements to the ten original framework and systematic conditions of Stam's (2018) framework, I added two new transformative conditions: 'Involvement of incumbents' and 'TEE branding'. The 'Involvement of incumbents' condition is added to acknowledge the main finding of the increasing importance of start-up - incumbent collaborations. Especially in the field of transformative entrepreneurship, the impact can seldom be scaled without this collaboration. The condition 'TEE branding' shows the importance of promoting the successfulness of the TEE and promoting its (successful) transformative entrepreneurs to the external environment.

For my internship at Merinova oy, no additional company question was formulated. Instead, I was granted a significant amount of freedom to conduct my research. An overview of the EE of Vaasa's strengths and weaknesses was agreed upon to be beneficial for my internship host. This overview is given in Appendix B. Also, I assisted with some work packages on the IRIS project. It was not possible to do an internship in Rotterdam due to the COVID-19 pandemic.

1. Introduction

Urbanization is predicted to result in 6 billion urban inhabitants by 2050. Cities will be exposed to climate change, not only from greenhouse gas-induced radiative forcing but also by localized effects from this urbanization¹ (McCarthy et al., 2010). The Earth's climate is changing because industrial economies have been locked into fossil fuel-based energy systems through a process of institutional and technological co-evolution driven by path-dependent increasing returns to scale (Unruh, 2000). This climate change indicates the necessity for humanity to make a transition to a sustainable and thus low-fossil society. Especially in cities, they generate the bulk of greenhouse gas emissions and have the increasing majority of humans living there. It makes them subject most critically to climate hazards (Corfee-Morlot et al., 2009; Bulkeley, 2013). On the other hand, cities also play an important role in shaping the sustainability transition, based on evidence that indicates that some of the world's most dominant cities are the target of attempts to purposively reconfigure socio-technical systems at the scale of the city (Hodson & Marvin, 2010). The city-level stakes are high, making them a significant arena of transition. I, therefore, focus on the urban transition to sustainability.

A transition is defined as a transformation process in which society changes in a fundamental way over one generation or more (Rotmans et al., 2001). Transitions are long-term and complex processes encompassing multiple actors (Geels, 2011). A fruitful framework to study such transitions is the *multi-level perspective on socio-technical transitions* (MLP). The MLP explains and combines patterns and mechanisms in transition processes (Geels, 2002). It identifies three levels: niche, socio-technical system/regime, and landscape. The different levels are heuristic and analytical concepts to understand the complex dynamics of socio-technical transitions (Geels, 2002). Thus, the MLP is a framework which strength rests in its capacity to capture the bigger picture (Smith et al., 2010). Because socio-technical transitions to sustainability are such complex and dynamic processes, it is pivotal to capture this bigger picture and wider context, making the MLP very suitable for this research (Geels, 2011).

The transition from one economic system to another has created unique opportunities for entrepreneurs to forge new companies that fill voids in the structure of industry and services in multiple transition pathways (Estrin et al., 2006; Geels & Schot, 2007). Moreover, entrepreneurship has an important function in the transition process by enabling change (Hekkert et al., 2007). Entrepreneurship that plays a significant role in sustainability transitions is defined as transformative entrepreneurship (Burch et al., 2016). A framework to create, maintain, and accelerate entrepreneurship in a certain delimited space (such as region or city) is the *Entrepreneurial Ecosystem* (EE). An EE is defined as a set of interdependent actors and factors coordinated in such a way that they enable *productive* entrepreneurship² within a territory (Stam & Spigel, 2016). The EE has emerged as a leading framework to explain the existence of productive entrepreneurship in a particular delimited territory. Therefore, I choose the EE approach. However, to link the EE to the MLP, the principal prerequisite is that this entrepreneurship created by the EE is not solely productive but also transformative. Only then can it function as an essential process in the urban sustainability transition.

¹ An example of this is the urban heat island effect: an urban area or metropolitan area that is significantly warmer than its surrounding rural areas due to human activities (Kim, 1992).

² The term productive entrepreneurship refers to "any entrepreneurial activity that contributes directly or indirectly to the net output of the economy or to the capacity to produce additional output" (Baumol, 1996 p. 30).

I identified research gaps for both the MLP and the EE that prevent bringing the frameworks together. On the MLP side, three relevant research gaps are exposed. Firstly, research on conditions for entrepreneurship, in general, is scarce, and research on conditions for transformative entrepreneurship is even nonexistent. Secondly, the role of agency in MLP is not satisfactorily elaborated (Smith et al., 2010; Seyfang et al., 2010; Geels, 2011). Thirdly, MLP analyses tend to overlook *where* transitions take place (Hodson & Marvin, 2010; Smith et al., 2010; Coenen et al., 2012; Coenen & Truffer, 2012; McCauley & Stephens, 2012; Fischer & Newig, 2016). Concerning the EE, there is little research investigating transformative start-ups, which are, again, required for a transition. Consequently, the relation and combination between the MLP and the EE are underconceptualized. Most importantly, because the MLP, thus, does not account adequately for entrepreneurship, whereas the EE does. The relation between the MLP and EE can be used to understand how transformative entrepreneurial output from an EE can play a serious role as the bottom-up component of an urban transition. This understanding can be realized by linking the theories. Scrutinizing transformative entrepreneurship as the output of an EE as a driver of transition and vice versa is therefore important. Accordingly, the research question of this study is:

What configuration(s) of the EE encourages transformative entrepreneurship, which subsequently supports the urban transition to sustainability?

To answer this research question, qualitative evidence is gathered from illustrative case studies of Vaasa and Rotterdam. These cities are illustrative for this research as they require sustainable urban solutions and are actively working on these solutions. This is demonstrated by the fact that these two cities are participating in ‘Smart Cities and Community Lighthouse projects’ from the European Commission. They are used to explore the different possible configurations of EEs in an urban transition context.

Engaging with conceptual-empirical evidence, the EE theory is combined with MLP theory and constructed as a novel ‘Transformative Entrepreneurial Ecosystem’ framework. Framing this, I provide research in the underconceptualized relation between the MLP and the EE in urban contexts. Moreover, the ultimate goal is not only to show the different relations between the frameworks but also to provide advice on how to rig the EE to actively use its influence and structure to support the sustainability transition in cities. In addition, the EE theory is enriched with conditions for transformative entrepreneurship. Given that the EE approach is built on strong spatial underpinnings and pays significant attention to the role of agency (O’Connor et al., 2018), it can also improve the MLP on these dimensions. The EE thus enhances the MLP with a spatial dimension and the required, more thorough, elaboration of agency. As a result, this study contributes to a better understanding of how to exploit the EE in the urban transition towards a sustainable future. It can serve as a roadmap to manage their EE for cities and regions worldwide facing a similar grand challenge of transitioning to a sustainable (low fossil) system.

This introductory section is followed by a theoretical section where the MLP and EE strands of literature will be analyzed and compared. The next section shows the methodological functionality of my thesis, which is followed by the results section. The results section presents the findings, integrating both cases and theory. A conclusion and discussion finalize the main body of my thesis.

2. Theory

2.1. Transitions to sustainability

To place the current urban transition in perspective, it is first crucial to stress that it is a ‘sustainability transition’. Such transitions have some special characteristics differing from many historical transitions (Geels, 2011). Three of these characteristics stand out. Firstly, sustainability transitions are ‘purposive’ or goal-oriented as they address persistent environmental problems, as opposed to many historical transitions that were more ‘emergent’ (Smith et al., 2005). Secondly, because sustainability is a collective good, sustainability transitions do not offer clear user benefits. They often score lower on price and performance dimensions than established technologies. Consequently, it is unlikely that environmental innovations or ‘green niches’ will be able to replace systems without deep-rooted changes in underlying economic frame conditions such as taxes, subsidies, and regulatory frameworks (Geels, 2011). Thirdly, the empirical domains where sustainability transitions are needed most (e.g., energy, agri-food, and transport) are characterized by large firms holding onto ‘complementary assets³’ (Rothaermel, 2001). Hence, these large firms have a strong position relative to new firms or entrepreneurs that develop environmental innovations first but have no complementary assets as opposed to these large firms. Sustainability transitions thus need incumbents’ strategic reorientation as they at first defend existing systems. These three considerations suggest that sustainability transitions are certainly about interactions between politics, technology, economics, and culture. These interactions are thus multi-dimensional and imply systemic change. The MLP is a framework that analyses transitions from a multi-dimensional and systemic point and is therefore chosen for this research. Moreover, the MLP has already been successfully applied to studies of contemporary and future transitions to sustainability⁴ (Geels, 2011). In the next sections, the MLP will, therefore, be scrutinized.

2.2. Multi-level perspective on socio-technical transitions

2.2.1. Background

The MLP is a middle-range theory⁵ that conceptualizes the overall dynamic patterns in socio-technical transitions (Geels, 2011). In this way, it serves as a heuristic approach for analyzing systemic socio-technical change (Geels, 2004; Geels, 2002). Thus, the MLP is a scheme that relates various concepts and uses empirical research to identify generalizable lessons and recurring patterns (Geels, 2011). The MLP’s core concept of a *socio-technical transition* originates from the *technological transition* developed by Nelson and Winter (1982) and Rip & Kemp (1998). The MLP framework combines concepts from *science and technology studies*⁶, *evolutionary economics*⁷, *structuration theory*, and *neo-institutional theory*⁸

³ Examples are specialized manufacturing capability, experience with large-scale test trials, access to distribution channels, service networks, and complementary technologies (Rothaermel, 2001).

⁴ Examples are electricity systems (Verbong and Geels, 2007; Verbong and Geels, 2010; Hofman and Elzen, 2010), mobility and ‘green’ cars (Nykqvist and Whitmarsh, 2008; Van Bree et al., 2010; Geels et al., 2011), biogas and co-combustion (Raven, 2004), organic food and sustainable housing (Smith, 2007), and animal welfare in pig farming (Elzen et al., 2011).

⁵ Merton & Merton (1968:39) defined *middle-range theories* as “theories that lie between the minor but necessary working hypotheses that evolve in abundance during day-to-day research and the all-inclusive systematic efforts to develop a unified theory that will explain all the observed uniformities of social behavior, social organization, and social change”. It navigates between the extremes of grand theory and abstracted empiricism, which only focuses on data-collection and data-analysis.

⁶ Concepts of science and technology studies are sense-making, social networks, innovation as a social process shaped by broader societal contexts (Geels, 2011).

⁷ Key concepts of evolutionary economics are trajectories, regimes, niches, speciation, path dependence, routines (Geels, 2011).

⁸ Neo-institutional theory argues that rules and institutions are ‘deep structures’ on which knowledgeable actors draw in their actions and the duality of this structure (i.e., structures are both context and outcome of actions, the ‘rules of the game’ that structure actions) (Geels, 2011).

(Geels, 2011). The theoretical micro-assumptions for these underlying strands of literature have been expressed elsewhere in studies by Geels (2004) and Geels & Schot (2007; 2010).

The MLP suggest that transitions result from the interplay of development of three analytical levels; an exogenous socio-technical landscape at the macro-level; the socio-technical systems that are stabilized by and intertwined with socio-technical regimes at the meso-level; and the micro-level niches, which are the locus for radical innovations (Rip & Kemp, 1998; Geels, 2002). Each of these levels refers to heterogeneous combinations of elements. Higher levels are more stable than lower levels in terms of alignment between the components and the number of actors (Geels, 2011). Transitions are defined as shifts from an old system to a new system (Geels, 2011). The landscape and niche levels are determined in relation to these systems. The landscape is defined as the external environment that influences interactions between systems and niche(s). In contrast, niches are defined as protected spaces for technologies or practices that differ substantially from existing systems (Geels, 2011). I will now delve deeper into the three analytical levels as they are the backbone of the MLP. A visualization of the three analytical levels is provided in Figure 1.

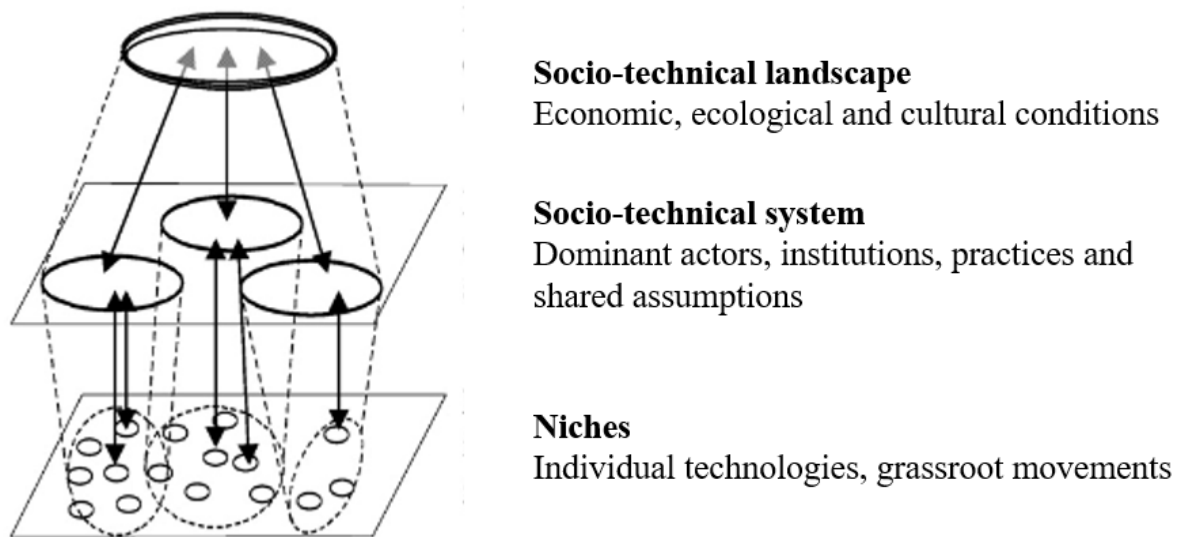


Figure 1. The three analytical levels in MLP, based on Nykvist & Whitmarsh (2008)

2.2.2. Socio-technical landscape

The landscape level is the broader context affecting the system and niche dynamics (Rip & Kemp, 1998). It highlights the material and technical setting, macroeconomic patterns, demographic trends, societal values, and political ideologies that sustain society (Geels, 2011). These factors are combined within a single ‘landscape’ level because they form the external context that actors at both niche and system levels cannot influence in the short run. The socio-technical landscape usually changes slowly (Geels, 2011).

2.2.3. Socio-technical system and regime

Geels (2004) defines systems as: ‘the linkages between elements necessary to fulfill societal functions (e.g., nutrition, communication or transport)’. Systems distinguish the production, distribution, and use of technologies as sub-functions, which are, in turn, fulfilled by necessary elements (i.e., resources). Systems do not function autonomously but are the outcome of human actors embedded in social groups (Geels, 2004). A schematic representation of such a system is presented in Figure 2.

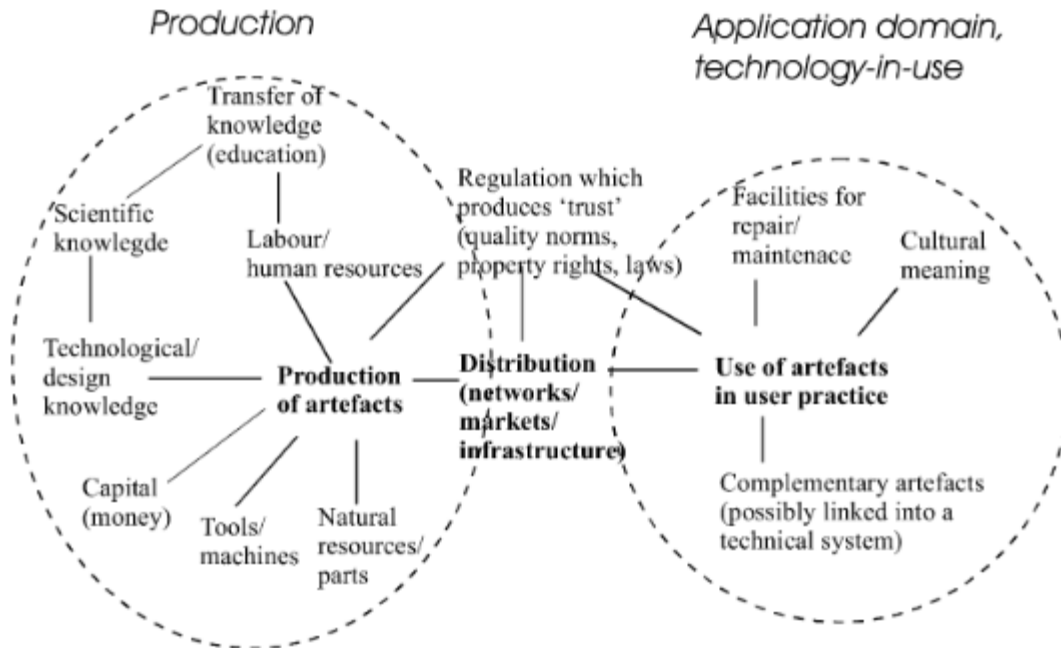


Figure 2. The basic elements and resources of a socio-technical system, retrieved from Geels (2004)

The regime⁹ forms the grammar or ‘deep structure’ that explains the stability of an existing socio-technical system (Geels, 2004). Thus, the regime is the semi-coherent set of rules (i.e., the institutions) that coordinate and orient the social groups’ activities that reproduce the variety of elements in a system (Geels, 2011). Examples of these regime rules are favorable institutional arrangements and regulations, capabilities and competences, cognitive routines and shared beliefs, legally binding contracts, lifestyles, and user practices (Geels, 2011). Regime rules work in two ways: they are both medium and outcome of action. In other words, on the one hand, the actors represent, enact and draw upon rules in terms of concrete actions in local practices, while, on the other hand, the rules configure the actors (Geels, 2011). Existing systems are characterized by lock-in. Therefore, innovations occur incrementally, with small changes leading to stable trajectories.

2.2.4. Niches

The third analytical MLP level is the niche. Niches are *protected spaces* such as subsidized demonstration projects, R&D laboratories, or small market niches where users are willing to support emerging innovations (Geels, 2011). Niche actors work on radical innovations that deviate from existing systems. Examples of niche actors are *entrepreneurs, spinoffs, and start-ups*. Niche-actors have the goal of using their radical innovations to challenge the current system. If the niche actors succeed, their innovations are used in the system or even replace the system (Geels, 2011). This concept of systemic replacement is another term for a transition. Systemic replacements are difficult because niche-innovations are often a mismatch with the actual system dimensions (e.g., lack of consumer practices, regulations, or appropriate infrastructure). Systems are, furthermore, as mentioned in the paragraph before, stabilized by many lock-in mechanisms.

⁹ Some clarification is required concerning the conceptual ambiguity of the terms ‘(socio-technical) regime’ and ‘(socio-technical) system’ in MLP literature. The terms are used interchangeably for the same phenomena; the meso-level of the MLP. However, a regime is not a system. I want to make a firm distinction here: the system is the analytical meso level in MLP, whereas the regime is the web of institutions structuring and shaping this system.

Therefore, niches are crucial for transitions; they provide the seeds for systemic change (Geels, 2011). The literature on niche innovation identifies three core processes in niche development (Kemp et al., 1998; Schot & Geels, 2008). These three processes are a prerequisite for niches to gain momentum (Geels, 2011). Firstly, the building of social *networks* and the enrolment of more actors expand the resource base of niche-innovations. Secondly, *learning and articulation processes* in various dimensions¹⁰. Thirdly, the articulation (and adjustment) of *expectations or visions* guides the innovation activities and aims to attract attention and funding from external actors.

For niches to gain this momentum, scholars further stress the importance of strategic niche management (SNM). SNM is the concentrated effort of creating, developing, and controlling protected spaces for specific applications of new technology (Kemp et al., 1998). Although superficial, it is interesting to notice that at the MLP niche level, there is some reference to entrepreneurship. Nevertheless, except for this reference, MLP does not go further than vaguely stating that entrepreneurship exists at the niche level, embodied as niche actors. Conceptualization of how this entrepreneurship exists is lacking. Oppositely, entrepreneurship is the central component of EE theory. Linkages and potential synergies between the theories do exist. This will further be elaborated in section 2.4.

2.2.5. *The MLP framework and pathways*

The three levels are combined into an ‘ideal-typical’ representation (Figure 3), the MLP on transitions. It explains how the three levels interact dynamically in the unfolding of socio-technical transitions. Each transition is unique, but the model argues a general dynamic pattern in transitions characterized by the interaction between processes at different levels.

¹⁰ For instance: technical design, market demand and user preferences, infrastructure requirements, organizational issues and business models, policy instruments, symbolic meanings.

Increasing structuration
of activities in local practices

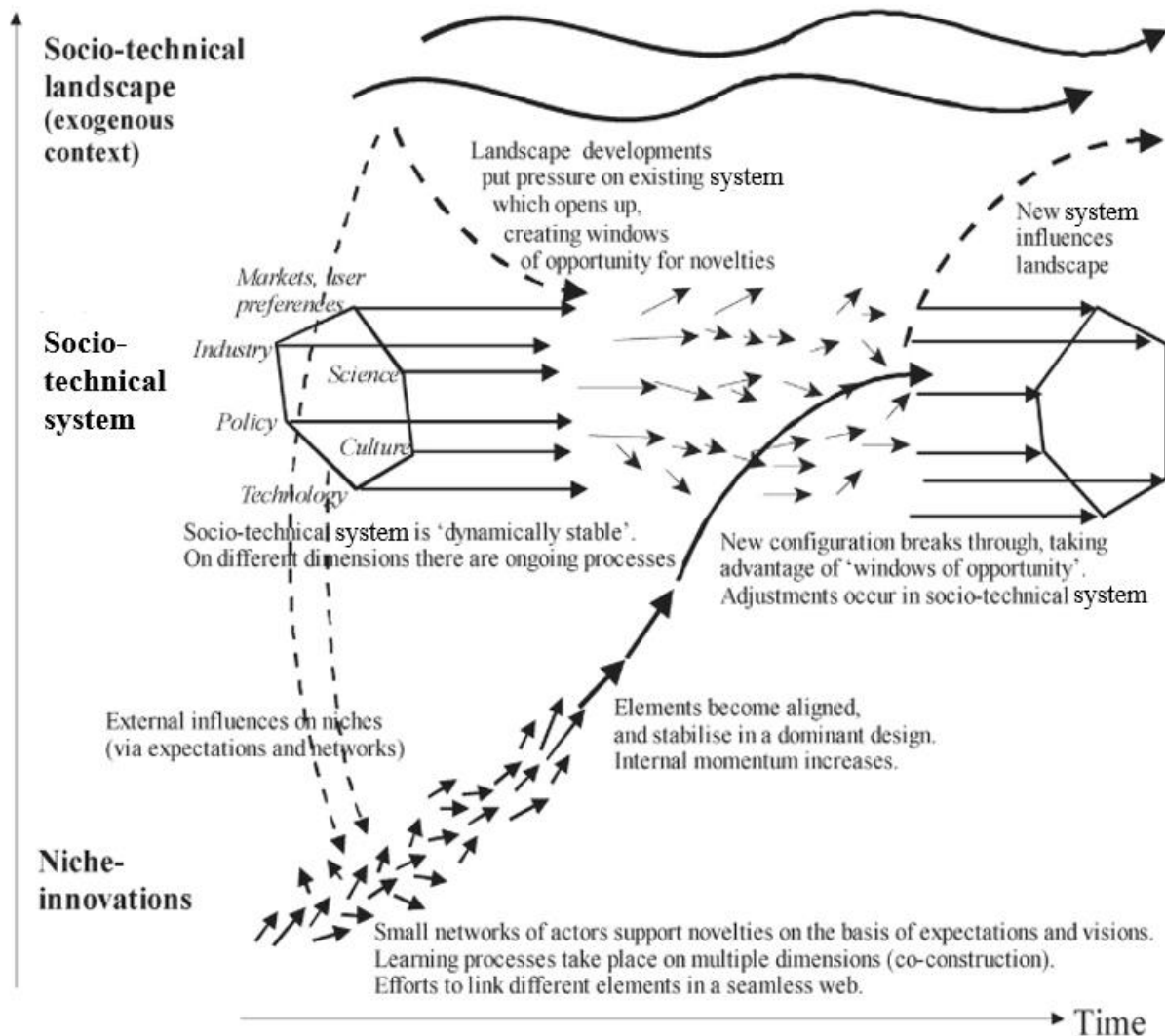


Figure 3. The multi-level perspective on transitions, based on Geels (2011)

The MLP rules out a single cause or driver of a transition. Instead, transitions are complex phenomena with processes in multiple dimensions and at different levels influencing each other in multiple ways. The growth of certain niche-innovations can, for instance, require interactions between two (or more) systems¹¹. Recognizing this complexity, Geels & Schot (2007) and Geels et al., (2016) developed a typology of four transition pathways: transformation, reconfiguration, technological substitution, and de-alignment and re-alignment. The different pathways alter in combinations of timing and the nature of multi-level interactions. Also, every transition can be unique because it can morph from one transition pathway to another and back (Geels & Schot, 2007). An overview of the four different pathways is given in Table 1.

¹¹ Examples of these interactions are battery-electric vehicles that link transport and electricity systems, co-generation of heat and power links heat and electricity systems and biofuels link agriculture and transport systems.

Table 1. Transition pathways, based on Geels & Schot (2007), Geels (2011) and Geels et al., (2016)

Transition pathways	Idea in short
Transformation	In this pathway, landscape developments exert pressure on the system when niche-innovations are not well-developed. Incumbent actors modify the direction of innovation activities and development paths, which leads to gradual adjustments of systems to landscape pressures. Although niche-innovations do not break through in this path, experiences from niches can be translated and accommodated (often in a watered-down form) in the system
Technological substitution	In this pathway, competitive niche-innovations are well developed when landscape developments exert pressure on systems. Tensions in the system form a window of opportunity for the breakthrough of niche-innovations that replace the system. An alternative route is that niche-innovations gain high internal momentum (because of resource investments, consumer demand, cultural enthusiasm, political support, etc.), in which case they can replace the system without the help of landscape pressures.
Reconfiguration	In this pathway, niche-innovations are more developed when landscape developments exert pressure on systems. If niches are symbiotic to the system, incumbent actors can adopt them as 'add-ons' to solve local problems. This incorporation can trigger subsequent adjustments, which change the system's basic architecture.
De-alignment and re-alignment	In this pathway, major landscape pressures first cause disintegration of systems (de-alignment). Then, taking advantage of this 'space', multiple niche-innovations emerge, which co-exist for extended periods (creating uncertainty about which one will become the winner). Processes of re-alignment eventually occur around one innovation, leading to a new system.

As this paper is particularly looking at the MLP in combination with the EE, bottom-up components of transition pathways (i.e., niche dynamics) are the areas of interest. Appendix C will unfold which transition pathway is relevant per case based on their relative characteristics. Overall, niche innovations 'emerge' with the help of SNM, but how they emerge is unclear, actor and agency issues remain (de Haan & Rotmans, 2018). These niches are to be perceived as pivotal for bringing about system shifts, but they cannot do this independently. Linkages with ongoing external processes are also imperative (Schot & Geels, 2008).

2.2.6. *The MLP on an urban scale*

In the last section, I identified the importance of niche dynamics in all transition pathways. Next, I turn to the fact that the subject of sustainability transitions has remained at the periphery of regional and economic geography studies (Coenen & Truffer, 2012). There is, however, a need to add greater emphasis on the territorial embeddedness and multi-scalar nature of sustainability transitions (Coenen & Truffer, 2012). Transition processes are geographically uneven because of their relative uniqueness to other regions around the world (Coenen et al., 2012). Acknowledging this need provides a complete understanding of the different ways spatial contexts actively and substantially shape transition processes and, consequently, emphasizes the multiplicity and heterogeneity of transition pathways (Coenen & Truffer, 2012). To enrich MLP theory with a spatial dimension, it should thus be combined with a geographic perspective. In the following section, I suggest such a perspective: the EE, to add required territorial encapsulation and further elaboration of niche dynamics concerning actors and entrepreneurial agency (as discussed in the previous section) to this urban transition.

2.3. Entrepreneurial ecosystems

2.3.1. Background

A bottom-up piece in the analytical puzzle of urban transitions to sustainability is the EE (Bischoff & Volkmann, 2018). Therefore, this section will first explicate the EE approach in terms of its background, assumptions, and concepts. EEs are, as stated in the introduction, defined as a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a territory (Stam & Spigel, 2016). Spigel (2017) further specified the EE as a union of active economic policies, universities, social networks, localized cultural outlooks, and investment capital that create environments of supportive innovation-based start-ups. The two dominant origins of the EE are strategy literature and regional development literature. Both lineages share common roots in ecological systems thinking, providing insights into the interdependence of actors in a community to create new value (Acs et al., 2017). Table 2 gives a representation of the EE in relation to its origins: strategic management and regional development.

Table 2. Origins of the EE approach, based on Acs et al., (2017)

	Regional development	Strategic management	EE approach
Value	Value creation by firms in related industries (productivity) driven by competition (value capture) and collaboration	Value creation and capture by firms	Value creation by individual entrepreneurs, as indicated by the prevalence of high-impact entrepreneurial efforts (such as Unicorns)
Context	Regional	Global	City/regional/national
Coordination	Firms' rivalry and collaboration, government policy	Governance and management by a focal orchestrator firm	Public-private governance

The EE approach is seen within academic, policy, and business literature as an important tool for creating resilient economies based on entrepreneurial innovation (Spigel, 2017). EE theory is related to multiple strands of research that include work on industrial districts, clusters, innovation (eco)systems, economic geography, triple helix, social capital, and networks (Spigel, 2017). Although these theories differ in their conceptual and methodological perspectives, they share a common idea that certain attributes exist outside a firm's boundaries but within a region, which can contribute to a new venture's competitiveness. These theories emphasize three regional resources that contribute to increased entrepreneurship and growth. Firstly, social networks within regions help spread information about entrepreneurial opportunities (Arenius & de Clercq, 2005), connect entrepreneurs with financiers (Powell et al., 2002), and create pathways for knowledge spillovers between firms and universities (Owen-Smith & Powell, 2004). The following regional resources are institutional environments and shared cultural understandings that ease interfirm cooperation and normalize practices such as firm mobility and knowledge sharing (Henry & Pinch, 2001; Gertler, 2003). Thirdly, universities and government policies can support these networks and cultures by training entrepreneurs and skilled workers by removing institutional and regulatory barriers for entrepreneurs and funding support programs tailored explicitly to incubation facilities and networking events (Feldman & Francis, 2004). Table 3 gives a thorough overview of the related theories and their input in the EE approach. Subsequently, table 4 highlights some of the most important similarities and differences. Both Tables serve to embed EE theory within its wider theoretical context. It shows that the

EE approach has a focus on the external business environment in common with the other established concepts. There are forces beyond the boundaries of an organization that can contribute to an entrepreneur's overall competitiveness, and the entrepreneur contributes to a system larger than itself (O'Connor et al., 2018).

Table 3. Comparison EE with related theories, based on O'Connor et al., (2018)

	Key actors	Key concepts	Input into EE approach	Key outcome
Marshallian industrial district	- SMEs	- Labor market pooling - Specialized goods and services - Knowledge spillovers - Market competition	- Talent (labor market pooling) - Intermediate services (specialized goods and services) - Knowledge (spillovers)	Regional economic growth (productivity)
Italianate industrial district	- SMEs - Local government	- Flexible specialization - Interfirm cooperation - Trust (social embeddedness)	- Networks between entrepreneurs and enterprises	Regional economic growth (employment)
Cluster	- Innovative firms	- Factor conditions - Demand conditions - Related and supporting industries - Firm structure - Strategy and rivalry	- Talent - Finance - Knowledge - Physical infrastructure (factor conditions)	National/regional competitiveness (productivity of particular industries)
Innovation system	- Innovative firms - National government	- Networks - Inter-organizational learning - System	- Knowledge - Finance - Formal institutions - Demand	Innovation
Triple helix model	- Government - Firms - Universities	- Interactions between university-industry-government - Innovation - Knowledge-based society	- Knowledge transfer and interdependence of three sectoral actors	Innovation system
Innovation ecosystem	- Innovative firms	- Co-innovation - Adoption chain - Shared value proposition	- Interdependence or actors involved in innovation - Global networks	- Value creation and capture by firms in the ecosystem - Firm survival

Table 4. Similarities and differences between EE and related theories, based on O'Connor et al., (2018)

Approach	Industrial District, Cluster, Innovation System, Triple Helix	Innovation Ecosystem	EE
Main focus	Economic and social structures of a place that influence overall innovation and firm competitiveness. In many cases, little distinction is made between (fast-growing) start-ups and other types of organizations.	Creating customer value through a chain of independent organizations, with differential value capture by different players in the ecosystem.	Start-ups are explicitly at center of ecosystem. Are seen as distinct from established large firms and (lower growth) SMEs in terms of conceptual development and policy formation
Locus of action	Private firms and state are primary locus of action in building and maintaining industrial district/cluster/innovation system. Little room for agency in their creation.	One large firm as orchestrator of the ecosystem, with many other firms co-innovating or involved in the adoption of innovation.	Entrepreneur is the core actor in building and sustaining the ecosystem. While state and other sources might support the ecosystem through public investment, entrepreneurs retain agency to develop and lead the ecosystem

What becomes clear from Table 3 is that many theoretical constructs in the EE framework originate from these abovementioned related strands of literature. Table 4 undoubtedly shows that the EE, as opposed to related theories, places entrepreneurship at its core, rather than ‘the enterprise’. In addition, entrepreneurship is not only the output of the EE. Entrepreneurs are important actors themselves in creating the EE and keeping it potent (Feldman, 2014). By doing this, the entrepreneurs retain agency to develop and lead the ecosystem. This is an important discovery in light of the lack of agency in MLP theory (Smith et al., 2010; Seyfang et al., 2010; Geels, 2011; de Haan & Rotmans, 2018). The next section will, therefore, scrutinize the EE approach.

2.3.2. The entrepreneurial ecosystem framework

The distinguishing feature of the EE is the focus on value creation by entrepreneurs. This entrepreneurial value creation has many manifestations, such as high-growth start-ups, innovative start-ups, ‘unicorn’ ventures, and entrepreneurial employees (Stam, 2013). Boundaries are defined by a city or regional geography. Also, the EE exhibits a complex mix of public-private governance (Acs et al., 2017). Researchers have created and debated a variety of lists of ‘ingredients’ for a successful EE¹². Stam (2015; 2018) researched this clutter of EE literature and its shortcomings and created a causal scheme of how the framework and systemic conditions of the ecosystem lead to entrepreneurial activities as the output of the ecosystem and new value creation as the outcome of the ecosystem. This scheme is a framework for analyzing the interactions between the elements within the ecosystem. Stam’s (2015; 2018) framework is an integrative model that connects the functional attributes of entrepreneurial ecosystems (including framework conditions and systemic conditions) with entrepreneurial outputs and welfare outcomes. The framework conditions consist of formal institutions, culture, physical infrastructure, and demand. Systemic conditions are the heart of the ecosystem and include networks (of entrepreneurs), leadership, finance, talent, knowledge, and support services/intermediaries (Stam & Spigel, 2016). As shown in Table 3, these

¹² These lists range from ‘nine attributes of a successful start-up community’ (Feld, 2012), to ‘six domains of the EE’ (Audretsch & Belitski, 2017), to ‘key principles to build EEs’ (Isenberg, 2010), to ‘EE pillars and their components’ (Foster et al., 2013), to ‘ten cultural, social, and material attributes of an EE’ (Spigel, 2017), and to ‘norms for the successful performance of a corporate EE’ (Beinhocker, 2007:371).

conditions greatly originate from the related strands of literature in regional development and strategic management (Table 2). I choose Stam’s framework because it is the most complete framework in EE literature, bringing together previous literature, and providing more causal depth (Stam, 2015). It offers a rigorous and relevant starting point for subsequent studies into EEs (Stam, 2015). Also, the EE approach goes beyond a metaphorical attitude by composing a complex systems approach to entrepreneurship and structural economic change (Stam, 2018). This framework is presented in Figure 4.

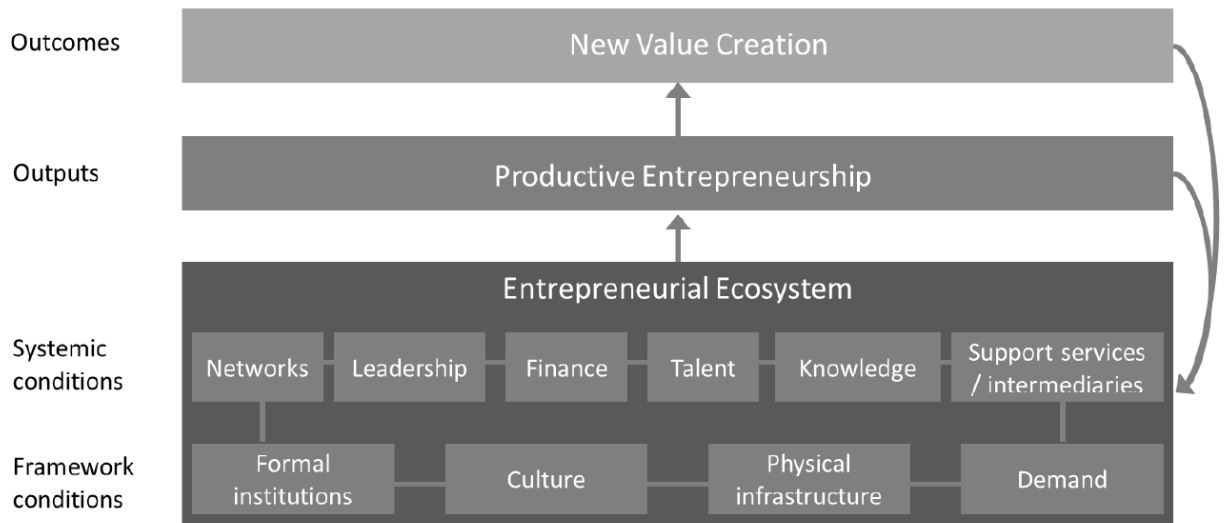


Figure 4. The EE framework, retrieved from Stam (2018)

Table 5 gives a more detailed description of the systemic and framework conditions depicted in Figure 4.

Table 5. Descriptions of the framework and systemic conditions of Figure 4, based on Stam (2018)

	Theme	Description
Framework conditions	Formal institutions	The rules of the game in society, in particular the quality of government
	Culture	The degree to which entrepreneurship is valued in a region
	Physical infrastructure	Physical infrastructure and the position of a region
	Demand	Potential market demand
Systemic conditions	Networks	The connectedness of businesses for new value creation
	Leadership	Leadership that provides guidance for and direction of collective action
	Talent	The prevalence of individuals with high level of human capital
	Finance	The supply and accessibility of finance for startups and/or scale-ups
	Knowledge	Investments in new knowledge
	Intermediate services	The supply and accessibility of intermediate business services

The EE framework visualized in Figure 4 includes downward and upward causation. Downward causation demonstrates how outcomes and outputs of the system over time feed back into the system conditions, while upward causation reveals how the fundamental causes of entrepreneurial activity and, in turn, new value creation are mediated by the intermediate elements (Stam, 2015).

2.4. Bridging the frameworks

The entrepreneurial ecosystem is a multi-level construct, composed of several interacting sub-(eco)systems (Theodoraki & Messeghem, 2017). The MLP also is a multi-level construct with interacting niche, system, and landscape dynamics. The critical challenge is to transform old systems into more sustainable configurations (Berkhout, 2002). Entrepreneurs define the ‘place’ boundary in transitions (O’Connor et al., 2018). Moreover, the bottom-up end of transitions is dependent on entrepreneurs being able to access resources that assist in new venture development (O’Connor et al., 2018). Consequently, the EE is considered a place-based change management instrument (O’Connor et al., 2018). Bridging the two frameworks towards a novel synthesis can help with future configurations of transformative EEs for the urban transition to sustainability. However, on the one hand, the EE approach lacks specification concerning transformative entrepreneurship, which is required for the urban transition. On the other hand, the MLP lacks (niche-level) specification of the conditions needed for transformative entrepreneurship. Thus, to link the MLP with the EE, the first step is to overcome these knowledge gaps. Table 5 takes this first theoretical step to combine the theories, an overview of the prevalent similarity between the MLP niche and the EE.

Table 6. Linkages between the MLP niche level and the EE

Approach	MLP niche	EE	Similarities
Definition	Niches are ‘protected spaces’ that allow the experimentation with the co-evolution of technology, user practices, and regulatory structures. Examples are: R&D laboratories, subsidised demonstration projects, or small market niches where users have special demands and are willing to support emerging innovations .	An EE is a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a territory.	
Main focus	To create temporary protected spaces for more sustainable technologies. Niche-innovation through SNM: niche-actors hope that their promising novelties are eventually used in the regime or even replace it. SNM is not the purview of a single actor but a collective endeavour .	Start-ups are explicitly at center of ecosystem. Are seen as distinct from established large firms and (lower growth) SMEs in terms of conceptual development and policy formation.	
Locus of action	The niche itself as a ‘black-box’ with respect to actors.	Entrepreneur is the core actor in building and sustaining the ecosystem. While state and other sources might support the ecosystem through public investment, <u>entrepreneurs retain agency</u> to develop and lead the ecosystem.	
Key actors	Entrepreneurs, start-ups and spinoffs. Niche managers’ who can be state policymakers, a regulatory agency, local authorities (e.g. a development agency), non-governmental organizations (NGOs), a citizen group, a private company , an industry organization, a special interest group or an independent individual .	Entrepreneurs, start-ups , universities, financiers, (large) firms , intermediaries (i.e. accelerators & incubators), mentors & advisors, government and supporters.	Similar actors
Key concepts	Niche- innovation Niche-accumulation (i.e. growth) Strategic niche management (SNM) Learning	Formal institutions, culture, physical infrastructure and demand, networks of entrepreneurs , leadership, finance, talent, knowledge (in addition to market and technical knowledge, entrepreneurial knowledge is crucial) and support services/intermediaries .	Knowledge/learning
Key processes	“ Small networks of actors support novelties based on expectations and visions. Learning processes take place on multiple dimensions (co-construction). Efforts to link different elements in a seamless web .”	Entrepreneurial activity: the process by which individuals create opportunities for innovation. EEs focus on the cultures, institutions, and networks that build up within a region. Knowledge about the entrepreneurship process is shared between entrepreneurs and mentors through informal social networks, entrepreneurship organizations, and training courses offered.	Building of networks of actors Prominent role of knowledge and learning
Key outcome	Niche- innovation and growth Building of networks of actors	Aggregate value creation Productive entrepreneurship Innovative entrepreneurship	Innovation
Key references	Schot & Geels (2008) Geels (2011) Kemp et al., (1998)	Stam & Spigel (2016) Stam (2015) Acs et al., (2014)	

The linkages are evident, firstly illustrated by the fact that niche and EE actors are similar. Secondly, the building of (social) networks is argued as a condition for niches to gain momentum and emphasized as well in the EE approach. Thirdly, the vital role of knowledge and learning in both niche and EE. Finally, the emphasis from both theories on innovation. I propose that the EE can function as a comprehensive

elaboration of an MLP niche. The EE can thus improve the MLP. This implicates the added value of combining the frameworks. On the one hand, the MLP niche level is enriched with place, actor, and entrepreneurial agency considerations. On the other hand, the EE is applied to contribute to sustainability and transition thinking in an urban context. It is important to notice that for this combination to be rigid; the EE should be configured so that its entrepreneurial output is transformative (i.e., transition oriented). Therefore, the dependent ‘productive entrepreneurship’ and subsequent ‘new value creation’ outcome of the traditional EE should be replaced by: ‘transformative entrepreneurship’ and subsequent ‘sustainable value creation’. The data collection of my thesis serves the need to scrutinize how this change in the dependent variables changes (the configuration of) the independent systemic and framework conditions of the EE. Furthermore, the data in the results section will show unique, region-specific patterns and more generalizable lessons of the shape of such a transformative entrepreneurial ecosystem (TEE). The next section provides methodological functionality on how to resolve these conceptual lacunae to answer the research question.

3. Method

3.1. Case description and selection

I take two cities as a spatial lens, because, as mentioned in the introduction, cities play an important role in shaping the sustainability transition. Qualitative evidence is gathered from illustrative case studies of Rotterdam and Vaasa. These cities are illustrative for this research as they are both requiring sustainable urban solutions and are working on these solutions, displayed by the fact that they are participating in ‘Smart Cities and Community Lighthouse projects’ from the European Commission. A smart city is defined by the European Commission 2019 as: "A place where the traditional networks and services are made more efficient with the use of digital and telecommunication technologies, for the benefit of its inhabitants and businesses". Rotterdam is a participant of the RUGGEDISED lighthouse project, while Vaasa participates in the lighthouse project ‘Integrated and Replicable Solutions for Co-Creation in Sustainable Cities’ (IRIS). RUGGEDISED is a smart city project. It tests and implements smart solutions, from energy, transport to digital technology, in three large-scale ‘Lighthouse’ city testbeds to pave the way towards a smarter, more sustainable Europe (ICLEI, 2019). Working in partnership with businesses and research centers, these cities will demonstrate how to combine ICT, e-mobility, and energy solutions to design smart, resilient cities. This means improving citizens’ quality of life, reducing the environmental impact of activities, and creating a stimulating environment for sustainable economic development (ICLEI, 2019). IRIS is also a smart city project that started in October 2017 for five years. It draws upon a mix of local authorities, universities and research organizations, private expertise, and innovation agencies to accelerate entire communities to adopt ambitious energy, ICT, and mobility initiatives (Iris Smart Cities, 2019). The purpose is not to privilege one EE over the other; the different cities are rather used to explore the different possible configurations of EEs in their respective unique urban transition contexts.

3.2. Research design

This research will combine insights from literature and qualitative research. I take an overarching abductive¹³ approach where the continuous interplay between theory and empirical observation is central (Dubois & Gadde, 2002). Hence, this research's primary concern is related to the development of the existing theory (EE and MLP) and the generation of new concepts from interviews. Through *systematic combining*, which is key in abductive research, theory on MLP and EE is thus refined and enriched by synergistic cross-fertilization between the established theories and new concepts derived from interviews with actors (Dubois & Gadde, 2002). Systematic combining is a nonlinear, path-dependent process of combining efforts with the ultimate objective of matching theory and reality (Dubois & Gadde, 2002). A schematic representation of systematic combining is provided in Figure 5. One major difference between abductive research and both inductive and deductive research, is the role of the framework(s). In studies relying on abduction, the original framework is successively modified, partly due to unanticipated empirical findings but also of theoretical insights gained during the process (Dubois & Gadde, 2002).

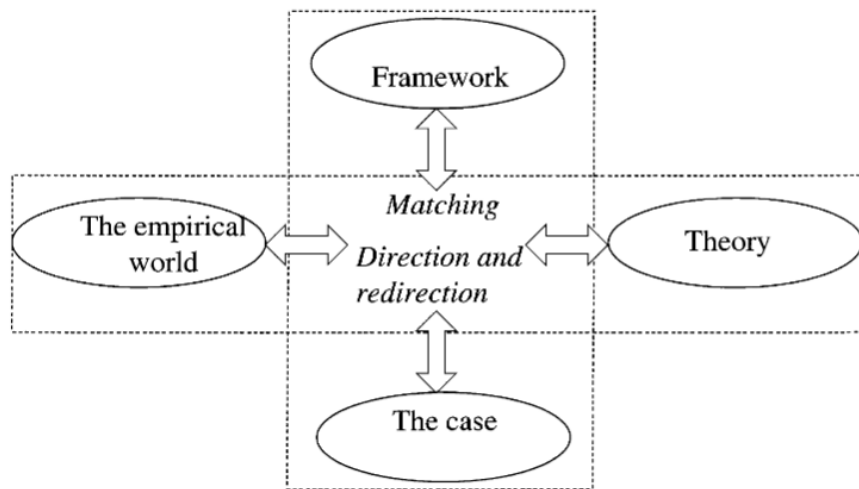


Figure 5. Systematic combining in abductive research, retrieved from Dubois & Gadde (2002)

3.3. Data collection

The literature research contained desk research into MLP theory, EE theory, and related relevant topics, incorporating scientific articles, books, and, if necessary, grey literature. The empirical research was qualitative by nature and ranged from actor-observation to actor-interviews. Actor-observation was executed by attending relevant local (online) events, summits, and task force meetings in the two cities. Actor-interviews were also conducted with the different appropriate actors in the EEs of Rotterdam and Vaasa. The interview sample encompasses all the relevant actors in the respective EE: entrepreneurs, incubators, related government officials, (early-stage) investors, affiliated businesspeople, advisors, and research institutes, both private and public. Snowball sampling (or 'chain referral sampling') was used to enrich the sample (Biernacki & Waldorf, 1981).

¹³ Abductive reasoning starts with the observation of phenomena and then seeks to develop explanations for them, by working iteratively between theory and data (Bell et al., 2018), it refers to the place of explanatory reasoning in justifying hypotheses (Douven, 2011).

The interviews were semi-structured and followed an interview guide (Appendix C). Furthermore, the interview guide was personalized per interviewee based on their background and position in the EE. Semi-structured interviews are used to collect detailed information and to delve deep into a topic and understand the answers thoroughly, without the loss of information (Harrell & Bradley, 2009), which suits well with the objective of this research. The interviews were recorded (after consensus) and transcribed using Otter.ai and Sonix.ai¹⁴. An example transcript is provided in Appendix D. The interviewee samples of Rotterdam (20 interviewees) and Vaasa (24 interviewees) are provided in Table 7 and Table 8.

Table 7. Interviewee sample Rotterdam

#	Organization	Position	Type of Actor	Code in text
1	Erasmus Centre of Entrepreneurship	Business Developer	Intermediate service - University	R1
2	Ciphix	Founder	Start-up / Scale-up	R2
3	SpeakSee	Operations Manager	Start-up / Scale-up	R3
4	PortXL	Senior Acceleration Manager	Intermediate service	R4
5	Thrive Institute	Innovation Manager	Intermediate service	R5
6	VentureCafe	Executive Director	Intermediate service	R6
7	Contra Music / Awesome Foundation	Event Production / Co-founder	Start-up / Scale-up - Intermediate service	R7
8	iTanks	Director	Intermediate service	R8
9	Yes!Delft / start-up Corner	Community Manager / General Manager	Intermediate service	R9
10	Skoon	Founder	Start-up / Scale-up	R10
11	Uniiq	Investment Manager	Investor	R11
12	Up!Rotterdam	MatchMaker	Local government - Intermediate service (public private)	R12
13	Voor Goed Agency	Communication	Intermediate service / Investor	R13
14	Innovation Quarter	Advisor Business Intelligence	Regional development agency – Intermediate service – Investor – Regional government (public private)	R14
15	Erasmus MC Incubator	Manager	Intermediate service - University	R15
16	Up!Rotterdam	Partner Success	Local government - Intermediate service (public private)	R16
17	Rotterdam Partners	Sector Manager Agro-Food	Local government - Intermediate service (public private)	R17
18	Rotterdam Partners	Business Manager Innovation	Local government - Intermediate service (public private)	R18
19	Woodwatch	Founder	Start-up / Scale-up	R19
20	Juuve	Founder	Start-up / Scale-up	R20

¹⁴ Both are programs that use artificial intelligence to convert audio in text.

Table 8. Interviewee sample Vaasa

#	Organization	Position	Type of Actor	Code in text
1	EnergySpin	Operations & Partners Key Account Manager	Intermediate service	V1
2	West Coast start-up	Incubator Manager	Intermediate service	V2
3	City of Vaasa	ICT director	Local government	V3
4	Wasa Innovation Centre	Director	Intermediate service	V4
5	Fusetwin	Co-founder	Start-up / Scale-up	V5
6	Wasa Innovation Centre	Sales manager	Intermediate service	V6
7	Novia University of Applied Science	Professor	University	V7
8	Platonic Partnership	Founder	Start-up / Scale-up	V8
9	MultitronicPro	Account Manager	Start-up / Scale-up	V9
10	Kvarken Council	Director	Government - Cross-border cooperation association	V10
11	University of Vaasa	PhD Student	University	V11
12	Muova	Development manager	Intermediate service	V12
13	Incoach	Founder	Start-up / Scale-up	V13
14	Hanken School of Economics	Director business lab	University	V14
15	Ecolabnet	Project manager	Intermediate service	V15
16	Innolab	Postdoc researcher	University	V16
17	VNT Management	Managing partner	Investor	V17
18	Nordic Institute of Digital Innovation	Founder	Start-up / Scale-up	V18
19	Vaasa Yrittajat	Head	Intermediate service	V19
20	Wärstsilä	Project Manager Smart Technology Hub	Corporate	V20
21	Vaasa Entrepreneurial Society	Chairman	Intermediate service	V21
22	Business Finland	Funding Advisor	Investor	V22
23	Finnish Parliament	Member of Parliament	National and local government	V23
24	Vasek	Project manager & business advisor	Region Development Company - Intermediate service (public private)	V24

3.4. Data analysis

The interviews were analyzed¹⁵ and coded¹⁶ in a grounded-theory¹⁷ inspired way, using the Gioia methodology to create qualitative rigor (Gioia & Chittipeddi, 1991; Gioia et al., 2013; Gehman et al., 2018). The theory evolves during the actual research, which happens through a continuous interplay between data collection, theory building, and analysis. In abductive research, theory development is stressed rather than theory generation (Dubois & Gadde, 2002). By utilizing these methods, the interview data is converted into *first-order concepts*, *second-order themes*, and *aggregate dimensions* (Gioia et al., 2013). Firstly, I identified first-order concepts by using open coding (Corbin & Strauss, 1990). The second step, progressing to axial coding, is to combine similar concepts into second-order themes (Gioia et al., 2013). Thirdly, moving to selective coding (Corbin & Strauss, 1990), second-order themes are combined into broader, more abstract, and theoretically relevant aggregate dimensions (Gioia et al., 2013) to explore relationships between my interpretations. An example of this coding method is provided in Table 9. For the sake of

¹⁵ Data analysis is performed using NVivo which is a qualitative data analysis software program

¹⁶ Coding means that labels (concepts) are attached to segments of data that depict what each segment is about (Charmaz, 2006, p. 3)

¹⁷ The grounded theory, created by Strauss & Corbin (1994), consists of four methods: theoretical sampling, theoretical saturation, coding and, lastly, constant comparison.

readability, not all the first-order concepts and second-order themes that constitute the aggregate dimension in Table 9 have been included in the example.

Table 9. Example coding method, based on Gioia et al., (2013)

Example quotes	1 st order concepts	2 nd order theme	Aggregate dimension
<p>But the funny thing is that, if it is the ecosystem in Rotterdam, everything happens, but quite fragmented, and that is therefore increasingly brought together. And the government plays a very important role in this [R11]</p> <p>Also think you have the right city for that. These are all things that are very high on the agenda in Rotterdam [R12]</p> <p>Rotterdam then pulled so hard and tried so hard for it and then received a loan, also from the municipality. And that is really unheard off actually. That is actually not done, of course, because it is a profitable organization [R16]</p>	Stimulating and building EE	Pro-active municipality	Formal institutions
<p>So that we regularly have calls with the existing hubs in Rotterdam to ask how they have been helped in their completion of their mission and the positioning of Rotterdam. And I am really talking about putting Rotterdam internationally on the map as a city where you have to go. [R16]</p> <p>One is attracting new international companies to start a business in Rotterdam [R17]</p> <p>If you want to compete internationally you must accelerate ... and that is of course what we, especially for the Cambridge Innovation Centre (CIC, start-up hub), have looked at. That they had that vision at the time, that we should use such a player as CIC, not because we cannot do it ourselves, but because you sometimes also must invest in an acceleration. [R18]</p>	International branding of the city		
<p>And that is very special to see how it grows. And you have the luxury of just seeing a party that has done well elsewhere in the past? We are not going to do it all again ourselves, we are just going to take it in [R11]</p> <p>My biggest project in this, also to accelerate, was bringing the CIC to Rotterdam. But everyone has no chance of getting that here they said. We did it anyway. [R18]</p>	Acquiring expertise		
<p>And we also have these good councilors sitting here this term. So that is very nice [R8]</p> <p>Alderman visits us regularly [R20]</p> <p>There are a number of councilors who are very active in this, who also support us [R10]</p>	Capable counsellors this term		
<p>Anyway, let us go back to the Smart Mobility campus or the climate adaptation center which will come to Rotterdam, which will open their doors in October. All those initiatives are a result of years of efforts initiated by the city of Rotterdam and the port of Rotterdam, with whom we have evolved as well. [R17]</p> <p>That works really well. That just works tremendously here. The municipality is also a real driver [R8]</p>	Supercharging sustainability		

Following the data analysis, the MLP and EE theories are refined and combined through constant comparison. The *outcomes* of this research will be new insights into transformative entrepreneurship in an EE context, enrichment of the MLP by specifying conditions for transformative entrepreneurship, and, finally, a novel synthesis of the MLP and EE combined in an enriched framework.

4. Results

Using the frameworks introduced in the theory section as a theoretical foundation, this section consists of four subsections. Firstly, I discuss and compare the incumbent energy systems in Rotterdam and Vaasa (4.1.). Secondly, I consider the EEs of Rotterdam and Vaasa¹⁸ to determine current transformative elements (i.e., elements that trigger transformative entrepreneurship in the current EE) and possible improvements (4.2.). Thirdly, these transformative elements and possible improvements are combined to create the TEE (as explained at the end of the theory chapter). It serves as an enabling framework to elaborate on the niche dynamics of the MLP and enrich it with actor, agency and spatial understandings (4.3.). The data of both cases concerning transformative elements are predominantly coinciding, which supports its generalizability. My findings are summarized in Table 10.

¹⁸ A case by case deepening of the current EE of Rotterdam and Vaasa is given in respectively Appendix A and B.

Table 10. Overview of findings

Factor	Rotterdam	Vaasa
City	Population GDP per capita	651,376 \$53,022.2
		67,552 \$50,175.3
Incumbent system	Dominant cluster	Harbor industrial cluster (petrochemical)
		Clean energy cluster
Current EE	Outputs	High volume and quality of start-ups and scale-ups
		Shortage of start-up supply
	Formal institutions	A municipality that is active and aware and stimulates and builds the EE; positive influence UP!Rotterdam
		City of Vaasa is supportive; on the national level, ineffective entrepreneurial policies and taxation
	Culture	The hands-on Rotterdam mentality is celebrated; in a wider context a general lack of ambition in NL is stressed
		International city (especially considering its size); widely supported entrepreneurial spirit; bilingualism of Swedish and Finnish speaking Fins; lack of marketing of the region is barrier for growth
	Infrastructure	Benefits in proximity to (TU) Delft; good accessibility, both in terms of personal and public transit
		Strong surrounding region (Ostrobothnia & Kvarken); geographic location compared to other cities in Finland is weak and train connections are poor
	Demand	Large and diverse market that is beneficial for start-ups
		Due to small size a small customer base
	Intermediate services	Good incubators and facilitators; many involved actors
		Relatively high volume of incubators; accessibility suboptimal
	Leadership	Public-private organizations provide EE leadership; strategic coordination among actors
		Sture Udd provides EE leadership (i.e. by building the Wasa Innovation Centre); overall strategic coordination lacking
	Knowledge	High quality and volume of research institutes in the region; Knowledge from Erasmus University and TU Delft complementary
		Positive influence of clean energy related knowledge from energy cluster; many universities but their level of collaboration is poor
	Finance	High level of regional public funding instruments; ambitious municipality funding into EE
		High level of public financing
	Talent	Especially before the corona-crisis hard to find; improvements in progress to boost current situation
		Difficulties in finding and attracting talent
	Networks	Highly collaborative on an individual level; on ecosystem level lack of collaboration
		Highly collaborative on the individual level; on ecosystem level a lack of collaboration

Table 10. Overview of findings continued

Factor	Rotterdam	Vaasa	
Transformative elements (TEE)	Outputs	The need for transformative entrepreneurs to have economically viable business models	The need for transformative entrepreneurs to have economically viable business models; transformative entrepreneurs access new business opportunities
	Incumbents	Include incumbents in the TEE because (especially in traditional industries) transformative entrepreneurs cannot 'scale-up' impact without collaboration with these incumbents	Need changing company culture for large incumbents to work with start-ups
	TEE branding	Promote successful transformative entrepreneurs (lighthouses, Tiba et al., 2020) and TEE; important to make the ecosystem transparent and map all its actors to improve accessibility	Active promotion of the TEE to increase awareness
	Formal institutions	Government needs to apply carrot and stick model for sustainability, stimulate frontrunners and correct laggards	Broad and patient governmental support for transformative entrepreneurs
	Culture	Cultural change needed on multiple dimensions: entrepreneurs themselves, the encompassing actors in the EE and society (e.g. customers)	Cultural change needed on multiple dimensions: entrepreneurs themselves, the encompassing actors in the EE and society (e.g. customers)
	Infrastructure	Create collaborative sustainable (pilot) hub; bring all (intermediate) actors literally together on one big campus	Create collaborative sustainable (pilot) hub
	Demand	Sustainable market pull of customers (related to culture but more suitable with demand)	Sustainable market pull of customers (related to culture but more suitable with demand)
	Intermediate services	Create sustainability first incubator	Create sustainability first incubator
	Leadership	Transformative leadership that serves the public interest and guides the ecosystem purposefully	Transformative leadership that creates strategic coordination to improve efficiency
	Knowledge	Transformative knowledge (i.e. existence of knowledge embedded in the TEE to challenge and transform the incumbent system) through education	Transformative knowledge
	Finance	Purposive funding instruments to enable entrepreneurs to be transformative	Effective funding instruments to increase impact of transformative entrepreneurs
	Talent	Sustainably purposed start-up competitions	Sustainably purposed start-up competitions
Networks	Ecosystem-level collaboration to increase efficiency and effectiveness of TEE	Collaboration amongst all actors (ecosystem-level collaboration)	

4.1. The incumbent systems of Rotterdam and Vaasa

The subsequent paragraphs describe the incumbent energy systems of Rotterdam and Vaasa for two reasons. Firstly, because energy is a prerequisite for any sort of change, the energy transition is the foundation for the other transitions within the urban sustainability transition and to mitigate climate change (McCauley & Stephens, 2012). Secondly, both cities are led by a dominant energy cluster, so, it makes sense to study this energy transition aspect when looking at their incumbent systems.

4.1.1. Dominant clusters

Rotterdam's harbor-industrial-complex (HIC) is a key feature of its incumbent system. Rotterdam has the biggest harbor of Europe and is often referred to as 'the gateway to Europe'. This HIC has a prominent role in the Rotterdam TEE. It is a great source of economic activity but also a tremendous challenge in the urban sustainability transition: "*We were not a representative of the clean industry. So, if a city like Rotterdam is changing to, for instance, renewable energy or more sustainable companies, the impact is tremendous*" [R17]. In terms of incumbent parties, the HIC is dominated by largely traditional multinationals in the fossil industry like Shell and Vopak. Also, the incumbent actors are characterized by their large size; no middle-sized incumbents exist in Rotterdam. One interviewee acknowledges: "*We have no intermediate size companies in Rotterdam. Some very large companies, those in an industry are among the largest in the world. And we have SMEs, but in between, it is very limited*" [R11]. Next, the Rotterdam institutions are very much intertwined with the HIC as they have a long mutual history. Therefore, inhabitants of Rotterdam are also historically proud of their harbor, which works through in their institutions.

Whereas Rotterdam is shaped by its large fossil HIC, Vaasa is dominated by its clean energy cluster. It is highlighted almost unanimously by the interviewees as a major strong point of the Vaasa region. One interviewee highlight: "*I would say because this region, they embark on being the clean energy cluster hub*" [V16]. Additionally, the presence of this clean energy cluster and its adjective knowledge and capabilities is interesting in light of the urban sustainability transition: "*So, Vaasa has this kind of critical mass, even though it is a small city, in this (clean) energy field it has a critical mass*" [V17], which means that the presence of this critical mass in clean energy knowledge paves the way for a fast energy transition. This is also displayed by the fact that Vaasa has set an ambitious target to be carbon neutral before 2030 in the project 'CARBON NEUTRAL VAASA 202X' (EnergyVaasa, 2020), while in Rotterdam, the ambition to become carbon neutral is set around 2050. Similar to the HIC of Rotterdam, the clean energy cluster of Vaasa is defined by a pair of very large multinationals, Wärtsilä and ABB. Although similar in terms of size and influence, these companies have set their sustainability targets much more ambitious. They envision Vaasa to be the clean energy hub of the Nordics. The Vaasa institutions are, similar to Rotterdam, through a process of coevolution, locked in with the clean energy cluster: "*I have not seen that the government or the Vaasa city are doing anything for other businesses than energy*" [V15].

Although parallels can be drawn between Rotterdam and Vaasa in a sense that they are both dominated by an influential cluster, the contents of these clusters give rise to very different implications in a transition context. Vaasa has the potential and the will to change their current energy system to a sustainable energy system much faster than Rotterdam because they have the knowledge and skills to transform their current energy system embedded in their clean energy cluster (McCauley & Stephens, 2012). In terms of impact,

however, Rotterdam can provide a significantly larger reduction of greenhouse gasses because its carbon footprint is larger than Vaasa's. The trajectory is more complex and longer, as the necessary change is larger.

4.2. Transformative elements of the EEs of Rotterdam and Vaasa and envisioned improvements

This chapter elaborates on Table 10 and describes the transformative elements of the EEs of Rotterdam and Vaasa¹⁹. It functions to make the EE's 'uniqueness' insightful by making their differences and similarities explicit. In addition, interviewees provided understandings about envisioned transformative elements to improve their current EE. Their insights are subsequently used to enrich the current EE framework with transformative elements and construct the conceptual TEE framework in chapter 4.3. which subsequently aligns with the MLP. After describing their current EE and its transformative elements, interviewees were asked to go beyond this current situation and describe what conditions are for entrepreneurship to play an important role in the sustainability transition in their respective cities.

4.2.1. Transformative entrepreneurship as the output of the TEE

The output of the two current EEs is very different. Whereas Rotterdam's EE creates a potent volume and quality of start- and scale-ups, Vaasa's EE is troubled by a shortage of start-up supply. As [V14] underscores: *"One really big challenge here in Vaasa is the volume of prospects"*.

In addition, findings from both cases show some remarks about prerequisites for the successful outputs of transformative entrepreneurship in a TEE (the output variable). Interviewees from both cases underline that transformative entrepreneurship in the first place needs to be economically viable: *"You need to have results of at least some sort because otherwise, you cannot grow the business either. If you are not making money, you cannot grow it"* [V1]. Within this argument also the concepts of scalability and feasibility are marked, as well as the comment that the solution needs to be better than the unsustainable alternative. In terms of scalability, the importance of successful scale-ups (lighthouses) is also named in both EEs to attract new investors and create momentum. This will further be discussed in 4.2.13 (TEE branding). To make their transformative business model economically viable, entrepreneurs are strongly encouraged to collect the right (industry-specific) information and find synergies. In terms of opportunities, interviewees are confident that transformative entrepreneurs will find new business opportunities because of their higher agility compared to incumbents who are often impeded by their rigid organization.

4.2.2. Formal institutions

The Rotterdam municipality names itself as the 'entrepreneurial government', the most tangible present activity being the establishment of UP!Rotterdam, which is a four-year program that serves as a public-private entity and through a process of co-creation, connects the different actors in the EE. The Vaasa municipality is also perceived as supportive but, to a lesser extent, as they take a less active role than the Rotterdam municipality.

Interviewees from both cases stress that governmental support in terms of having a sound strategy and roadmap is vital for a TEE to flourish. So, not only the presence of a qualitatively high (local) government

¹⁹ A comprehensive overview of strengths, weaknesses, similarities and differences of the current EEs of Rotterdam and Vaasa is given in Appendices A and B.

is important but also a government that is benevolent and knows what is needed in the urban transition to sustainability. It is furthermore stressed that the best way to determine this strategy and roadmap is to do it in a co-creative way (i.e., construct the vision in co-creation with the other (private) actors in the TEE). As interviewee [R14] formulates: *“Ideally, this vision has also been drawn up in consultation with the business community”*. Additionally, the municipality should not be the organization that implements solitary; the implementation should be placed with knowledgeable actors in the TEE. Furthermore, interviewees suggest that a pivotal part of this strategy is to ‘practice what you preach’ as a municipality.

Multiple measures to enact this roadmap and strategy are suggested and they generally fall under the umbrella of the carrot and stick model to incentivize both frontrunners and laggards (Dix, 2014). These measures are enabling taxes, political encouragement, and (restrictive and supportive) regulations, *“The regulations and laws can be a driver for sustainability”* [V12]. Restrictive regulations create the ‘soft force’ or ‘stick’ to incentivize entrepreneurs (and incumbents) lagging in terms of sustainability. Also, the possibility for the municipality to stimulate transformative entrepreneurs using the instrument of sustainable public procurement is posed (related to the demand variable). Municipalities should act more often as a launching customer of a start-up: *“I think that the municipality of Rotterdam itself and its partners, should act more often as a so-called launching customer... to make more use of the innovative offers of many start-ups”* [R12].

4.2.3. Culture

While in general, my findings show a recurring lack of ambition in the Dutch culture of both entrepreneurs and their encompassing actors in the EE, the Rotterdam mentality is celebrated for being bold and forward, creating the right mindset to do business. For Vaasa, other elements are in play; interviewees highlight the generations-long entrepreneurial spirit in the region as opposed to other Finnish regions. Next, interviewees stress that Vaasa’s region is impeding its EE growth due to a lack of branding of the region. Something which Rotterdam is very well-versed in. Rotterdam Partners is actively branding the city of Rotterdam throughout the world. So, in terms of culture, Rotterdam and Vaasa are very different but do have some interesting parallels, most notably the entrepreneurial spirit/mentality in both cities.

Cultural change is one of the key components for a TEE. The interviewees argued multiple facets of this cultural change. Firstly, the notion that entrepreneurs themselves should change their mindset towards a more sustainable oriented course. As one interviewee [V6] mentions: *“The thing that can be at odds with entrepreneurship, it is all about making money. Maybe we need to be looking at what are driving forces rather than making money; it should be more about accepting”*. Secondly, interviewees highlighted the cultural change or landscape shift in demand of society in a broader sense. *“I think, in 10 years, sustainability and business are equal because it will be a license to operate”* [R17]. Thirdly, interviewees reiterated that for an EE to become transformative, the mindset of the entire set of actors in the EE should change: *“In the end, you have to tackle the entire ecosystem and the whole range of ideas of everyone who is in it”* [R9].

4.2.4. Infrastructure

In Rotterdam, plans are constructed for the Mobility City Campus to settle, which is envisaged to become the place where international companies and other important players work together with start-ups on mobility concepts of the future (Verkeersnet, 2020). In Vaasa, Wärtsilä is building their Smart Technology

Hub, which will serve as a new integrated center of research, product development, and production (Wärtsilä, 2020). Thus, in terms of infrastructure, both Rotterdam and Vaasa are planning to build a collaborative sustainable hub.

So, interviewees in both cities agreed that in terms of infrastructure, the most added value to a TEE is the creation of a collaborative sustainable hub. A place where actors in the TEE are literally brought together on the same campus as there are benefits in proximity. It increases the likeness of serendipitous encounters and crossovers. Simply put by interviewee [R8]: *“Take a building and put us all together and see what happens next”*. This infrastructure argument is, therefore, closely related to the network and intermediate service variables.

4.2.5. Demand

Rotterdam has a large and diverse market, a key ingredient for (transformative) entrepreneurial success. As the interviewee [R12] discusses: *“There are large-scale corporates, there is also large-scale industry, and there is the consumer level”*. On the opposite, Vaasa is dealing with a small customer base, especially outside the clean energy cluster. The reason for this is a size issue: *“It would be beneficial to be a bigger region, especially if it comes to the consumer market”* [V20]. Furthermore the paramount focus and subsequent dependence of Vaasa on its clean energy cluster. This is also one of the main impediments of a more heterogeneous and thriving (T)EE as ‘access to markets’ is a key condition for entrepreneurs. The demand conditions are thus very different in Vaasa compared to Rotterdam.

The common denominator for the demand variable in a TEE is the sustainable market pull of consumers, other businesses, and governments. This is closely related to and caused by the culture (change) variable but more fitting to discuss here as it concerns demand. These changing demand patterns are a consequence of this abovementioned cultural change. Interviewees anticipate that doing business in a sustainable way will be *“a license to operate”* [R17]. They suggest that demand for unsustainable alternatives will continue to drop: *“The market takes care of that. When the customers learn to ask for sustainable solutions, it means that you have to transform your business so you can meet that new demand”* [V14]. Additionally, the importance of finding early adopters as a transformative start-up is stressed. This access to markets or early adopters can be: *“Launching customers, pilots, and internationalization”* [R12].

4.2.6. Intermediate services

Rotterdam is home to multiple praised incubators, facilitators, and accelerators (see Appendix A for a list of actors). Furthermore, Rotterdam inhabits an accelerator tailored to their dominant HIC cluster: the accelerator PortXL. For Vaasa’s clean energy cluster, the accelerator EnergySpin is established in a likewise manner. So, a similarity and transformative element is that both cities’ EEs inhabit an accelerator tailored to their dominant cluster. Both accelerators are actively brokering between the incumbents’ needs and the innovative solutions provided by entrepreneurs, attracting start-ups from all over the world.

Findings concerning intermediate services in a TEE are clear. Namely, the establishment of a sustainability first incubator that incubates start-ups that are selected and assessed on social, environmental and economic criteria. An example of this in the field of circularity is BlueCity in Rotterdam. However, this sustainability first incubator should be more holistic than just circularity. Interviewee [R19] contemplates: *“Create a kind of community with all kinds of sustainable start-ups and sustainable ideas”*. For instance, this can be in the

form of a serious playground: *“Really a place in the city where companies with new ideas can really test, so a serious playground which can also put the city in the picture”* [R6].

4.2.7. Leadership

In Rotterdam, EE leadership mostly comes from central public-private organizations like UP!Rotterdam and Rotterdam Partners to *“Pull the organization out of the bureaucracy, but with some sort of accountability”* [R6]. Differently, in Vaasa, leadership stems substantially from private actors like Sture Udd, who is the owner and driving factor behind the Wasa Innovation Center and Wårtsilå, who is guiding collective action with the establishment of its Smart Technology Hub.

It became apparent in both cases that the role of (transformative) leadership becomes increasingly decisive when configuring the EE in a transformative way. The following metaphor of one interviewee gives a clear impression of the importance of such transformative leadership: *“What you see at the Tour de France, people stand in the form of letters. You have no use at all to someone who can stand very well. Only someone who says: you should be there, you should be there, trust me, if you all stand there where I pointed you, then that word will appear. You cannot tell everyone: guys, you have to do your best, we want this word, figure it out. That just does not work, you have to compare it with that. It is a complex problem with many actors”* [R11]. The tenor of this metaphor is twofold. Firstly, to perform as an adequate TEE, it needs to be led by one or multiple actors to guide collective action and steer the EE to a transformative path, as individual actors (almost literally) do not see the bigger picture or overarching transition challenge. Secondly, the fact that for this transformative leadership to occur and be effective ecosystem-level collaboration²⁰ and trust is paramount. Without this collaboration, the implementation of transformative leadership is impossible. Taking it one step further: when ecosystem-level collaboration and transformative leadership are both in place and combined, strategic coordination of the ecosystem takes place. As one interviewee pleads: *“And it is really hard to understand how to implement what you are selling, and how does it fit into the bigger picture. You get all these, like, small pieces of the puzzle”* [V24]. In other words: to configure an EE as a TEE, strategic coordination is crucial, and this strategic coordination consists of two elements: ecosystem-level collaboration and transformative (public-private) leadership.

It is also emphasized that this strategic coordination, in turn, increases the (T)EE’s effectiveness and efficiency: *“I think it also raises the question like how do we coordinate resources effectively in such a way that the same thing is not done twice in two places”* [V11]. Interviewee [R11] summarizes the need for strategic coordination: *“Clearly. A number of actors that you just need for that (a successful TEE) and depending on what you always used to think about, what is unique about a region today does not have to be unique in twenty years. But it always has an important impact on what is happening now. But you want to do something different. How do you ensure that that does not bite each other”* [R11]?

4.2.8. Knowledge

Interviewees from Rotterdam stress that the Erasmus University and the Technical University Delft are complementary. Interviewee [R18]: *“That combination and that is also a good thing that you do not find everywhere in the Netherlands or in Europe. It is precisely the combination between the Delft University of Technology and the Erasmus University and even the Erasmus Medical Center”*. In Vaasa, transformative knowledge is furthermore emphasized to enable the urban sustainability transition: *“It is the*

²⁰ The concept of ecosystem-level collaboration is further elaborated on in chapter 4.2.11.

value of the knowledge that exists inside these companies and the knowledge that exists in the people as a whole when it comes to the energy business (in Vaasa). And I think that is a very important and very positive thing” [V8]. An interesting connection here is also the coevolution of knowledge institutes like universities and their collaboration with the incumbent system (again linked to the network condition). Vaasa has the advantage of their clean energy cluster meaning that transformative (energy) knowledge is embedded to a great extent in their education system: “What the industry needs are, also shapes how we work, how we try to train the students to answer the needs that the companies have” [V11]. The Rotterdam and Vaasa regions are both home to several universities. So, for both EEs, the inflow and investments in (new) knowledge are high.

The knowledge variable encompasses multiple prerequisites and suggestions. The education of transformative entrepreneurs can be a larger extent be a focus area of universities with more emphasis on new (transformational) domains²¹. Next, the importance for start-ups to have industry-specific knowledge of the particular dynamics in that industry is stressed. Because “People basically only innovate and renew when it hurts so you have to quickly validate it just by gut feeling, which is only possible with people who know the industry” [R8].

4.2.9. Finance

Rotterdam is characterized by a high level of public funding instruments. Most regional funds²² are administered by InnovationQuarter and focused on the energy transition. The municipality of Rotterdam distinguishes itself by funding start-ups directly through grants and competitions and indirectly by funding the encompassing EE actors: “Sometimes you just have to do something to speed things up, it also took the city money and time to get it all done” [R18]. The funding landscape of Rotterdam also consists of a diverse variety of private investors. In Vaasa, the high level of public financing is accentuated as well, with multiple public funding instruments like an entrepreneurial early-stage subsidy, and municipality funding. Supplementary, the transformative funding instruments at the organizations Ely-Keskus²³ and Business Finland are highlighted: “Sustainability is the umbrella theme, and then there are different kinds of areas under that umbrella. For example, digitalization for sustainability, cleantech for sustainability, and then the circular economy and to support sustainable development” [V22]. Like in Rotterdam, interviewees underscore the diverse array of private investors like business angels and venture capitalists in Vaasa. So, the level of public and private funding is praised in both cities. But, indirect EE funding, like in Rotterdam, is something which is less developed in Vaasa.

Interviewees highlighted the importance of purposive and effective funding instruments to enable transformative entrepreneurs. This concerns both public and private funding for entrepreneurs with clear criteria on impact: “If we talk about funding mechanisms, then it is quite easy to have the criteria that assess from a sustainability point of view” [V14]. In addition, the decisive stimulus of (local) subsidies for transformative entrepreneurs is underlined: “Subsidies that only go to companies that actually pursue a social or sustainable goal. I think such initiatives really help to stimulate start-ups to do something in that direction” [R3]. Also, cooperative funding in the TEE is assumed to be pivotal, as one interviewee affirms: “We always invest in ecosystems in cooperation because we all know that you create more added value if

²¹ Interviewee [R12] provides an example of this: ‘So you also see a development at the Rotterdam University of Applied Sciences that they are engaged in training people specifically for the maintenance plans of the large-scale wind farms that are build off the coast’.

²² IQcapital, EnergiIQ, Uniiq.

²³ Ely-Keskus is the ‘Centre for Economic Development, Transport and the Environment’ in Finland.

you work together, and the funding and the money is often the key, and the resource, you can use to encourage that kind of cooperation” [V22].

4.2.10. Talent

The Rotterdam EE witnesses difficulties attracting talent, especially in the field of transformative start-ups²⁴: *“There is enough talent in the Netherlands, only finding talent is very difficult ... the top of the university and the top of the university of applied sciences are very difficult to bind to socially responsible projects” [R5].* Furthermore, the Erasmus University historically has a (too) corporate focus, making it even harder for start-ups to attract talent as they are outcompeted by these corporates. This focus also makes it less likely for students to become an entrepreneur when they graduate, which negatively affects the talent variable in the EE of Rotterdam: *“I will never forget that when I graduated it was when the Rector Magnificus said: your employers may be happy with you...” [R2].* Also for the case of Vaasa attracting talent for (transformative) start-ups is difficult, [V10] contemplates: *“I think we will have a big problem with the labor force, because people do not want to live and to move to our regions, for some reason”.* A reason for this (and similar to Rotterdam) is that the (big) companies in the dominant cluster take a large chunk from the talent pool.

The talent variable is very much intertwined with the knowledge variable (same as demand and culture). Therefore, an improvement in the educational system often leads to an increase in highly skilled workers. Findings anticipate that the amount of talent available is sufficient (both cities have multiple universities), but attracting this talent to transformative start-ups is perceived as one of the biggest challenges associated with the TEE: *“There are plenty of people who enjoy working for start-ups who contain a lot of talent. But the crucial word is access” [R12].* A proposed solution to increase start-ups' access to talent is a talent competition that connects the brightest students to the most pressing sustainability challenges in the region. An example of this in Rotterdam is the Rotterdam100 organized by the Thrive Institute: *“A talent competition that is very focused on: how are you going to improve the municipality? And the ideas that are created, how are they implemented as well as possible” [R5].* Another initiative is the endeavor to attract highly skilled migrants. Next, the suggestion is made to establish an overarching job board for transformative start-ups and scale-ups to improve access to talent.

4.2.11. Networks

Interviewees from both Rotterdam and Vaasa stress that collaboration is also a major strong point of their EE. However, for both cities (after giving further scrutiny to this topic), interviewees highlighted a lack of ecosystem level collaboration in Rotterdam and similarly a lack of strategic coordination in Vaasa: *“I think it also raises the question like how do we coordinate resources effectively in a way that the same thing is not done twice in two places” [V11].* So, for both cities' network dimensions, the same paradox was found that they were highly collaborative on certain levels but at the same time missed ecosystem/level collaboration/strategic coordination. In Rotterdam, improvements are triggered: *“A lot of things are happening, but quite fragmented, but that is getting better and better. And the government plays a very important role in this” [R11].* This important role of the local government in ecosystem level collaboration is (again) observed by the establishment of UP!Rotterdam: *“The objective of UP!Rotterdam is to support and strengthen the ecosystem, not only with the municipality, also with other (private) partners” [R12].*

²⁴ This lack of talent, however, is currently remedied by the corona-crisis

For a TEE to play a serious role as the bottom-up component of the urban transition to sustainability, ecosystem-level collaboration between all different actors is vital. Also in a sense that the TEE can encompass and connect the multiple niches in the urban sustainability transition. Collaboration between entrepreneurs: *“It is important that start-ups and scale-ups also have to commit themselves to be concentrated to want to work together because you just never make it on your own, certainly not on those (transformative) kinds of themes”* [R11]. Collaboration between intermediate service actors: *“I think those collaborations are the most important because it ensures the transfer of knowledge and other types of transfers that are necessary to make it a success”* [R1]. But most importantly: interdisciplinary ecosystem-level collaboration between all the different kinds of actors. As [R12] fittingly concludes: *“Indeed, all those players who are important for innovation, all those things that can work together to realize large-scale projects. Because we are all aware that the problems are simply too great to solve independently”*. As this interviewee points out, transformative impact can only be reached and enlarged in collaboration. As a positive consequence, synergetic crossovers between multiple different niches within the TEE and between the TEE and the incumbent system can be realized. Finally, connecting (contemporary) transformative entrepreneurs to seasoned entrepreneurs and enabling them to share their knowledge is conveyed.

4.2.12. Involvement of incumbents

Interviewees from both cases argue the importance of start-up - incumbent interaction. For traditional clusters like the HIC in Rotterdam, interviewees dispute that it is even the only way: *“Some products require acceptance from larger parties. Especially when it comes to innovation in the harbor”* [R11]. A practical example to make this work is to establish an accelerator (like PortXL in Rotterdam and EnergySpin in Vaasa) as a middleman to bring incumbents and start-ups together in an effective way and respond to unique regional challenges.

Therefore, the ‘Involvement of incumbents’ condition is added to the EE framework to acknowledge this increasing importance of start-up - incumbent collaborations. Moreover, because, in a transition (and congruent to the MLP), the incumbents must be addressed. This incumbent structure subsequently has implications for the cities’ specific transition pathways²⁵. Especially in the field of transformative entrepreneurship, impact can rarely be scaled without this collaboration: *“They (corporates/incumbents) have a much greater clout, so they can actually take big steps with the ideas of start-ups”* [R1]. In other words, by integrating the entrepreneur’s solution in the incumbent practice, impact can tremendously be increased. So, it is necessary to include the incumbent condition in the TEE framework because the transition challenges are too grand to tackle in solitude by transformative start-ups.

A precondition for this (and related to the culture variable in 4.2.3.) is a change in company culture for an incumbent to work together with start-ups and scale-ups effectively: *“As an incumbent, you must be able to use the advantages, but without the disadvantages of your rigid organization and the limitations that can even be imposed by your own system”* [R18]. So, incumbents need to improve implementation when acquiring start-ups because otherwise, the probability is high that the start-up is ‘killed’ as it loses its agility [V20]. In other words: *“One of the most important things is that people within large companies or organizations who deal with start-ups, know how to deal with it”* [R10]. Furthermore, the need to better facilitate spinouts also increases the success rate of intrapreneurship: *“Internal entrepreneurship is very important, because then you get the boat running as well”* [V1]. This can only be achieved by high level

²⁵ See Appendix C.

and intrinsic incumbent commitment, so both top-down and bottom-up within the incumbent's organization: *"It is the benevolence of the companies (incumbents) to just jump into the deep end"* [R12].

4.2.13. TEE branding

In Rotterdam, start-up competitions like the Philips Innovation Award, Get in the Ring, and Thrive Institute are actively giving entrepreneurs a podium. In Vaasa, this podium for (transformative) entrepreneurs is lacking, which is perceived as a weakness of the EE by the Vaasa interviewees.

Interviewees from both cases²⁶ stress the importance of promoting the successfulness of the TEE and promoting its (successful) transformative entrepreneurs to the external environment. The transformative orientation of these role models is instrumental in creating environments in which transformative start-ups can thrive. Therefore, the condition 'TEE branding' is an essential addition to the original EE framework. Especially transformative entrepreneurs should be given a podium to convince a larger public of their transformative solutions, prove their concept, challenge incumbents, inspire others and get rewarded for their endeavors. This podium can, for example, be a sustainable start-up competition: *"Give them a stage, and give them handles to reach that stage, I think that is the most important thing"* [R7]. Additionally, success stories should be bolstered to increase exposure and create role models: *"A great figurehead, you really need it for this direction"* [R11]. It is believed that by doing this, the attractiveness of the (T)EE increases and that more companies and more highly-skilled individuals are engaged to settle. Therefore, it is subsequently beneficial for the talent variable. Also, the branding of the TEE as a whole is emphasized through collaboration and to create awareness. Interviewee [V20] explains: *"We need to, in a sense, market ourselves and especially in those areas where we already are globally known"*.

To make it easier for the TEE to be branded, interviewees furthermore highlight the need for transparency and thus mapping of the TEE to make its actors visible. This transparency is stressed to understand the TEE's heterogeneity, understand its needs, increase cooperation, and increase its actors' accessibility. Interviewee [R1] argues the connection between the concepts of transparency and increasing cooperation as follows: *"There can be many parties, but if they are not clear to the other parties, no collaborations will arise"*. The appendices A and B contain these 'maps' of the current EEs of Rotterdam and Vaasa.

4.3. The transformative entrepreneurial ecosystem (TEE)

The findings listed in Table 10 and elaborated in paragraphs 4.2.1. up to and including 4.2.13. are bundled in Figure 6, which envisages the TEE. Even though the EEs (and thus urban transition processes) of Rotterdam and Vaasa are different due to their relative regional uniqueness, generalizable lessons can be drawn when constructing the TEE framework. I will provide alterations to the original EE conditions and add two supplementary conditions (4.2.12.: Involvement of incumbents and 4.2.13.: TEE branding) to incorporate transformative elements in the initial framework of Stam (2018). Thus, this TEE brings the case level empirical data together in a combined framework and depicts the preferable configuration of the EE that encourages transformative entrepreneurship and consequently shapes conditions for transformative entrepreneurship on the niche level of the MLP framework.

²⁶ In Rotterdam based on experience with these competitions, while in Vaasa based on the absence of such competitions

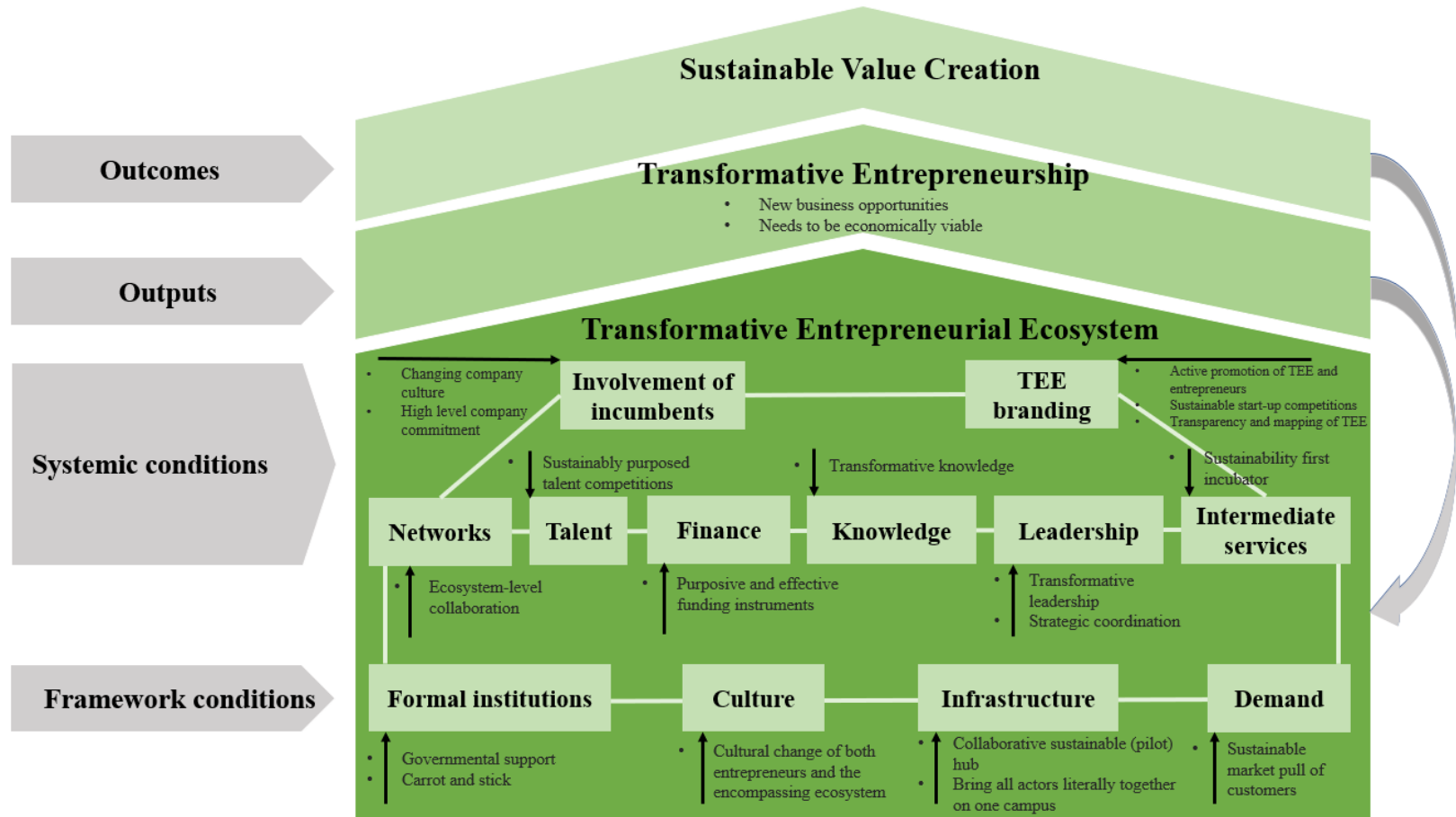


Figure 6. The transformative entrepreneurial ecosystem (TEE), based on Stam (2018) and own findings

In the theory chapter, I pointed out that the dependent outputs of the traditional EE, namely productive entrepreneurship, should be substituted for transformative entrepreneurship. Furthermore, I argued that the TEE is an extensive elaboration of an MLP niche that gives a more thorough insight into internal niche actor, agency and place dynamics rather than the ‘black box’ MLP literature emphasizes. In addition to this argumentation, I analyze, based on the empirical insights of this results chapter, that the TEE can encompass and connect multiple different niches within the multiple transition arenas of which the urban transition to sustainability consists. Thus, the transformational aspects of a TEE are not limited to only one transition (for instance the energy transition). The TEE framework should rather be seen as the overarching bottom-up framework at the MLP base, embracing multiple niches with sustainable value creation as its output. Additionally, as envisioned in the theory section, the TEE framework enriches the MLP niche level with place, actor, and entrepreneurial agency considerations. Findings summarized in Figure 6 answer the research question as being the configuration of the EE that encourages transformative entrepreneurship, which subsequently supports the urban transition to sustainability in Rotterdam and Vaasa. TEE research in different cities can yield different configurations. Also, Figure 6 does not imply that by configuring an EE in a transformative way (as depicted in this Figure), the TEE will always play the same role in the transition pathway of a certain city or region. The transition pathway is still very much dependent on the incumbent system and landscape dynamics. Instead, Figure 6 proposes the configuration in which the likelihood of transformative entrepreneurial success and impact is the highest, thereby contributing to the

urban sustainability transition the most. Hinged on their respective (T)EE and incumbent system, Appendix C depicts the likely transition pathways of Rotterdam and Vaasa. Based on empirical findings, the transformation transition path for Rotterdam and the reconfiguration transition path for Vaasa is proposed.

5. Conclusion

My research set out to investigate the entrepreneurial ecosystem in a multi-level perspective on transitions. The research question I posed was: *What configuration(s) of the EE encourages transformative entrepreneurship, which subsequently supports the urban transition to sustainability?* To answer this research question, I conducted 44 semi-structured interviews: 20 in Rotterdam and 24 in Vaasa. The empirical insights of these interviews were in an abductive way systematically combined with case information and EE and MLP theory. This method led to the construction of an enriched conceptual TEE framework (Figure 6) that nests itself on the interface of EE and MLP literature. This TEE framework answers my research question by depicting the generalizable configuration of the EE that encourages transformative entrepreneurship, which subsequently supports the urban transitions to sustainability in Rotterdam and Vaasa. Firstly, it presents the necessary transformative (MLP) refinements in the form of enabling factors and requirements to the ten original EE conditions. Secondly, it adds two new transformative conditions: ‘Involvement of incumbents’ and ‘TEE branding’, to increase the conceptual embeddedness of the EE and the MLP in both ways. Thirdly, it refines the dependent outputs and outcomes of the original framework in a transformative way by substituting ‘Productive entrepreneurship’ and ‘New value creation’ for ‘Transformative entrepreneurship’ and ‘Sustainable value creation’. I furthermore argue that the TEE can embody and connect multiple different niches within the multiple transition areas of which the urban transition to sustainability consists.

6. Discussion

In the results section, I answered my research question by constructing the TEE framework. This framework envisages the configuration of the EE that encourages transformative entrepreneurship as a driver of the urban transition to sustainability. The ten systemic and framework conditions of Stam’s (2018) framework are finetuned and tailored towards the urban transition to sustainability. In other words, transformative elements are added to the original conditions. Empirics furthermore showed that two conditions needed to be added to use the EE as a framework that aligns with the MLP context, namely, incumbents and TEE branding. The dependent variables, productive entrepreneurship as output and new value creation as outcome were changed for transformative entrepreneurship and sustainable value creation. The next part of this chapter will interpret the most salient findings generated from the analysis and reflect upon them in the context of the MLP and EE theory and frameworks (6.1.). Secondly, practical implications are discussed (6.2.). Thirdly the theoretical and methodological limitations of this study are listed (6.3.). The final part of this discussion will give avenues for future research (6.4.).

6.1. Theoretical implications

My research’s central theoretical implication is the enrichment of the original EE framework of Stam (2018) with transformative elements to make the framework align with and embed in the MLP framework. The EE is thus configured transformative as a TEE. Consequently, both frameworks serve together as vehicles

to achieve the end goal of a transformed and thus sustainable ‘future proof’ society. To what extent my results correspond with related literature on MLP and EE is discussed in this subchapter.

6.1.1. New transformative conditions ‘Involvement of incumbents’ and ‘TEE branding’

The added ‘Involvement of incumbents’ variable of my conceptual TEE framework was abducted from empirical data as one key missing link to connect the EE and MLP framework. This variable corresponds with the notion of Rothaermel’s (2000) work, which argues that sustainability transitions need incumbents’ strategic reorientation as they at first defend existing systems. Also, by including incumbents as condition in the TEE framework, I make MLP dynamics regarding the incumbent system(s) more explicit. Furthermore, similarly to the work of Tiba et al., (2020), the additionally included ‘TEE branding’ variable is the other missing link between EE and MLP theory. It shows the importance of promoting the success of the TEE and promoting its (successful) entrepreneurs (what Tiba et al., (2020) call ‘lighthouses’) to the external environment to increase and accelerate the TEE’s transformative impact.

6.1.2. Transformative refinements to original EE conditions

Based on the empirics, for the variable of formal institutions, the importance of broad governmental support in mobilizing different elements to encourage transformative entrepreneurship was formulated. This is congruent with literature (O’Connor et al., 2018). It reflects the idea that governments around the world admit that entrepreneurship can transform their systems (Isenberg, 2010) and that they can play a role in amplifying this transformative entrepreneurship in a stepwise manner (Rotmans et al., 2001). (Local) governments should acknowledge the conflict between short-term concerns and long-term ambitions and keep the public interest in mind (Rotmans et al., 2001). In this way, municipalities can purposively mediate, engage in brokering services, stimulate, create the right conditions, engage in steering, and enforce its laws (Loorbach & Rotmans, 2010; Smith et al., 2005). My contribution is to make the role of city-regions explicit in the governance/management of transition pathways (Coenen & Truffer, 2012).

The notion of cultural change to enable and accelerate transformative entrepreneurship that emerged from the data also finds strong theoretical underpinnings. As Konrad et al., (2008) argue, socio-cultural dynamics are part of transformation on various levels and dimensions. Seyfang et al., (2010) furthermore accentuate that behavior change will likely occur in this context. If the local culture that facilitates trust and safety is likely to improve the EE (Audretsch & Belitski, 2017), then cultural change to a sustainable trajectory is likely to improve the TEE. Also, the emphasized sustainable market pull for the closely related demand variable finds its roots in literature, as Coenen & Truffer (2012) argue that sustainability transition research analyses changes in markets. Stam (2014) phrases it as the opening of (sustainable) public demand. Next, for the infrastructure argument, I argued that there are benefits in proximity. Scholars in MLP and economic geography support this. To enable effective learning (Gertler, 2003; Owen-Smith & Powell, 2004) through relatively transparent channels (Hildén et al., 2017) and to increase the ability to learn and manage face-to-face across multiple projects (Powell et al., 2002).

Also, in terms of (transformative) leadership, my thesis is consistent with existing literature. This notion of public-private leadership and governance is confirmed by EE scholars (Acs et al., 2017). However, especially public transformative leadership should remedy possible ‘disempowerment’ (i.e., creating a sense of powerlessness and decreasing the ability of actors to take up roles in sustainability transitions) (Hölscher et al., 2019). Additionally, transformative knowledge, as presented in Figure 6, is discussed by

scholars to stimulate technological change, novelties, and institutional adaptation (Loorbach & Rotmans, 2010; Geels, 2002; Kemp et al., 1998). For the variable of networks and the necessary ecosystem level collaboration, scholars acknowledge these spatial configurations and dynamics of the networks within which transitions evolve (Coenen et al., 2012).

In addition, I contribute to the TEE/niche dynamics in the realm of the MLP. The factors of finance, talent, and intermediate services emerged as important elements from the empirics but are generally overlooked by MLP scholars. This is interesting and relevant as EE theory shows that these are important for (transformative) entrepreneurs and the encompassing TEE to flourish (Stam, 2018). By linking the EE to the MLP using the conceptual TEE framework, these conditions can enrich MLP bottom-up understandings to provide a more holistic view of these TEE/niche dynamics. Thereby, I argue that the TEE can incorporate multiple niches, as start-ups and scale-ups from different niches (for instance, food or energy) are not excluded in this TEE context as long as they fall under the umbrella of the urban sustainability transition. Furthermore, by recognizing this heterogeneity of niches within the TEE, crossovers between multiple niches are established by the increased probability of serendipitous encounters (i.e., different entrepreneurs from various fields coming across each other).

6.2. Practical implications

6.2.1 *Analysis of the current EEs of Rotterdam and Vaasa*

A practical contribution of my research is the detailed overview of the current EEs of both Rotterdam and Vaasa to further improve and steer their respective EE in a sustainable trajectory. Although both cities visualized their EEs by mapping the current actors (see Appendices A and B), the underlying dynamics and structure were not scrutinized so far. Therefore, this part of my thesis can be of value to policy makers and EE actors in both cities. Also, the presence of multiple parallels and similarities between Rotterdam and Vaasa creates an opportunity to collaborate and learn from each other. Especially the embedded transformative knowledge in the clean energy cluster of Vaasa can be of great benefit to the current situation of Rotterdam. Reversely, the way Rotterdam tackles the branding of its city by the installment of Rotterdam Partners can be very beneficial for Vaasa. I therefore strongly urge representatives from both cities to open a dialogue with each other.

6.2.2 *Strategic Transformative Entrepreneurial Ecosystem Management*

In addition, as posed in the research question, to create and configure a TEE that encourages transformative entrepreneurship which also supports the urban transition (which is purposive), strategic coordination (4.2.7.) is vital and logical because of its purposiveness. Therefore, this subchapter discusses and reflects on the practical implications of this concept. I argued that strategic coordination consists of ecosystem-level collaboration and transformative leadership. To capture both elements, I introduce *Strategic Transformative Entrepreneurial Ecosystem Management* (STEEM). I define STEEM as: ‘the concentrated effort to develop and maintain a TEE to accelerate transformative entrepreneurship and sustainable value creation’. Thereby going beyond the nurturing of new technologies and taking a more holistic approach to developing the TEE that in turn enables bottom-up sustainable value creation as a whole (so not only from new technologies) with transformative entrepreneurs as an engine.

STEEM is the process of actively and purposively managing the TEE, recognizing the wider context of the urban sustainability transition. In that sense, applying STEEM can purposefully push the TEE component of the urban sustainability transition in the desired direction. So, the core practical implication is that cities should implement STEEM to develop and accelerate their (T)EE. Also, when looking at EE efficiency in Rotterdam and Vaasa, there is much to gain, which can be tackled using this STEEM as resources can be coordinated more effectively. In addition, STEEM can be used to consider the coevolution of the TEE structure with changing transition parameters over time. Current actors are purposefully and actively ‘managed’ with the knowledge that what is unique about a certain region in the present does not have to be unique in the future and to ensure that these possibly conflicting temporary and future interests do not impede each other.

Also, interesting parallels can be drawn between STEEM and SNM literature (introduced in 2.2.4.). This gives some guidance into the elaboration of STEEM. These linkages with SNM also further embed the TEE framework in the MLP literature. STEEM is in line with what Kemp et al., (1998) debated for SNM. They argued that SNM is more than a useful addition to a spectrum of policy instruments. It is a necessary and reflexive component of purposive transformation processes of systems. Indeed, STEEM as well as SNM is more than a technology push approach, as sustainable value creation requires interrelated social and technical change (Schot & Geels, 2008). Additionally, parallels can be drawn with literature on transition management, which has been emphasized as a governance approach for sustainable development (Loorbach, 2010). Finally, STEEM finds its roots in EE literature, evidenced by the notion that EEs are a vehicle focused on the strategic management of a place (O’Connor et al., 2018; Audretsch, 2015). So, to conclude, STEEM finds theoretical underpinnings in both MLP and EE literature.

6.3. Research design and limitations

My qualitative method allowed for a nuanced understanding of how entrepreneurs interact with their local EE and is particularly useful in situations where there are yet few standardized metrics to analyze the structure or success of EEs (Spigel, 2017), which was the case for my research. Despite this nuanced understanding, my research has its limitations. Firstly, the largest barrier for the reliability of the interview data is ‘social desirability’ of the answers given by the interviewees. In other words, respondents may answer in what they believe is the preferred social response whether it is true or not (Brink, 1989). Especially Finnish interviewees were very polite, which is embedded in Finnish culture. It is even considered inappropriate and impolite to force one’s opinions on others in Finland (Nishimura et al., 2008). I tackled this by repeatedly stressing the importance of an unbiased opinion for the results of my thesis.

In terms of validity, during the interviews, the possibility of participant bias or error was witnessed (Chenail, 2011). An example of such a bias was the differing viewpoints of the interviewer and interviewee on sustainability, EE, and other specific terms (Lozano et al., 2013). I resolved this as much as possible by extensively introducing any new concept during the interviews to enable mutual understanding. In addition, all interviews in Rotterdam were conducted in March, April and May 2020, at the height of the COVID-19 pandemic, which led to the cancellation of some interviews in Rotterdam, decreasing the sample size. It also possibly influenced interviewees’ answers in a negative way due to the imposed lockdown and grim future perspectives at that time, during the data-gathering of my thesis in Rotterdam. To resolve this bias, I urged the interviewees to describe the pre-COVID-19 situation.

Additionally, there are some limitations with regard to generalizability. All general conclusions should be treated with care because conclusions drawn from this two (European) city comparison do not fully incorporate the regional uniqueness of cities worldwide. TEEs on other continents, such as Asia and America, which also represent a large share of entrepreneurial activity, can provide new insights into the dynamics that foster the creation and development of TEEs. Also, my study focused on the urban context, meaning that findings are not generalizable regarding transformative entrepreneurship in rural areas. In these areas, perhaps different elements and dynamics are in play. Considering these limitations, my research generalizes to an urban European context.

Next, for the results section, I sometimes witnessed an overlap in findings between some conditions. This is caused by the ‘interconnectedness’ of the different variables in the EE (Stam, 2018). For instance, the culture condition is closely associated with the demand condition, and the talent condition is to a large extent intertwined with the knowledge condition. The consequence of this interconnectedness was that the analysis sometimes became entangled because I had to make choices where to discuss an argument. To iron this out, I made clear and explicit choices where I discussed what argument that could be discussed in multiple subchapters. Finally, a more theoretical limitation is the inherent tension between the open-ended and uncertain process of sustainability transitions (towards the future) and the ambition of governing such a process (Frantzeskaki et al., 2012). In other words, my research tries to understand and govern a process that is inherently difficult to govern because of its open-endedness. By expanding my interview sample as much as possible (to 44) given the thesis’ time constraints, I tried to paint the most complete picture and deepest understanding of governing (STEEM) this urban sustainability transition.

6.4. Future research

Firstly, I used data and arguments based on Western/Northern Europe. Future research can further validate my findings and explore how the results can be extrapolated to (T)EEs on other continents in the world. Similarly, elaborating on the limitation regarding urban versus rural settings, further research regarding transformative entrepreneurs in a TEE context in rural areas can display other intriguing perspectives. In addition, it would be interesting to find out if combinations of certain elements can lead the transition, next to each other. So, one type of city has element ‘x, y and z’ and another ‘a, b and c’, and both can accelerate the urban sustainability transition. Therefore, future research into more opposite cases, for instance, from different continents, can yield compelling new insights in different transformative configurations of the EE.

Secondly, there is a need for a dynamic perspective that seeks to understand how the structure and influence of EEs change over time in response to both external economic and social shocks as well to internal changes, such as entrepreneurial successes or the purposive philanthropic or organizational efforts of a few ecosystem entrepreneurs or lighthouses (Spigel, 2017; Tiba et al., 2020). In other words: the EE framework (as well as my research methodology) functions as a snapshot of a current situation; therefore, it lacks a temporal aspect. Longitudinal research can for that reason be an interesting avenue for further research (Ployhart & Vandenberg, 2010). Repetition of similar research in five years makes it possible to see (1) EE and MLP coevolution and (2) the evolution of the cities using these frameworks. Due to time constraints, this was out of the scope of my thesis. Next, because my thesis studied a future urban transition to sustainability, shifts between transition pathways can occur. It is not possible to determine whether the

transitions will shift between pathways (Geels et al., 2016). Also here, longitudinal research can be an outcome.

Fourthly, researchers need to develop metrics that can be used to identify the presence of the (T)EE conditions discussed in my thesis and compare them between regions (Spigel, 2017). Metrics such as the size of entrepreneurial exits, venture capital investments and start-up rates of transformative start-ups are already difficult to find, gathering *comparable* data on the effectiveness of (social) networks or cultural elements is even harder, especially because the availability of adequate data varies significantly for different regions (Leendertse et al., 2020). These research advancements will yield both a more rigorous and nuanced understanding of how TEEs affect the transformative entrepreneurial process and will also enable more reliable and precise policy recommendations to advance existing TEEs and subsequently develop successful TEEs in regions without histories of successful bottom-up sustainable growth. Finally, an interesting avenue of further research is how theme-specific incubators act as protected spaces or micro-level niches embedded within the overarching TEE.

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9. Appendices

9.1. Appendix A: A comprehensive overview of the EE of Rotterdam

Rotterdam is a young dynamic world city which is rapidly innovating. Unique at home, internationally renowned for our innovative drive and unpolished charm. Whether it is the constantly changing skyline with its bold architecture, our port which is the smartest in the world or the can-do mentality of our residents. Rotterdam is a city with a distinct character, energetic and always in motion. A city of forerunners, pioneers and people with the courage and will to drive change (Rotterdam Partners, 2020).

For the case of Rotterdam, interviewees provided insights and formulated strengths, weaknesses, and regional factors of the Rotterdam EE. Figure I shows the characteristics of the interviewee sample of Rotterdam.

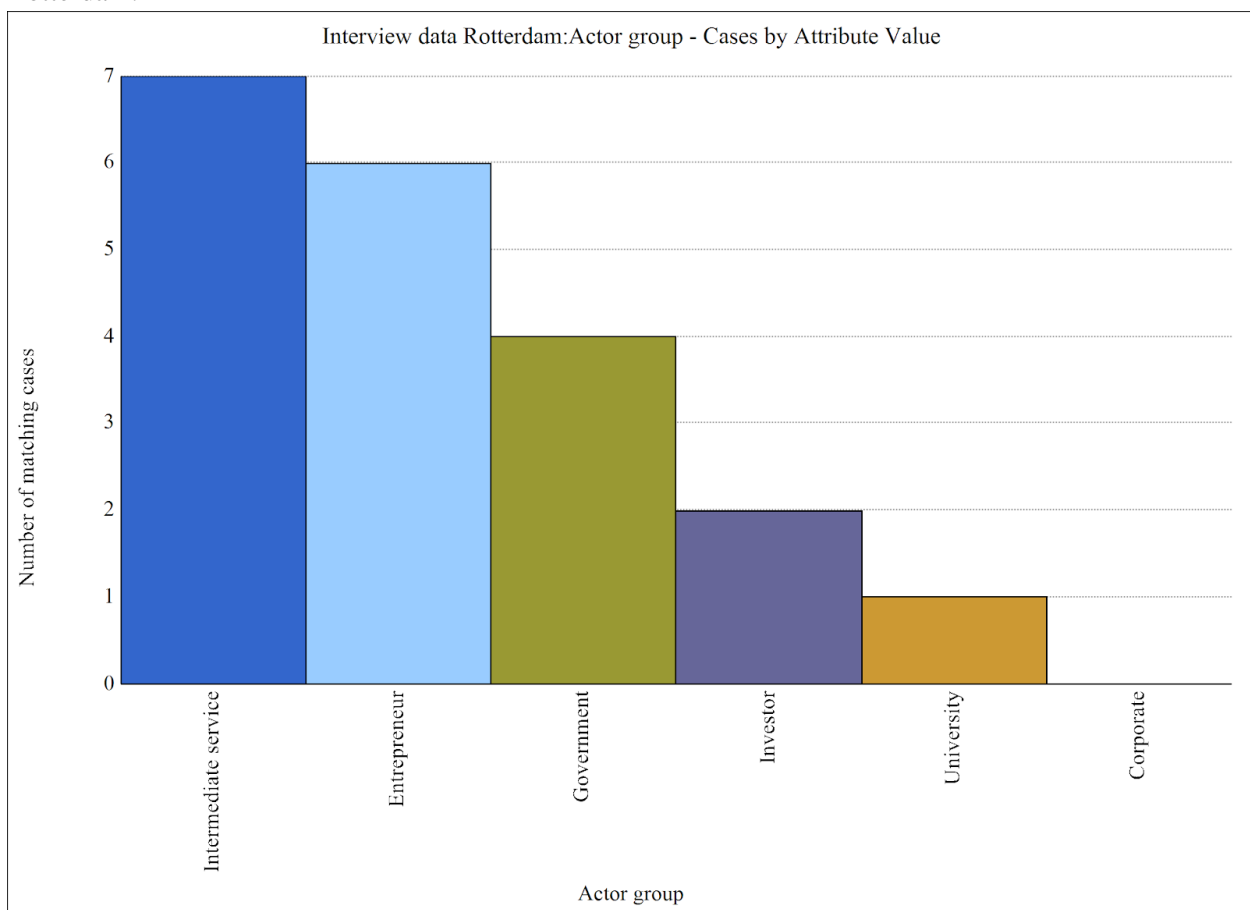


Figure I. Characteristics of interviewee sample Rotterdam

9.1.1. Rotterdam EE strengths

Table I. Strengths of Rotterdam’s EE, based on interview data

EE strengths	Mentioned by interviewees
Municipality active and aware	18/20
Highly collaborative	16/20
Harbor-industrial-complex	14/20
Good incubators and facilitators	14/20
Regional public funding	14/20
Many and good start- and scale-ups	12/20
High quality and volume of research institutes in the region	12/20
Rotterdam mentality	11/20

With regard to the framework condition ‘formal institutions’, the active and constructive role of the city of Rotterdam was highlighted as a strength: *“And you see with us in Rotterdam, for example, that it was only about five or six years ago that the button was pushed and that is very much encouraged by the municipality.”* [R11]. The municipality of Rotterdam is therefore named the ‘entrepreneurial government’. This is for a large part due to the fact that Rotterdam has some very capable counsellors this term and became particularly clear with the establishment of UP!Rotterdam which is a four year programme that serves as a public private entity and through a process of co-creation connects the different actors in the EE. Also, the fact that Rotterdam municipality actively acquired expertise outside its own organization to improve the EE, thereby acknowledging that they are themselves not the experts regarding their EE, stands out. [V11]: *“We had the luxury that we could see a party that has done well elsewhere in the past: we’re not going to do it all ourselves again, we’re just taking it in”*. Regarding the international branding of the city of Rotterdam, public-private organization Rotterdam Partners takes a central role. In addition, the role of InnovationQuarter as the regional development agency of Zuid-Holland is positively stressed.

Secondly it was stressed by the interviewees that Rotterdam contains high quality intermediate services such as incubators, facilitators, and accelerators²⁷. As one interviewee simply said: *“You have a lot of cool places like incubators and accelerators”* [R16]. The intermediate services in Rotterdam are also complementary in a sense that they are specialized in various fields. Also, in terms of shared office space, Rotterdam hosts an abundance of those possibilities. However, because of this high volume of intermediate services, the accessibility is a point of improvement: *“One thing which is difficult for the start-ups is to also get in contact with the network”* [V15]. It is stressed that some entrepreneurs are overwhelmed by the amount of options available.

Thirdly it was argued by the interviewees that the Rotterdam EE (same as the Vaasa EE) is highly collaborative: *“Yes. How much I do not know myself, I am not involved, but I have the feeling that they do*

²⁷ ECE, Yes!Delft/Yes!Rotterdam, PortXL, CIC, Erasmus Tech Community, Van Nelle Fabriek, Rotterdam Partners, InnovationQuarter, VentureCafe, BlueCity, Get in the Ring, RDM, Buccaneer Delft, Deltalinqs, Keilewerf, Steurgebouw, VoorGoed, iTanks, UP!Rotterdam, Erasmus MC incubator, Thrive Institute, We Are Builders

work together, pick things up together and coordinate events and not all organize an event on the same day” [R10]. Rotterdam findings furthermore show that the actors propagate that there are many (network) events. An important player hosting those events and connecting the EE is VentureCafe in Rotterdam. Next, the harbor-industrial-complex (HIC) has an interesting and prominent role in the Rotterdam TEE. A great source of economic activity but also a tremendous challenge in the urban sustainability transition: “And I would say that Rotterdam is, we are a city with a huge petrochemical cluster logistics. So, you mentioned clean tech (in Vaasa) we did not, we were not a representative of the cleanest industry. So, if a city like Rotterdam is changing to, for instance renewable energy, energy, or more sustainable companies. The impact is tremendous” [R17].

Additional EE strengths that were highlighted is the high level of regional public funding. Rotterdam is characterized by a high level of public funding instruments as well. Most regional funds are administered by InnovationQuarter. The municipality of Rotterdam distinguishes itself by funding not only start-ups directly through grants and competitions but also indirectly by funding the EE: *“Sometimes you just have to do something to speed things up. And it also took the city money and time to get it all done. But I think it is definitely invested on the right side” [R18].* Other strength is the amount and quality of entrepreneurs, Rotterdam’s EE creates a potent volume and quality of start- and scale-ups.

Next quality and volume of research institutes in the region is perceived as a strength. Interviewees from Rotterdam stress that the Erasmus University and the TU Delft are complementary. Interviewee [R18]: *“That combination and that is also a good thing that you do not find everywhere in the Netherlands or in Europe. It is precisely the combination between the Delft University of Technology and the Erasmus University and even the Erasmus Medical Center”.* Additionally, on a national level in the Netherlands, there is high investment in education and a lot of research into start- and scale-ups. Finally, the Rotterdam mentality is celebrated for being bold and forward: *“Exactly, the Rotterdam mentality that is one thing that makes a difference, you see that people are fighting really hard to make their company a success” [R1].* As such creating the right mindset to do business.

9.1.2. Rotterdam EE weaknesses

Table II. Weaknesses of the EE of Rotterdam, based on interview data

EE weaknesses	Mentioned by interviewees
Lack of ecosystem level collaboration	14/20
Talent scarce	10/20
Lack of ambition	6/20
Access to capital	5/20
City of opposites	5/20
Ecosystem leadership not optimal with municipality because of bureaucracy	5/20

In the previous subparagraph, the finding was presented that the EE of Rotterdam is highly collaborative, however this insight was also one of the most heavily debated, as on the opposite side, the majority of the interviewees underlined that there is a lack of ecosystem collaboration. In fact, this insight means that some interviewees discussed that the Rotterdam EE is highly collaborative, whilst they mentioned in the same

interview that there is a lack of ecosystem collaboration. This interviewee accentuates it as such: *“What I have heard, is that there was only very limited cooperation a few years ago. Not only within the ecosystem, but also to a very important extent between public parties. Parties found each other insufficient”*. But, A positive element is that improvements in Rotterdam are triggered: *“In the ecosystem in Rotterdam, a lot of things are happening, but quite fragmented, but that is getting better and better. And the government plays a very important role in this”* [R11]. This important role of the local government in ecosystem level collaboration is, again, observed by the establishment of UP!Rotterdam: *“The objective of UP!Rotterdam is to support and strengthen the ecosystem and is therefore an initiative organized by the Rotterdam innovation team (city of Rotterdam). But not only with the municipality, also with other (private) partners”* [R12].

Next weakness of the Rotterdam EE is the scarcity of talent: *“If you look at the statistics, you will see that ... human capital, I believe that one in four South Holland companies now see limited supply of human capital as an obstacle to growth, which is really a big thing”* [R14]. This lack of talent is especially witnessed for software developers and programmers. Also, the drain of talent to Asia is emphasized as a threat. Specially to capture talent for sustainability is perceived as difficult because of fierce talent competition with large corporates: *“You have to be quite special (as a start-up), to prevent those kids from just walking straight to the big money-making consultancy bureau x...”* [R5]. An additional barrier is access to capital. This access to capital is a bottleneck. Also, the lack of ambition in the Netherlands, has a causal connection with the fact that Dutch investors display lack of courage. The former leading to the latter and vice-versa.

Rotterdam being a city of opposites is also perceived as a weakness. Especially when witnessing that the Rotterdam-Zuid area suffers from a large concentration of socio-economic problems compared to Rotterdam-Noord (Bastiaanssen et al., 2013). Also, the fact that the ‘top’ sectors of Rotterdam are widely spread both in terms of geography and in terms of interfaces: the harbor cluster on one side and the life-science and health cluster on the other side: *“The range of ideas is good, but it is very difficult because the port and medical sector are so far apart”* [R11]. Lastly a dichotomy was found that has to do with the size of companies in Rotterdam: *“We have no intermediate size companies in Rotterdam. Some very large companies, those in an industry are among the largest in the world. And we actually have SMEs, but in between it is very limited”* [R11].

Finally, interviewees warn that ecosystem leadership is not optimal with the municipality because of its bureaucracy. The solution that is suggested is public-private leadership or governance to pave the way for ecosystem level collaboration: *“It only has a good chance of success if you pull the organization out of the bureaucracy. But with some sort of accountability”* [V6]. In accordance with this public-private governance, interviewees from Rotterdam stress the strategic coordination provided by public private actors like UP!Rotterdam and Rotterdam Partners and the (informal) Economic Board of Zuid-Holland: *“It is not only avoiding that they (the actors) reinvent the wheel but also connecting these initiatives, this makes the ecosystem bigger and the impact bigger”* [R17]. These organizations function as a spider in the web and guide collective action.

Findings on strengths and weaknesses of the EE of Rotterdam are combined and visualized in Figure I, which gives an illustrative overview of the current EE of Rotterdam.

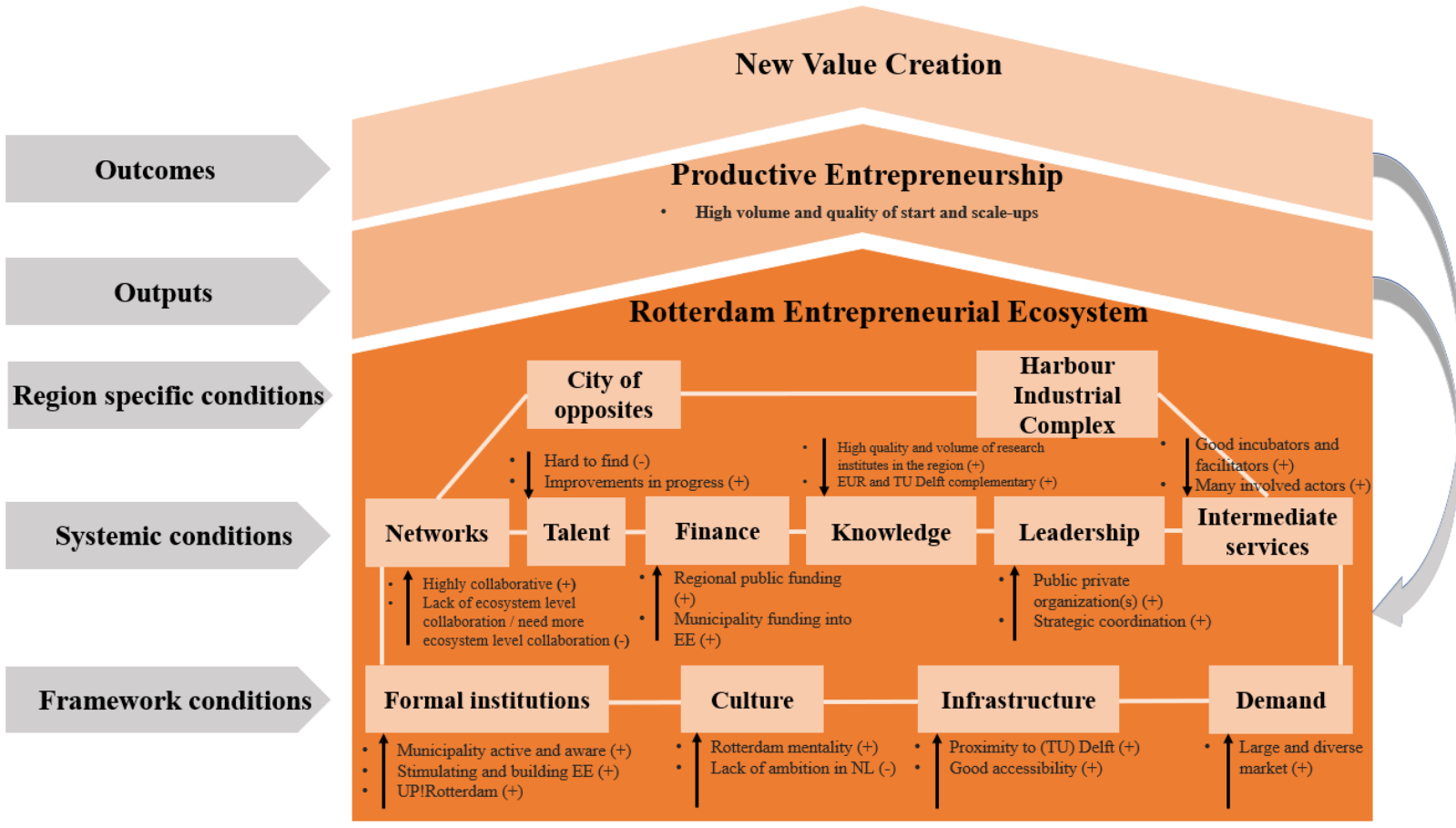


Figure II. The EE of Rotterdam, based on Stam (2015)

Next to Figure II, Figure III additionally depicts a comprehensive overview of the current actors and their role in the EE of Rotterdam.

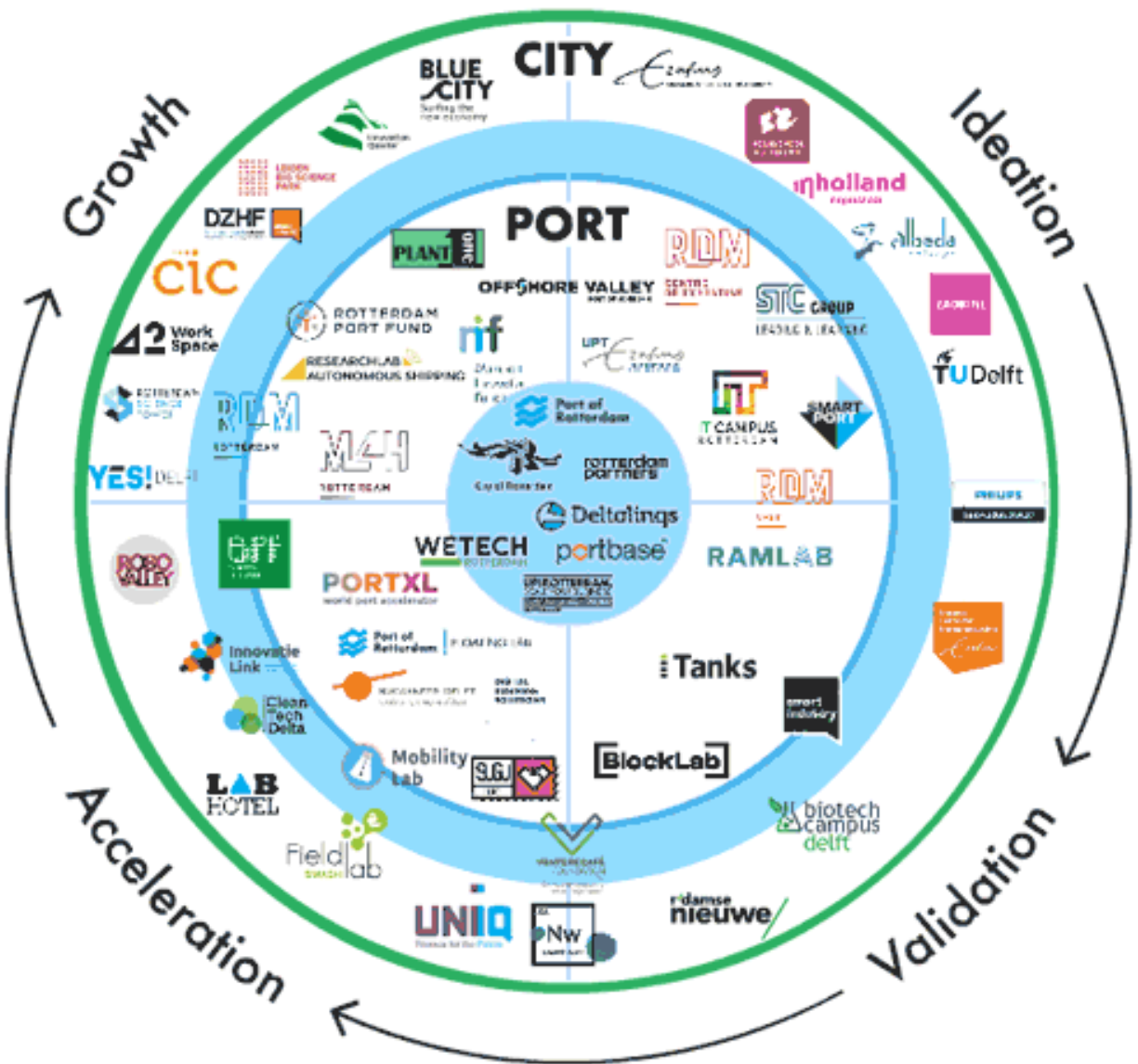


Figure III. Overview of EE actors and initiatives in Rotterdam, retrieved from Haven van Rotterdam (2020)

9.2. Appendix B: A comprehensive overview of the EE of Vaasa

In Vaasa, energy is a positive force that is not only visible in business, but also in people's everyday lives and the development of the city. The Nordic Energy Capital is a unique combination of modern internationalism, young enthusiasm, innovative know-how as well as peace and tranquility (City of Vaasa, 2020).

Vaasa is considering its size a thriving region with many opportunities. Located on the west coast of Finland at the Gulf of Bothnia, Vaasa has had (since the 17th century) strong sea connections and therefore a long history of ship building and trade. 24 interviews were conducted resulting in more than 24 hours of transcription. This appendix describes the current EE of Vaasa. Interviewees provided insights in these conditions and formulated strengths, weaknesses and unique regional factors of the Vaasa EE. Figure I shows the characteristics of the interviewee sample of Vaasa.

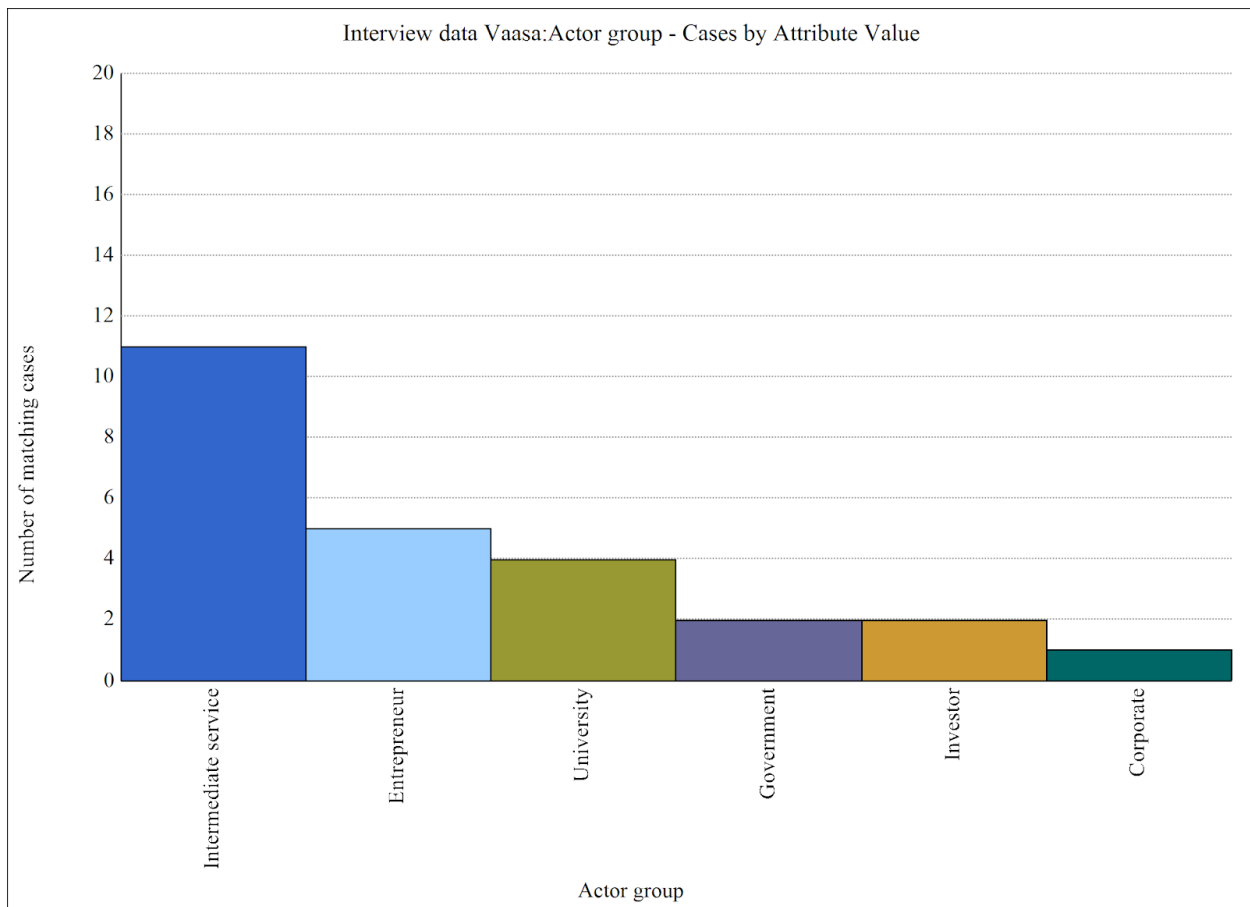


Figure II. Characteristics of interviewee sample Vaasa

9.2.1. Vaasa EE strengths

Table I. Strengths of the EE of Vaasa, based on interview data

EE strengths	Mentioned by interviewees
Energy cluster	22/24
Collaboration	21/24
High volume of intermediate services	20/24
International	19/24
Culture	18/24
Small size	13/24
Bilingual	11/24
Strong surrounding region	10/24

First and foremost, the energy cluster is highlighted almost unanimously by the interviewee sample as a major strong point of the Vaasa region and its EE. [Interviewee V16] highlights: *“I would say because this region, they embark on being the energy cluster hub”*. This is not surprising as the Vaasa energy cluster comprises more than 160 businesses of which several are global market leaders in their field and has a total business turnover of some 5 billion euros annually with an export rate of over 80%. To put things in perspective: 2% of Finland’s population in Vaasa generates 5.5% of its export, 12% of its tech export and 30% of its energy tech export (EnergyVaasa, 2020). Within the theme ‘energy cluster’, interviewees identified multiple interesting concepts. Firstly, the existence of the big companies within the energy cluster was emphasized as a positive influence (17/24 interviewees): *“But then we have these big companies. So, of course they have not always been big, but they grew big. And it means that they have quite a big influence on a city this small”* [V12]. The big companies mentioned most often are ABB, Wärtsilä and Danfoss. Reasons for their positive influence are that they boost the economy and EE by giving subcontracting possibilities, that they enable start-ups and invest in start-ups. As [V14] argues: *“And thanks to them it has also been possible to build up a quite great number of suppliers. Let in different kinds of activities and subcontractors in the whole area”*. Secondly, the energy cluster’s long history is underscored (11/24 interviewees). Especially the prevalent coevolution of the energy sector with the city of Vaasa and its universities is stressed (9/24 interviewees): *“I think what’s good also: very and extremely strong connections between the universities and industry and also with the city”* [V23]. This insight is also interesting considering the MLP and will be discussed later on. Finally, to a lesser extent remarks were made about the positive influence of transformative knowledge, generating spin offs, being a source of innovation, being high tech and the existence of the accelerator EnergySpin as contributing to the strength of the Vaasa energy cluster.

Next, it was pointed out by the interviewee sample that collaboration is a major strong point of the Vaasa EE. [V1] highlights: *“Which is our strength from that collaboration. It is very unique, ... Even though they are competitors in some form, they might be cooperating in some other, so that is very unique”*. Within the theme collaboration concepts as interdisciplinary collaboration are deemed important, especially between the universities and the (big energy) companies. Also, the Nordic cross border collaboration is underlined.

Interviewees even speak of a collaborative culture, “*We have this mindset of co-creation and open innovation and I think that kind of culture is very beneficial*” [V11] and further accentuate the concept of co-creation.

Another important strength of the Vaasa EE is the high volume of intermediate services, “*Well, what comes to the spectrum of it, I see that there are quite many services available*” [V2]. Other significant strengths of the Vaasa EE that arose from the data are its international character, its small size, its bilingualism, its culture and the strong surrounding region. Regarding the international strength of Vaasa, the following reasons surfaced: close to Sweden, export oriented, inherent to large international companies, international history and international image. “*And then we have quite an international environment here. People in Vaasa are, if I remember right so we are talking 104 languages now. So, this is quite an international place*” [V22].

The small size was mentioned as a strong point because it results in short lines and tight networks, loyalty and easy access to intermediate services. [V11] argues: “*Because the city of Vaasa is quite small, all the actors are close to each other so there's benefits in proximity to say that if I want to call someone I can do it and I do not have to really be worried about it because people know each other*”. Next the strength of bilingualism was stressed, as Vaasa has a large Swedish speaking minority: “*It develops the brain and I think that is also a big strength*” [V10]. For the highlighted cultural EE strength, interviewees mostly celebrated the entrepreneurial spirit and history in the region and the high level of trust. Finally, the strong surrounding region was mentioned often. This makes sense as Vaasa is surrounded by the affluent Finnish Ostrobothnia region and with Sweden only 40 kilometers away also falls within the scope of the economically strong Kvarken region. [V5] underscores: “*Getting more and more and more here in this Vaasa area and beyond in Sweden in the Kvarken region*”.

9.2.2. Vaasa EE weaknesses

Table II. Weaknesses of the EE of Vaasa, based interview data

EE weaknesses	Mentioned by interviewees
Difficulties in finding talent	20/24
Small size	16/24
Culture	12/24
Strategic coordination	12/24
Homogenous economy	11/24
Geography	11/24
Shortage of startup supply	9/24
Bilingual	7/24

What is most widely recognized as a weakness of the Vaasa EE is the difficulty of finding talent. [V10] contemplates: *“And of course, big weakness for our region as well. We need more people here to come to work. Yes, I think so we will have a big problem with, with the labor force. because people do not want to live, to move to our regions, for some reason”*. Multiple reasons cause this phenomenon. One of them being that the earlier mentioned big companies take a large chunk from the talent pool. Also, there is a lack of interest from people outside the Vaasa region to come and stay, which is caused by a lack of cooperation and a large outflow of talent. Finally, the size and thus the little amount of job options is emphasized as a reason for the lack of talent. These ‘size-issues’ will further be discussed in the next paragraph.

The next EE weakness that is affirmed by the interviewees is the size of the city. *“There's not many people here”* states [V6] when asked about the weaknesses of the Vaasa EE. As reasons and consequences of its small size, interviewees indicate a small customer base, little amount of options, little number of investors, little funding opportunities for investors, a stagnating population growth and that the city is too small for some EU projects. An example of this is the fact that Vaasa is an IRIS follower city, because of its size.

In addition, cultural aspects are recognized as weaknesses of the EE. Interviewees mostly argue that this entails a lack of promoting and marketing of the region. [V24] explains: *“Marketing is really important and there's one thing, cultural thing in Finland, the Fins have been really bad at marketing”*. An interesting insight as this probably is a cause of the weaknesses mentioned in the previous paragraphs. A lack of promoting and marketing can cause a lack of talent in a region, leading to difficulties in finding talent in that region. Some interviewees suggest that this lack of promoting and marketing of the region is due to the fact that the people of the Vaasa region are too proud. Other cultural EE weaknesses are affirmed as the Fins being too risk averse and introvert with regard to entrepreneurship.

Other weaknesses of the Vaasa EE worth mentioning are a lack of strategic coordination, a too homogenous economy, its geography, an overall shortage of start-up supply and its bilingualism. The lack of strategic coordination becomes clear from [V11]: *“I think it also raises the question like how we coordinate resources, effectively so that same thing is not done twice in two places”*. With regard to the homogeneity of the Vaasa economy [V15] explains: *“I have not seen that the government or the Vaasa city are doing anything for other businesses than energy, that is basically it”*. Geography wise, Vaasa is far away from the Finnish capital, Helsinki (4+ hours by train), leading to little political power in the capital which in turn results in difficulties to get national (infrastructure) investments causing poor public transit and logistics. [V23] acknowledges: *“We are also, let us say used to doing things by ourselves, and we have never counted on any help from Helsinki because Helsinki is very far away”*. The shortage of start-up supply is again a size-issue, *“I mean, one really big challenge here in Vaasa is the volume of prospects”* [V14]. The bilingual character is described as a weakness by interviewees who mostly have in mind the language barrier for non-bilingual Fins from other parts of Finland. Hampering them from coming to Vaasa. [V21] expresses it as follows: *“Most speak Swedish, which is a bit problematic for Finnish speakers because they do not feel comfortable here”*.

9.2.3. Vaasa EE characteristics that are both a strength and a weakness

Vaasa has certain characteristics that are both a blessing and a curse. These characteristics deserve some further scrutiny. The first one being that the small size of Vaasa is mentioned both as a strength and a weakness by the interviewees. While on the one hand its small size leads to strong lines and tight networks,

it on the other hand leads to difficulties in finding talent, options, funding etc. The crux is to maximize the positive aspect and minimize the negative aspect of the same characteristic. This is easier said than done and also has to do with the next aspect of the Vaasa EE that is both a strength and a weakness, the culture. Interviewees positively highlight the entrepreneurial spirit present in the Vaasa region, but also criticize the culture for its insufficient promotion and marketing of the region possibly due to pride on the one hand and being risk averse on the other hand. This lack of promotion and marketing in turn hampers the city and EE to grow. Related to this cultural dilemma is the fact that the bilingualism of the region is both identified as a strength and a weakness. A strong background in both Swedish and Finnish adds to the skill set of Vaasa inhabitants, while people from different areas see it as a barrier to come to the region, as they feel not at ease because they sometimes do not understand the language. It also makes it more difficult: *“There’s a risk for this language, of course also. It makes everything a little bit more difficult. Yes, there always have to be two languages. Yeah, so you have to provide everything in two”* [V5].

Next factor that has both an upside and a downside is the presence of the energy cluster, although broadly appreciated and celebrated, interviewees do voice their concern on the dependence of Vaasa on the energy sector. There is a call not to have all the eggs in the same basket and to strive to a more heterogeneous playing field. *“But this is a strong energy cluster, I think it can be like a strength, or at the same time it can be a weakness if you are focusing too much on one sector”* [V9]. *“That is of course a risk”* argues [V20], but *“The good thing about energy is that that will always be needed in everything”*. Which is a valid argument.

Finally, there is a discrepancy between the insight that a major strength of the Vaasa EE is the collaboration, while it also became clear that a weakness of the EE is its strategic coordination. An important remark here is, again, the fact that in such a small city, different dynamics are in play. What is happening in Vaasa is that highly collaborative small networks prevent ecosystem level collaboration decreasing the EE’s efficiency and effectiveness. As [V18] identifies: *“And how do we distribute the work so that we are, we’re not like doing the same thing. Double work, triple, quadruple work which we are doing now. And there is no, not the pyramid is not, there is nobody in charge. Yeah, there is just all these small actors, but so like small, small kings on every hill, instead of having a common vision”*.

These findings about strengths and weaknesses result in the Figure III, which provides a customization of Stam’s (2015) framework for the status quo of the Vaasa region EE. It depicts the various framework and systemic conditions of Stam (2015) and adds distinct Vaasa characteristics to those framework and systemic conditions. It also adds the two major region-specific conditions that cannot be integrated in the conditions in Stam’s authentic framework as they have a dynamic influence on all these different initial conditions. For that reason, they are added as extra ‘boxes’ in the Figure.

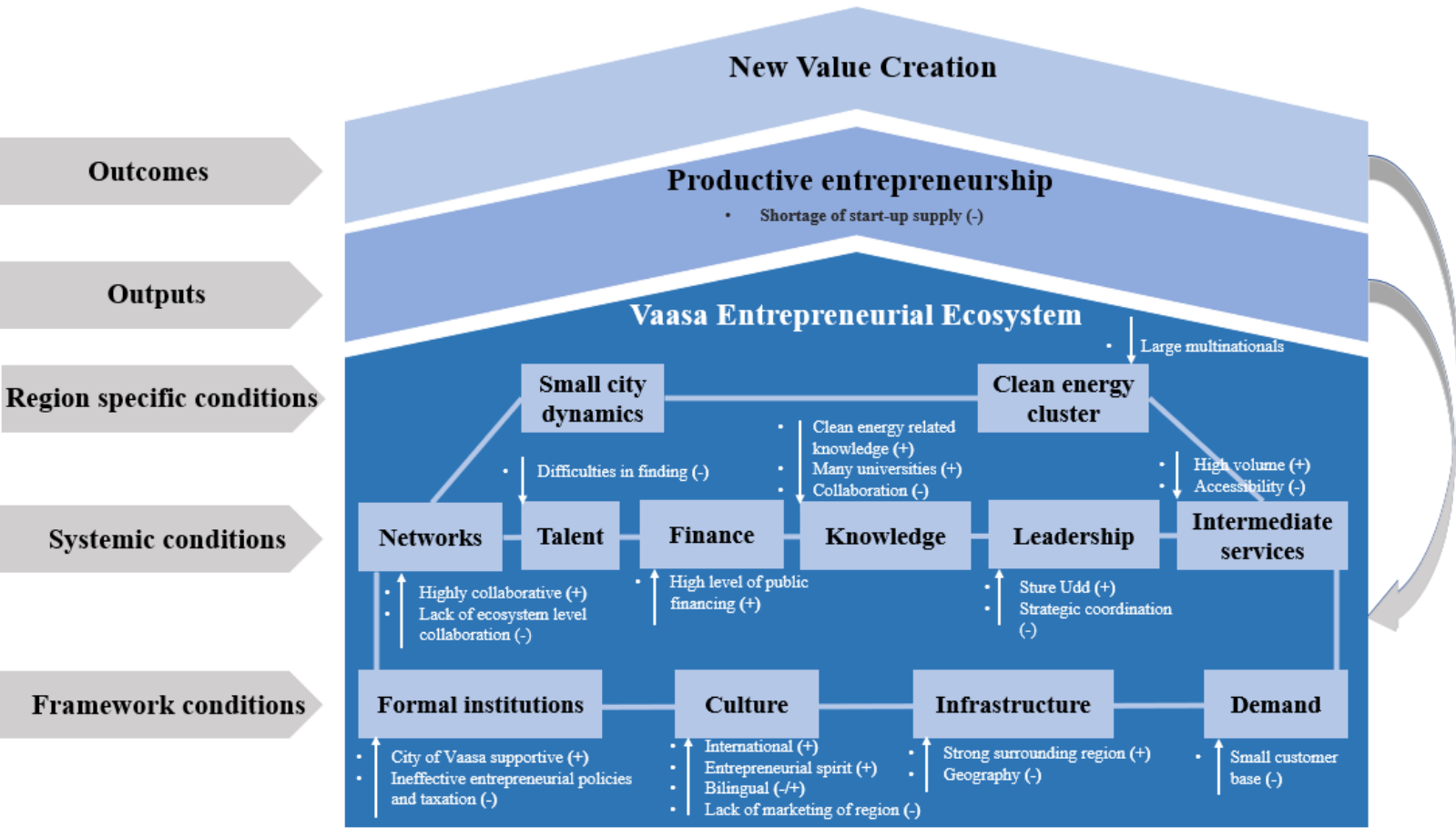


Figure III. The EE of Vaasa, based on Stam (2015)

Next to Figure II, Figure III additionally depicts a comprehensive overview of the current actors and initiatives in the EE of Vaasa.



Figure IV. Actors and initiatives in Vaasa, retrieved from EnergyVaasa (2020)

9.3. Appendix C: Transition pathways of Rotterdam and Vaasa

This Appendix translates the generalizable TEE findings from the results chapter back to the unique case specific situations and subsequent transition paths in Rotterdam and Vaasa.

9.3.1 *The transformation transition pathway of Rotterdam*

I propose that the TEE and incumbent system of Rotterdam are currently on a transformational transition pathway. Landscape developments from European (European Green Deal) and national level ('Klimaatakkoord') exert pressure on the incumbent system. The developments lead thus to a substantial change in institutions (Geels et al., 2016). But especially in Rotterdam with its HIC, TEE outputs are not impactful enough to break through the incumbent system but are rather gradually adjusted in collaboration with the incumbent multinationals after which the system adjusts more slowly than in Vaasa.

The energy transition is even more a difficult task in Rotterdam because of the petrochemical industry in the harbor that will still need oil for the coming 30 to 40 years: *"In the end we will just continue to use oil for the next thirty or forty year, for transport it will become less and less, but you just cannot stop with oil in chemistry"* [R8]. Additionally, the HIC is dominated by conservative corporates that still earn vast amounts of money. Also the fact that the harbor is part of the culture in Rotterdam, inhabitants are historically proud of their harbor. Next, the Rotterdam harbor is far away from the city center, so negative externalities like fossil industry air pollution are perceived as less negative because it does not directly affect the inhabitants. These factors amplify the current lock-in: *"Unfortunately there still are too many powerful players in the market who are also stopping things"* [R18].

Also positive elements are witnessed. Namely that the Port of Rotterdam as an organization takes a central role, strategizing their ambition of a sustainable port. Example is the fact that even though the corona crisis occurred they are still investing in the energy transition. Another positive element is the announcement of the build of a hydrogen plant on the '2e Maasvlakte' by Shell and partners to become the hydrogen hub of northwestern Europe (Shell, 2020). This announcement shows a partial but substantial incumbent reorientation in line with the transformation pathway. Moreover, the open innovation process between incumbents and start-ups coordinated by PortXL adds to this partial incumbent reorientation and in co-creative way develops old and new technologies.

9.3.2 *The reconfiguration transition pathway of Vaasa*

The Vaasa TEE is symbiotic to the clean energy incumbent system. Innovations from TEE outputs such as start-ups, scale-ups and spin-offs from incumbent actors are adopted (again) by these incumbent actors. Triggering possible further incumbent adjustments and 'innovation cascades'²⁸ through co-creation in Wärtsilä's newly built Smart Technology Hub (Berkers & Geels, 2011; Geels et al., 2016). Vaasa's incumbent energy system is a frontrunner: *"The difference is that in Vaasa most of the people have already been working over 10 years in this (clean energy) business. When somewhere else they have started and got an idea that we have to go into it, so the starting point is different"* [V17]. Which has the consequence that the incumbent system also does not have to be overthrown because it is already on a sustainable trajectory. Therefore, I argue that Vaasa is on a reconfiguration trajectory where alliances are established between incumbents and transformative entrepreneurs (Geels et al., 2016). The initial add-ons from

transformative entrepreneurs lead to new combinations between new and existing clean energy technologies. The locus of these new combinations will likely take place in the Smart Technology Hub. Next, the coevolution of the energy cluster, the city of Vaasa and the universities has led to limited institutional change in the past but changed recently to a more ongoing substantial institutional change, specifically observed by Vaasa's ambition to become carbon neutral before 2030. Interviewee V23 underscores: "*Vaasa has extremely strong connections between the universities, industry and the city*".

9.4. Appendix D: Interview guide

Interview Guide Thesis Beyer

Introduction

Firstly, thank you for your time, and this opportunity to conduct an interview with you. As became clear from our earlier contact, I am a master student in the master sustainable business and innovation. (I am conducting an internship at Merinova for my thesis at Utrecht University. Merinova is an important and neutral background actor, whose mission is to make the energy cluster in the Vaasa region even more successful). I am looking into the Vaasa/Rotterdam entrepreneurial ecosystem and how it relates to transition challenges towards a sustainable future.

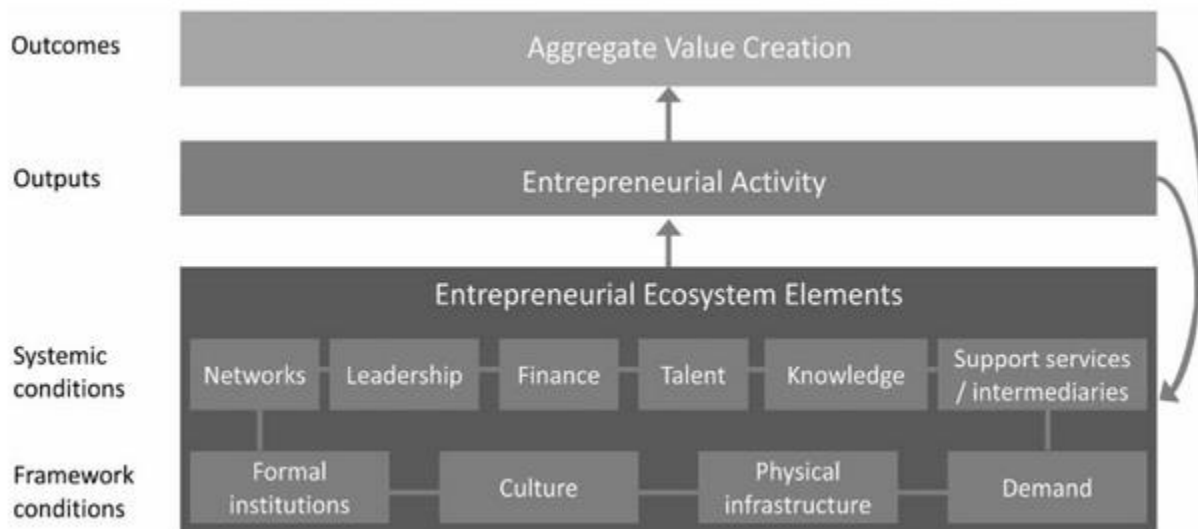
Confidentiality + Introduction

- I. Do you agree with this interview being recorded for transcribing purposes?
- II. Could you give a short description of what you do and how you ended up doing this?

General questions

1. Can you tell me about your organization?
 - a. *What does your organization do?*

A way to map entrepreneurship in a region is by looking at it as an entrepreneurial ecosystem, with multiple interconnected actors. Your organization is (of course) part of this. See Figure below.



2. How does this EE look here?
 - a. *If not answered: what role do you/your organization play in this?*
 - i. *How do you influence the ecosystem?*
 - b. *Reversing it, how are you influenced by the ecosystem?*
3. What are the strengths of the EE here?

- a. *And what are the weaknesses?*
4. In your experience, how did entrepreneurial activity or entrepreneurship develop in your city?
- a. *From a historical perspective: how did it evolve?*
 - b. *Which (unique) regional factors influence the rate and content of this entrepreneurship?***
 - i. *Did these factors change over the years?*
 - ii. *Which are the most important?*

Now we move to sustainability, for entrepreneurship to be transformative it is important to get a grasp of the state of sustainability in your region.

5. To what extent are there initiatives for a more sustainable future society in your city?
- a. *Can you tell me more about them?*
 - b. *What do you miss?*
 - i. *What can be improved?*
 - 1. *How?*
6. How did (thinking about) sustainability develop in your city?
- a. *What role does sustainability play in your city now?*
 - b. *If not answered: what role does your organization play in this?*

Mapping the unique EEs of the different cities

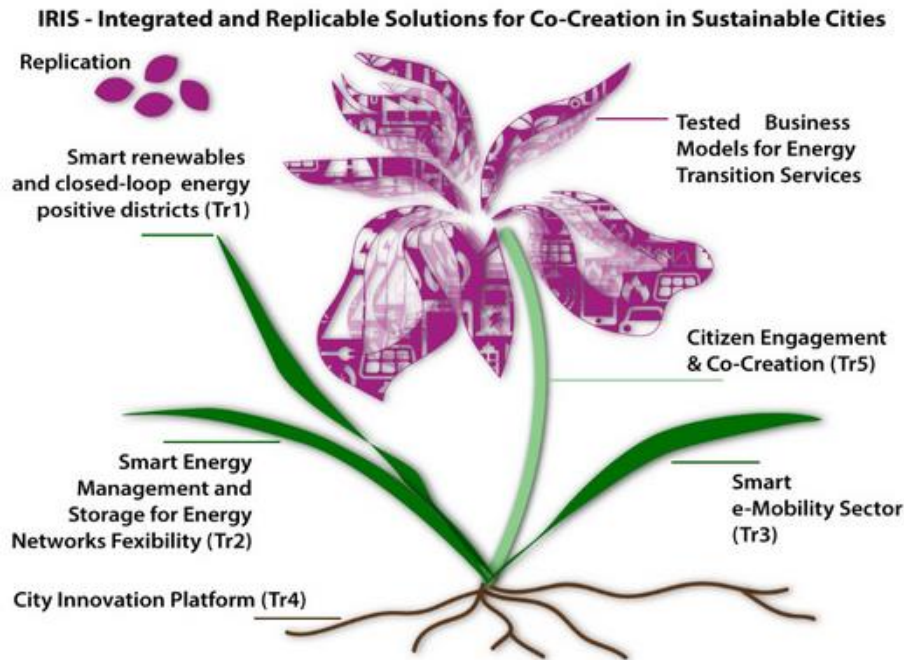
(The following questions are optional and complementary to what has already been answered in the general questions to get the most complete overview of the unique EE of the city/region. They are based on the empirical work of Stam (2018))

The following questions aim to get a more detailed overview of your EE and is also specifically looking into transformative entrepreneurship. With transformative entrepreneurship I mean start-ups looking for transition solution and into sustainability

Formal institutions

7. How would you describe the regulatory environment for entrepreneurs in general? (employee scheme, regulation of patents, accessibility domestic and foreign markets etc.)
- a. *What are current barriers/impediments?*
 - b. *How can this be improved?*
 - c. *What about the regulatory environment for transformative entrepreneurs?*
8. To what extent does the municipality/local government contribute to a favorable system for start-ups?
- a. *What do you miss?*
 - b. *What measures could the municipality implement to stimulate start-ups?*

- c. Does the municipality also stimulate transformative start-ups?
- d. (For Vaasa and Merinova) Do you know about the IRIS project?
 - i. “Each city will draw upon a mix of universities and research organizations, local authorities, innovation agencies and private expertise to accelerate entire communities to adopt ambitious energy, mobility and ICT initiatives.”



Finance

- 9. What are the financing opportunities in your city for start-ups in general?
 - i. What are your experiences with this?
 - ii. What do you miss?
 - iii. How can this be improved?
- b. And what about financing opportunities for transformative start-ups specifically?

Demand & Culture

- 10. How is the demand/appetite from Vaasa society for start-up’s services and products?
 - a. What about transformative/sustainable start-ups?
 - b. What are your experiences with this?
 - c. What can be improved?
 - i. How?
- 11. How is entrepreneurship valued in your region/city by society?
 - a. What are your experiences?
 - i. If entrepreneur: how do people react to you?
 - b. What can be improved?

Interacting actors/networks

12. To what extent are you collaborating in your region/city?
 - a. *With whom do you collaborate?*
 - i. *Other start-ups?*
 - ii. *Municipality/government?*
 - iii. *Research institutes?*
 - b. *What are your experiences with the overall rate of collaboration between actors in your city/region?*
 - i. *What can be improved?*
 - c. *What about your connections with other actors?*
 - i. *Do you work together intensively?*
 - d. *Wherefore do you collaborate? (i.e. for innovation and sustainable new value creation)*

Leadership

13. In your city, are there organizations or persons that provide leadership regarding sustainability?
Persons that help you achieve your goals.
 - a. *How did they come about?*
 - b. *Can you tell me something about the process?*
 - c. ***What about leadership for entrepreneurship?***

Talent

14. Do you find sufficient talent in your city?
 - a. *What is missing or not?*

(New) knowledge plays a key role in every system.

15. What can you say about the creation and maintaining of knowledge in Vaasa?

Local vs non-local influences

16. To what extent are there local initiatives in the start-up ecosystem development in your region/city
(for instance: knowledge creation)
 - a. *What about nonlocal (external) initiatives?*
17. What about external/non-local influences and initiatives to develop your ecosystem?
 - a. *To what extent do you look beyond your own system for guidance (for instance by looking at silicon valley)?*
 - i. *What about other actors, what do they do in general?*
18. What is the balance between these local influences and external influences in your city? (with regards to the EE development?)
 - a. *Did this balance change over the years?*
 - b. *Is this the right balance according to you?*

Intermediate services

19. How is the supply and accessibility of intermediate business services in your city/region (i.e. incubators, accelerators, facilitators for start-ups)?
 - a. *What is your experience with intermediates?*
 - b. *What can be improved?*

Relating the EE to the MLP

Now it is time to relate the topics of entrepreneurship to sustainability and transition thinking

EE and (MLP on) transition

20. To summarize everything we talked about, what role does entrepreneurship play in the sustainability transition here?
 - a. *How can it help?*
 - b. *What can be done to improve this role of entrepreneurship?*
21. Taking it one step further: **what are conditions for entrepreneurship to play an important role in the sustainability transition in your city?**
 - a. *How can the EE be configured/used to support the sustainability transition here?*
 - b. *How can this be improved, to make even more use of entrepreneurs in this transition?*
22. What is your vision for a sustainable Vaasa?

Conclusion

23. Do you recommend other people/colleagues within your network for me to speak to?
24. Do you agree with the use of your own name in the results of my thesis, or would you prefer to stay anonymous?

9.5. Appendix E: Example of transcript

Interview Kvarken Council with Matthias Lindström

Mon, 2/24 9:33AM • 1:07:39

SUMMARY KEYWORDS

region, people, companies, ferry, cluster, city, project, Helsinki, big, entrepreneurship, innovation, cross border cooperation, good, organization, world, Finland, heavily, regional, form, money

SPEAKERS

Mathias Lindström, Casparis Beyer

Casparis Beyer 00:03

Yes. Yes, thank you for this opportunity to conduct the interview with you. As I said, I gave a little introduction before I am a master student from Utrecht. I am doing sustainable business and innovation. And I am here to do the data collection for my master's thesis, which is really into that entrepreneurialism ecosystem and cities in acquisition context. So in that way I compare three cities faster than leaf and Rotterdam. And so I started here. And I am talking with all the relevant actors in the, in the network or ecosystem. So, could you firstly give a description of what you do and how you ended up doing this,

Mathias Lindström 00:54

of course, start with we are not a company in any way. We are an organization, owned by the regions and the major cities on both sides of the Straits of the kvarken. You know where you can go. Yes, I will show you a map later on but we are official cross border Cooperation Organization, and our task is to help all the official organizations to enhance cross border cooperation in order to make it better for the companies in the region of course, the Regional Development Organization, so to speak, and this has been a long we have a long tradition of cross border cooperation here. We started the organization already in 1972 and was formalized into unnecessary Association in 2008. And now we will form reform our organization to the EGTC, that is shortening of European grouping for territorial cooperation in order to further improve the cooperation across the across the strait and

Casparis Beyer 02:03

To better align with the European standards.

Mathias Lindström 02:06

Exactly,. And many of the we fulfill our, you know tasks, mainly, via different, EU funded projects. So we help the regions, and the actors in the regions both private and public parties to find EU financing for different development projects. One of the major, and most successful projects we have been involved in the latest year where we have had a very good public private partnership formed. Is this ferry project, new on midway alignments project where we will build a completely new ferry between Umea and Vaasa. And that was as you know a long, many years of the problem for us because when we entered the European Union tax free states were abolished here, but preserving the southern parts of the lines between Finland

Sweden that is why they went back to bankruptcy here. And of course, the council is very, you know, dependent on foot well functional transport systems there because otherwise you cannot, you know, promote cross border cooperation. And that is why we started this midway alignment probably where we involved the city's city of Vaasa municipality Umea where the owners but were project leading the project in that in that project we also involved. The companies in the region. In order to make, not only a ferry connection but to make a platform for new innovations and to create the showcase and I , so to speak, a window-shopping window for the regional companies. Yes. And we also had them in bold in the planning process to, to sort out what kind of transports do they need, mostly and how do they want the ferry to be designed. And that is huge, probably the total budget is about a hundred and 55 million euros. That is now ordered, and under construction.

Casparis Beyer 04:11

So, because the current ferry the Watson is not is not profitable or

Mathias Lindström 04:17

It is profitable but it is old. It is old, it is slow, but it is also 40 years old, and it is not very effective in a way that does not meet the demands of the goods the transport of goods that we have in the region. It is hard to get in the ferry it is hard to you know you got to take perishable goods, and then no, and it is nothing very environmental friendly and says we have very beautiful nature here we also want to preserve this and as you know we have an energy cluster here so we thought, Okay, why not use this knowledge, we have here, to create something new and innovative and also use the products that are manufactured in the region.

Casparis Beyer 04:59

So what is the aim will be like one of the most environmentally friendly ferries in the world, they will be

Mathias Lindström 05:05

one of the most environmentally friendly roll packs you know that takes over both goods and passengers . It will be no. There is a lot of innovations integrated in it, but it will use LNG lbg, and batteries for,

Casparis Beyer 05:25

for batteries to store the energy and also that also to

Mathias Lindström 05:28

be used in harsh ice conditions nice you know here without a harsh winter but sometimes the ice can be up to one meter, then you have to have a lot of power then it is not wise to have, you know, several extra engines just to us once or twice every second year. That is why it is wiser to use batteries. And they can also be used when you are, you know cruising inside the archipelago. And when you are open sea you can use lbg or LNG. So it will be very interesting, and it is very LBG liquefied biogas that is by. Yes. So, and also a lot of other different innovations are related to that because you use for example, a way to store energy from the shaft, so have to be used for heating and cooling and it is, you know, I'm not an engineer.

Casparis Beyer 06:20

Where were they building in Rauma , South from here about. So still part of the kvarken

Mathias Lindström 06:36

not a part of our, our region but it is a part of the maritime cluster in Finland, which is

Casparis Beyer 06:42

also Kokkola Yes,

Mathias Lindström 06:45

and the Vaasa is also part of the maritime cluster and, you know, of course, when we plan this we wanted, of course, to be built somewhere in Europe, in order to be able to also use Finnish knowledge and European knowledge and to enhance the knowledge on this, on the innovation part, because we cannot compete with Asia and the rest of the world with, you know, cheap labor cheap, cheap. The raw materials that we can compete with innovations. And that is why it also will be used because when we did this benchmark, we are planning this with the companies and asking them what they are, they may have the biggest challenge when getting new innovations to markets. They said that nobody wants to be the guinea pig. And that is why these various adapted that you can test also new innovations, you know, in traffic so this would be kind of like a little

Casparis Beyer 07:43

kind of like a living lab. Yes, exactly. Living lab on the water. that will be a separate

Mathias Lindström 07:49

And also connected to this Vebic Research Institute so that they can, the students there also can be on board to see how it works and also collect data from the various, so on so it will be like a living lab, and it is very interesting because it is, it is, of course important, that will awake important, important connection between the regions, but it can also be used in many other ways. Yes. And that is why the municipality of Vaasa and the city of Umea they own the ferry conference together

Casparis Beyer 08:22

because it will still be the Wasaline, it will be.

Mathias Lindström 08:27

That is, that is the brand name but the company behind this NLC ferry . And they own 50 50. Yes. That is quite a unique solution but. And when we started this you know there were many skeptical people who knew to throw money into the sea. You know this will never be profitable, but now we already know with this old ferry. It is profitable. And when we have this new very will be more efficient, it will be more cost efficient, it will work. It will be able to make shorter trips and shorten time to get over you know also when people say there is something new. Also the transporters of goods see that okay this is more suitable to us, I think that, again, the usage of the ferry will rise. Yes, dramatically. That will make this a good business therefore the city of Vaasa and Umea.

Casparis Beyer 09:22

And what will you do with the old ferry?

Mathias Lindström 09:24

It will be sold. , I do not know. I have no clue.

Casparis Beyer 09:32

There is still demand. There is probably always demand

Mathias Lindström 09:36

ships already you know heavily renovated, to be able to care because it was both from Spain. There we had a short time because the private company that had been trafficking. They filed for bankruptcy will be heard again. But you can see there in the picture there was in the, the key the key lane

Casparis Beyer 10:07

picture on the right, yes,

Mathias Lindström 10:09

There were a lot of yellow vests yes it is the first part of the ferry that was last week. When they start to build , then these parts are welded together.

Casparis Beyer 10:20

And that is a huge shipyard. Then super nice that you could that you can manufacture it so close by none that it is not even that you have to do it somewhere else in Europe ,you can do it like 60 kilometers.

Mathias Lindström 10:33

Yes, we wanted, of course, Europe and since it was a demand in the procurement since it is official money you have to do a public procurement. Yes. It was

Casparis Beyer 10:44

so, so, some companies can, they can offer

Mathias Lindström 10:47

There is an open bid offer. Yes, I see. Yes, so it was a long procedure you know to get because you cannot then say okay we want to finish. We have no data

Casparis Beyer 10:58

And then you take the best Yes,

Mathias Lindström 11:01

and I think it was the two last shipyards, I think one was in the Netherlands in Rotterdam, was the place I do not remember the place

Casparis Beyer 11:15

Damen shipyards , yes, I am from Rotterdam . So,

Mathias Lindström 11:23

yes, but then the price was in favor of Rauma, of course they have closer everything. But it was a good competition and they had a really good bid also the Damen shipyard

Casparis Beyer 11:38

and pretty famous and, yes, let us take it back to entrepreneurship. Although live, can also be played ownership of course so it is all related but, yes. In the next figure you see this schematic overview of the entrepreneurial ecosystem, which is a way to map entrepreneurship in the region by looking at multiple interconnected actors. So, you see below in the bottom you see all the little boxes, and together they constitute the ecosystem and a successful ecosystem leads to an activity of course an entrepreneurial activity generates value.

Mathias Lindström 12:25

Okay, so also formal institutions have a role and

Casparis Beyer 12:28

The formal institutions are the regulations by the government. So they're pretty important actually, but my first question would be, if you look at it from this perspective how does the ecosystem look here and you do not have some say, fill all the boxes already but just like the grand overview and then later on we'll go into the, how it looks. Yes.

Mathias Lindström 13:03

Yes, it is quite hard to answer that without. You mean the cooperation between the official side and also the.

Casparis Beyer 13:16

Yes. Yes What are my next questions would be with like what are the unique regional factors which have unique

Mathias Lindström 13:23

Unique factors. That is easier. Yes, that is easier to answer because I think it is one of the strengths in this region. Yes, we talk about the of the Vaasa side because I usually when I talk I see the whole perspective the both sides of the strait, since

Casparis Beyer 13:39

Yes, like the wider system around how it is also interesting,

Mathias Lindström 13:43

I think one of the best things in Vaasa is that I used to say that the city and the network of companies within the city region is big enough to make a difference, and you can achieve great things very quickly and it is small enough to be very smooth. And, you know the distance between decision makers and companies is very short, and they have great connections and they have an open dialogue all the time. What is the need of the region, for example in this ferry project? What is the need of the region, what should we do here in the public sector to make it better for you? And all the other way around all sorts do have a very open dialogue and it is very easy to make things happen very quickly because if you are in a bigger city for

Helsinki, for example, before you have a decision to do something. It is a very long period of time, but in Vaasa and also on the Umea side. You can do things, big things very quickly, and that is, I think, also in favor of the companies integrated. And as the dialogue between the decision the politicians and also the company the bigger companies yes also the smaller companies can. They are very heavily involved also in the Regional Development question and so. And I think the politicians also in this region are very aware of the importance of a very well-functioning ecosystem. And I think that is also a big strength, because not that is not always the case when you go out in other parts of Finland also other parts of the world that you live like in your own little bubble, and do not realize that if you want to have regional development, you also have to have companies investing and coming and grow in your region because then from there you create growth. Yes, I think that is the strength of the Vaasa

Casparis Beyer 15:47

Can you think of other strengths?

Mathias Lindström 15:51

I think also the one we spoke about last time that people here are very open to new things and not, and also very used to, to go outside in the world. And not only to, you know, they are very, you know, quick to go and act on the export market. And that is also one of the strengths of course in this region you have a very high level of exports that have everything produced. I do not remember the figures now, but you will probably know them. Yes. It is the that is very unique and I think that also has to do that, we have, we have like a mix of people here we have from the in the Finland Finnish inland we have from Sweden and we have you know a lot of foreigners for in Finnish measure

Casparis Beyer 16:41

yes I see what people are used to this idea of internationalization

Mathias Lindström 16:45

Exactly. I think that is a good idea and also the companies here all the companies we have had, you know, strengthen this international image so to speak and people are not afraid to you know to go abroad and to get new ideas and also Wärtsilä, for example, is started up from a guy who had been in America, making machines with Ford Henry Ford. Yes. And then started to make you boat engines instead. So this has grown to a multi, multi company. Yes, so it is a. I think that is also one of the strengths, the, the interest, the big, the great interest for new things, and also the international image that be it is easy to come here and it is easy to also go abroad and language skills, of course, when people are moving around in the world they also learn two new languages and the Vasa region is very heavily bilingual. Yes, because we have both Swedish and Finnish here. So people who are you know used to use different languages on an everyday basis, for example my mother tongue in Swedish, I have to speak Finnish or had the opportunity to speak Swedish every day. Now, also English. So it is a.

Casparis Beyer 18:08

People are often now everybody is from like little childhood used to use different languages which is very beneficial, so they said from an educational point yes

Mathias Lindström 18:21

develops the brain and. Yes, and I think that is also a big strength. Yes.

Casparis Beyer 18:26

And, and what are the weaknesses. Because the

Mathias Lindström 18:31

the size of the Vaasa We are, we are a little city . In the middle of Finland, and the political power to affect you know these formal institutions and now legislations and decisions on when to where to put public money to in order to even more bloom. The, the industry, and also infrastructure questions. We have not enough possibilities to affect the big decisions in Helsinki, made that are being made there, none will directly affect our possibilities to further grow. Yes, because for example, infrastructure questions. Yes. No, there's very little understanding in Helsinki of the needs for our region, even if they look at the map, and they look at the statistics Oh, how much do you produce here and how much do you export and Finland is dependent on exports. Yes.

Casparis Beyer 19:37

And a lot of those exports come from here, except man. And what kind of infrastructure, are you,

Mathias Lindström 19:42

roads, airports, Ferries railways. Yes, it is interesting that there seems to be always money for infrastructure investments in the capital region, but very seldom if you go 250 kilometers away. Then it is very seldom possible to find funding for that then since we are very heavily export oriented region and we also of course need goods in to be able to manufacture and produce them sometimes you would wish that they would have broader vision,

Casparis Beyer 20:22

this kind of a bottleneck area in my life, almost literally, yes.

Mathias Lindström 20:26

Finally we got them to co finance the ferry. based on the, everything that I know

Casparis Beyer 20:33

Based on the figures. Yes,

Mathias Lindström 20:35

but it was five years of hard work every day and that is, you should not be that hard when you know the benefits. Now,

Casparis Beyer 20:43

if you look at all the effort you put into it, which you otherwise would have put in some else

Mathias Lindström 20:48

civil servants in Helsinki and they say okay this it we give money to this we do not have money for that in Helsinki region and where the voters are in Helsinki regions, because we do not have a lot of people . And

of course, a big weakness for our region as well. The. We need more people here to come to work. Yes, I think so we will have a big problem with the labor force. because people do not want to live, to move to our regions, for some reason, because they want to live, usually in bigger cities and so on but I do not really understand why because here you can live in a very nice place and you can live it. You know work in multinational companies with a probably good salary, and you can also you know the real estates are more affordable, and also the housing is more affordable, and you do not have to sit in a queue for many hours each day or travel by bus or anything you can go buy your own car electric car, of course. Yes, back and forth, but it is convenient today, in my opinion, very convenient to live here,

Casparis Beyer 22:04

but I do not think it is important to do an investment in some study of why people. Yes, but what people keep away from the region.

Mathias Lindström 22:14

Now also when you see that. That digitalization is coming, and you also have the possibility to do work at home from your home. You do not have to be in the office every day. And, why would not they want to live in a nice place of nature, I could not imagine, even to live in Helsinki I like to go to Helsinki or Stockholm under the capitals, I would not want to live there. In my world. Everything is not work, you have to have quality of life. Quality of life is your spare time.

Casparis Beyer 22:50

Within. I do understand that city people if you can if you see the center of Helsinki region. Very beautiful. Yes. And the city center of Vaasa here. There are many of those. Yes, almost like Soviet building set. That is how they look. That is not very attractive.

Mathias Lindström 23:11

No, but you do not have to live in the city in your own house, and you have to see I live by the sea and in the forest.

Casparis Beyer 23:21

See some moose, you need a permit probably

Mathias Lindström 23:27

a smaller game you can hunt without. As long as you belong to the hunting club in the region. So, I eat only you know, almost only meat from. Almost yes, maybe 90% of all the meat consumed is from hunting. cable. Yes, that is my way of living also in an ecological way. Because I do not support the long transports of animals back and forth, I think it is now more humane to go out in the backyard and shoot the deer and take it in.

Casparis Beyer 24:02

Yes. Yes. And, yes You already said you were the Regional Development organization Yes, organization, sir. Yes. That is what I meant better. This also you influence the ecosystem and, yes,

Mathias Lindström 24:18

We tried to develop the region by funding to find the EU funding for different development projects where private companies are involved. Yes. And to help them. For example, in this case, we have wetech Wärtsilä, SCA, Volvo, Komatsu forest. They are all involved in this and they in that way we also create platforms for these guys coming in European arena so they also can find themselves new ways of funding. So, we are like, yes. What is it called the spider in the web?

Casparis Beyer 24:50

Yes, something like a catalyzer Yes,

Mathias Lindström 24:52

exactly, that is, that is a good name. Yes. And we also know when we see there's a need for something we, you know, invite people to platform discussions, and to make people meet and usually when you make people meet from different from the universities and from the private sector, public sector. things usually start to happen especially when you have from both sides of the straits. And that is also the strength in this region when Vaasa wants to grow together with Umea because Umea it is a very fast, fast growing city in the northern parts of Sweden. It grows by 2000, people a year, and it is fun now there is a lot of investments here also going on in the region. So, I think it will attract more people in the future, in a couple of years. But the question is, will there be enough people to because as you know Northolt is investing ourselves outside Celestia. FCA is making a huge investment in the city of Umea. Komatsu forest is building a new, the biggest factory outside Japan in Umea. Wärtsilä is building here at, ABB is investing in innovations here so, will be a very interesting region to live

Casparis Beyer 24:55

and there is also the giga Vaasa right

Mathias Lindström 26:17

yes that is also and now also this year's problem most likely that will come to Norway also in this region. Battery factory so it is a battery cluster that is forming in this region.

Casparis Beyer 26:32

And what is your organization's view of entrepreneurship in this bigger picture?

Mathias Lindström 26:39

The view of entrepreneurship, I think, what do you mean, how we look at it or what is happening now

Casparis Beyer 26:45

what is happening. etc.

Mathias Lindström 26:48

I think we have; we have great possibilities here in the future as soon as we get new people coming here to work. Yes, that will be the biggest challenge and I think this will be the one of the most interesting regions in Europe in the future, as I said before it is very easy to live here and stay here and affordable, and you can still work in very interesting multinational companies. And you can also do a career on a global level, even if you stay here. Many of the bosses in Wärtsilä are bosses on a global level, even though they stay in Vaasa.

That is quite unique because they stay in a smaller place and they've convenient and nice career. So, I think I think it is very favorable at the moment that it is, it is always impossible to be very future oriented in this region. We always want to be in the front line with new things and not afraid of since this new innovative project that we now have ongoing regional electric flights. Since you know we have, we have this one. Yes, we have quite long distances here and now we want to, to make a study on how we could prepare our regional smaller airports for electrical flight and in the future that has also to do with accessibility. Here we have a lot of private companies also involved because they are very interested in this

Casparis Beyer 28:17

yes that will be such a step if we finally get those airplanes that fly in electricity yes

Mathias Lindström 28:23

and especially here in our region where you have like 200 to 400 kilometers to travel. And it can step into a small planet, you can be there in 20 minutes and it is no pollution at all. Yes, then it makes the region, connected in a different way and yes the stability will improve and they will improve also for the, the would be a better climate also for the industry to read yes since we have the knowledge here and we have the battery factories coming, what would be more perfect than to develop this really answer to a test bed for regional electric

Casparis Beyer 28:55

yes and if it works. It is good you can roll this out all over the world, everywhere there is a need for that.

Mathias Lindström 29:03

Exactly. And that is what is exciting. So the main goal is to make a system to make a you know a road map on how to do it, with what is needed, what kind of planes, what kind of charging infrastructure.

Casparis Beyer 29:15

It is interesting you actually you, you kind of look at it from your perspective in the same way as the SI as the figure I showed that you need to infrastructure out to strengthen the system but then you're looking at, also the like the enterprise ecosystem and focusing on this bottom part that is where the. Yes, a lot of innovation and creativity comes from start-ups.

Mathias Lindström 29:43

Yes, we have a nice start-up involved in this project is the aerospace company, and they are now developing the first regional air flights, small 19 persons, 19-seater , but they are, they are planning to have their first commercial regional flight route in 2025. He said the technique is already there. All one needs to do is nicely handle the two handles with our regulations. Yes, because the regulations are very strict Of course and it should be.

Casparis Beyer 30:15

So you cannot have an engine fail midair. No, no, no, sorry the margin of error is very small. Yes. And how did entrepreneurial activity develop in Vaasa from a from a historical perspective,

Mathias Lindström 30:33

From historically, of course, as I said, many of the energy clusters of course are formed by, by chance, when this guy came here and to start the, the, the first Wärtsilä city and around that you have had a lot of spin offs. Now, and of course, subcontractors. What is it called sub delivery companies that delivers things to them and in that way, subcontracted Yes? In that way it has evolved and also a lot of innovative people have found their place in Wärtsilä. And then moved on to other private companies. And in that way it has evolved all the time and now I think also the, the, when everybody was aware of this and also the city has a strategy on how to also form, you know, younger students into this energy sector and the city has this strategy has all started starting already in kindergarten that is also strength of course, and also you know the special education institutions that we have here for example, we have Master of Laws education here also even though the main from Helsinki. I have been studying there myself, really. Yes, but back in the days it was, you know, only a common, Master of Laws education but now they also specialize in this. What is it called the energy sector? Now, to get lawyers that know, yes. To be able to work and also with this company and that is, I think that is a strength also that further strengthens the image of the region. And then we also then that since people here has also been very by tradition I do not know that is I do not know why, but I think it has to do that with people coming to the shorelines it is people that are very entrepreneurial, they want to do things now that is why we also have a lot of small and medium sized companies, employing a lot of people, and a lot of different. We do not only have the energy cluster we have this boat cluster we have the greenhouse cluster and we

Casparis Beyer 32:56

Greenhouse cluster?

Mathias Lindström 32:57

Yes, it is. Yes. huge one in the South of Vaasa in the Narpia region. And then we also have the fruit cluster in Seinajoki and that is not a part of Vaasa, but it is very close. And also the,

Casparis Beyer 33:14

so it is not that you are only dependent of the energy cluster because

Mathias Lindström 33:17

that is the strongest of course

Casparis Beyer 33:18

if that will be. If you only have this energy sectors also make makes you kind of dependent of

Mathias Lindström 33:23

they are very dependent. That is one, one may be one of the weaknesses also that Wärtsilä , ABB are in a very strong position. But as we go into the future, many more bigger companies are formed. You know we have Danfoss growing here also very quickly. So I think that is a good thing that will have many legs to stand on. Yes. That is also of course a strength for people who wants to come here work that they are not you know they do not have to be in the same company, all their life No you do not want so they can change that because that is,

Casparis Beyer 34:01

that is also not the trend anymore I think that now stay at the same job for like, 50 years no

Mathias Lindström 34:07

no it is not they usually five 5 to 10 years and then they will go

Casparis Beyer 34:11

job hoppers.

Mathias Lindström 34:13

And that is also a good thing you get your ideas of new innovations into.

Casparis Beyer 34:17

Yes, almost all we are talking about this also has to do with sustainability of course, yes. So let us dive into that one because I am looking at Entrepreneurship, to, to be transformative so transformative entrepreneurship so not like the new hairdresser and the. Yes, really new sustainable ideas coming from entrepreneurs, but it is also important to get a grasp of the state of sustainability in your region we already talked a lot about them that is what can you say about the state of sustainability here,

Mathias Lindström 34:52

I think it is improving, I think, to be a bit harsh. I think the city of Vaasa could have done a lot more of this during this taking into consideration what kind of knowledge we have here. Yes. And if you want to brand your city as the most. you know energy capital of Northern Europe, then you should also be seen in the pictures, you should have more recharging stations, you should,

Casparis Beyer 35:22

there are only like 50 electric cars in the area, that is really strange

Mathias Lindström 35:27

it is very hard to find them and they usually, you know, cost a lot of money, so you should do that. There is one thing that the city of Vaasa could do. But they have done this gas bus that goes down. That is of course a good thing. And also this ferry now is also part of the branding of the city. So, yes, as a sustainable city. And I think that is a good thing and it is improving all the time. But a lot more could have been done already. And now this regional air electric aviation projects also part of that, that you should be able to create a completely sustainable city in

Casparis Beyer 36:11

2020 x, and it wants to be carbon neutral by then.

Mathias Lindström 36:14

Yes. So it is quite a short time. So you have to start doing things and I think that is a good thing but much more things could be done, but we are on the right track. Yes, and of course the companies in the region of course heavily support and contribute to this. And I think that is a good thing. Yes.

Casparis Beyer 36:38

And your us as your organization is expected to steer this

Mathias Lindström 36:44

get there it is and yes, we try to form project that supports this

Casparis Beyer 36:49

the European perspective.

Mathias Lindström 36:50

Yes, and also to attract new investors here, because if they see that here you have a, you know, every good round to develop these things in a good partnership. Then we also have to attract investors. And I am also EU money.

Casparis Beyer 37:09

Yes, if you heard us talking about the new money have you heard of this, this Iris projects.

Mathias Lindström 37:15

Yes, I have heard about it, it is run by the Regional Council. Yes. I have heard about it, but I have not been involved in any way. And, and what, and that is an innovation project is not it

Casparis Beyer 37:30

yes I would like to reflect your thoughts about integrated replicable solutions for co creation and sustainable cities, yes. Yes because also. I am doing the internship at Merinova so they are also affiliated so I can try to see what if people know about the project and what because there is some, some interesting. Yes, it is about co creation. So, for that to be able to actors in the region should be aware of that so

Mathias Lindström 38:04

That is why I mentioned that. Yes, we have heard about but have not been involved in any meeting, so I think I have a little invitation to some meetings, but we are only three people here and I have to run all over the area

Casparis Beyer 38:17

so that is also a thing like there are enough people you are so busy that you are doing the job of like three people. Yes,

Mathias Lindström 38:27

exactly. You know, I am hired to be the director of this behind the director and project leader in three projects. And that is not what I was supposed to be doing. But let us see if there's no. You know, sometimes you are in a hurry and you just do it. So,

Casparis Beyer 38:44

yes, yes. Same with Triinu she is. I think she is working sometimes from seven until seven. seven.

Mathias Lindström 38:53

That is the common problem here.

Casparis Beyer 38:56

Yes. Yes, we already talked a little bit about the municipality but of Vaasa what they are doing. How would you describe the regulatory environment for entrepreneurs?

Mathias Lindström 39:07

. For entrepreneurs, it is very tricky. In my opinion, I am an entrepreneur myself. I have a company on my side. Yes. Yes. In my spare time.

Casparis Beyer 39:20

Yes, same for me.

Mathias Lindström 39:23

I think it is. It has been. They have done a bit of improvements but not enough, you know to form a company's what, it is very complicated and very old-fashioned yes should be much easier, and it should be much cheaper. Now, because now you have to have this shareholder capital. I think they have diminished from 8000 other things down to two half thousand or something. But anyhow, you know, depending on what company you want to form it is very complicated. In my opinion it is very old fashioned to form a company already. And then also the regulations regarding employees and very strict very strict and very, very expensive company I think that is something that keeping small and medium sized companies down, they do not, they cannot afford to hire someone and that is why they working too hard, and they cannot grow because then they have to be sure that they have worked for many years, since that,

Casparis Beyer 40:30

because you are locked into your

Mathias Lindström 40:33

salaries for now, that should be, you know, deregulated quite heavily I have a friend also in that is owning a big company in Estonia. They have a completely different system. And also you know with reinvesting in the companies grow this tax zero and everything so he said that he could not imagine moving his company to Finland. Even though he would like to which is strange because

Casparis Beyer 40:59

you are also saying that there is a very entrepreneurial spirit, and then it is very hard to be an entrepreneur,

Mathias Lindström 41:05

It is something that is contradicting them, we should make it even easier, because people here want to be entrepreneurs and they want to work, and they want to do things and then it should also be easy. You should of course Vasek is having good support for new start-ups. Now, that they give advice and so on, but it could be even more, you know, develop that men so

Casparis Beyer 41:28

if you need to do less procedures you also need less help from

Mathias Lindström 41:34

They would have more time to help with business ideas and strategies and so it is not the only formal stuff that comes to me in time. Yes. Of course, there has to be some regulations that you do not start off when they do crazy things and either file for bankruptcy but anyhow. That is, that is, you know, the thing, too, for two companies that no two companies have consumers to agree on. Think you cannot be over protected from the government side all the time you also have to make people bloom. Yes, and to make it possible, and cheaper to hire people at least the first one, it could also be an idea to do, so to speak, discharge for hiring younger people or older people, so that you can get them into work quicker and easier. And also this when you want to end the contract with an employer, you should mores. Yes, for the, for the conference is made at least the small and medium sized. Yes.

Casparis Beyer 42:41

And otherwise the burden is too high,

Mathias Lindström 42:44

For example, my brother has a construction company. They are two people. And they are both owners. The day he said they would have, they could have hired three, four people during summertime. But since it is so hard.

Casparis Beyer 42:58

Now, you cannot hire people for seasonal.

Mathias Lindström 43:01

You can do it, but it is hard, and it is very costly. So if they do not do it they will work you know night and day. That is not wise not from a national economical view either

Casparis Beyer 43:15

know. Now you will get people into burnouts and stuff like that. So that is then also saw some weakness which should need to be and

Mathias Lindström 43:27

As I said I was already talking about these accessibility problems, and we have to have good accessibility in all forms. flights, roads , railroads and sea. Since we are very export oriented , and also to attract people to come here to work, because it is easy to travel here, and easy to go, then it is also easy to stay. If you want to have your family somewhere else in the world. But yes, it is easy and cheap to go traveling and see them, and it is no problem.

Casparis Beyer 43:58

Yes. Yes, of course. Yes. So on to the question. To what extent does the municipality contribute to a favorite system for start-ups you are saying on the one hand,

Mathias Lindström 44:10

I was talking about Vasek there. They are helping there. And as I said, the local municipality local governments, of course, cannot do much about the national regulations but the elected people and some members of the Parliament of course could contribute to that and they are. Try all the time, especially our members of the Parliament from this region,

Casparis Beyer 44:37

where did, where did all those groups come from is it from like some timeframe ago

Mathias Lindström 44:42

yes, old, old legislation. And I do not know exactly where it comes, I should know since I am a lawyer but. But now it has been so many years since I've been studying this but I think it is one of the most important also, I think the taxes and the employment, you do not have to pay also to this to the government for the guys you hire social security. Security fees and so on. That should also be diminished. And also puts bigger responsibility on the employers, or the employees that they could take care of themselves I think that would be much easier to hire people.

Casparis Beyer 45:29

And what can you say about the financing opportunities for start-ups in the Region.

Mathias Lindström 45:38

There, I know there are some financing opportunities. You can get money for different kinds of businesses, but I do not. I am not really familiar with it since I cannot really tell. No, because I have never used every time we have started the company or business we have totally arranged everything ourselves because we, because if you want to apply for these kinds of start-up monies and so on its time consuming and not all if you do not, if you are not supposed to work full time with your company. I think the other. I think it is too time consuming to file for this stuff. And I know that you cannot get for anything and that is of course good, but I think it should be. If you have a good idea, and a good idea. Then, I think they should focus more on good innovative start-ups. Yes, and not give a small amount to everybody.

Casparis Beyer 46:37

Yes, true. Yes. Someone has liked a solid ID, an interesting business model Yes,

Mathias Lindström 46:44

because if you are starting a restaurant or hairdressing company or whatever, construction companies in my case, it is not much in the many innovations related to that. But it is always good if you can start up, but it

Casparis Beyer 47:04

is not very innovative or transformative.

Mathias Lindström 47:06

I am in the long run, do not you know, hire people on a big scale. Now, I think it would be better to focus on very innovative start-ups that are a good possibility to grow to something they can,

Casparis Beyer 47:19

because at this moment there are not. Additional financing opportunities for transformative start-ups,?

Mathias Lindström 47:25

I do not know, actually,

Casparis Beyer 47:29

because from, from the perspective of your organization you can only get funds to project right it is not, you cannot work as an investment funds now

Mathias Lindström 47:39

know why we cannot give you know, support the private companies. Yes, we can invite them , we can invite them to take part in the project and give them a part of the results, but we cannot give them funding for different things, we can enable them you know, access to markets and we can access to, to consultants that they whenever they all have to be provided. And given the same opportunities, it is all official money,

Casparis Beyer 48:07

in a way, you are bound by your mandate.

Mathias Lindström 48:09

Exactly, and under regulations related to support for companies. That is strictly regulated not to, you know, destroy the competition between the companies. And of course it is a wise thing, but it is also sometimes you would when you see that if we could do something here,

Casparis Beyer 48:28

you have to be some agile. Yes. As Here we are, we already talked about how entrepreneurship is affiliated in the region, entrepreneur spirit so I think this already. Question 12. This implicit that we are sitting here is already an answer to this question, to what extent are you collaborating in your region I.

Mathias Lindström 48:54

Very good. Very good. And also, not only within the region, but also between them as municipalities, and also between organizations, as we, the public sector and the private sector and also on a cross border perspective. yes. As I told you before that. Umea and Vaasa They really do want to grow together and also in Norway, and one good example is of course also the forming of this nice EGTC that will be the first fully Nordic EGTC in the world, we do not, since we all by tradition, have a good cooperation between the Nordic countries. But strangely enough, we do not have this yet

Casparis Beyer 49:36

You did not register for it like that.

Mathias Lindström 49:39

No, no, no, we have twelve official cross border cooperation in the region, organizations, but no one is in the EGTC we will be the first. And that is of course.

Casparis Beyer 49:48

Are you also working closely together with the other ones?

Mathias Lindström 49:52

cooperate in different things and share experiences between Norway and Sweden, Denmark, Sweden, Finland, Finland, Norway, Finland, Norway, Sweden up north. And there we are also partly funded by the northern Council of Ministers, that one. Yes.

Casparis Beyer 50:16

Yes, and it is super good. And what about leadership. Are there? , organization, persons that provide leadership regarding sustainability.

Mathias Lindström 50:31

Yes, of course, persons that we have a lot of people working with these questions as already have a you know, a focus on these things are helping a lot in our work but also in the region to develop the mayor for example is a very has a very strong profile in these questions and also being the main one of the main drivers in the ferry project. And also this Chairman on the council is Joachim and also the member of the Parliament Strand, probably heard of him. He is also the chairman of the kvarken Council, our organization. And he is also the chairman of the Vaasa Sakho and chairman of the Regional Council as it says every bit yes, and he is also very strong in this he is also the initiative to take it to this regional Air Flight. What was his name, Joachim Strand, okay, yes he did not ask Triinu about him? You should. He is one of the main key players in this region, and also very. He is a member of the Parliament and also is the chairman of the future. Council in the, in the parliament, they related to future development, future project so here is the story no but

Casparis Beyer 51:53

in the in the Finnish Parliament

Mathias Lindström 51:55

Yes, you should meet him. He is from Vaasa . And he is a very interesting person.

Casparis Beyer 52:00

If you have not. If you can send his email to mee

Mathias Lindström 52:05

very strong drive and another very, you know, heavily profiling, the Vaasa region a national level. So, and also he is also a Nordic is also a member in the Nordic Council of Ministers,

Casparis Beyer 52:20

just really pulling his weight so to speak

Mathias Lindström 52:23

He is like if Triinu is working for three people, he is working for five as extreme, as three. We work a lot, he works very much more, yes. He has been working here for Sture if you have met Sture

Casparis Beyer 52:38

Yes I have met Sture. Also a guy with a strong vision Yes.

Mathias Lindström 52:43

If you have met him then Joachim has been working for him before he went to Parliament, so they are quite similar. But Joachim has a platform on a national

Casparis Beyer 52:54

and Sture is also providing leadership right more on entrepreneurship

Mathias Lindström 52:59

He is also one of the key players in the region and making concrete examples for this latest one now solarized is electric demand is building all these things. Yes, we are hiring this from him because he said when he started this everything I have to come here you are right player to be in this, in these surroundings, you have to come here I will give this room for you to get it quite cheap,

Casparis Beyer 53:30

but you work as a very innovative place so today is for you guys also a good place to be. Yes. Yes, you already talked about the talents. Yes, the inflow is not good enough but there are five six universities if you count in law

Mathias Lindström 53:52

This year, there were a lot of students on both sides of the strait and we could also use a lot more universities in Umea, because in the small city of Umea they have a big university with 34,000 . So, in this region you have a like 55,000, students at an upper level. Yes, that is I think that is something you further to improve.

Casparis Beyer 54:14

Yes. So this, this also what you would say but the maintaining creation of knowledge. Yes,

Mathias Lindström 54:19

exactly. And you have to. And I think his Vaasa is very aware of this that you have a connection to the Umea side, but what I think could be done much better is to coordinate the educational institutions, because now everything in Vaasa you have all these universities. They should know how to coordinate so it is better to look beyond borders. Yes, and beyond borders and to provide the kind of knowledge that the industry needs. Yes, that is a big, huge thing.

Casparis Beyer 55:03

Yes. Yes. Also really relating to this like the local Vaasa system but then also the non-local influences but this also nonlocal Kvarken. So, what can I say but balance into the ecosystem from like Vaasa I inside, and the more the bigger perspective,

Mathias Lindström 55:29

the balance. Yes, between the regions. Yes. I think as I said it is quite in especially along the coastline is quite well balanced. Yes. Because the energy cluster is strong. But as I said, we have the boat cluster. The

greenhouse cluster. Food cluster and I think it is quite a good balance, even though the energy cluster has been in a key role. Yes, and I think the main driver also for also waking up these other clusters to show them. Yes, stick out their cheek Yes,

Casparis Beyer 56:08

you have to set their best leg in front.

Mathias Lindström 56:09

I think they have served as a good example. Yes, yes, even though there is a lot of things to improve still, but we are doing something, and we are, we are learning all the time. Yes,

Casparis Beyer 56:25

Yes, there is a lot of development going on. If you could just share if you look at this, innovation, hub from Barcelona, which is also very interesting,

Mathias Lindström 56:34

and also as I said what is happening on the other side of the state that will heavily affect the labor market, and the development of the region also here.

Casparis Beyer 56:44

Yes. We already talked about Vasek . For instance, but how would you, what can you say about the supply and accessibility of these like Vasek intermediate business services in the region.

Mathias Lindström 57:02

I think it could further improve accessibility to them and also for me. If I take myself as an example maybe I maybe I was, you know, the best one to search information but I should know, working in this. Yes. Yes. I think it should be rather to advertise that this is possible to get, and to also arrange more and official, you know, meetings and to inform people better, and also to develop throughout in the universities and schools and say, Hey guys, if you have a good idea on something. We are here to help you. And we have also found a bit of funding if you have to speculate about the universities in the different schools. They can be further utilized because when you have come , so far that you are already decided to form a company. You have already decided and maybe you are not. You are not so, you know, open to new ideas or advice from external experts there if you could take them in with the experts and these advisors, you know, at an early stage. That is why they should be. They should make this. They should make the mainly young people aware of this opportunity at an earlier stage

Casparis Beyer 58:31

them earlier to make them ready

Mathias Lindström 58:34

yes to get a possibility. Because many people start up their companies already in universities or high schools. So make them aware that this is available to make a better business case. Yes, from the beginning. And to help them avoid the common mistakes. Yes,

Casparis Beyer 58:52

and still it is okay to fail of course because if you already feel when you were in your early 20s. You have a bigger chance of success, certainly going to get to, To summarize everything we were talking about here I am trying to connect really entrepreneurship and its conditions to sustainability. What role does entrepreneurship play in this sustainability transition here,

Mathias Lindström 59:18

key role. key role , because without this new innovation, I think, if you want to create a sustainable society. You have to have cheap well-functioning solutions. Without the entrepreneurs, you will not get these, so that they are the key roles to make this happen. And I think when we are talking about climate change and pollution worldwide. You can make whatever regulations you want that you will not get people to stop flying, you will not get people to stop consuming. People need heat, people need electricity. You have to provide the right technology. That is the key factor if you want to save the planet. You cannot say to somebody, okay, you cannot use your iPhone, you are polluting the world, and you cannot tell people in Asia, or in Africa, not to want to come to the same standard of living as you and me. That would be unfair. Yes. Because, why wouldn't they? Everybody wants to have a higher standard of living. And if you and that also usually pollutes. Yes, they want to have a car they want to use electricity and whatever, but if you can provide and make this happen, it sustainable solution and technology

Casparis Beyer 60:38

If you can skip some of the unsustainable steps

Mathias Lindström 60:41

They can jump over them, and directly go into the sustainable ones . That is why we need to focus now, not on regular regulative things to make people fly less and to increase the taxes of plastic bags and things like that. We have to find new, innovative solutions in technology that will be the only thing that will save the planet and that is why entrepreneurship is a key role.

Casparis Beyer 61:08

Yes. Yes. and I am taking it one step further, what are the conditions that can be set for this entrepreneurship to play this key role in the sustainability transition.

Mathias Lindström 61:25

The conditions here are very good, because we have an agenda and a strategy to improve this and to improve the surroundings for entrepreneurs in this area. Yes, and also the cluster that has been formed around it will make it easy for people to compare and they find cooperation partners. Also, people buying their products and companies buying their products but they can also have exchange of knowledge, between the companies now people attract also people that if you can create a cluster big enough, at some point, the cluster feeds itself, it is going to allow for a segment that the people come in, it is all it is happening, then you do not have to actively promote it in the same way and then will promote itself. But when you are in this phase as we are now. Then you have, you have to have active promotion of the cluster also active in the political level, make it possible to for to attract further investments and to further grow the, the

Casparis Beyer 62:33

process. So to summarize, it is there but people should be more aware that it is here. Exactly.

Mathias Lindström 62:40

And also the decision makers and it is improving all the time, but also the outer world, to make aware, now we have this energy week. Yes, probably. Yes, that is one of the good things here also that is opening up the energy cluster to the world. So that is just once a way forward

Casparis Beyer 63:01

and how can this framework which you say is in place. How can this be improved, to make even more use of these entrepreneurs in the transition.

Mathias Lindström 63:13

How the city could further improve this.

Casparis Beyer 63:15

Yes, or like the whole cluster, the whole ecosystem

Mathias Lindström 63:20

to work even better together to promote this also the company and the bigger company themselves when they hire people and track people and attract investors. They could also promote this. And to say that. Okay, we are here but we are a part of a bigger, bigger system, and also to make people think about outside the box a bit and not only look at their own possibilities in the future but also look, what is the possibility for the cluster, because in the long run, it will benefit also that. Yes, that we attract more companies and we attract more people that can have higher skills. Yes. Highly trained people. So in the long run I think we should be more open minded to these kinds of solutions. Yes.

Casparis Beyer 64:18

My last, It is kind of the bonus question is, what is your vision for sustainable Vaasa.

Mathias Lindström 64:26

Yes My wish is that we should use this knowledge, and the technology available within our energy cluster in a more visible way in the region and in the, mainly in Vaasa, but also in other parts of the region. And we are working on it all the time and we will have the new, the most environmentally friendly ferry we will have gas buses, we will have electrical regional aviation with our battery clusters come here, but I think the Vasa region should brand itself as a sustainable city with a lot of opportunities, but also focus a bit of the recycling part because we know that this batteries and so, they're not everlasting, that could also be something that the region could specialize in. And we also have, you know, on the construction side we have the possibility to build more in wood for example. and also all the time trying to develop things and I think we are on a good path. Now, when we make sure that we have electrical electrification of railroads we have electrification of reasonable flight we have a LBG electrical fairy. I think that in some way that could also attract people here that want to live a sustainable life. idealists, maybe. I think that would be. I think it would be a good idea also to promote this more heavily, out, out in the world, not only in the Nordic countries but also in the European and international. Come here and live a sustainable life. You can live in the countryside; you can work in global companies and interesting tasks. No,

Casparis Beyer 66:20

that is quite a good sales pitch, there is no,

Mathias Lindström 66:23

In my opinion, I would never move.

Casparis Beyer 66:27

Though I also really, really like thinking about it, because I will be here until the end of March to May become a comeback in the summer or something because yes they should do that. Yes, yes, yes, yes my girlfriend with this too, has to be positive on that and she was like, Yes, because last time I had to go away for like two months to do a summer school and stuff and now I have to be out of the country again. So she is like this the last time you are going away for such a long time to be on board with you. Yes. Yes, for sure. What is she studying law? London is very specific Of course because she can she is very resourceful so. Can I use your name and the results of my thesis or do you? Yes. And can you send me the email?

Mathias Lindström 67:32

Yes, I can write it down.

Casparis Beyer 67:34

Yes. Okay, thank you very much. Thank you.