

UNIVERSITY OF TARTU

Faculty of Social Sciences

School of Economics and Business Administration

Kazuki Saeki

The perceived effect of Estonian Entrepreneurial Ecosystem from successful Estonian ICT startups

Eesti ettevõtluse ökosüsteemi tajutav mõju edukate Eesti iduettevõtete näitel

Master's thesis

Supervisor: Junior Lecturer Piia Vettik-Leemet

Tartu 2021

Name and signature of supervisor: Piia Vettik-Leemet

Allowed for defense on:.....Piia Vettik-Leemet.....

I have written this master's thesis independently. All viewpoints of other authors, literary sources, and data from elsewhere used for writing this paper have been referenced.

.....Kazuki Saeki.....

(signature of author)

Table of Contents

| | |
|---|----|
| Abstract..... | 4 |
| Introduction | 5 |
| Literature reviews | 7 |
| Systemic conditions..... | 12 |
| Framework conditions | 14 |
| Methodology..... | 16 |
| Sample and data..... | 17 |
| Estonian Entrepreneurial Ecosystem | 17 |
| Startups | 19 |
| Results and discussion..... | 22 |
| Systemic conditions..... | 23 |
| Framework conditions | 29 |
| Conclusion and suggestions | 33 |
| Reference | 35 |
| Appendix 1. Interview Questions | 46 |
| Appendix 2. The non-exclusive license to reproduce thesis and make thesis public..... | 47 |

Abstract

The purpose of the paper is to identify the Estonian Entrepreneurial Ecosystem. Estonia has been regarded as a successful Entrepreneurial Ecosystem. The ICT sector in Estonia has grown up remarkably as the most unicorn companies holder per capita. The research aims to understand how the Estonian Entrepreneurial Ecosystem is perceived from companies' side. Some of the unicorns already left Estonia. Thus, the Estonian Entrepreneurial Ecosystem still needs improvement. The research interviewed seven Estonian ICT companies to comprehend the perception of the Estonian Entrepreneurial Ecosystem, the specificity of the ICT sector, the reason some companies left Estonia. Based on the interview, this paper gives some propositions to improve the Estonian Entrepreneurial Ecosystem. As a result of the discussion, startups were aware of being benefited from the Ecosystem. However, the paper proposes that Estonia needs many investments for startup growth, collaboration for a knowledge-based economy, and talent pool for ICT developers.

Keywords: Entrepreneurial Ecosystem, Estonia, ICT sector, startup.

Resüme

Töö eesmärgiks on välja selgitada Eesti ettevõtluse ökosüsteemi tajutav mõju Eest IT iduettevõtete seisukohast. Eesti ettevõtluse ökosüsteemi peetakse edukaks. Eesti IT sektor on kasvanud märkimisväärseks, kuna Eestis on kõige enam üksisarvikeettevõtteid ühe elaniku kohta. Töö eesmärgiks on mõista, kuidas iduettevõtted tajuvad ettevõtluse ökosüsteemi. Mõned üksarvikud on Eestist juba lahkunud. Seega vajab Eesti ettevõtluse ökosüsteem veel edasist arendamist. Töö koostamise käigus küsitleti seitset Eesti IT iduettevõtet, et mõista Eesti iduettevõtete arusaama ettevõtluse ökosüsteemist, IT sektori eripäraga arvestamist ja põhjuseid, miks mõned iduettevõtted on Eestist lahkunud. Intervjuu põhjal esitatakse käesolevas töös mõned ettepanekud Eesti ettevõtluse ökosüsteemi täiendamiseks. Diskussioonis tuuakse tulemusena välja, et iduettevõtted olid teadlikud ettevõtluse ökosüsteemist saadavast kasust nende ettevõtete arendamisel. Siiski tehakse töös ettepanekuid, mille kohaselt vajab Eesti mitmeid investeeringuid iduettevõtete kasvu toetamiseks, teadusmahuka majandusega koostöö arendamiseks ja talentide järelkasvu tagamiseks IT arendajate seisukohast.

Märksõnad: ettevõtluse ökosüsteem, Eesti, IT sektor, iduettevõtte.

Introduction

Entrepreneurship has long been known as a driving force behind a country's economic development, job creation, and overall profit (Mason & Brown, 2013; Zahra et al., 2006) since Schumpeterian (Schumpeter & Opie, 1934) brought out the concept of creative destruction. Researchers focused on what has created entrepreneurship, education, investment, capability. However, recent research brought out a comprehensive idea for explaining the context of entrepreneurship, which is called the Entrepreneurial Ecosystem.

The Entrepreneurial Ecosystem is a term that has gained popularity among scholars and spokespeople (Cavallo et al., 2019). The Entrepreneurial Ecosystem has been described as knowledge sharing among individuals (Stam & Spigel, 2016; Závodská & Šramová, 2018), supportive government policy (Isenberg, 2010; Obaji, 2014), various financial means (Bellavitis et al., 2017; Klaus, 2013). This fruitful Ecosystem has resulted in the emerge of a bunch of unicorns that appeared from many countries, for instance, Silicon Valley in the USA (M. P. Feldman, 2014), Waterloo in the USA (Spigel, 2017), Kyoto in Japan (Aoyama, 2009), Estonia (Velt et al., 2018), and South Korea (Kshetri, 2014). However, the term, Entrepreneurial Ecosystem lacks the rigor definition and academic correspondences (Oh et al., 2016) regarding the difference with some traditional concepts of innovative environments (Spigel & Harrison, 2018). This term is a coinage by adding the academically familiar word "entrepreneurial" to the biological term "ecosystem".

The Entrepreneurial Ecosystem concepts emphasize the interdepending associations between entrepreneurs and their local economic and social backgrounds. It revealed the flow of the idea amongst principal entrepreneurs and politicians that the community and culture of a prearranged place can have an important influence on entrepreneurship (Stam, 2015). The entrepreneur is also placed as a feeder equal to one of the determinants of context, such as the government, which recognizes features of the Ecosystem and addresses them through commitment over time (Feld, 2012). The rooted entrepreneurs in the certain Ecosystem would notice the hole of the Ecosystem. These entrepreneurs plan and act to improve the limitation of the Entrepreneurial Ecosystem. For example, successful entrepreneurs work as 'deal makers,' using their social networks and capital to enhance the entrepreneurial environment of their home region. Even failed entrepreneurs form part of the Ecosystem to diffuse and accumulate information among the community. The government also took the feeder role in the Ecosystem with adjustments of laws and regulation but much less important than traditional theories.

Researchers discussed entrepreneurial Ecosystem definition in an academic context for several years. Stam (2015) set definition is so far the most accepted definition among scholars. He defined the Entrepreneurial Ecosystem as "a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory." Stam contributing to the definition is that the aim of the Ecosystem is neither mere value creation nor the development of the region, but the objective was "productive" entrepreneurship, a more wide-ranging perspective for a new venture. Spigel (2017) also took over the "productive" facet, which connected Entrepreneurial Ecosystem concepts to existing concepts before the Ecosystem.

Additionally, the word "territory-specific" also allowed scholars to reconsider the traditional cluster theory into this Ecosystem, even though today's digitalization and internationalization make the boundaries ambiguous. Therefore, Stam's definition is succeeding the previous research into one stream. This paper follows this definition.

The research aims to get the perceived effect of the Estonian Entrepreneurial Ecosystem for Estonian ICT startups. Estonia is one of the successful Entrepreneurial Ecosystems. The explanation of entrepreneurial surroundings is based on Stam's (2015) model after choosing a general definition of Entrepreneurial Ecosystems in this paper (and components of the concepts). This research characterizes the Ecosystem by exploring quantitative data such as demography and qualitative data like geographical conditions and historical background gathered by formal institutions.

Especially the ICT sector stands for the Estonian Entrepreneurial Ecosystem, known as Skype, one of the most successful global ventures from Estonia. Therefore, there is a significance to comprehend the perception of Entrepreneurial Ecosystems from the viewpoint of people in the ICT sector. Later on, the focus point is narrowed to only the ICT sector, describing the difference between the Estonian Ecosystem and the ICT sector's Ecosystem. The reason behind selecting the ICT sector is that in this sector, Estonia has the biggest number of successful startups and unicorns. It is also shown the fact that the share of ICT companies was grown from 2.2% in 1995 to 4.9% in 2015, in numbers – from 681 to 5767 for the same period (Mets, 2017). ICT sector added value creation through job creation with higher wages (Mets, 2017), which is the common goal for the theory of the Entrepreneurial Ecosystem.

This research contributes to providing the state of the Entrepreneurial Ecosystem in Estonia perceived by Estonian startup companies. This paper will identify the imperfection of the

Entrepreneurial Ecosystem and suggest how Estonia improves the ideal Entrepreneurial Ecosystem. In this paper, the qualitative analysis approach is selected to understand why support is needed or satisfied behind their business context.

To achieve this goal, the following research questions (R.Q.) were formed:

R.Q. What support is perceived by ICT companies from the Entrepreneurial Ecosystem?

R.Q. What describes the Estonian Entrepreneurial Ecosystem and the specificity of the ICT sector in the Entrepreneurial Ecosystem context? How does the current Ecosystem work?

R.Q. Is there any proposition to improve the Entrepreneurial Ecosystem from?

R.Q. Why companies leave Estonia? What is missing between the other Entrepreneurial Ecosystems and Estonian Entrepreneurial Ecosystems?

The thesis is organized into four sections. The article begins with section one, which gives an overview of the current state of the discourse of Entrepreneurial Ecosystem frameworks and opens up systemic and framework conditions. Section two provides an overview of the used methodology. The third section contains an analysis of the Entrepreneurial Ecosystem and its application in the Estonian situation and investigations the interview results. Finally, with discussions and conclusions, section four gives a summary and critique of the findings and the recommendations for Estonian Entrepreneurial Ecosystem participants, policymakers, and researchers.

Literature reviews

The concept of entrepreneurship is not new, and entrepreneur has the corresponded definition by Schumpeter (1934). He defined entrepreneurship as the process by which individuals exploit opportunities for innovation (Schumpeter, 1934; Shane & Venkataraman, 2000). This definition emphasized not the measurable indicators of enterprise but rather the quality of the enterprise, which delivers the value for society. Each individual has a strong ambition to exploit specific ideas or opportunities into profit or intangible benefit (Bogaert et al., 2011), leading to innovative inventions like developed goods, services, and methods. Entrepreneurship is an important driving force for countries' economic growth by enhancing GDP, enlarging job opportunities, and eventually creating values for society (Wong et al., 2005). After Schumpeter conveyed the entrepreneurship concepts, many researchers focused on individual entrepreneurship by zooming in their talent or ability (Gartner, 1989). From their study, entrepreneurship has been largely concerned with the characteristics and behaviors of individuals or firms (Stam, 2015). However,

there is no general approach to entrepreneurship that has focused on its interconnected aspects across several fields of study. This interaction occurred by way of market or even not via the market, which is traditionally regarded as externalities.

Conventional theories such as "System of innovation" or "National System of Innovation" ignored either context or individuals as an unattainable external factor (Ács et al., 2014). These theories centered the enterprise as a passive subject of the system rather than entrepreneurs. Entrepreneurs are complicated and dynamic initiative in the sense of multi-communicative. The person with entrepreneurship is not emerging on the stage but fostered by multi factors that interacted with each other.

The focal point of the Entrepreneurial Ecosystem is the interaction of entrepreneurs and their stakeholders with notable elements of the Ecosystem, which brings new venture creations. As follows the definition of Entrepreneurial Ecosystem in this paper, Stam (2015) noted that Entrepreneurial Ecosystem has a "set of interdependent actors and factors," which reveals that the relationship is interactive among organic and non-organic elements. The ultimate aim is not to produce new startups, but the objective was "productive entrepreneurship" following the definition. However, many researchers have proposed many different definitions based on their specificity (Cavallo et al., 2019). Van De Ven (1993) put out the early definition of the Entrepreneurial Ecosystem as "Networks of actors involved in developing each function, and how these functions and networks of actors interacted over time to facilitate and constrain innovation development." Spilling (1996) also brought the definition as "The entrepreneurial system consists of a complexity and diversity of actors, roles, and environmental factors that interact to determine the entrepreneurial performance of a region or locality." These two early definitions have commonalities in the definition of the Entrepreneurial Ecosystem, the interaction between actors and components is a complex dimension, and the end goal of the Entrepreneurial Ecosystem is starting new ventures (Cavallo et al., 2019). Based on these early definitions, the following definition described the details of the actors and components, introducing its ultimate aim as regional development. For example, Mason & Brown (2014) stated that Entrepreneurial Ecosystems are made up of interconnected entities. One of the entities is Entrepreneurial actors who are both potential and existing. Other entities are Entrepreneurial organizations are such as firms, venture capitalists, business angels, banks, institutions, universities, government agencies, financial bodies. Also, indicators such as the business birth rate, numbers of high-growth firms,

levels of blockbuster entrepreneurship, number of serial entrepreneurship denote the results of entrepreneurial processes by interconnected entities. Another example, Isenberg (2011) opened up that is composed of elements that can be grouped into six domains: a conducive culture; facilitating policies and leadership; availability of dedicated finance; relevant human capital; venture-friendly markets for products, and a wide set of institutional and infrastructural supports.

Moore (1999) was the first who used the term "Ecosystem" in the business context to note the word "Business Ecosystem." He has focused on the surroundings of central business actors in the economy rather than profiling a few excellent gifted actors. Following the Business Ecosystem, many ecosystem types emerged, University-based Ecosystems, sector-based Information Communication Technology (ICT) Ecosystem, organizational Ecosystem, Innovation and Knowledge Ecosystem. Significantly, the Innovation or Knowledge Ecosystem attracted scholars, which is defined as a "network of interconnected organizations, organized around a focal firm or a platform, and incorporating both production and use side participants, and focusing on the development of new value through innovation" (Autio & Thomas, 2014). This Ecosystem emphasized the aspect of value appropriation more than value creation itself. By Ecosystem concept, the innovation recreation for competitive advantage is a result of complicated activities. The most important thing that the Ecosystem gives us is understanding the complexity that exists among actors in the environment presenting interdependencies. Although the Entrepreneurial Ecosystem became complicated, this ecological metaphor also helps to explain the dynamics of diversity, selection, related diversification, resilience, and adaptation (Alvedalen & Boschma, 2017; Auerswald & Dani, 2017; Boschma, 2015).

They are moving back to entrepreneurship, the interaction of "biotic" systemic conditions and "abiotic" framework conditions (Stam & Spigel, 2016). The biotic conditions point out the core of the Ecosystem, which includes networks of entrepreneurs, leadership, finance, talent, knowledge, and support services. In comparison, the abiotic conditions are involved with enablers or constraints of the interaction. The Ecosystem approach provides us the entrepreneurship is evolutionary, socially interactive, and non-linear, which occurs in a community of interdependent players, individuals, units, and governing bodies within a given terrestrial area (Isenberg, 2010; Kuratko et al., 2017).

Some research spotlight the framework with model contains factors in the Ecosystem. The core is entrepreneurs in shared understanding. The entrepreneurial Ecosystem model is designed to help

us better understand how Entrepreneurial Ecosystems function (Thurik et al., 2013) and how they generate entrepreneurship as a system-wide property (Arthur, 2013).

Van De Ven (1993) first brought out the elements of Entrepreneurial infrastructure. Although he did not use the term of the Entrepreneurial Ecosystem, he used four criteria, institutional arrangements for incentive and restrictions, public donation on scientific knowledge and finance, market demand for entrepreneurs, proprietary because of R&D, and marketing, supply chain efforts. Feld (2012) analyzed the network of key players, access to the resource, and government as a background. His analysis breaks the Entrepreneurial Ecosystem's characteristics into nine attributes Entrepreneurial Ecosystem, Leadership, Intermediaries, Network density, Government, Talent, Support services, Engagement, Companies, Capital. Isenberg (2010) also described the nine principles to build the Entrepreneurial Ecosystem. To stop emulating Silicon Valley, to shape the Ecosystem around local conditions, the Entrepreneurial Ecosystem has its specificity that is not duplicatable by others. In the next principles, by engaging the private sector from the start, stressing the roots of new ventures, helping engineer cluster grow organically. Selection of high productive startups by favoring the high potentials, getting a big win on the board. Finally, the transformation of the Ecosystem from the top by tackling cultural change head-on, reforming legal, bureaucratic, and regulatory frameworks. He emphasized to remain the locality and bottom-up process, to keep ambition in entrepreneurship and institutions. Like his principal findings, he lists six separate spheres of the Entrepreneurial Ecosystem: policy, finance, culture, support, human capital, and markets. The World Economic Forum also points out the components of the flourishing Ecosystem (Klaus, 2013). Velt et al. (2018) analyzed the perception of Entrepreneurial Ecosystem elements. They divided former collective concepts (Isenberg, 2010; Klaus, 2013; Stam, 2015) into 16 components, Leadership Bootstrapping, Bank loans, Informal Loans, Venture Capital, Angel Investor, Corporate Venture Capital, Crowdfunding, Entrepreneurial Talent, Worker Talent, Knowledge, Network, Professional Services, Intermediaries, Networking Services Engagement Services. Velt used quantitative importance for 1 to 100 scales. These listed frameworks are overlapped areas such as resources, government, and informal institutions. However, all of them showed similar shifts from traditional economic notions focused on moving markets and companies to the network of people and institutions organized by diverse governance settings.

Researchers have developed the study at the national level or regional level. Nonetheless, a new type of startup companies, some of them successfully funded billion-dollar known as unicorns (Prohorovs, 2020), are appeared due to the digitalization. For example, Airbnb has brought disruptive innovation of accommodation and hospitality services by using digital technologies, which enable vast numbers of users to match agents through their multisided platform (Sussan, 2017). For another example, Bolt dominated the market share of the European and African taxi industry by bringing out novel taxi ordering platforms (Mets, 2018). These digital startups successfully keep millions of users though they are small in employee size. Sussan (2017) has conceptualized the digital Entrepreneurial Ecosystem by integrating the extant Entrepreneurial Ecosystem and digital Ecosystem framework (Li et al., 2012). This new framework consists of four concepts: digital infrastructure governance, digital user citizenship, digital entrepreneurship, and digital marketplace. This paper does not go deeper on digital entrepreneurship; however, the digital infrastructure, interchangeable with I.T. infrastructure, is vital for this paper's ICT sector analysis case. The digital era's infrastructure is provided for creating the new type of successful startup by the government.

Besides introducing one definition, followed by researchers, the Entrepreneurial Ecosystem brought by Stam (2015), this paper applies the framework and model into research. The model is led by some previous research on Entrepreneurial Ecosystems' critical elements (Feld, 2012; Isenberg, 2010; Klaus, 2013). Thus, Stam synthesized earlier works of the conceptual model of the Entrepreneurial Ecosystem. Additionally, the model consists of some components that build up the Entrepreneurial Ecosystem that creates value creation through many Entrepreneurial activities.

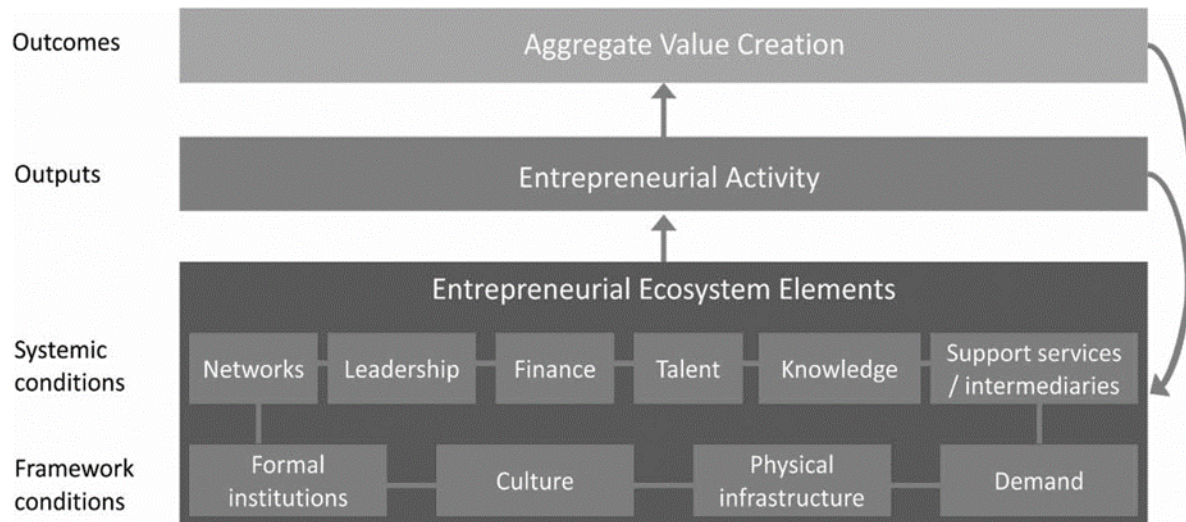


Figure 1 Key elements, outputs, and outcomes of the Entrepreneurial Ecosystem. (Stam, 2015)

This model has critical elements on the bottom from two aspects: systemic and framework conditions.

Systemic conditions

Systemic conditions include network, finance, talent knowledge, support services, and intermediaries, which is the heart of the Entrepreneurial Ecosystem for creating high-growth enterprises (Stam, 2015).

Entrepreneurial actors form networks that contribute to the flow of information, more efficient distribution of knowledge, work, and capital. For the Entrepreneurial Ecosystem, leadership offers guidance and role models. This type of leadership is essential for the creation and maintenance of a healthy environment. This environment entails a group of 'seen' business leaders who are committed to the region. Access to finance is critical for long-term investments in risky Entrepreneurial ventures.

Nonetheless, the inclusion of a diverse and professional community of employees as 'talent' is perhaps the most critical aspect of a successful Entrepreneurial Ecosystem. Awareness from both public and private entities is a valuable source of entrepreneurship opportunities due to the knowledge. Finally, the provision of support services by various intermediaries will significantly lower entry barriers for new Entrepreneurial ventures and shorten time to market.

Networks

A network is a set of actors and factors that exist within the entrepreneurial Ecosystem. A community is one of the forms of the network in which an entrepreneur is along with people who are, for example, investors, mentors, professional services, supporters, etc. Entrepreneurial and business networks facilitate the exchange of information, allowing for the efficient transfer of expertise, labor, and resources (Malecki, 1997). The example of a network is received from public organizations or other companies from the same field as collaboration or universities or other possibilities.

Leadership

The Entrepreneurial Ecosystem and collaborative action are driven and directed by leadership. This type of leadership is essential for creating and maintaining a sustainable ecosystem (M. P. Feldman, 2014). This entails a group of 'visible' business leaders committed to the region (M. Feldman & Zoller, 2012). The high levels of commitment and public spirit of regional leaders might reflect underlying norms dominant in an area (Olberding, 2002). In this research, the focus is on the ownership, who has the authority for decision making. Furthermore, the structure of decision-making inside the company is also the concern of this research. Either the system is centralized or divided.

Finance

Availability to the finance to launch, maintain, grow and expand is an indispensable factor of the firm, especially startup in the every life stages (Kerr & Nanda, 2009). Nowadays, collecting financial resources is diverse, for example, formal/informal debt, investors, equity capital, crowdfunding, bootstrapping, etc.

Talent

Talent is the skills, knowledge, and experience possessed by individuals. This element is the most important of an effective Entrepreneurial Ecosystem: a diverse and skilled group of workers (Z. J. Acs & Armington, 2004; Lee et al., 2004; Qian et al., 2013). Talents include intangibles like education and experience. Human capital is likely to create new knowledge (Romer, 1989) and use new knowledge (Cohen & Levinthal, 1989).

Knowledge

Knowledge is about investments in science and technology for knowledge creation. Ambitious individuals or entrepreneurs can find an important source of opportunities for entrepreneurship in expertise from both public and private organizations. Talent and knowledge have a strong codependent relationship in a regional setting (Qian et al., 2013). New knowledge investments are a major source of entrepreneurship opportunities, and if they contribute to better solutions, they can also be a source of growth. Further information is developed in various ways, but investments in public and private research and development are perhaps the most well-measured (Stam & van de Ven, 2019).

Support systems/Intermediaries

The intermediate services are input into proprietary functions. The supply of support services by various intermediaries can substantially lower entry barriers for new entrepreneurial projects and reduce the time to market innovations (Howells, 2006; Zhang & Li, 2010). These are represented by mentors, professional services such as accounting or legal services, incubators, and networks of entrepreneurial peers.

Framework conditions

On the other hand, framework environments are social and physical situations that help or hinder human interactions. This research paper will apply this model to the analysis of Estonia's Entrepreneurial Ecosystem. The social (informal and formal institutions) and physical conditions that allow or constrain human interaction are included in these conditions. Furthermore, having access to a more or less exogenous demand market for new products and services is critical. However, this access to consumers of products and services is more likely to be determined by the Ecosystem's relative status than by its internal conditions. These circumstances may be considered the root causes of value formation in the Entrepreneurial Ecosystem.

Formal institutions

The rules of the game in society are reflected in formal institutions (North, 1990). The extent of alleged corruption and the general regulatory system within countries matter to entrepreneurship: the consistency and performance of structured institutions. Institutions include the basic preconditions for economic activity and the sustainable utilization of capital (Acemoglu et al., 2004; Granovetter, 1992). The most effective form of the formal institution is government, which handles coercing authority inside the territories through the rule. In contrast, local University is represented as an enabler that promotes interaction.

Culture

Cultural context is another form of institution that indirectly affects entrepreneurship. Entrepreneurship culture (as an informal institution) reflects the degree to which entrepreneurship is valued in society (Fritsch & Wyrwich, 2014). The entrepreneurial culture is not intentionally formed but has been formed in many years due to entrepreneurial activity. Phoenix's entrepreneurial successes have given the Entrepreneurial Ecosystem due to visible success stories and supportive entrepreneurial culture with public policies (Mack & Mayer, 2016).

Physical Infrastructure

Physical infrastructure is the physical context of actors. It includes possible connectivity of all kinds of logistics such as highways and railways, commercial flights (Stam & van de Ven, 2019). Nowadays, the infrastructure emphasizes the importance of physical and digitalized infrastructure because of the emergence of a new type of startup that is relevant to the digitalization field.

Demand

Demand is market size based on access to buyers of new goods and services (Stam, 2015). The presence of financial means in the population to purchase goods and services. People buy goods and services locally and on a further distance, which is essential for entrepreneurship to occur at all. A composite of disposable income per household and two indices of future consumer demand is used to calculate demand. Wealth per capita includes disposable income (Stam & van de Ven, 2019).

In addition to the Stam mentioned above's model elements, this paper investigates the ICT sector as a factor of the Entrepreneurial Ecosystem. The emerging mega ventures revolved the traditional services with a digitalized multisided platform, enabling both firms to matchmake and users to be available by reducing the transaction cost from service price. This wave of digitalization attracted the attention of the system to produce digitalized companies. Sussan & Acs (2017) discussed two pillars of the digital system: abiotic digital infrastructure and biotic users. The significant changes come from the interaction of these two entities. The term digital infrastructure can be replaced by information infrastructure (Henfridsson et al., 2013). Also, the digital infrastructure has empirical evidence from the Global Information Technology report of the World Economic Forum, which describes the readiness for the level IT infrastructure for each country (Baller et al., 2016). Concerning the second pillar, the people who have access to digital technologies are quite broad because Technologies allow open access via the internet and bottom-up process inside the organization. In the digitalized business model, the user is key as a valuable co-creator (von Hippel & von Krogh, 2006).

The model enabled us to understand the silhouette of the Entrepreneurial Ecosystem. The elements that contribute to productive entrepreneurship the crucial aim of the Ecosystem through entrepreneurial activities. Aspects of this model consist of ten perspectives, six systemic conditions function as the heart of the activities, and four framework conditions adjust the interconnection of systemic diseases.

Methodology

This research uses qualitative analysis with companies with Estonian roots and is deeply connected with the ICT sector, also internationalized in other words; they have international offices or are deeply associated with internationalization. The methodology of collecting data is conducting 30 minutes-long semi-structured interviews with accessible companies seven companies listed on the Startup Estonia. These companies are mainly matured startups with roots in the Estonian Entrepreneurial Ecosystem, including most of them already moving their headquarters outside of Estonia or having an office outside of the borders. This paper targeted the more prominent and stable startups to interview. As mentioned above, the interview will ask about the perception of components of the Entrepreneurial Ecosystem in Estonia and the scenario the company faces.

Sample and data

Estonian Entrepreneurial Ecosystem

This research focuses on the Estonian Entrepreneurial Ecosystem for analysis because Estonia is, regarding the Entrepreneurial Ecosystem, a suitable place to investigate the relationship between entrepreneurship and startups. Many pieces of research (Mets, 2018) on the Estonian Entrepreneurial Ecosystem conclude that the Estonian Entrepreneurial Ecosystem has equipped with components that have already been shown in this paper. Estonia is one of the highest startups density in Europe (Velt et al., 2018) and the highest unicorn per capita in Europe (*Estonia Gets Its Sixth Unicorn*, 2021).

Estonia is a Baltic country where are proximate to Finland, Sweden, and Russia. The size of the population is 1,329,460 in 2020. Estonia placed first in reading and science and third in Mathematics among the OECD countries. Estonia ranks fifth in reading, fourth in science, and eighth in Mathematics among all participating countries and economies. The amount of expenditures on research & development is increasing to 453 million euros in 2019, which is 24% more than in 2018, the share of GDP is 1.61%, the highest number in the past five years. The private sector causes the radical increase; especially ICT enterprises spent 100 million euros.

Since 2014, Estonian infrastructure has been ranked second after Hong Kong (*GEM Global Entrepreneurship Monitor*, 2016). According to the evaluation of Freedomhouse (Puddington et al., 2017), Estonia is a model for an open internet.

Most startups based on ICT infrastructures, ICT exploitation with specific fields to innovate, such as EdTech, Fintech, and health tech, differ depending on which field technologies are brought out (Startup Estonia, 2020).

Additionally, the Estonian government devotes energy to cultivating new ICT talents. Tiger Leap program started in the late 1990s, which provides ICT and computers introductory courses for all citizens. This program formed today's ICT-based society by increasing familiarity with digital knowledge (Mets, 2017). The interest in the ICT is not top-down; study on computer science has gained popularity over the years. For example, the fixed number for ICT students occupies over 10% of all higher education seats (Trabskaja & Mets, 2019). The most recent test by OECD has shown that Estonian children ranked the highest score in three domains of study of all E.U. countries, reading, mathematics, and science (Rex, 2020). The latter two domains are associated with fundamental ICT skills and encourage students to be future I.T. specialists. Increasing ICT

sector growth attracts international talents, leading to forming other mature networks that compose an Entrepreneurial Ecosystem because of diverse backgrounds, inspirations, and ideas.

Trabskaja & Mets (2019) analyzed Estonian Entrepreneurial Ecosystems and validated some advantages on the startup initiation. Nevertheless, they also pointed out that the current challenge for Estonia is needed to be tailored for a knowledge-based economy (Trabskaja & Mets, 2019). The knowledge from academic institutions or think tanks is not fully exploited for the business outcome. Knowledge is a source of technology that leads to consumer goods via interventions of the agents (Arrow, 1962). The technology itself comes from the knowledge which results from research carried out by corporations, universities, and governments (Sussan & Acs, 2017). In the Ecosystem in the digitalization era, technologies are considered as the component of the infrastructure. This digital infrastructure is replaced by the information infrastructure, I.T. infrastructure, and e-infrastructure (Henfridsson et al., 2013).

Although there are some researches already done for holistic analysis on the Entrepreneurial Ecosystem of Estonia (Trabskaja & Mets, 2019) and admitted the superiority of the Ecosystems, most of the successful startups left Estonia except Bolt. The government had asked startups to stay in Estonia before (ERR, 2019). Successful Estonian startups expanded their business globally; international people accepted some of their business models. In the globalization of successful startups, these businesses have either been acquired by foreign capitals or relocated the headquarters abroad. For example, Microsoft acquired Skype in 2011 after relocating to Luxembourg, Stratasys acquired GrabCAD in 2014, Fits.me was acquired by Rakuten in 2015 after relocating to the United Kingdom. Fits.me faced difficulties with collecting additional investments at the round B stage and convinced the investors to remain them in the mid-bus discounting value and investment. GrabCAD, as a platform provider, was aimed to broaden its links while growing the business. GrabCAD decided to lose control for competitive advantages (Trabskaja & Mets, 2019). Eventually, in both cases, investors were satisfied with Fits.me being acquired. In recent years, the amount of investments into Estonia has increased, especially investments from outside after moving international H.Q.s out of Estonia (Mets, 2018; Trabskaja & Mets, 2019). From previous research, Estonian startups have already been encountered challenges in the existence of more significant investments and knowledge base. Conversely, successful startups in the U.S. where the most Unicorns holder, according to some data gained from corporate research (*Countries - With the Top Startups Worldwide | Startup Ranking, 2021*;

Dautovic, 2021; Rudden, 2021), extends their business globally but still the headquarters remain, even though the main customer base transits to other areas of the world.

Startups

The author selected the list of interviewees from the webpage of Startup Database owned by Startup Estonia. The Database page gives an overview of an Estonian startup company, year of foundation, business model, stage of development, etc. The author picked up 21 ICT companies that have Estonian origin and over five years of operation. These companies had a strong linkage with the ICT field in which introducing high-tech to their business. The author reached out to companies via email as below;

Dear company,

My name is Kazuki Saeki, Master Student at the University of Tartu.

Currently, I am writing a thesis about the Estonian Entrepreneurial Ecosystem.

I would like to conduct interviews with you because I need information about the perception of the Estonian business environment from the company's side for my research.

I would like to make an appointment with you to interview for research. This interview does not take so much time, limiting it to at most 30 minutes.

There are some sample questions that I will ask you during the interviews;

Have you ever thought or experienced collaboration with University, or are the activities only among your workers?

Was there an ownership transition in your company?

What kind of previous knowledge about the field and the business did you have before starting the business?

Is Estonian culture helpful to operate your business? Is the culture supporting your business?

etc....

If you cannot answer some of them, I will leave out those questions.

I would appreciate it if you would let me know the best date for you. You have something unclear, and then you could write or call me to contact information.

Best regards,

Kazuki Saeki

The companies which accepted interviews are Funderbeam, reWiLD, Veriff, Stebby, NeverCode, Click and Grow, and MindTitan. Following table 1. will give an overview of the main characteristics of the interviewed companies. Five companies have online interview, and two had paper based interview.

Table 1. Main data about the interviewed companies

| | Funderbeam | reWiLD | Veriff | Stebby | NeverCode | Click & Grow | MindTitan |
|--|---------------------------------|---|------------------------|---|---|---|------------------------|
| Established | 2013 | 2013 | 2015 | 2012 | 2015 | 2010 | 2016 |
| Business model | B2B B2B2C | B2B B2G | B2B B2B2C | B2B B2C | B2B | B2B B2C | B2B |
| Technology | Blockchain, Marketplace service | Expert Systems Geo-informatics, Special purpose Algorithm | A.I., Machine learning | Marketplace services, Online payment processing | Cloud computing, Web/mobile tools, Physical storage mediums | Precision agriculture, Smart city, Smart home | A.I., Machine Learning |
| Sector | Fintech | DeepTech, SpaceTech | Cyber-Tech | HealthTech, Life science & Wellness | Business software & HR | AgTech & FoodTech | DeepTech & SpeedTech |
| Stage | Scaling Stage | MVP/Seed Stage | Scaling stage | Product-Market fit | Product-Market fit | Scaling stage | Product-Market fit |
| Headquarter location | London, U.K | Tartu, Estonia | Tallinn, Estonia | Tartu, Estonia | The U.K (parent) | Tartu, Estonia | Tallinn, Estonia |
| Other offices | Singapore, etc. | - | New York, USA | - | Tallinn, Estonia | San Francisco, USA | Portland, USA |
| Turnover in 2021 1 st quarter | 138,3K € | 56,8K € | 3,1M € | 245,2K € | 61,1K € | 3,6M € | 284,2K € |
| Investments | 15.8M € | un-disclosed | 92.3M € | 439.8K € | undisclosed | 17.9M € | undisclosed |
| Employee count | 14 | 5 | 248 | 18 | 17 | un-disclosed | 26 |

Source: Author's contribution, data from Startup Estonia database, Crunchbase, companies' website, and interviews

Interview questions for research are based on the conditions of Stam's (2015) model and research questions. Interview questions have aspects of both framework and systemic conditions. Furthermore, parts of the research question are related to the ICT sector and suggestions for the Estonian government from their point of view. Interview questions are attached to the appendix. Short descriptions about the companies are added next.

Funderbeam

Kaidi Ruusalepp and Urmas Peiker founded Funderbeam in 2013. Both are from Estonia, as a global data platform for startup companies. The platform worked as a marketplace for early-stage investments secured by the blockchain. The headquarter of Funderbeam is located in Tallinn, Estonia. Funderbeam has global offices in London and Singapore as financial centers, Copenhagen, Zagreb. Funderbeam was put into the interview list of this research due to a successful and internationalized startup.

reWiLD

reWiLD is a spin-off company from the University of Tartu. reWiLD is founded in 2013 by Jaanus Remm from Estonia. The company uses Expert Systems, Geoinformatics, Special purpose algorithm to track animals and prevent conflict between humans and wildlife. reWiLD has been developing new map software for environmental reports and examination. The headquarter is located in Tartu, Estonia. reWiLD is chosen for the interviewee because reWiLD is also a successful startup company as the spin-off from University and compared to the H.Q. in Estonia.

Veriff

Veriff is founded by Kaarel Kotkas in Tallinn in 2015. Veriff provides an I.D. verification service for security with a different method. He initiated from difficulties of traveling id-based transactions. In 2018, Veriff was invested by Y-combinator, which is the U.S. accelerator. In 2021, Veriff raised a series B fund of \$69 million. The headquarter is currently located in the United States.

Stebby

Stebby, former SportID, was Founded in 2012 by Marti Soosaar. SportID created a health and sports compensation administration service for businesses which is providing the welfare of employees. They renamed the brand Stebby in 2020. The headquarter is located in Tartu, Estonia.

NeverCode

NeverCode is Founded in 2016 by Triin Kask and Kristian Sägi. NeverCode provides cloud base computing technologies to support developers. NverCode launched three successful products. NeverCode CI/CD in 2017, Codemagic CI/CD in 2018, and Testmagic in 2019. The Current CEO,

Martin Jeret, assumed the position of CEO in 2019. The headquarter is located in the U.K. The structure of a company is H.Q. in the U.K. However, the actual business entity is still in Estonia.

Click & Grow

Click & Grow was Founded in 2009 by Mattias Lepp. The headquarter is located in Tartu, Estonia. It is originated with the idea of building electric-powered self-watering indoor gardens for everyone to grow their greens at home, inspired by a NASA report. Click & Grow worked with universities around the world to fine-tune the technology. Click&Grow launched the first smart pot prototype in 2012. In 2017 the smart garden nine was launched.

MindTitan

MindTitan is A.I. and machine learning company founded in 2016 by Kristjan Jansons. They provide AI-technology service which helps companies solve real-life problems and achieve business goals. The headquarter is located in Tallinn and has an office in the U.S. Because of great success in the A.I. tech solution, which is one of the main topics of the I.T. sector, and they have an overseas office in Portland, U.S., the company is in the list.

All those seven companies have Estonian origin, and representatives of those companies are willing to take this interview. The interview has taken 30 minutes on averages because the interviewer promised the period within thirty minutes by email. The interviewed data were transcribed and analyzed by the author.

Results and discussion

Common subjects that appeared from the interview transcripts delivered vision to the research questions listed above. Qualitative data collected in the interviews were interpreted in terms of the six systemic and four framework conditions of the Entrepreneurial Ecosystem framework and are presented below.

Systemic conditions

Systemic conditions consist of 6 elements, networks of entrepreneurs, leadership, finance, talent, knowledge, and support services. These conditions present and mutually interact, which leads to determining the success of Entrepreneurial activities.

Networks

Most of the interviewed companies brought out financial aid as the network first in their network. There are many supportive institutions for entrepreneurs in Estonia, such as Enterprise Estonia, the Centre of registers and information system (RIK), The Estonian Agricultural Registers and Information Board (PRIA), etc. MindTitan received support from Enterprise Estonia (EAS). reWiLD received support from other organizations and EAS, Veriff received help and worked with the collaborated projects, and Click&Grow received support due to startup competition.

We have received help from EAS with a Customer service automation solution. (MindTitan)

The project's total cost is 448 000 euros (four hundred and forty-eight thousand), of which the European Regional Development Fund will cover 45%.

The initial Ajujaht competition win could be categorized under EAS. We have been granted NUTIKAS grants twice to cooperate R&D projects with Tartu University to develop our growing medium. This has been a significant help and a very great success story of company + university collaboration overall. (Click & Grow)

Others have gained help from Startup Estonia. Also, it depends on the type of business the company handles. The companies need to reach out to more organizations and legally essential processes such as accounting, lawyer, insurance. Once they could build a connection with such an organization, its connection allows companies to easily access the further helps in continuous processes in various areas. The network of the Estonian Ecosystem worked well in this sense.

Leadership

Searching for funds turns out to be another effect on the Entrepreneurial Ecosystem in Estonia regarding leadership. The more funds received from investors, the more changes in management structure and people from outside of companies join the board. The ratio of founders' ownership (and co-founders in some cases) has changed over the years. Therefore, a company would not be

able to avoid the transition of ownership. Though they do not allow them to enter into the management, they must be accountable for the decision to investors.

Click & Grow has still the founder of the companies; Mattias possesses the ownership. However, having gone through some investment phases, there is a structural change in the ownership by the stakeholders, primarily investors.

The initial founder and owner of the company is still its CEO and largest stakeholder, Mattias Lepp. The percentages of ownership have changed over time due to startup investments and new investors joining. Therefore, the composition of a governing council has changed as well but not the leadership. (Click & Grow)

The case of NeverCode is a bit different due to the organizational structure mentioned above. The owner's structure is not only by the board within the company but also the nominal parent company. They also experienced the change of the CEO, new CEO, Martin is also from Estonia and worked in NeverCode for a couple of years.

So, we are in this inferior position in terms of company structure. Moreover, the ownership structure is also bad. Because we have maybe you saw the news, we had our founders of the company left. So, I took over a CEO, and I did not found the company. And because of this and other reasons, our shareholder structure is quite messy. And this sometimes makes investing in companies like ourselves aren't attractive. So, we just need to we can't impress people with their ownership structure. We have to impress in other ways (NeverCode)

As Martin said, the leadership structure can attract investors to join as both financial supporters and advisors. It is inevitable for companies to accept the leadership from outside since the more companies grow, the more stakeholders are involved.

And I think then the structure does change, and the leadership does change when the company grows. For us, the first significant change was with a Series B, therefore, a series A, so when we got two new board members, the board members were representatives of the investors. So, it's one from mosaic ventures, who was the lead investor. And the other one was an angel investor, actually, the co-founder of tensor vice, Dean Rico. So, these are board members. So, this is, and they came in as a Successful startup did the Series B after Series A. But now, as the company is growing, we are getting the management team that we have. So, we have a management team of 10 plus people, and so different the heads of various business units belong to the management team. And now we recently have hired a new Chief Financial Officer, Chief operational officer,

VP of product, Vice President of Product. So, these are all the senior positions. And I think the leadership now is shifting as the company is maturing, so more talent comes in. (Veriff)

The ownership has changed because the startup grows; this process is natural for many startups. The power of ownership is divided based on the expertise area. At the same time, this mixed-ownership can be the risk for confusion because of the diversity.

Finance

Estonia has enough pre-and seed or round (series) investments at the stage of launching their own business or validating their products into the actual market. This investment stage is covered by multiple paths for the funds, individual investors, formal investment, crowdfunding, bootstrapping.

So far, we have had several investment rounds - angel, seed, and strategic investors. We have also done two very successful Kickstarter crowdfunding campaigns to launch new products. (Click & Grow)

However, Estonia lacks founders who invest in round B investments, enormous financial support over a million euros, and further acquisitions. Moreover, to receive the fund from foreign investors, a company sometimes is pressed to set up the other form of company or office at the foreign country in which the investor locates due to the restriction on foreign investors. This kind of problem was similar in Fits.me in an early study (Mets, 2018). For some companies in the interview, they have received funds from diverse types of investors. Veriff is likely to raise the round B investment phase, collecting investment from various investors internationally.

They knew about us so but all in all, a very diverse group of investors, and so we also did the bridge funding round last Summer for \$15.5 million, so and so, and we will be raising Series B funding soon as well. So, but all of these investors are primarily outside of Estonia, and we are looking at more considerable funds in the United States and the U.K. (Veriff)

In another case, NeverCode once accepted the funds from U.K. investors. They were obligated to have another company that has the only I.P. without actual process works. This is a challenge for Estonian Start-up to receive more significant funds that are the energy for further growth.

Initially, we were an Estonian company. And then, in 2017, I think we received the investment from the U.K. ... And this required us to make company in the U.K. So, then we had to do a share swap, where U.K. company where all Estonian investors became investors of U.K.

company. And, yeah, that is when we make this parent company transition. And another thing that happened was also when we started, so we were part of another company. (NeverCode)

what Funderbeam said in the interview was sum up the problem of the current Estonian Ecosystem in funds.

Individual investors. Access to investors is easier compared to before. Angel investors and accelerators are engaged in this market because of the early success of unicorns in Estonia. Nevertheless, for series B investments, local investors cannot support the more extensive investments phase. They come from outside (Funderbeam)

Finding investors in Estonia is becoming easier over the years because of the early success in startups and increasing the investors in the Estonian Ecosystem. Also, the network is alive to follow the connection for finding the people who have interests in your business.

Talent

All of the companies are satisfied with the quality of skills and talents of workers. As for Estonian people, companies regard them as well-educated and skilled people. However, The quantity of the workforce is scarce. Primarily there is scrambling for developers in I.T. sectors. Companies opened the door of recruitments internationally. They are no more focused on local talents.

It could be better, of course. Lots of competition and few human resources in the Estonian market, especially in terms of the job roles our company needs as our company is unique in what we do and how we do it. In both Estonian and worldwide assignments. (Click & Grow)

However, the obstacle is how attractive Estonia is for foreign workers. The wage level of Estonia is not competent among E.U. countries.

Hopefully, I can offer higher salaries to employees because I pay them right now when I'm employing people from overseas. For example, I pay 6k to someone working from us. And when you move to Estonia, he's getting 3.5k. So that's half of that. And you tried to get someone from the Netherlands to come to Estonia. And it's very difficult or from Prague to Estonia because they have differences. They look at the bottom line, what they take home. They don't look at how much I have to pay. (NeverCode)

Employees from third countries are haunted by the working visa issue, pausing companies to gain the force of the worker. The decision from the previous government has disturbed the inflow of

workforces into Estonia can be a risk to lessen the competence of the economic activities of Estonian companies.

However, the educational system does not prepare us well to start a business. Things are a little bit worse with workforce regulations for hiring from abroad. (Click&Grow)

According to the interview with Funderbeam, the visa issue is problematic for especially third countries. The lag between hiring people and starting working can be immortal for startup companies that the workforce is urgent; it can also be a disadvantage for workers in just the third country.

For a while, I think things were during the previous government; we were pretty worried. Because Estonia was not very open about welcoming other nationalities and talents to come to Estonia. (Veriff)

Overall, companies are satisfied with the quality, concerning skills and education, of talent. The person who has needed talent exists within the employee market. However, in common, the quantity of workers is the constant problem within Estonia. Most companies mentioned and requested the broaden the employee market internationally.

Knowledge

Surprisingly some of their founders did not have experience in the field even though they had built success in the area. The founder of click & Grow does not have previous knowledge and understanding about the field, but this scarce motivated the R&D department.

It was more of creating the knowledge in the first place, not accessing it. There were no similar examples out there, and the idea was built into a product through novel R and D. (Click & Grow)

Also, Stebby does not have much knowledge in the field; they solve an actual problem through business and gain practical knowledge and experience over the years.

it was tiny since we started to solve the real problem we had, and the knowledge about entrepreneurship how low, like working out state is working, was bigger. (Stebby)

(The founder) did a case study for TransferWise, So when he said, what are the loopholes in the identity verification systems and how is there anything that can be done better so that people would not be faking the system, so he was doing a case study there. However, he was, and that is

how he mainly became interested in identity verification so. However, he had done his sort of calling him a serial entrepreneur, and he's done very few already his 12 projects. However, he's done starting from students, businesses and developing websites and platforms to do short time, work and things like that. So, he's tried lots of different business ideas in the past. The first one that he started to build on started to grow and went all in, and then now it's become a successful large business. And another founder, Yana piece, his background is in it. So, he's been working in different I.T. companies before and in project management and engineering and in positions like that. (Veriff)

Kaarel from Veriff discovered the necessary knowledge holder, the co-founder Yana who has an IT background through his past network. The knowledge of a certain field is acquirable content disregards to the expertise. However, what is significant in the Veriff is that Kaarel was an experienced serial founder with the knowledge for building up enterprises. Likewise, from the experience of Stebby, the knowledge being accumulated over the years. Knowledge is the detector of the profitable opportunity to monetize the ideas, but it does not mean just being informed but the experienced practical situation. Consequently, the knowledge of the entrepreneurial activity has contributed to the success of the firm.

Support services/intermediaries

They have enough accessibility to the support services as outsourcing. Once they came into the network connection such as EAS, Startup Estonia, Wise Guys, they do not need to worry about these functions. Additionally, for many startups, the priority of support service is low.

We have Estonian accounting. And then we have U.K. accounting as well. And then we have lawyers also. Those introductions of which accountant or lawyer to use come from our, from Estonia, from our investor, or friends' networks. (NeverCode)

Questions about Support services often were overlapped with the domain of the network and finance. The existence of abundant support services formed the networks and enabled new entries to find and enjoy professional services.

Framework conditions

Framework conditions are social and physical conditions that consist of Culture and Formal institutions, Infrastructures, and demand. The substance of these conditions assists or limit the interaction.

Formal institutions

In general, companies perceive the governmental work as "good" enough as a function. The perceived obstacle of regulation is minor on the business.

The government doesn't hear companies know our government is quite good in that matter. But there is always room for improvement. (Stebby)

The constraints or enabling depend on the field; for example, Veriff is handling the process for personal identification, which needs to cope with GDPR issues as responsibility for E.U. country.

we need to keep our client's data safe, but the regulations are different depending on the market and whom we can service whom we cannot service. ... So, at least in Europe, we have the GDPR in place. But in America, there's nothing like it in place. So, each state might have its regulations. So, and again, who and how can you do business with? It is complicated. (Veriff)

As Roman said, there is always room for improvement for governmental legislation that enables or constrains the interconnection between multiple actors in Estonia. This research gained many propositions from interviewee companies that can solve the perceived problem from companies' side. It is critical to adjust the laws and regulations to address the issues in the Ecosystem.

This paper focus on the University as a formal institution. University is one of the forms of the embedded institutions that enforce systemic conditions of entrepreneurship. In Triple Helix theory of entrepreneurship, the University is a technology office to discover innovative knowledge which is possible to commercialize. The collaboration between University and industry has delivered enormous value to society (Etzkowitz & Leydesdorff, 1995). However, University has related to multiple aspects beyond mere the knowledge infrastructure. The University stimulates the networking of skillful people having from diverse backgrounds (Raagmaa & Keerberg, 2017). University is also a source of talent that is attractive for the student, not only local but also international talents (Bramwell et al., 2008).

University, the formal representative institution, is also perceived as a significant place by companies. In most companies, the University is nothing more than a place that provides training

for potential future workers. For many companies, research and development are not the priority at the early discovery stage of startups. Except for university spin-off company reWiLD, only Click & Grow has experienced collaboration with universities. These two companies have shared a feature that is R&D intensive business. reWiLD workers consist of postgraduate academic skilled people who have a master's degree or doctoral degree, including the founder of reWiLD Jaanus. On the other hand, Click & Grow mentioned a supportive partner, NUTIKAS, in the earlier question. The intermediary was helpful for companies to stretch out for knowledge-pool. The effect of the network is observed in other aspects, as the Ecosystem is not a set of independent variables but interdependencies.

We have been granted NUTIKAS grants twice to cooperate R&D projects with Tartu University to develop our growing medium. This has been a significant help and a very great success story of company + university collaboration overall.

...We have a very close relationship with Tartu University and some universities in France, the USA, and Russia before the company was in its infancy. The cooperation projects we've had with Tartu university I already talked about. Our complete R&D is very close with university teams. (Click & Grow)

Collaboration is a difficult thing to mount as an early stage of startups. The priority for such kind of startup is to find a business that fits the market. University is regarded as the primary source of human capital in General view. However, besides the university spin-off companies like reWiLD, the minor example of Click & Grow can be eager to work with the University.

Culture

Pioneers of blockbuster startup set up Today's Estonian business culture, the so-called skype effect (Prohorovs, 2020). The success stories of earlier startups (e.g., Regio, Skype, Playtech, Pipedrive, Bolt, Wise) have influenced Estonia. The positive image on start business stimulates tolerance for the risks, numbers of self-employment. On the other hand, foreign companies have attention on Estonia to seek another win with investment in novel startups.

Estonia has a great business culture. Success stories are kept in a good light; they are promoted. People are cheering for Estonian companies that reach further or do good. Starting a business is a cool thing to do, something that's encouraged (Click & Grow)

People cheered up the Estonian companies and further success. The presence of a network consists of entrepreneurship enablers such as incubators, consultants, accelerators, etc., have maintained and stimulated the notion of entrepreneurship. For example, Latitude 59 is one of the biggest events in Estonia, organized by multiple startup incubators startup Estonia, Garage 48, Lift99, and so on. This event has attracted international engagement. Additionally, the success stories also attract global talents, which creates diversity, which positively affects the growing Ecosystem. Some of them also mentioned the personality of stereotyped Estonian. The resilience until achieving goals character form the Estonian entrepreneurial cultures.

I've always experienced that if you share similar goals, then at least I haven't experienced this that people can't get along well, or I think it's good. So is this, and having this critical thinking is good, but I mean, that's true for many cultures. So, this is positive. What this negative is maybe they're a little bit afraid to try new things there. (Stebby)

The entrepreneurial culture within the Estonian Ecosystem is perceived as positive. Role models of forerunners and the perceived Estonian heads-up characteristic triggered the ease of Entrepreneurial activities in Estonia.

Physical Infrastructure

Like global report evaluation, the Estonian infrastructure for the I.T. sector is regarded as good enough. Around the infrastructure is not the big problem that leads to startups focusing on core business rather than the wide range of activities. No fatal deficiency became an advantage.

For the I.T. sector, the telecommunication network is the most crucial piece of infrastructure. At a level that does not hold back the I.T. sector, speeds and coverage are good enough. Of course, if 5G is delayed more than it has been at the moment, there might be issues in the long run.

The challenge remains in the high technology's introduction domain, as Kristjan mentioned 5G. Currently, the level of I.T. infrastructure is well covered and speed. However, the delay can be a weakness for the Ecosystem in the future. The environment had better be the forward attitude to the innovation-friendly, to precede the business growth as a feeder.

Demand

Estonia built up better networks for startups at the early stage to validate the stable business model. The size of the market is still growing with GDP. However, the supply of labor and the market size is small to continue and grow their business to the following levels.

The public sector has historically been a good client for the I.T. sector, and it seems to remain so. The private sector is ordering increasingly more, which is a good sign as it increases everybody's competitiveness. Nevertheless, Estonia's market is not significant, which forces Estonian companies to look for other needs from day 1, which is great if they managed to do it.
(MindTitan)

According to reWiLD, due to the niche, the industry market is small without demographically regarding the Estonian market, they have the motivation to internationalize the business in the future. The market of Estonia is small because of its 1.3 million population sizes. This size is not satisfied with the companies, of course, among successful startups. However, the small domestic market gives the shot to steer companies towards extending the business to other markets. Fortunately, Estonia and the proximities belong to the European Union, where the hurdle of commercial actions is quite low. Although the domestic Estonian market size is not beneficial, it could be the weakness of the environment turned into gaining the competence of the business.

Along with questions based on the Entrepreneurial Ecosystem, the interview asked the uniqueness of the Estonian startups, namely, ICT sectors. In particular, the specificity of Estonian ICT startups, what made the difference. There is no specific strength for the Estonian I.T. sector than other countries regarding the other IT-developed countries, such as the U.S, Israel. However, the success story and reputation of Estonian I.T. companies spread out increasingly. That results in the inflow of high potential people or much more investments into Estonian companies. It can eventually form a further strong specialty in the ICT sectors. The current position is not comfortable, so it is needed to push up.

Overall, the elements of the Entrepreneurial Ecosystem of Estonia have been perceived positively. Both the systemic conditions as the central actor and the framework conditions as a tuner of the interaction are well-equipped essential functions, as some entrepreneurial report showed (Acs et al., 2019; *Countries - With the Top Startups Worldwide | Startup Ranking*, 2021; *GEM Global Entrepreneurship Monitor*, 2016; *The State of European Tech*, 2020). However, challenges have

been perceived from their interviews and the previous literature contributions in detail level. Most of the systemic conditions are the continuous growth for companies, financial support, available knowledge resources, supply of skilled talents, and more.

Conclusion and suggestions

This paper investigates the Estonian Entrepreneurial Ecosystem based on an interview with several ICT startups. Results of interviews discover answers to established research questions. The view of the Estonian Entrepreneurial Ecosystem is perceived positively for successful startups to validate their business model. Regarding all elements in the model, the Estonian Entrepreneurial Ecosystem has been improved for producing valuable startups, as previous literature has revealed (Kshetri, 2014; Mets, 2017; Trabskaja & Mets, 2019). The Entrepreneurial Ecosystem in Estonia facilitates the starting of new business thanks to a set of conditional factors.

In systemic conditions, the empirical part observed the co-evolution of elements (Stam & van de Ven, 2019). For example, the network of Ecosystems works effectively to gain other necessities for startups. Once the startup is on the radar of supporters like Startup Estonia, they have the opportunity for access to the funds, professional service, experts on specific domains, unknown talents. Most systemic conditions in the Estonian Ecosystem function by lowering the hurdle to start a new business. Framework conditions also worked well in the Ecosystem. The culture and formal institution (government) of Estonia are supportive of the startups. Infrastructure is well equipped, and the Estonian market is growing. Estonian Entrepreneurial Ecosystem has been paid attention to because the Ecosystem functions efficiently, formed in thirty years. Estonian startup ecosystem can be used as a marketing tool. This will draw new talent, expertise, and resources and expand existing networks and create new programs to aid local growth (Velt et al., 2018). The answer to the first research question perceived support by ICT companies from the Entrepreneurial Ecosystem lies in almost all areas regarding conditions of the model.

However, the Estonian Entrepreneurial Ecosystem has weaknesses in several points. Firstly, the financial support within Estonia no longer covers startups that have grown up to some extent. A return of earlier startup success attracted many and diverse access to investments (Prohorovs, 2020). Nevertheless, the case of Estonia is opposed to the common challenge of entrepreneurial financial Ecosystem (Bellavitis et al., 2017), when the companies are matured and need a more significant investment size, such as round B investments, which range are over millions of euros,

Estonia has hardly such investors. As an Estonian company, Fits.me in the previous literature (Mets, 2018), Companies in the further investment round tend to rely on foreign investors.

Moreover, along with the investments, the ownership structure will change; it is difficult for companies to remain the leadership committed to the region. Secondly, the knowledge-based business, which is interactive with knowledge institutions, is small. Even successful startups, which are like companies in the interviewee, do not have strong incentives. The University is regarded as a professional school rather than a source of knowledge for discovery. As Trabskaja & Mets (2019) showed, Estonia is needed to adjust to a knowledge-based economy.

On the other hand, in the Entrepreneurial Ecosystem context, the element of knowledge had slightly different meanings. Knowledge is no longer means expertise knowledge alone. The ecosystems approach highlights a new type of knowledge: knowledge about the entrepreneurship process itself. About the challenges, how to design business plans and pitch ideas, and overcome the liability of newness (Lafuente et al., 2007). As some founders in Estonia did not have previous experience and knowledge, they achieved success in their businesses. In other veins, put max cap on social tax, which relieves the competition. This weakness of the Estonian Entrepreneurial Ecosystem answers the research question of why companies leave Estonia and the need for Estonian Entrepreneurial Ecosystems. Thirdly, the market in Estonia is scarce with the employee and products. The biggest concern from companies is about human resources, which companies faced competition for human resources. Companies are forced into fierce competition to obtain needed workers, especially developers in the ICT sector.

The second research question about the specificity of the Estonian ICT sector is linked with the Estonian Entrepreneurial Ecosystem. There is little advantage in the sense of technology in the Estonian ICT sector ranked seventeenth just as “good enough” level (*ITU | 2017 Global ICT Development Index*). From the perspective of companies, the technologies that Estonia possesses are not leading in the world. However, along with cultural conditions in the Entrepreneurial Ecosystem, success stories of unicorns can make a difference. Such a positive worldwide image attracts potential technology talents all over the world. It would lead to the future growth of Estonia. Considering discovered problems in the Estonian Entrepreneurial Ecosystem, there are several propositions for improvement responding to the third research question. It is desired to have larger-sized investors who can cover round B investment to maintain the motivation for startups to stay in Estonia. The Ecosystem needs to continue creating productive startups steadily to enlarge the

number and size of investors, which can cause the second wave of Skype effect that exceeds the previous one. Another problem of the Estonian Entrepreneurial Ecosystem is still in the way of a knowledge-based economy. In the case of Estonian Startups, there is less collaboration with knowledge sources except for entrepreneurial knowledge. Therefore, it is needed to promote middle-stage startups which already established business models to partner up with knowledge institutions such as universities. The third proposition is to ease the fierce competition in the Estonian labor market to employ ICT talents. Government should improve the education and immigrants law to overcome the constant shortage of labor (*How Estonia Is Solving the Shortage of ICT Specialists?* 2021; Laas, 2019). Therefore, the government needs to promote Estonia and open the doors for potential workers, increasing Estonian startups' productivity. In other veins, put max cap on social tax, which relieves the competition. This weakness of the Estonian Entrepreneurial Ecosystem answers the research question of why companies leave Estonia and the need for Estonian Entrepreneurial Ecosystems.

There are a couple of reasons why successful startups leave Estonia following the discussion as a answer for the fourth research question. The main exit reason is rooted in a lack of ownership. The companies go through the validation phase; they seek to scale up their business for future growth(Prohorovs, 2020). To achieve growth, they need to have a larger fund from the international market since it is oversized by the general Estonian investors. As seen in some cases, they have to make new companies with foreign located office, or in other cases, the board for decision making accepts people from various background, which leads to change the place. Estonian Entrepreneurial Ecosystem is well performed for early-stage and validation stage startups. However, Estonia needs to be sufficient for companies in the growth phase.

Reference

Interviews.

Peterson, B. (Research lead of FounderBeam), interview. Transcription by Kazuki Saeki, March 26, 2021.

Remm, J. (founder of reWiLD) interview. Transcription by Kazuki Saeki, April 5, 2021.

Sall, K. (Head of Global communication and Branding of Veriff) interview. Transcription by Kazuki Saeki, April 6, 2021.

Jeret, M. (CEO of NeverCode) interview. Transcription by Kazuki Saeki, April 6, 2021.

Gnibada, R. (COO of Stebby) interview. Transcription by Kazuki Saeki, April 8, 2021.

- Laidla, M. (P.R. manager of Click & Grow) interview. Transcription by Kazuki Saeki, April 1, 2021.
- Jansons, K. (CEO of MINDTITAN) interview. Transcription by Kazuki Saeki, April 4, 2021.
- Acemoglu, D., Johnson, S., & Robinson, J. (2004). *Institutions as the Fundamental Cause of Long-Run Growth* (No. w10481; p. w10481). National Bureau of Economic Research. <https://doi.org/10.3386/w10481>
- Acs, Z. J., & Armington, C. (2004). The impact of geographic differences in human capital on service firm formation rates. *Journal of Urban Economics*, 56(2), 244–278. <https://doi.org/10.1016/j.jue.2004.03.008>
- Ács, Z. J., Autio, E., & Szerb, L. (2014). National Systems of Entrepreneurship: Measurement issues and policy implications. *Research Policy*, 43(3), 476–494. <https://doi.org/10.1016/j.respol.2013.08.016>
- Acs, Z., Szerb, L., & Autio, E. (2019). The Global Entrepreneurship Index. In Z. Acs, L. Szerb, & E. Autio, *Global Entrepreneurship and Development Index 2019* (pp. 19–38). Springer International Publishing. https://doi.org/10.1007/978-3-319-63844-7_3
- Alvedalen, J., & Boschma, R. (2017). A critical review of entrepreneurial ecosystems research: Towards a future research agenda. *European Planning Studies*, 25(6), 887–903. <https://doi.org/10.1080/09654313.2017.1299694>
- Aoyama, Y. (2009). Entrepreneurship and Regional Culture: The Case of Hamamatsu and Kyoto, Japan. *Regional Studies*, 43(3), 495–512. <https://doi.org/10.1080/00343400902777042>
- Arrow, K. J. (1962). *Economic Welfare and the Allocation of Resources for Invention* | SpringerLink. https://link.springer.com/chapter/10.1007%2F978-1-349-15486-9_13

- Arthur, B. (2013). Complexity Economics: A Different Framework for Economic Thought. *CFA Digest*, 43(4), dig.v43.n4.70. <https://doi.org/10.2469/dig.v43.n4.70>
- Auerswald, P. E., & Dani, L. (2017). The adaptive life cycle of entrepreneurial ecosystems: The biotechnology cluster. *Small Business Economics*, 49(1), 97–117. <https://doi.org/10.1007/s11187-017-9869-3>
- Autio, E., & Thomas, L. D. W. (2014). *Innovation Ecosystems*. Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199694945.013.012>
- Baller, S., Dutta, S., & Lanvin, B. (2016). *The Global Information Technology Report 2016: Innovating in the Digital Economy*. <https://www.deslibris.ca/ID/10090686>
- Bellavitis, C., Filatotchev, I., Kamuriwo, D. S., & Vanacker, T. (2017). Entrepreneurial finance: New frontiers of research and practice. *Venture Capital*, 19(1–2), 1–16. <https://doi.org/10.1080/13691066.2016.1259733>
- Bogaert, S., Bosma, N., Edwards, N., Jaspers, F., Jong, J. P. J., Stam, E., & van Witteloostuijn, A. (2011). Ambitious Entrepreneurship. A Review of the State of the Art. *Social Indicators Research - SOC INDIC RES*.
- Boschma, R. (2015). Towards an Evolutionary Perspective on Regional Resilience. *Regional Studies*, 49(5), 733–751. <https://doi.org/10.1080/00343404.2014.959481>
- Bramwell, A., Nelles, J., & Wolfe, D. A. (2008). Knowledge, Innovation and Institutions: Global and Local Dimensions of the ICT Cluster in Waterloo, Canada. *Regional Studies*, 42(1), 101–116. <https://doi.org/10.1080/00343400701543231>
- Cavallo, A., Ghezzi, A., & Balocco, R. (2019). Entrepreneurial ecosystem research: Present debates and future directions. *International Entrepreneurship and Management Journal*, 15(4), 1291–1321. <https://doi.org/10.1007/s11365-018-0526-3>

- Cohen, W. M., & Levinthal, D. A. (1989). Innovation and Learning: The Two Faces of R & D. *The Economic Journal*, 99(397), 569. <https://doi.org/10.2307/2233763>
- Countries—With the top startups worldwide | *Startup Ranking*. (2021). StartupRanking. <https://www.startupranking.com/countries>
- Dautovic, G. (2021, February 10). The 20 Most Important Startup Statistics (2021 List). *Fortunly*. <https://fortunly.com/statistics/startup-statistics/>
- ERR, E. N. |. (2019, November 27). *Prime minister asks startups to stay in Estonia*. ERR. <https://news.err.ee/1007641/prime-minister-asks-startups-to-stay-in-estonia>
- Estonia gets its sixth unicorn: Zego*. (2021, March 10). Invest in Estonia. <https://investinestonia.com/estonia-gets-its-sixth-unicorn-zego/>
- Etzkowitz, H., & Leydesdorff, L. (1995). *THE TRIPLE HELIX---UNIVERSITY-INDUSTRY-GOVERNMENT RELATIONS: A LABORATORY FOR KNOWLEDGE BASED ECONOMIC DEVELOPMENT*. https://www.researchgate.net/publication/241858820_The_Triple_Helix_-_University-Industry-Government_Relations_A_Laboratory_for_Knowledge_Based_Economic_Development
- Feld, B. (2012). *Startup communities: Building an entrepreneurial ecosystem in your city*. John Wiley & Sons, Inc.
- Feldman, M. P. (2014). The character of innovative places: Entrepreneurial strategy, economic development, and prosperity. *Small Business Economics*, 43(1), 9–20. <https://doi.org/10.1007/s11187-014-9574-4>

- Feldman, M., & Zoller, T. D. (2012). Dealmakers in Place: Social Capital Connections in Regional Entrepreneurial Economies. *Regional Studies*, 46(1), 23–37.
<https://doi.org/10.1080/00343404.2011.607808>
- Fritsch, M., & Wyrwich, M. (2014). The Long Persistence of Regional Levels of Entrepreneurship: Germany, 1925–2005. *Regional Studies*, 48(6), 955–973.
<https://doi.org/10.1080/00343404.2013.816414>
- Gartner, W. B. (1989). “Who Is an Entrepreneur?” Is the Wrong Question. *Entrepreneurship Theory and Practice*, 13(4), 47–68. <https://doi.org/10.1177/104225878901300406>
- GEM Global Entrepreneurship Monitor. (2016). GEM Global Entrepreneurship Monitor.
<https://www.gemconsortium.org/report/gem-2016-2017-global-report>
- Granovetter, M. (1992). Economic Institutions as Social Constructions: A Framework for Analysis. *Acta Sociologica*, 35(1), 3–11. <https://doi.org/10.1177/000169939203500101>
- Henfridsson, O., Bygstad, B., Norwegian School of IT, & University of Oslo. (2013). The Generative Mechanisms of Digital Infrastructure Evolution. *MIS Quarterly*, 37(3), 907–931. <https://doi.org/10.25300/MISQ/2013/37.3.11>
- How Estonia is solving the shortage of ICT specialists?* (2021, March 4). Education Estonia.
<https://www.educationestonia.org/how-estonia-the-pisa-leader-is-solving-the-shortage-of-ict-specialists/>
- Howells, J. (2006). Intermediation and the role of intermediaries in innovation. *Research Policy*, 35(5), 715–728. <https://doi.org/10.1016/j.respol.2006.03.005>
- Isenberg. (2010, June 1). The Big Idea: How to Start an Entrepreneurial Revolution. *Harvard Business Review*. <https://hbr.org/2010/06/the-big-idea-how-to-start-an-entrepreneurial-revolution>

- Isenberg. (2011). *The Entrepreneurship Ecosystem Strategy as a New Paradigm for Economic Policy: Principles for Cultivating Entrepreneurship*.
<http://www.innovationamerica.us/images/stories/2011/The-entrepreneurship-ecosystem-strategy-for-economic-growth-policy-20110620183915.pdf>
- ITU | 2017 Global ICT Development Index. (2017). <https://www.itu.int/net4/ITU-D/idi/2017/>
- Kerr, W. R., & Nanda, R. (2009). Democratizing entry: Banking deregulations, financing constraints, and entrepreneurship. *Journal of Financial Economics*, 94(1), 124–149.
<https://doi.org/10.1016/j.jfineco.2008.12.003>
- Klaus, S. (2013). *The global competitiveness report 2013-2014*.
http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf
- Kshetri, N. (2014). Developing successful entrepreneurial ecosystems: Lessons from a comparison of an Asian tiger and a Baltic tiger. *Baltic Journal of Management*, 9(3), 330–356. Scopus. <https://doi.org/10.1108/BJM-09-2013-0146>
- Kuratko, D. F., Fisher, G., Bloodgood, J. M., & Hornsby, J. S. (2017). The paradox of new venture legitimation within an entrepreneurial ecosystem. *Small Business Economics*, 49(1), 119–140. <https://doi.org/10.1007/s11187-017-9870-x>
- Laas, L. (2019, August 14). Jobs in Estonia—Most In-Demand Professions in 2019. *MeetFrank Blog*. <https://meetfrank.com/blog/meetfrank-insights/work-in-estonia/jobs-in-estonia-most-in-demand-professions-in-2019/>
- Lafuente, E., Vaillant, Y., & Rialp, J. (2007). Regional Differences in the Influence of Role Models: Comparing the Entrepreneurial Process of Rural Catalonia. *Regional Studies*, 41(6), 779–796. <https://doi.org/10.1080/00343400601120247>

- Lee, S. Y., Florida, R., & Acs, Z. (2004). Creativity and Entrepreneurship: A Regional Analysis of New Firm Formation. *Regional Studies*, 38(8), 879–891.
<https://doi.org/10.1080/0034340042000280910>
- Li, W., Badr, Y., & Biennier, F. (2012). Digital ecosystems: Challenges and prospects. *Proceedings of the International Conference on Management of Emergent Digital EcoSystems - MEDES '12*, 117. <https://doi.org/10.1145/2457276.2457297>
- Mack, E., & Mayer, H. (2016). The evolutionary dynamics of entrepreneurial ecosystems. *Urban Studies*, 53(10), 2118–2133. <https://doi.org/10.1177/0042098015586547>
- Malecki, E. J. (1997). *Entrepreneurs, networks, and economic development: A review of recent research*.
- Mason, C., & Brown, D. R. (2014). *ENTREPRENEURIAL ECOSYSTEMS AND GROWTH ORIENTED ENTREPRENEURSHIP*. 38.
- Mets, T. (2017). Is ICT the Solution of the Problem for Estonia? In H. Kaur, E. Lechman, & A. Marszk (Eds.), *Catalyzing Development through ICT Adoption* (pp. 273–288). Springer International Publishing. https://doi.org/10.1007/978-3-319-56523-1_15
- Mets, T. (2018). *Entrepreneurial developments toward a knowledge-based economy in Estonia. Case of Fits.me – venture-capital-backed start-up going global*. 20.
- Moore, J. (1999). Predators and Prey: A New Ecology of Competition. *Harvard Business Review*, 71, 75–86.
- North, D. C. (1990). *Institutions, Institutional Change and Economic Performance* (1st ed.). Cambridge University Press. <https://doi.org/10.1017/CBO9780511808678>
- Obaji, N. (2014). The Role of Government Policy in Entrepreneurship Development. *Sci. J. Bus. Manage*, 2, 109–115. <https://doi.org/10.11648/j.sjbm.20140204.12>

- Oh, D.-S., Phillips, F., Park, S., & Lee, E. (2016). Innovation ecosystems: A critical examination. *Technovation*, 54, 1–6. <https://doi.org/10.1016/j.technovation.2016.02.004>
- Olberding, J. C. (2002). Does Regionalism Beget Regionalism? The Relationship between Norms and Regional Partnerships for Economic Development. *Public Administration Review*, 62(4), 480–491. <https://doi.org/10.1111/0033-3352.00201>
- Prohorovs, A. (2020). Unicorn Exits as a Trigger for the Development of Small Countries' Startup Ecosystems. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3726135>
- Puddington, A., Dunham, J., Aghekyan, E., O'Toole, S., Roylance, T., & Repucci, S. (2017). *FREEDOM IN THE WORLD 2017*.
- Qian, H., Acs, Z. J., & Stough, R. R. (2013). Regional systems of entrepreneurship: The nexus of human capital, knowledge and new firm formation. *Journal of Economic Geography*, 13(4), 559–587. <https://doi.org/10.1093/jeg/lbs009>
- Raagmaa, G., & Keerbergh, A. (2017). Regional higher education institutions in regional leadership and development. *Regional Studies*, 51(2), 260–272. <https://doi.org/10.1080/00343404.2016.1215600>
- Rex, K. (2020). Education Policy Outlook: Estonia. *EDUCATION POLICY OUTLOOK*, 34.
- Romer, P. (1989). *Human Capital And Growth: Theory and Evidence* (No. w3173; p. w3173). National Bureau of Economic Research. <https://doi.org/10.3386/w3173>
- Rudden, J. (2021). *Topic: Startups in North America*. Statista. <https://www.statista.com/topics/4734/startups-in-north-america/>
- Schumpeter, J., & Opie, R. (1934). *The Theory of Economic Development*. Cambridge, Mass: Harvard University Press., 2.

- Shane, S., & Venkataraman, S. (2000). The Promise of Entrepreneurship as a Field of Research. *Academy of Management Review*, 25(1), 217–226.
<https://doi.org/10.5465/amr.2000.2791611>
- Spigel, B. (2017). The Relational Organization of Entrepreneurial Ecosystems. *Entrepreneurship Theory and Practice*, 41(1), 49–72. <https://doi.org/10.1111/etap.12167>
- Spigel, B., & Harrison, R. (2018). Toward a process theory of entrepreneurial ecosystems: Toward a process theory of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal*, 12(1), 151–168. <https://doi.org/10.1002/sej.1268>
- Spilling, O. R. (1996). The entrepreneurial system: On entrepreneurship in the context of a mega-event. *Journal of Business Research*, 36(1), 91–103. [https://doi.org/10.1016/0148-2963\(95\)00166-2](https://doi.org/10.1016/0148-2963(95)00166-2)
- Stam, E. (2015). Entrepreneurial Ecosystems and Regional Policy: A Sympathetic Critique. *European Planning Studies*, 23(9), 1759–1769.
<https://doi.org/10.1080/09654313.2015.1061484>
- Stam, E., & Spigel, B. (2016). *Entrepreneurial Ecosystems* (Working Paper No. 16–13). Utrecht School of Economics. <https://econpapers.repec.org/paper/usetkiwps/1613.htm>
- Stam, E., & van de Ven, A. (2019). Entrepreneurial ecosystem elements. *Small Business Economics*, 56(2), 809–832. <https://doi.org/10.1007/s11187-019-00270-6>
- Sussan, F., & Acs, Z. J. (2017). The digital entrepreneurial ecosystem. *Small Business Economics*, 49(1), 55–73. <https://doi.org/10.1007/s11187-017-9867-5>
- The State of European Tech.* (2020).

- Thurik, A. R., Stam, E., & Audretsch, D. B. (2013). The rise of the entrepreneurial economy and the future of dynamic capitalism. *Technovation*, 33(8–9), 302–310.
<https://doi.org/10.1016/j.technovation.2013.07.003>
- Trabskaja, J., & Mets, T. (2019). Ecosystem as the Source of Entrepreneurial Opportunities. *Foresight and STI Governance*, 13(4), 10–22. <https://doi.org/10.17323/2500-2597.2019.4.10.22>
- Van De Ven, H. (1993). The development of an infrastructure for entrepreneurship. *Journal of Business Venturing*, 8(3), 211–230. [https://doi.org/10.1016/0883-9026\(93\)90028-4](https://doi.org/10.1016/0883-9026(93)90028-4)
- Velt, H., Torkkeli, L., & Saarenketo, S. (2018). The entrepreneurial ecosystem and born globals: The Estonian context. *Journal of Enterprising Communities: People and Places in the Global Economy*, 12(2), 117–138. <https://doi.org/10.1108/JEC-08-2017-0056>
- von Hippel, E., & von Krogh, G. (2006). Free revealing and the private-collective model for innovation incentives. *R and D Management*, 36(3), 295–306.
<https://doi.org/10.1111/j.1467-9310.2006.00435.x>
- Wong, P. K., Ho, Y. P., & Autio, E. (2005). Entrepreneurship, Innovation and Economic Growth: Evidence from GEM data. *Small Business Economics*, 24(3), 335–350.
<https://doi.org/10.1007/s11187-005-2000-1>
- Zahra, S. A., Sapienza, H. J., & Davidsson, P. (2006). Entrepreneurship and Dynamic Capabilities: A Review, Model and Research Agenda*. *Journal of Management Studies*, 43(4), 917–955. <https://doi.org/10.1111/j.1467-6486.2006.00616.x>
- Závodská, A., & Šramová, V. (2018). Collaboration and Knowledge Sharing as a Key to Success of Entrepreneurial Ecosystem. In L. Uden, B. Hadzima, & I.-H. Ting (Eds.), *Knowledge*

Management in Organizations (pp. 128–139). Springer International Publishing.

https://doi.org/10.1007/978-3-319-95204-8_12

Zhang, Y., & Li, H. (2010). Innovation search of new ventures in a technology cluster: The role of ties with service intermediaries. *Strategic Management Journal*, 31(1), 88–109.

<https://doi.org/10.1002/smj.806>

Appendix 1. Interview Questions

| | |
|-------------------------------------|--|
| Network | What kind of help have you received from the public organizations (for example, EAS, RIK, PRIA, and other structural funds) or other companies from the same field (network, collaboration ...) or universities, or other possibilities? |
| Leadership | What do you think about ownership of the business? Who takes the lead? Has there ownership transition been in your company? What caused that transition? How changes affected your business? |
| Talent | Do you satisfy with the Estonian employee market? Do you have access to the needed workforce who has enough skills in Estonia? (IT skilled workers, or any job title with qualifications) |
| University | Have you ever thought or experienced collaboration with University, or are the activities only among your workers? What do you think about your business that is it deeply relevant to the scientific basis? Did academic research contribute to success in your business? |
| Finance | Which sources did you get the fund of your business? (formal/informal debt, investors, equity capital, crowdfunding, etc.) How difficult to collect or find financial support at the start of your business? |
| Knowledge | What kind of previous knowledge about the field and the business did they have before starting the company from your study fields? |
| Support services/ Intermediaries | How is the accessibility of professional services (legal, accounting, real estate, insurance, and consulting) in Estonia? Did you get any advice from some mentors/advisors, professional services, incubators/accelerators, and networks of entrepreneurial peers when you started your business? How helpful are they or not. If you did not have any advisors, why not? |
| Formal institutions | Have you ever go through conflict obstacles (disturbance) by regulations while operating the business? In addition, what type? |
| Culture | Is Estonian culture helpful to operate your business? (Tolerance for risk and failure, preference for self-employment, success stories/role models, research culture, positive image of entrepreneurship and celebration of innovation) |
| Physical infrastructure | What do you think about the importance of Estonian infrastructure for ICT, telecommunication systems? Is it enough, or you feel frustrated with the quality or quantity of them? What benefit have you ever experienced from Estonian e-government? |
| Demand | What is your view of the current Estonian market in regards to your business? How do you forecast the future of this market? |
| ICT | Have you ever thought that the specialty of ICT companies in Estonia compared to other countries? |
| RQ | Why your company (or other successful startups) left (moved their headquarter out from) Estonia? |
| Suggestion | If you have enough authority in the government (like you can push policymakers by lobbying), what kind of suggestion would you propose? |

Appendix 2. The non-exclusive license to reproduce thesis and make thesis public

Non-exclusive licence to reproduce thesis and make thesis public

I, _____KazukiSaeki_____
(author's name)
(date of birth: _____20th Novemeber 1996_____),

1. herewith grant the University of Tartu a free permit (non-exclusive licence) to:
 - 1.1. reproduce, for the purpose of preservation and making available to the public, including for addition to the DSpace digital archives until expiry of the term of validity of the copyright, and
 - 1.2. make available to the public via the web environment of the University of Tartu, including via the DSpace digital archives until expiry of the term of validity of the copyright,

The perceived effect of Estonian Entrepreneurial Ecosystem from successful Estonian ICT startups_____

(title of thesis)
supervised by _____Piia Vettik-Leemet_____,
(supervisor's name)

2. I am aware of the fact that the author retains these rights.
3. I certify that granting the non-exclusive licence does not infringe the intellectual property rights or rights arising from the Personal Data Protection Act.

Tartu, 24.05.2021