Implementing the entrepreneurial university concept in the Finnish innovation ecosystem

Case of Aalto University

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Abstract

Universities have an essential function to contribute to society and economic and social development. In recent times, governments worldwide expect universities to be more efficient, especially in the context of increased global competitiveness. The idea of the entrepreneurial university plays a central role in the triple helix model, which recognises the development of the university's role from its traditional mission to the main contributor to economic development through technology transfer from the laboratories to the market.

The research aimed to discover how a successful entrepreneurial university can be created in the regional innovation ecosystem. The researcher used as a theoretical background the OECD entrepreneurial university framework. One of the most successful Finnish universities, Aalto University, was chosen as the case study in this research.

The research method chosen in this master thesis was qualitative, using primary and secondary data. The preliminary data was gathered by conducting detailed interviews with six different stakeholders from Aalto university, representing the students, the management, the professors, the student-led entrepreneurial activities, and the university-led entrepreneurial activities.

It is concluded that there are several essential elements for creating a thriving entrepreneurial university. For example, entrepreneurship should be identified and part of the university's strategy. There is a need for a high-level commitment from all actors – students, staff, and management towards the entrepreneurial strategy. An entrepreneurial university should have a clear and coordinated system to integrate and monitor all entrepreneurial activities around the entire university. Multidisciplinary collaboration is essential for the creation of a successful entrepreneurial university. The university should also allow all staff and students to experience entrepreneurship. Internationalisation is one of the main features of an entrepreneurial university. Finally, another essential element for creating a thriving entrepreneurial university is monitoring its entrepreneurial activities and their impact on the involved stakeholders.

Keywords/tags (subjects)

Entrepreneurial university, academic entrepreneurship, Finnish innovation ecosystem, qualitative research, Aalto University

Miscellaneous (Confidential Information)

Contents

1 Introduction

"The national mission of the university is to promote Finland's success and to make a positive impact on Finnish society, its economy, technology, art, design, internationalisation and competitiveness, and to promote the welfare of humankind and the environment through high-quality research and education."

(Aalto University 2021 Annual board report and financial statement, 2021, p. 8)

In 2010 the three universities – University of Art and Design Helsinki, Helsinki School of Economics, and the Helsinki University of Technology combined into one new revolutionary university – Aalto University (Aalto University, 2020). The primary responsibility of the newly created educational institution was to reinforce Finland's innovation capacity. During the last 12 years since the establishment of the university, Aalto has built a first-class centre of knowledge and expertise, achieved through high-quality education and research (Aalto University, 2020).

In its brief life span, Aalto University has proved that it is the top university in Finland, one of the best universities in the Nordic countries, and amongst the forerunners in Europe. There are roughly 17000-22000 universities worldwide, and approximately 1000 are situated in Europe, around 70 in the Nordic countries, and 14 in Finland (Aalto University, 2021). Aalto University scores highest in Finland among different rankings and top 5 in Nordic countries (Aalto University, 2021). One could wonder how Aalto University has achieved such impressive rankings in such a short time. According to World 100 (2021), the main three critical ingredients for developing the university are a new brand that is built on the combination of three disciplines: technology, business, art and design, and their close interaction; increased autonomy of Finnish universities to hire top talent and to attract global cooperation, and last but not least, embracing students and focusing on the entrepreneurial mindset.

The main reason behind the selection of Aalto University as a case study for this master's thesis lies in the university's entrepreneurial strategy. This master's thesis aims to examine how Aalto University has managed to influence the innovation ecosystem in Finland. This chapter will deliver a thorough explanation of the research motivation for this study. In addition to all the above stated, the researcher will present the research question and the thesis' structure.

1.1 Background

Based on the latest research, entrepreneurial universities are considered to have a significant influence on developing the regional innovation ecosystem by enabling regions to be more innovative (Saha et al., 2020). Dominici & Cagnidze (2021) found that the entrepreneurial university is the essence of the continuous creative progress of the economy. Today's economy is suffering turbulence, so higher education systems worldwide find themselves under a lot of pressure. In such an intensive situation, universities and more entrepreneurial universities are primarily responsible for providing solutions and solving problems (Dominici & Cagnidze, 2021). Various research organisations have predicted sharp changes in the world economy in five to ten years. The entrepreneurial university has been seen as one of the tools to tackle these future challenges. These universities develop an entrepreneurial ecosystem and regional economy, create micro-systems around themselves and form clusters. There are difficulties in changing the currently established university models toward the entrepreneurial university model (Dominici & Cagnidze, 2021). According to Pugh et al., (2017), making universities act and think entrepreneurially is a challenge. However, some universities have proven that they are proactive and innovative and have a significant role in shaping communities and regions. One of these universities is certainly Aalto university.

Aalto University was designed to be the flagship national university (Graham, 2014). In only 12 years since its establishment, Aalto University has created an effective entrepreneurial ecosystem model that serves the local community and positively affects the region's innovation capacity. Aalto University can and should be used as a best practice for benchmarking how a university can have a significant role in developing the area and creating the innovation ecosystem (Lappalainen et al., 2015).

Aalto University is home to nearly 12 000 full-time students and 4000 staff members, which makes the university one of the largest in Finland (Aalto Executive Education Academy, 2018). Aalto University is based in Otaniemi, Espoo, Finland's second-biggest city. Otaniemi is the Silicon Valley of Finland – in the relatively small area of 4km^2 there are 25 other research centres and higher education institutions, such as VTT research and Laurea University of Applied Sciences amongst many others (Graham, 2014).

Lappalainen et al. (2015) concluded that the Finnish economy experienced difficult times after the financial crisis in 2008 and the European debt crisis in 2010. The early 2010 were disruptive years for the Finnish economy, and entrepreneurship was seen as a possibility to diversify the Finnish economy and support new businesses (Lappalainen et al., 2015). The establishment of Aalto has been seen as a direct effort to promote innovation and entrepreneurship through multidisciplinary education and research (Lappalainen et al., 2015).

One cannot help but wonder how Aalto has become such an entrepreneurial university and what was the main drive behind this achievement. Two major factors influenced the emergence of an entrepreneurial ecosystem at Aalto. The first and by far most important factor were the student-led initiatives. The second factor was merging the three previous universities into one new. Aalto University was born from the government initiative to develop entrepreneurship in the region and become a home to innovation. (Graham, 2014, p. 51).

Aalto University has a unique approach to entrepreneurship. The senior management has played a crucial role and has supported all entrepreneurial activities since the establishment of the university. Remarkably, the management supported all activities without even having an explicit university policy on entrepreneurship back when Aalto University was created. Their explicit goal has been to support and develop the regional entrepreneurial ecosystem from the beginning. Aalto's management concentrated on providing support to local start-ups rather than thinking only about the university's IP (intellectual property) and investment return. (Graham, 2014, 55.)

Fostering entrepreneurship is Aalto's core responsibility. Entrepreneurship infuses everything at Aalto. The example of the university is respected and well known worldwide. MIT (The Massachusetts Institute of Technology) appraised "Aalto's ecosystem among the top 5 rising stars in the world" in 2014 (Technopolis, 2015, p.1). Another recognition of Aalto's success is the 30th place in 2022 in the young university rankings. This ranking is relevant for universities which are 50 years or younger. Amongst the Nordic universities, Aalto is the first one to be selected for this ranking. (Aalto University, 2022.)

1.2 Motivation for the research

The initial motivation for this research arises from the author's interest. The topic of the thesis and the research focus was changed since its initial plan. After participating in the JAMK Leadership program in Silicon Valley in 2019, the author developed a profound interest in the topic of entrepreneurial university and the impact of academic entrepreneurship as a key success factor in the region's innovation ecosystem development. Reichert (2019) draws a conclusion that our society requires technological, scientific and social innovations to be able to respond to the current and upcoming challenges. In his view, the cooperation between universities and their regional stakeholders will lead to the required solutions. Therefore, the author aims to contribute in the research field of the shifting role of the university nowadays and its influence on the regional innovation ecosystem.

Prior to the trip to Silicon Valley the author had to write a short pre-assignment and compare the research universities and the entrepreneurial environment in Silicon Valley and the author's country of origin – Bulgaria. The initial idea of this Master thesis was to prepare a benchmarking study of Silicon Valley and how the lessons learned can be transferred and implemented in Bulgaria. However, Silicon Valley is known as the mega of innovations and furthermore famous for technology disruptions. Silicon Valley is the place where innovations happen all the time and this is for a valid reason. Silicon Valley has many assets that have contributed to the formation of this unique place: In Silicon Valley are some of the biggest technology companies in the world, top-notch research universities, access to capital and an inspiring entrepreneurial culture (Deloitte University Press, 2016). The author realized that the transfer of knowledge from Silicon Valley to Bulgaria will be very challenging due to the lack of all above listed unique assets in Bulgaria. The author concluded that the benchmarked university had to come from a country which had some similarities to Bulgaria – a country which is situated in Europe, has a smaller population, and where the entrepreneurship and entrepreneurial university is a new concept which is still being developed. Aalto University was quickly chosen as a case study by the author – the main reasons behind were the physical proximity for the author to Otaniemi and the fact that the author has studied and lived in Finland for over 10 years. Furthermore, Aalto University (2021) see themselves as a global promoter of entrepreneurship. The initial research idea of the author was to make a comparison between Finland and Bulgaria's innovation ecosystems and study the role

of the entrepreneurial university in the creation of the regional innovation network. After further analysis, the research focus of this Master thesis was narrowed down only to Finland and the Finnish Innovation Ecosystem and the role of the entrepreneurial university in it. This study aims to examine best practices of academic entrepreneurship in Finland and use those as a guidebook that can be implemented in any other country.

1.3 Research questions

This Master's thesis focuses on the establishment of Aalto University as an entrepreneurial university. The researcher wants to investigate the university's role in the regional innovation ecosystem and its importance in creating a flourishing innovation ecosystem. The research question of this master's thesis is only one and therefore:

How to create a successful entrepreneurial university in the regional innovation ecosystem?

1.4 Structure of the thesis

This master's thesis comprises of five different chapters. Section one describes the background and the research motivation for engaging with this topic. Chapter two concentrates on the available literature review and examines key concepts which are relevant for the understanding of the topic of this research. The author starts from the wide concept of the innovation ecosystem, goes through the Finnish innovation ecosystem, describes the Triple helix model of innovation and the Entrepreneurial University, and finishes with the theoretical structure built on the OECD framework of the entrepreneurial university. Chapter three defines the research methodology and describes step by step each part of the research process, from questionnaire preparation, over data collection and ending with analysis. Chapter four describes the outcomes of the performed qualitative research – in-depth interviews with various stakeholders – professors, students, and university management staff. The findings of the research and the answer to the research question is described in chapter five, further to that the researcher summarises the limitations that occurred during the research process and proposes recommendations for further research.

2 Literature review

In this chapter, the researcher describes the essential concepts for understanding this master's thesis topic, starting with the essence, and giving an overview of the innovation ecosystem and its leading players on a general level. Further on, the Finnish Innovation ecosystem is described, covering the main players and key milestones and achievements that have brought Finland to its position as an innovation forerunner. Additionally, this chapter covers the triple helix model and its players and describes their importance in creating an innovation ecosystem. Finally, the chapter describes the idea behind the term entrepreneurial university and describes the OECD theoretical framework for creating one.

2.1 Innovation ecosystem

Before trying to understand the concept of an innovation ecosystem, one should try to understand the meaning of the word innovation. Innovation is defined in the dictionary as something new and revolutionary that changes existing product, service or field (Innovation Definition and meaning, 2022).

According to Reichert (2019), innovation is one of the most important words in our times. Since Europe is facing challenging times ahead, innovative solutions will be more critical in resolving them. According to the European Commission (2018) our society can progress and move ahead only as fast as it can innovate. According to Cooke (2002), in our globalised word, innovation can be used as a main tool for gaining a competitive advantage. To conclude, innovation will significantly contribute to our society's economic and social progress. For this reason, different countries, governments, and corporations are trying to promote innovation and develop better systems to enable its growth.

How does innovation happen, and what supports the development of this process? The reader will be familiarised with the concept of the innovation ecosystem. This concept has gained popularity during the last 15 years. However, the definition of the concept is somehow ambiguous, and it requires a more explicit explanation (Granstrand, 2020).

"*An innovation ecosystem is the evolving set of actors, activities, and artifacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors*"

(Grandstrand, 2020, p. 1)

The concept of a "business ecosystem" was first introduced by Moore already in 1993. According to Moore, effective businesses are the ones that progress fast and efficiently, but these businesses cannot evolve on their own. These businesses need to attract various resources such as capital, partners, service providers, network, and clients to flourish. (Moore 1993, p.75.) Another early definition of the terms comes from Hannan and Freeman already in 1989. Hannan and Freeman had interest in this topic because they understood the importance of the effects of the environment on an organisation and its development. They wanted to understand the forces that shape the structure of an organisation over a long period. (Hannan & Freeman 1989, p. 2.)

One of the first persons to address the term innovation ecology in 2008 was William Wulf. He looked at an economy from an organic perspective. He used the term to explain how different factors interrelate in the American economy to improve the capability to innovate. (Wulf, 2008).

Innovation ecosystem is defined as the combination of various factors that contribute to the creation of innovation (Millard, 2018). Therefore, an innovation ecosystem includes various players such as government, universities, research centers and facilities, investors, entrepreneurs, coaches, mentors and many more actors (Millard, 2018, para. 5). Each of these players has an enormous role in creating the ecosystem and enables new ideas to be brought into reality (Millard, 2018).

According to Reicher (2019), an innovation ecosystem is an interaction between organisations to optimise access and absorption of relevant knowledge. Innovation ecosystems are interdependent systems and rely on dense interaction between the different actors (Reichert, 2019).

Talking about innovations and innovation ecosystems, one might immediately think about Silicon Valley. Silicon Valley is known as the home to some of the biggest technology companies and start-up heaven. Silicon Valley is the place where innovations happen all the time. According to

Munroe (2009), the uniqueness of Silicon Valley lies in its innovation ecosystem. The critical elements of the Silicon Valley innovation ecosystem are as follows: high number of top-class research universities, entrepreneurs and vibrant entrepreneurial culture, investment capital, workforce (Munroe, 2009).

Furthermore, Munroe describes the innovation ecosystem as a unique living creature which converts new ideas into innovative products and services. Moreover, Munroe (2009) continues that, “like any biological ecosystem”, a thriving innovation ecosystem is dependent on the constant evolvement and improvement of these fundamentals and their connection (Munroe, 2009).

According to Ketonen-Oksi & Valkokari (2019) the importance of continuous interaction between the various actors of the innovation ecosystem is more significant than ever for the creation of a dynamic and practice-oriented view on innovation. From all previous definitions it is already clear that the innovation ecosystems consist of numerous players that interact together, and their aim is to bring additional value though their cooperative activities (Oskam et al., 2020).

Who are the main actors in an innovation ecosystem? Nowadays, the Silicon Valley is one of the most important and worldwide best-known innovation ecosystems that has been taken as an example and benchmark for other innovation systems around the world such as Tel Aviv in Israel and Bangalore in India (Oksanen & Hautamaki, 2014). Therefore, the ecosystem actors of the Silicon Valley are taken as an example in this chapter and described in depth. According to Munroe (2011) the ecosystem model consists of seven key pillars (see Figure 1).

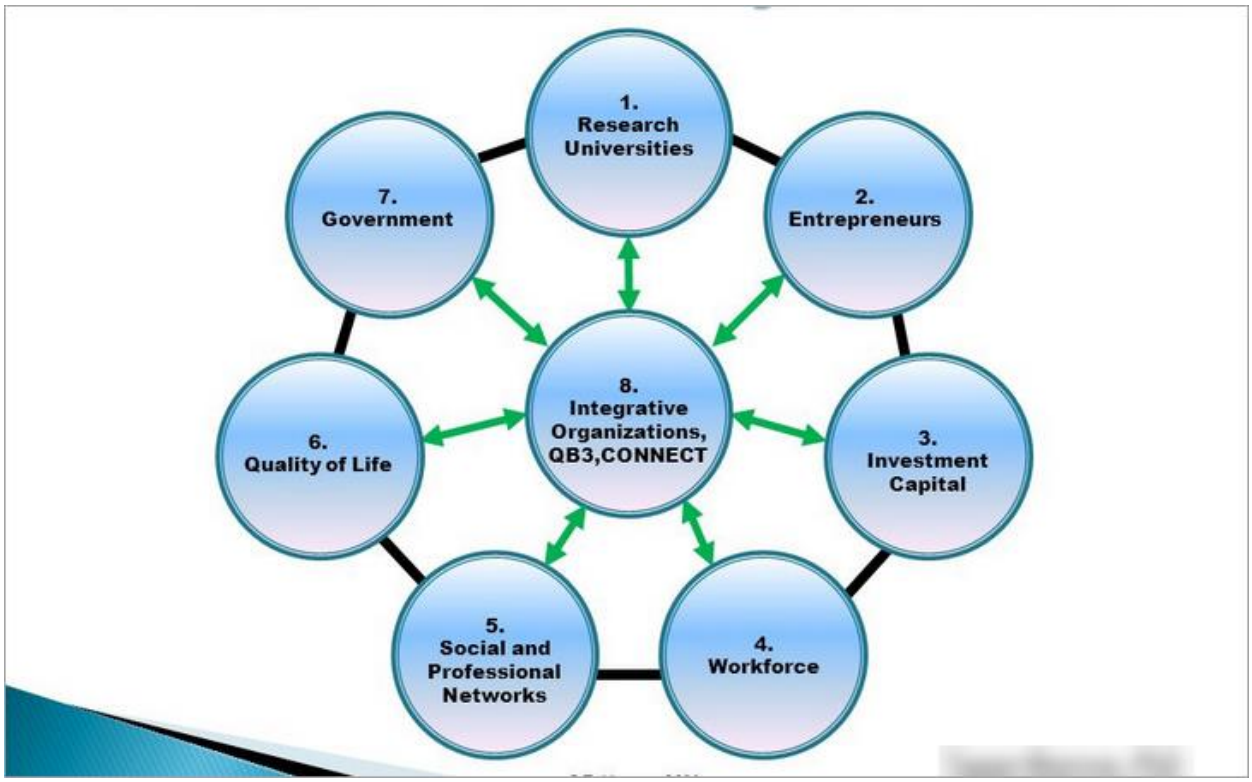

Figure 1. The Innovation Ecosystem Model (Munroe 2011, slide 2)

According to Munroe (2009) the first and maybe even the most important component of the innovation ecosystem is the research university. Furthermore, Munroe (2009) states that the research universities play enormous role in an innovation economy in various ways: generation of intellectual property, supporting faculty members to make the most of their innovations, providing educated and talented workforce to the businesses, providing innovators with laboratories and equipment and not on the last place for enabling continuous dialog between industry, faculty, and students.

The second element of the innovation ecosystem are the entrepreneurs (Munroe, 2009). Munroe compares the entrepreneurs with the biological host of the ecosystem. Entrepreneurs are the ones that enable new ideas reaching the market. They are the ones willing to take the risk and make a commitment towards innovation. Therefore, an entrepreneurial mindset is crucial for a successful innovation ecosystem (Munroe, 2009).

The third component of the innovation ecosystem is the investment capital. According to Munroe (2009), almost no start-up can have the financial capacity to grow to world-class technology company without the financial support of investors at the beginning stage, which is the most important one in their growth curve. Investors are not only the primary source of money, but also can offer technical and business expertise, and valuable connections to resources and people (Munroe, 2009).

According to Munroe (2009), the fourth cornerstone of the innovation ecosystem is the labor force. Educated and skilled people are one of the main requirements for building successful businesses.

The fifth element that is significant for the formation of the innovation ecosystem is the social and professional networks (Munroe, 2009). Information is as valuable as capital when companies are aiming to enter the competitive global market. Information can be accessed via various channels – using official and casual networks.

According to Munroe (2009), the sixth element of the innovation ecosystem is the quality of life. Quality of life is crucial, supporting elements of an innovation ecosystem. Innovation ecosystems consist of humans, and they all appreciate a safe and clean world-class lifestyle. Munroe believes, for example, that the climate, lifestyle, and nature in the Bay area have been the main reason behind the valley's establishment, development, and continuous success (Munroe, 2009).

Finally, the seventh pillar of the innovation ecosystem is the government. Creating favorable conditions and environment for innovation is a challenge for any government around the globe. This process requires long-term planning, widespread structural changes, and systemic view (Oksanen & Hautamaki, 2014). The government creates “the rule of the game” as it shapes a nation’s innovation system. The government policy makers and regulators are the key components of innovation systems as they shape the outcomes (Fransman, 2018). As stated, earlier innovation does not happen on its own and in a vacuum. Behind each innovation stands a whole set of institutions, described as a national system of innovations who are regulated by the government (Fransman, 2018). As we can see the role of the government is major on the creation and existence of an innovation ecosystem. In the next chapter the innovation ecosystem of Finland will

be discussed in more detail, and we can see the importance which the Finnish government has played for the creation of the ecosystem and its success over the years.

2.2 Finnish innovation ecosystem

"…the only truly sustainable advantage comes from out-innovating the competition."

(Moore, 1993), *p.75*

How can a small Nordic country like Finland out-innovate its competitors to gain sustainable advantage? A question to which apparently Finland has found the correct answer considering the Finland's ranking in the Global Competitiveness report for 2019 and the entire last decade.
The competitive index 4.0 report evaluates national competitiveness (Schwab, 2019). The Global Competitiveness Index 4.0 is a combination of 103 indicators which are divided into 12 sub-sections. Some of the evaluated areas are market size, ICT adoptions, employees' skill, country's infrastructure, public institutions stability and various others. Finland has been ranked as number eleven out of 141 countries in 2019 (see Figure 2). More detailed assessment of the ranking is available in Figure 3 (see Figure 3). The report emphasizes that Finland's assets are based on economic stability, safety, and the high quality of public institutions.

Rank	Economy	Score[1]	Diff. from 2018[2] Rank	Diff. from 2018[2] Score
1	Singapore	84.8	+1	+1.3
2	United States	83.7	–1	-2.0
3	Hong Kong SAR	83.1	+4	+0.9
4	Netherlands	82.4	+2	—
5	Switzerland	82.3	–1	–0.3
6	Japan	82.3	–1	–0.2
7	Germany	81.8	–4	–1.0
8	Sweden	81.2	+1	–0.4
9	United Kingdom	81.2	–1	–0.8
10	Denmark	81.2	—	+0.6
11	Finland	80.2	—	—

Figure 2: The Global Competitiveness Report 2019 (Schwab, 2019, p. xiii)

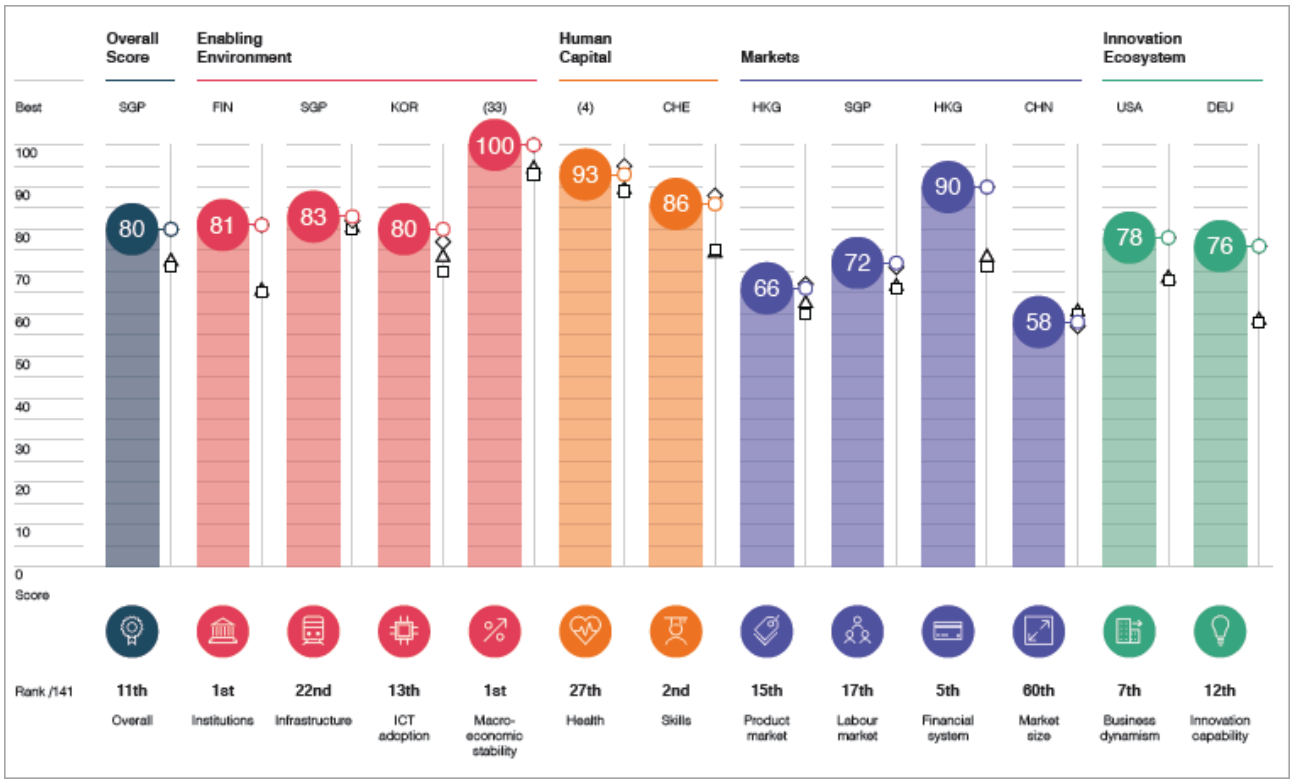

Figure 3: Finland performance overview (Schwab, 2019, p. 218)

Further indication of Finland competitiveness and very strong innovativeness can be concluded from the recent ranking of Finland in the Global Innovation Index 2021 (See Figure 4). According to the report, Finland ranks in 2021 7th place worldwide and 5th place in Europe out of 132 economies in terms of innovation ecosystem performance (GII 2021 at a glance, 2021).

GII rank	Economy	Score	Income group rank	Region rank
1	Switzerland	65.5	1	1
2	Sweden	63.1	2	2
3	United States of America	61.3	3	1
4	United Kingdom	59.8	4	3
5	Republic of Korea	59.3	5	1
6	Netherlands	58.6	6	4
7	Finland	58.4	7	5

Figure 4: Global innovation Index 2021 ranking (GII 2021 at a glance, p. 4)

To understand how one reaches the top of the ladder and remains there, we need to look at the past and understand it. For decades, the success of Finland was formed around new skills,

technology, and new knowledge. New knowledge and technologies generated via R&D activities are the main elements behind the country's economic growth (Rinkkala, 2019). Furthermore, Finland's economic and social development are considered as one of the great successes of the second half of the 20th century. This success would not have been possible without continued investment in education, research, and innovation. Finland is an excellent example of a successful change from a predominantly resource-oriented economy to a knowledge-based one. One of Finland's central areas is high-technology manufacturing. (OECD, 2017.)

According to Miettinen (2013), Finland was one of the pioneers to adopt a national innovation system between the 1990s and 2000s. At the beginning of the 2000s, Finland was working on improving its education and research system. The main goal of Finland was to build good infrastructure and create a highly educated labour force. The Finnish innovation policy relied on science and technology, which was reflected via the continuous raising of public spending in these areas (Laasonen, 2020). After 2008 a major reform took place in the Finnish innovation policy. Finland concentrated on making its innovation system resilient to shocks (such as the economic crisis in 2008) and worked on creating ways of improving fast after such periods. From 2009-to 2010, the Finnish Innovation ecosystem was reorganised by establishing six Finnish Strategic Centres for Science, Technology, and Innovation (SHOKs) (Akpinar & Qi, 2020). In 2014 the Government Research and Innovation Council raised the awareness over the flexibility of the economic structures as being the most significant for the innovation policy (Laasonen, 2020). All these incentives have empowered innovation inside the country.

The Finnish Research and Innovation council’s vision is that by 2030 Finland will be the most attractive location for innovations and research. To reach this goal, Finland will continue to build on solid ecosystems in the traditionally strong segments of the country. The government, as such, cannot oversee the management of the required ecosystem, but it can be an essential player in its creation and development. For this reason, The Ministry of Economic Affairs and Employment will collaborate with Business Finland and the Academy of Finland to create new policy instruments that include funding instruments. (Ministry of Economic Affairs and Employment of Finland, 2022.)

There was more emphasis put on entrepreneurship in the Finnish Innovation policy during the 2000s. The reason behind is that for decades large companies like Nokia have dominated the

Finnish economy and this has led to lack of diversity and as well poor commercialisation of knowledge and inventions (Laasonen, 2020). As a result, cities have been given the possibility to foster innovations and innovation-based entrepreneurship (Laasonen, 2020).

Greater Helsinki's innovation ecosystem is a clear result of fostering innovations and innovation-based entrepreneurship. With a population of only 5.5 million, a lack of central geographical location, low amount of natural resources, Finland has revealed an impressive capacity to create success stories from Nokia to Rovio and Wolt (Startup Genome, 2022). The Greater Helsinki is one of the top four emerging ecosystems for 2020, according to the Global Start-up Ecosystem report 2020. The report evaluates more than 100 factors that influence the accomplishment of a start-up innovation ecosystem. Greater Helsinki scores high in the following fields: funding, market reach, talents, and investor activities (Business Finland, 2020). The start-up conference Slush takes place in Helsinki, and it is the largest gathering of venture capital in Europe, with more than 1500 investors attending the event. The Greater Helsinki area has created four unicorns, and all the start-ups in the area generate more than 10% of all Finland's tech jobs. The success of local start-ups has attracted the interest of global investors. The area is also home to an extensive business angel network and offers public funding to start-ups via Business Finland, Finnvera, and so on. The strength of the ecosystem relies on the following sub-sectors: digital health, artificial intelligence (AI), big data and analytics and gaming (Startup Genome, 2022). The emergence of the Great Helsinki area as one of the leading ecosystems in Europe is not coincidental. The following chapter will address the reasons behind its success, analysing the Aalto University case study.

Finland succeeded in this area due to multiple factors such as: stable political environment with social-democratic society which underlines equality and inclusivity, major talent pool trained in excellent universities, strong history, and success in various technologies such as mobile and computing, courage of the university leaders to give freedom and autonomy to student led-initiatives and strong government which supports innovations with different grant and loan instruments. All these factors have contributed to the formation of hyper-collaborative start-up ecosystem that has generated many success stories already: Supercell, Rovio, Seriously, Wolt, Smartly.io, Beddit, and so on. (Järvilehto, 2019.)

According to Business Finland (2022), Finland's success is a direct result of the continued successful collaboration of all players in the country – such as the government, the universities, companies, and start-ups. The collaboration between these players is known as the triple helix model, and it will be discussed in-depth in the following subchapter.

However, despite the excellent performance of Finland in international rankings, there are also issues and challenges with the Finnish innovation ecosystem. The Finnish government was heavily criticised during the period between 2015-2019. One of the main criticisms against the government was its negative impact on the innovation policy (Laasonen, 2020). Although there have been initiatives regarding the support of start-ups and entrepreneurship, science, technology, and innovation (STI) policy has a lack of coherence and orientation in recent years (OECD, 2017). According to Rinkkala (2019), there are various threats to the Finnish Innovation ecosystem and its development. Some of the threats referred to by her are reduced overall competitiveness and export, decreased R&D spending in all areas, lack of trust in research and innovation politics, and poor consistency in decision making in innovation politics. According to Laasonen (2020) Finnish Innovation policy currently faces a lack of clearness. Some of the reasoning behind the existing confusion is a long-lasting economic crisis, coherence of innovation policy-making decisions and lack of communication between academics and policymakers (Laasonen, 2020). Finland has a broad-based innovation policy that contains a little bit of everything and includes various actors and players; this creates problems in understanding the responsibilities within the system. Today's innovation policy is complex, ambiguous, and difficult to put boundaries on (Laasonen, 2020).

Overall, one can conclude that Finland provides favourable conditions, and the economy can be renewed based on innovation and entrepreneurship. Recent reforms done by the government support employment, entrepreneurship and economic growth and aim most of all to reduce regulatory burden for business (OECD, 2017). In the next subchapter the reader will be familiarised with the collaboration between the government, academia and business and see how these actors work together to create better value for society.

2.3 Triple helix model of innovation

This subchapter will discuss the triple helix model of innovation in detail. Furthermore, the leading players of the triple helix model of the Finnish innovation system will be defined, and the researcher will look closer at the interactions between the different players. The triple helix model of innovation is a model that enables the understanding of how factors and players are affecting knowledge-based economies. The three helices: academia (universities and universities of applied science), government, and industry cooperate to create new knowledge, product, or service (Momeni, 2020). According to Etzkowitz (2003), innovation is progressively built on the interactions among the actors of the Triple helix model: university – industry – government. The concept of the Triple helix Model was firstly presented by Etzkowitz in 1993 (Ranga, 2013). The Triple helix Model is only one of the models used for clarifying regional differences in innovativeness. Opposite to other models, such as regional innovation systems and cluster theories, which emphasize the importance of the firm for the creation of regional innovativeness, the Triple helix Model stresses the critical role which universities are playing in the creation of regional innovation level. (Steiber, 2013, p. 577).

There could be different types of Triple helix configurations depending on the interactions between the different actors. The three configurations are according to Ranga (2013) (see Figure 5):

1. A *statist* configuration – meaning that the government is taking the leading position, a spearhead for the industry and the academia
2. A *laissez-faire* formation – the industry is the powerful player, and the remaining two actors have more of a supporting role: the industry is mainly used as a provider of educated human capital and the government as a regulator
3. A *balanced* establishment, in which universities are partners with government and industry and even take the leading role in joint initiatives.

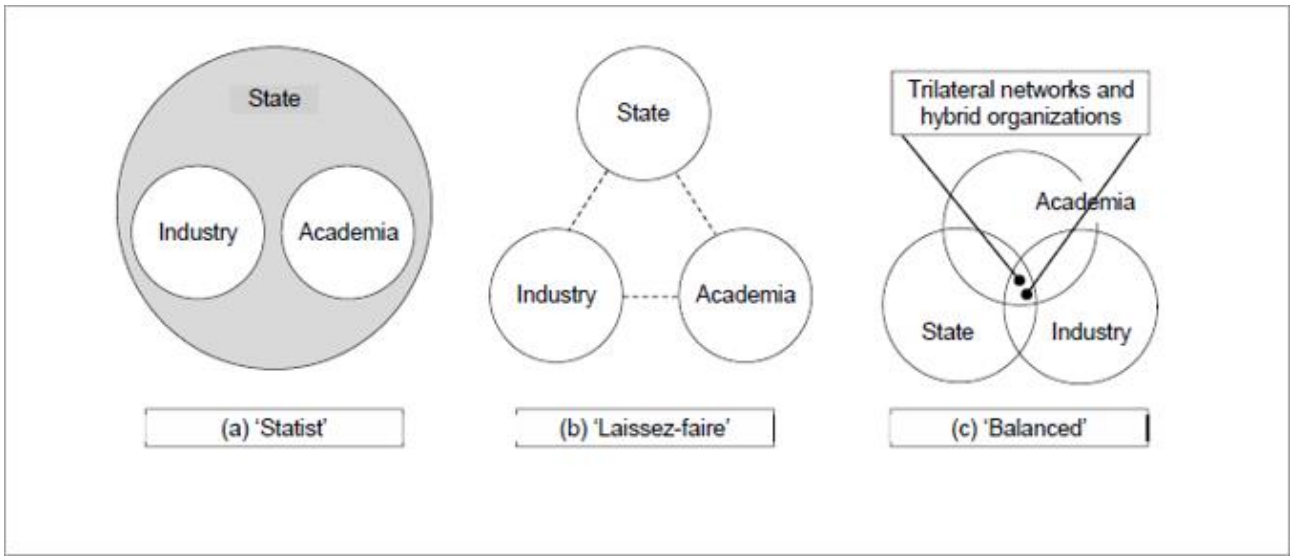

Figure 5: Three models of a triple helix (Ranga & Etzkowitz, 2013, p. 239)

According to Ranga (2013), the balanced configuration creates the best environment for innovation development and creation. This is the environment where synergies arise and mobilise the process of ”innovation in innovation” (Ranga, 2013, p. 239).

The following section will examine more closely the structure of the Triple helix Model in Finland and describe the interactions between the different actors. According to Akpinar & Qi (2020), the Finnish Innovation ecosystem is perceived as well-adjusted and cooperative consisting of different stakeholders. Some of the most important stakeholders are the Ministry of Employment and Economy, Business Finland, the Academy of Finland, the Confederation of Finnish Industries, the Finnish Innovation Fund – Sitra, and Finvera.

The Finnish Government is one of the leading contributors in the Finnish innovation ecosystem. Its direct impact can be described via the creation and management of innovation-related legislation and funding of research and development (R&D) activities. The indirect impact of the Government can be illustrated through its involvement with other public organisations that are essential for the national creation of the innovation framework. Such organisations are Sitra, the Strategic Research Council of the Academy of Finland, the Technical Research Center of Finland (VTT), Business Finland and many others. All these organisations are independent, but they collaborate with the Government to reach the desired level of national innovation success. (Akpinar & Qi, 2020, pp. 19-20.)

Sitra, also known as the Finnish Innovation Fund, is a public organisation reporting to the Finnish Parliament, responsible for building stable and balanced development of Finland (Sitra, 2020). Sitra published in 2016 Finland's' national roadmap moving towards circular economy. The Finnish Government has included Sitra's proposal as a main element of the government package (Akpinar & Qi, 2020). This is one of the examples how indirectly the Finnish government impacts the innovation ecosystem.

Another example comes from the Strategic Research Council of the Academy of Finland, an expert organisation in science and research that provides funding to first-class scientific research. It is a government agency which belongs to the Finnish Ministry of Education, Science and Culture (Academy of Finland, 2022). The academy proposes different research topics which could be valuable for the society and the government decides on the funding (Akpinar & Qi, 2020).

Another two compelling examples of the indirect impact of the Finnish government on the innovation ecosystem are VTT and Business Finland. VTT was established in 1942 and nowadays is one of the important research institutions in Europe (VTT, 2022). VTT is under the Ministry of Trade and Industry, and its main aim is to contribute to the attractiveness of Finnish companies through applied research (Akpinar & Qi, 2020). The spin-offs generated from VTT are the foundation of new businesses built on innovations (Akpinar & Qi, 2020).

The last example of indirect impact of the government is represented by Business Finland, Finnish government organisation which is involved in funding of innovation, trade and investment (Business Finland, 2022). Team Finland is a hybrid organisation which works for the development of innovation, business growth and internationalisation. Business Finland supports the growth and internationalisation of Finnish SMEs through different services such as consultancy and funding (Akpinar & Qi, 2020).

As stated in the previous chapter, the Finnish government is facing various challenges and criticism. Some of the main issues are budget cuts from R&D, lack of public sector support to small and medium size companies (SMEs) and from here a low level of entrepreneurial activities. Finnish entrepreneurs are as of the opinion that the national innovation system is owned by the

government and not established to support them. Furthermore, there is criticism that Finland has high level of bureaucracy. (Akpinar & Qi, 2020.)

The university is the next player in the Finnish Triple helix model of innovation. After the Second World War, Finland concentrated on expanding the number of educational institutions to more areas within the country rather than concentrating all only in the capital and the main cities (Jauhiainen & Suorsa, 2008). Finland has been successful with this objective as nowadays, there are 13 universities and 23 universities of applied sciences within the country. In Finland, all higher education institutions are publicly owned and managed by the Ministry of Education and Culture (Akpinar & Qi, 2020). Higher education in Finland is separated into two main areas: universities and universities of applied sciences. The significant difference between the two institutions is that universities concentrate more on scientific research and education. In contrast, applied sciences universities offer pragmatic education that gives the skills needed for working life (Fulbright Finland Foundation, 2022). The collaboration between industry and academia is very close, and often students are engaged in real work-life projects with companies. There are numerous ongoing projects between various universities and companies, and students are involved in innovation projects and traineeships and are being offered employment opportunities (Helsinki times, 2022). Big Finnish companies such as Neste donate money to universities to support further research and education as they know that their long-term success is built on innovativeness (Neste, 2021).

The last pillar of the Finnish triple helix model is represented by the industry. Finland has a small population, accounting for about 5.5 million inhabitants but relatively large size of 338 thousand square kilometers. Due to its small population, the Finnish economy is highly dependent on its exports. Most of the exported goods are shipped to EU countries, and largest trading partners are Sweden, Germany, and the Netherlands (OECD, 2020). The key industries in Finland are pulp and paper, ship building, sustainable energy, health care, information and communication technology, bioeconomy, machinery, gaming, education, and construction (Akpinar & Qi, 2020).

The Finnish industry has faced serious challenges during the last decade. For more than 15 years Nokia had a significant influence on the Finnish economy and the country’s gross domestic product (GDP). In its peak years in the 2000s, Nokia contributed for 4 percent of the Finnish GDP

(Ali-Yrkkö, 2010). Since the collapse of Nokia and learning the hard lesson on heavily relying on one multinational company, Finland has put a lot of effort on diversifying its economy and making it less dependent.

However, the Finnish industry's ability to innovate has been limited due to R&D budget government cuts (Akpinar & Qi, 2020). There are other major issues which are also causing a huge negative impact on the Finnish economy such as COVID-19 pandemic during the last 2 years. The government has provided substantial fiscal support to business and household trying to minimise the impact of the pandemic (OECD, 2020). Despite the government efforts, the pandemic has brought Finland into its deepest recession since early 1990 (OECD, 2020). Some further threats to the Finnish economy are also the exit of the United Kingdom from the EU, EU sanctions on Russia caused by the annexation of Crimea in 2014 (Akpinar & Qi, 2020). Further to all this, the recent Russian attack on Ukraine will have an additional major impact on the Finnish economy. Russia is currently facing various economic sanctions and it is evitable that the Russian economy will fall into a deep recession. There is an expected surge in energy and oil prices, and this will accelerate inflation even more causing limitations in consumptions and investments in Finland. The Finnish export to Russia will suffer because of the sanctions (Helsinki Times, 2022).

According to Akpinar & Qi (2020), the Finnish triple helix model can be summarized as following:

- Government plays the leading role in the Finnish Innovation ecosystem
- The Finnish innovation ecosystem is well-adjusted
- independent hybrid organisations such Tekes, VTT, Business Finland and so on are collaborating with the government. The government has the final word when deciding the funding, but it considers opinion of experts and academia
- Regional governments (municipalities) are empowered through innovation cities program
- R&D funding, from government goes to universities, universities of applied sciences and VTT
- Excellent collaboration between industry and academia

Akpinar and Qi (2020) advocate that more concrete actions need to be taken to promote growth-based entrepreneurship in Finland. Further support needs to be provided for the internationalisation of small and medium-sized companies. Even though there is an excellent

collaboration between universities and industry in Finland, there is much room for improvement before the effective implementation of the entrepreneurial university concept.

2.4 Entrepreneurial university

Feola et al. (2020) presents the entrepreneurial university concept as a critical requirement in the triple helix model developed by Etzkowitz, which recognizes the change of the university role from its old mission, mainly education and research towards the main contributor to economic development. This transition can be best achieved through technology transfer from the research lab to the market. The entrepreneurial university appeared as a term in the scientific literature quite late, in the end of the previous century. Initially, the term was used to define universities with enhanced instruments to promote their region's economic development and raise their incomes (Dominici & Gagnidze, 2021).

According to Etzkowitz (2013), there are three stages which a university undergoes on its way of reaching the stage of an entrepreneurial university. Over-all, each phase builds upon the previous one, but it is not necessary for a university to move from phase one to phase two and only then to reach phase three. The initial phase, also known as *University entrepreneur one,* is characterised by the fact that the university takes a strategic look of its own direction and decides its own priorities. Furthermore, in the initial stage the university raises its own financial resources via different channels such as donation and tuition fees (Etzkowitz, 2013). During the second phase or so-called *University Entrepreneur Two*, the university actively commercialises the generated knowledge, created from activities by its staff and students. In this stage universities often create technology transfer competences. The final stage or *University Entrepreneur Three*, universities often take the lead to improve the efficiency of their regional innovation environment in close collaboration with government and industry (Etzkowitz, 2013).

Universities have a significant impact on our society's development and heavily contribute to economic growth. Governments worldwide are expecting universities to be more efficient, especially in the context of increased global competitiveness (Liu & van der Sijde, 2021). Universities' role is to continue teaching and researching, and on top of that, they need to become entrepreneurial, which requires a change of structures within the university. One of the most

known scholars in the field – Clark, suggests that the entrepreneurial university should have the following: strong management that enables the university to be more adaptive, flexibility and responsiveness to external demands, diverse funding to avoid being entirely dependent only on governmental funding, integrated entrepreneurial culture (Liu & van der Sijde, 2021).

The number of university spin-offs and the time of their existence is one of the indicators assessing the effectiveness of entrepreneurial university (Dominici & Gagnidze, 2021).

For many decades, the United States has been used as an example to illustrate entrepreneurship and a vibrant and thriving entrepreneurial ecosystem. Recently, many discussions have been ongoing on how Europe can thrive in a global, complex environment through entrepreneurship. The creation of entrepreneurial spirit in Europe has become a target for European leaders and a common goal. The Entrepreneurship 2020 action plan indicated creating an ecosystem where entrepreneurs can grow and be a priority. Universities have been considered a key instrument in this renewed European strategy. The new role assigned to universities is for them to go beyond their current role of education and research and become a connecting element between new generated knowledge and industry. (Pita et al., 2021, p 2.)

The main elements for creating an entrepreneurial university are establishing an entrepreneurial environment, entrepreneurial staff and equality, important entrepreneurial teaching, and the presence of leaders with a robust entrepreneurial vision (Dominici & Gagnidze, 2021).

The entrepreneurial universities impact the creation of a regional entrepreneurial ecosystem positively. These universities create themselves microsystems and form clusters (Dominici & Gagnidze, 2021). An excellent example of a microsystem creation is Aalto University and the whole Otaniemi region in Espoo, which will be examined in this master's thesis as a case study.

2.5 Theoretical framework – OECD entrepreneurial university framework

This chapter briefly describes the Organisation for Economic Cooperation and Development (OECD) entrepreneurial university framework. The researcher builds the theoretical structure for the empirical study of this master's thesis based on the OECD framework. As stated in the previous chapter, universities are challenged more than ever to continue teaching and researching and

provide more to society and the economy. The creation of an entrepreneurial university is considered very significant and strategic for the progress and competitiveness of the European economy. For that reason, OECD, in collaboration with the European Commission, has prepared a guiding framework for entrepreneurial universities.

The term entrepreneurial university has not been commonly agreed upon, and there are numerous efforts from researchers to outline the term in the scientific literature. Several features of the entrepreneurial university have been recognised commonly, and therefore, the OECD theoretical framework has been built around these standard features (European Commission & OECD, 2012). The typical features of the entrepreneurial university are divided into seven different fields (See Figure 6).

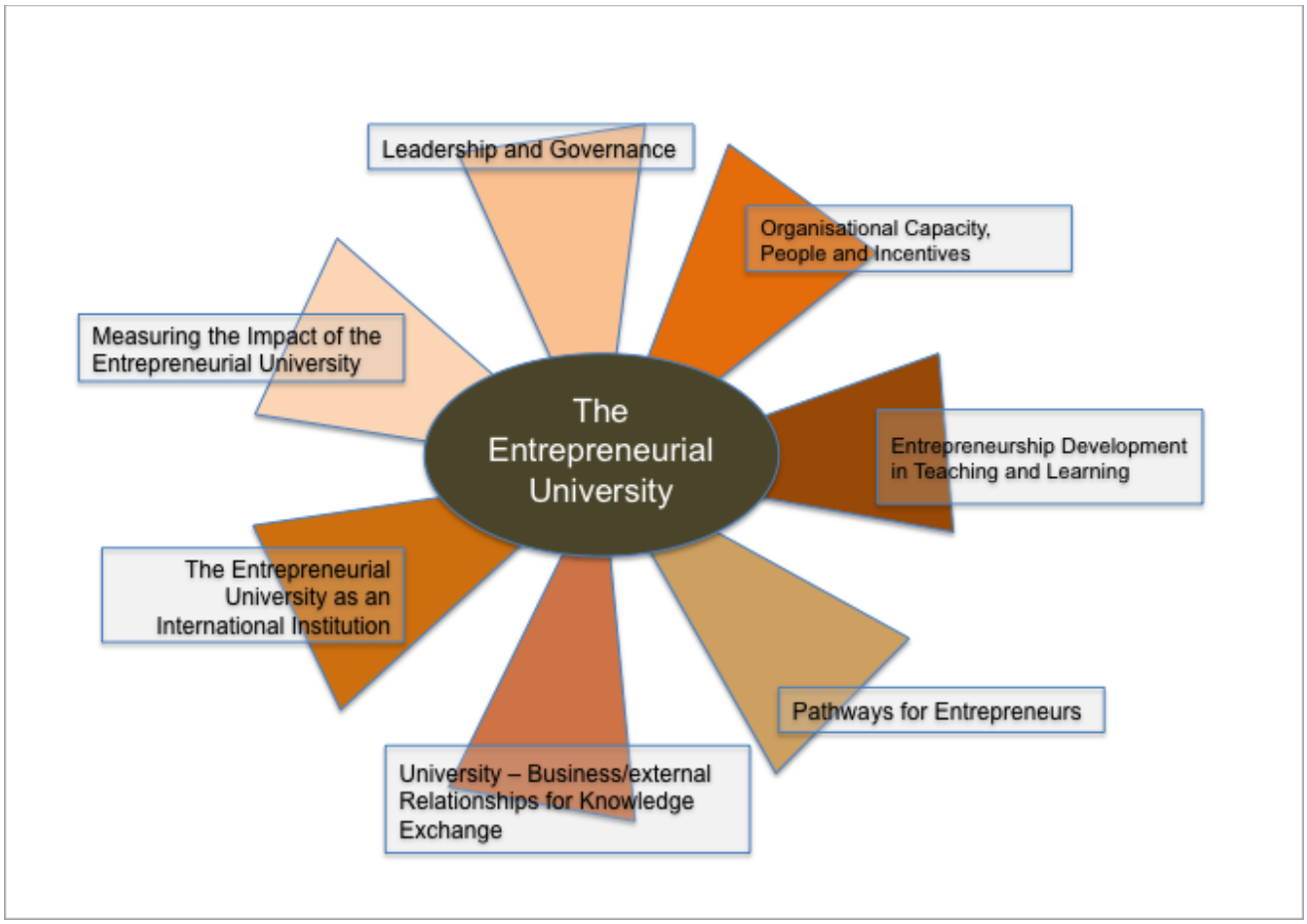

Figure 6: A guiding framework for entrepreneurial universities (European Commission & OECD, 2012, p.1)

Leadership and Governance

The first chapter of the OECD report investigates the features related to leadership and governance of a university. A university needs much more than a mission statement on its web page to become entrepreneurial. Long-standing strategy which builds upon entrepreneurial culture and entrepreneurial activities is a necessity. It is recommended that the strategy has exact aims for entrepreneurship defined by specific indicators. There could be several different indicators, such as: generating entrepreneurial competencies and skills amongst the staff and the students; supporting the creation of start-ups, commercialising research over a technological transfer, generating revenue for the institutions from spin-off activities, and strengthening collaboration amongst the university and the local companies and so on. Further to that, the entrepreneurial strategy of the university should be communicated across the institution. Therefore, the university should put a particular emphasis on communication efforts. It is also essential that one of the leading figures within the university, such as the Rector, Dean, or other managerial staff, is personally involved and responsible for the creation and development of the entrepreneurial agenda of the university. Another critical element is the need for a coordinating body between all university departments to supervise the work and avoid duplication of work. The OECD framework also emphasises the importance of low bureaucracy within the university. Entrepreneurship thrives when there are fewer barriers or hierarchies within the institution. The freedom enables entrepreneurial activity and speeds up idea creation and decision making. Finally, the university should be a key player in the regional entrepreneurial ecosystem. The university should be active and present in the community. Its actions should be visible and guide the direction for developing entrepreneurship within the local community. (European Commission & OECD, 2012. p. 4-5.)

Organisational capacity, people and incentives

For a university to successfully carry out its entrepreneurial activities, the institution needs to minimise its organisational constraints. This includes multiple aspects, for example, financial strategy, hiring and keeping the right staff and increasing business behaviour amongst their students and staff. Universities should not be over-reliant on governmental funding. They should expand their financing and diversify it as much as possible – for example, and they should provide

services to companies or share facilities. The university needs a long-term entrepreneurial strategy and long-term financial strategy that will allow consistent funding for entrepreneurial activities. Significantly, staff and students from across the organisation collaborate, and this consecutively will lead to the creation of a successful entrepreneurial university. The collaboration can be enabled through interdisciplinary programs, cross-faculty teaching and research groups. Universities must hire and retain staff with entrepreneurial backgrounds who can share their knowledge and experience with others and influence the entrepreneurial culture even more. Universities should also be responsible for keeping their staff well trained and updated. The entrepreneurial agenda is constantly moving, and the university staff would need continuous training and upscaling to keep up with all trends. Universities should encourage entrepreneurial behaviour of their staff and students, which could be done by actively acknowledging all the efforts and rewarding them. (European Commission & OECD, 2012. p. 6-7.)

Entrepreneurship development in teaching and learning

A university must have unique structures that deliver entrepreneurial learning. To be successful, a university could create positions such as professor of entrepreneurship. Senior staff should be closely in control of the entrepreneurial activities and be actively involved in the strategy formation. Some more proactive universities even have student ambassadors of entrepreneurship. It is also crucial that the teaching happens via different tools and instruments and not only traditional teaching through lectures. Students respond differently to various methods, and therefore it is good to experiment with diverse teaching methods, for example - mentoring, living labs, and cross-disciplinary learning. Students can also create their own companies, learn from this experience, participate in competitions, and run clubs. Universities committed to providing good quality entrepreneurial education are regularly reviewing the content of their courses and are constantly striving for improvement. Universities often do not fully explore collaboration with the external environment. To score highly, a university should cooperate and constantly interact with external stakeholders and regional players. (European Commission & OECD, 2012. p. 8-9.)

Pathways for entrepreneurs

Becoming an entrepreneur is not a one-time event but a continuous development. Therefore, universities need to support the students and the staff in becoming entrepreneurs. This process requires time and often much support.

The university needs to raise awareness amongst its staff and students about developing entrepreneurial abilities. Furthermore, universities should provide occasions for their staff and students to be entrepreneurs. This could include the following activities: staff training, collaboration on projects with entrepreneurs, and so on. Having an idea is the first step to becoming an entrepreneur, but bringing this idea to the market requires time, money, and effort. Therefore, universities should provide a range of support services and opportunities. Mentorship programs are also valuable and can bring real-life experience from entrepreneurs to students. To be successful, universities could consider the need to provide mentorship or another sort of consultation services to their students, alumni, and staff. Universities should also enable private financing for the students and staff that are following their entrepreneurial dream. This can be achieved via dedicated financial events, where entrepreneurs can pitch their ideas to investors. Business incubators are essential for the creation of new start-ups and spin-offs. To score highly, universities should provide business incubators to their staff and students with free premises, laboratories, research facilities, available mentors and business consultants, and access to finance. (European Commission & OECD, 2012. p. 10-11.)

University – business relationships for knowledge exchange

The successful entrepreneurial university has a wide range of involvement with various external stakeholders. Building and sustaining contacts with stakeholders is significant for discovering the university's full potential. The most important external stakeholders' relationships are with the public sector, industry, and alumni. The university should commit to exchanging knowledge and research with companies and the public sector, which must be part of the university's internal policy. There should be guidance on different relationships with external stakeholders, coordinating and monitoring these relationships. As stated previously, there should be a strong link between universities, science parks, and research centres that enable knowledge capitalisation in some of the other areas. (European Commission & OECD, 2012. p. 12-13.)

The entrepreneurial university as an internationalized institution

Being entrepreneurial and international goes hand in hand. Internationalisation should play a central role in the university's entrepreneurial strategy. Staff and students must be actively encouraged to be part of different international mobility initiatives such as exchange programs, scholarships, and internships. Strategic international partnerships are a central element of the entrepreneurial university. (European Commission & OECD, 2012. p. 14-15.)

Measuring the impact of the entrepreneurial university

If a university wants to thrive towards improvement and further development of its entrepreneurial agenda, the university needs to have tools to measure the impact of its actions. An entrepreneurial university impacts the internal stakeholders, such as students and staff and external stakeholders, such as local businesses and the entire community. Some impact indicators used nowadays are the number of spin-offs, IP and research outcomes. However, this field is currently underdeveloped, and there is a need for additional indicators to be created that can evaluate the university's impact on the development of the regional economy. (European Commission & OECD, 2012. p. 16-17.)

3 Methodology

This section describes the approaches used by the author to obtain and analyse the necessary data for the research. The author describes the reasoning behind selecting qualitative research methods for obtaining the data. In the following chapter, the author defines how the different data sources for this research were selected. The researcher used a combination of primary and secondary data. Further, the discussion moves on to the data analysis methods, and the chapter concludes with the research's verification, justifications, and ethical principles

3.1 Research approach

The researcher uses qualitative research methods to explore and understand how Aalto University has established itself as Finland's best entrepreneurial university and amongst the best in the Nordics. The researcher consciously chose to use qualitative research in this master's thesis due to

the nature of the researched topic. The topic of interest in this research is entrepreneurship, academic entrepreneurship, and the entrepreneurial university. According to Van Burg et al. (2022), qualitative research can contribute to a better understanding of entrepreneurship and new phenomena. Qualitative research has been used in social science research for a long time providing in-depth understanding by paying attention to the experiences and views of participants (Javadian et al., 2020). The qualitative research field has enjoyed a growing interest in recent years since this research often produces new insights. Furthermore, qualitative research enjoys popularity as it has been observed that the most intriguing research articles in top journals are often based on qualitative research (Javadian et al., 2020). There are several advantages associated with qualitative research when researching entrepreneurship. Firstly, the outcome of qualitative research is open-ended, meaning that the researcher does not need to predefine the answers. Furthermore, qualitative data is often very rich and nuanced and helps capture small details that can often be overlooked by quantitative data (Javadian et al., 2020). The author is eager to generate a profound knowledge of the phenomenon of the entrepreneurial university. According to Trochim (2022), qualitative research is precious when investigating complex topics and enables the researcher to describe the phenomena in detail and the original language of the interview participants.

The primary research strategy in this master thesis is built on a case study – Aalto University case study. According to Yin (2003), when “how” and “why” questions are being addressed, a case study is a suitable method of research. Using a case study as methodology, the scholar investigates a contemporary phenomenon in its actual context. There are specific criteria which define the correct research strategy. According to Yin (2003), the first condition is the question asked in the research. Since the research question in this thesis is a “how” question requiring more explanatory answers, this could be best achieved using a case study (Yin, 2003). The second condition is the control of the researcher over actual events. In conditions when the researcher has limited control over the situation, such as contemporary events, a case study is again a recommended option. According to Yin (2003), the essence of a case study is that it attempts to describe a choice and why it has been made, how the decision has been implemented and with what results. Aalto University is the primary choice of the researcher for a case study of this master thesis. The

reasons behind the selection of Aalto are various: Aalto has decided to be an entrepreneurial university, has been successfully implemented and has had numerous positive results.

The data was gathered for this research through field research and a mixture of semi-structured and unstructured detailed interviews. Field research is characterized by the fact that the researcher goes directly into the field to observe the event of the phenomenon in its natural environment. (Trochim, 2022).

The theoretical framework by OECD, described in chapter 2, is the background to provide an answer to the research question, narrow down the research focus and structure the thesis analysis. The research analysis is done by using a coding method following the layout of the OECD framework.

3.2 Research context

Thanks to extensive secondary data, the researcher had a clear idea about the structure of Aalto's entrepreneurial ecosystem and the leading players within the ecosystem. Aalto's entrepreneurial ecosystem consists of three key elements: student-led activities, university-led activities, and external community. The researcher's main aim was to actively engage with each of these players and involve them in the research by interviewing at least one person from each group.

The student-led activities are represented by two leading organisations: Aalto Entrepreneurship Society (Aalto ES) and Start-up Sauna Foundation (Graham, 2014). Since its creation in 2009, Aalto ES has been an extremely active player in the entrepreneurship ecosystem of Aalto. Aalto ES has been widely credited as the leading influencer of the development of the Aalto entrepreneurial ecosystem. (Rissola et al., 2017, p 17.) Aalto ES is an entirely student-run society which supports individuals and the development of their ideas in a creative and supportive atmosphere. Aalto ES primary purpose is the creation of an entrepreneurial mindset (Aaltoes, 2022). Aalto ES organises many activities such as open breakfasts, weekly topic events, and workshops for specific skills. Another component, Start-up Sauna Foundation, adopts successfully implemented actions from Aalto ES and places them further to obtain a funding stream (Graham, 2014). The Sauna Start-up Foundation was established in 2012 and aimed at supporting entrepreneurship. The foundation is

one of the cornerstones of the local ecosystem. It is the non-profit owner of the SLUSH conference, the largest start-up event in Northern Europe, the hackathon community Junction, talent accelerator The Shortcut and a co-owner of the start-up campus Maria 01. (Startup Foundation, 2022.)

The university-led activities have increased significantly since the establishment of Aalto in 2010. Some university-led activities that have been actively involved in the innovation ecosystem creation are Aalto Design Factory (ADF) and Aalto Ventures Program (AVP). Aalto University Design Factory started as a project, and its purpose was to provide physical space for collaboration between industry, researchers and students and a place for interdisciplinary education (Björklund et al., 2011). Aalto Design Factory is a physical space of 4000 square meters that is intended for flexible use and activities - from prototyping to hosting events for several hundred people (Björklund et al., 2011). Aalto Design Factory has its own initiatives, but its main agenda is to act as a collaborator with the broader community of Aalto University and industrial partners. Aalto Design Factory was born as a research project that continues to exist. It can be said that it is one of the head projects and one of the first physical spaces of Aalto University. (Aalto DF, 2022.)

The other university-driven initiative worth mentioning is Aalto Ventures Program (AVP). AVP is an educational programme available to all Aalto's students, and its main aim is to familiarise students with real-life entrepreneurial experiences. During the AVP courses, students learn how to create their start-up or manage and fix an existing company. The main aim of AVP is to teach students to be like entrepreneurs, to think like entrepreneurs and act like entrepreneurs. The entrepreneurship education is available to all Aalto students from all departments. The courses offered by AVP cover a wide range of topics such as entrepreneurship, prototyping, sustainability, design thinking, prototyping, leadership and management, finance, and so on. (Aalto Ventures Program, 2022.)

The external community supporting the Aalto ecosystem can be divided into groups. The first group is built by governmentally subsidised agencies, investors, and entrepreneurs. The second group consists of Aalto's international university partnerships and, most of all, its collaboration with STVP (Stanford Technology Ventures program) (Graham, 2014). Aalto University is involved in

continuous collaboration with more than 500 companies. Current strategic business partners involve companies such as ABB, Neste, Nokia and Saab (Aalto University, 2021).

Aalto's achievements are numerous, and the university's impact on the progress of the local innovation ecosystem is discernible. Aalto's alumni represent all societal levels – some are founders of companies, some are owners of start-ups or board members of significant cooperation. 40% of Aalto's alumni are taking the roles of managing directors of Finnish listed companies. Furthermore, for the last ten years, Aalto's students, researchers, staff and alumni have raised more than EUR 1.1 billion in funding. (Aalto University, 2021, p. 29.)

Besides the measurable indicators of Aalto's success and influence, there is also evidence of "soft" indicators which suggest that a vibrant ecosystem has been established. Firstly, there has been a significant change in students' and youngsters' attitudes towards entrepreneurship; secondly high level of involvement in start-up investments. (Graham, 2014, p. 59.)

3.3 Data collection

The data collected in the research process of this thesis was done via face-to-face and Teams in-depth interviews. The choice of semi-structured interviews was provoked due to the nature of the research method. Semi-structured interviews allow the gathering of rich qualitative information from several actors. Furthermore, the semi-structured interview approach enabled the researcher to be an active player in the production of data and control the degree of interaction with participants, interpret the questions and clarify the answers (Saunders et al., 2019).

The researcher is interested in human behaviour and, for this reason, wanted to play a crucial part in the study rather than being an observer. The researcher reached out to nine actors within Aalto's entrepreneurial ecosystem and decided to conduct in-depth interviews. The main aim of the interviews was for the researcher to confirm the information from the secondary data sources and validate them. Out of nine sent enquiries, the researcher received six positive replies and proceeded with organizing the interviews. The researcher aimed to have at least one representative from the following interest groups: management, faculty member, member of the

university's entrepreneurial-led activities, member of the student-led entrepreneurial activities and students.

To execute the semi-structured interviews, the author prepared five questionnaires, one for each stakeholder group. The interviews are available in Appendix I of this master thesis. The questionnaires are built upon the OECD theoretical framework and the seven primary elements supporting a university's conversion from a standard to an entrepreneurial one. Key ideas were extracted from the OECD framework before they were used as a guideline for interview questions design. Even though the interviews were planned as semi-structured, some of the interviews (2 out of 6) turned out to be unstructured. The unstructured interviews had some initial guiding questions, but the researcher navigated the discussion in the direction of interest that came up during the interview. The additional four interviews were executed as semi-structured, following the pre-defined questionnaire. All the interviews were in-depth interviews where the researcher was actively involved with the respondents and discussed the research topic thoroughly.

The interviews in this research were conducted in an open-minded, positive, and confidential way. The semi-structured interviews allowed the researcher some flexibility and contributed to more conversation and an informal atmosphere (Eriksson & Kovalainen, 2008).

The interview questions are divided into five categories: each interest group has a separate set of questions. The OECD framework article inspired the questions, and they were divided into separate groups (Appendix 1). A big part of the questions is formulated as what, why and how questions. The researcher selected "what" questions since they are descriptive and allow focusing on the topic, situation, and the process. On the other hand, the "how" and "why" questions allowed the researcher to focus on causes and consequences and therefore provide an answer and explanation in qualitative terms (Eriksson & Kovalainen, 2008).

The interviews began with an introduction to the entrepreneurial university topic and the researcher's motivation for the study. The researcher gave an overview of the different sets of questions and estimated the time needed for the interview. The researcher used the predefined questions in the beginning. However, the format of the questions and the set-up of the interviews allowed the researcher to explore in detail interesting topics and avoid questions that might not

be entirely relevant for some of the interviewees. The flexible set-up of the interviewees allowed the researcher to obtain profound knowledge about the organisation and its culture.

Ultimately, before proceeding with the interviews, the researcher should have done trial interviews to fine-tune the questions and to gain a better understanding of the necessary time. Unfortunately, since there is only one interview from each interest group, a trial interview was not an option.

Four interviews were conducted face to face and the other two via business communication platform – Microsoft Teams in the period between 30 March – 7 April. The researcher preferred to conduct the interviews face to face. Face-to-face interviews allow more non-verbal communication and usage of body language, which according to the researcher, enables a more relaxed atmosphere. The interviewed persons are as following:

- Janne Laine, Vice President of Innovation – representing Aalto's management
- Lauri Järvilehto, Professor of Practice at Aalto Ventures Program (AVP) – representing the university-led entrepreneurial activities
- Ahmed Hadi, President of Aalto ES, representing the student-driven entrepreneurial activities
- George Atanassov, Specialist at Aalto Design Factory, representing the university-led entrepreneurial activities
- Kalle Ylönen, student at Aalto, representing the students
- Lauri Elfving, student at Aalto, representing the students

The interviews were recorded by voice recording application. The researcher did not take any notes during the interview but engaged fully in the discussions and moderated the direction of the conversations in the desired way. The researcher transcribed immediately after each interview to capture as much as possible from the obtained information. The researcher tried to use different applications to transfer voice into written data. The applications were not working well for interviews recorded via Teams, and the researcher transcribed the interviews herself. The researcher analysed the data from the first interview before proceeding with the next one. Generally, the interview sessions were exciting, very open, and very informative. The research

proved that when the interviewees are interested in the topic and the outcome of the research, they are more involved in the discussions and more eager to share information.

In addition to the primary data obtained through in-depth interviews, extensive secondary data is also used for this master thesis. Before proceeding with the primary data collection, the author collected and analysed relevant secondary data for the research. There are four reports used in the analysis of this master's thesis. All relevant reports are produced by accredited institutions within 2014-2018 and analyse Aalto University's entrepreneurial ecosystem. Since the reports are slightly outdated, the researcher used the interviews to validate the outcomes from the reports.

3.4 Data analysis method

Designing questionnaires and conducting interviews are only a tiny part of the research. Turning the collected data into a piece of helpful information that allows the researcher to conclude is the most critical part of the research. The data analysis in this master's thesis is theory-driven, built upon the OECD theoretical framework, described in detail in chapter two of this thesis. Since the data analysis is theory-driven, a suitable analysis method is a thematic analysis. This is a category of a qualitative study which analyses groupings of data (Ibrahim, 2012). According to Ibrahim (2012), thematic research enables the scholar to regulate the connection between concepts correctly.

The main principle of the thematic analysis is to compress and diversify the raw data into a meaningful structure achieved via encoding data into charts and tables (Ibrahim, 2012). The researcher coded and categorised the collected data into themes. An available print screen of the coded data is available in Appendix 2.

According to Lancaster (2005), one of the essential issues in qualitative data analysis is to confirm that the results are reliable, effective, and impartial. It is well-known that qualitative data is subjected to the researcher's interpretation based on his previous experience and knowledge. However, qualitative collected data is one of the most influential and valuable as it brings thorough information and insights into the research topic (Lancaster et al., 2005). The researcher did the data analysis in a couple of steps. Firstly, each interview was encoded in a word format text. Secondly, by following the OECD theoretical framework, the researcher created an excel

which contained different codes and relevant descriptions of the codes (available in Appendix 2). The data were coded and analysed according to the pre-determined theoretical framework. Thirdly, the researcher read each encoded interview multiple times to collect relevant information for each code. After all, information was coded and divided into the right sections, the researcher filtered the information under each code and analysed all available information under the relevant section.

3.5 Research quality and ethics

According to Lancaster (2005) the quality of the data can be measured by using three dimensions: validity, reliability, and generalizability. The quality of the research performed for this assignment is assessed below considering all three criteria.

Validity refers to how much the collected data describes the phenomenon or event that has been the research focus (Lancaster, 2005). The subject of the research is of interest to the interviewees. For that reason, all invited participants not only accepted the invitation for an interview but also replied to all questions and were very eager to participate in the in-depth discussion. The research can be considered complete and accomplished for the above reasons. The provided information enabled the researcher to reply to the research question. The relaxed and friendly atmosphere during the interviews increased the quality of the provided data and allowed the respondents to open up and provide valuable information. The answers are meaningful and permit the scholar to respond to the research question. There is a good link between the theoretical framework, the research questions, the methodology used for the research and the outcomes; therefore, the researcher considers this research valid

Reliability refers to what extent the collected data can be reproduced if conducted by another researcher in the same environment but on another occasion (Lancaster, 2005). This research has been specifically designed to investigate the concrete organisation – Aalto University. Therefore, this research is unique for the organisation and this thesis. However, if another researcher reproduced the research, the outcomes would probably be quite similar. The discussed topic was not sensitive or vulnerable, and the interviewees were very open, honest, and concrete with the provided answers. Furthermore, the researcher used reliable secondary data to validate the

outcomes provided by the primary data. All used reports were produced by reliable institutions such as European Commission, JRC, Aalto University, and MIT. In addition, the researcher also used diverse secondary data such as articles from magazines and newspapers and newsletters from Aalto University. For all the above reasons, the researcher believes the research is reliable.

Generalizability is another measurement of data quality, and it relates to how much the collected data and the conclusions drawn from it can be used in other circumstances (Lancaster 2005). The sample size of this research included only six persons. Even though many of the outcomes were reoccurring by almost all interviewees, the researcher thinks that further in-depth study could be made with a broader audience, leading to even more objective and reliable outcomes.

Ethical considerations are an essential part of conducting qualitative research. Ethical behaviour is a combination of values, moral principles, and rules that influence a person's behaviour. Certain ethical principles must be kept in mind and followed while performing qualitative research, such as privacy and anonymity, cause no harm, confidentiality, informed consent, intrusiveness, inappropriate behaviour, and so on. (Ethical Issues in Qualitative Research, p 66.)

Firstly, participants were contacted via email. The purpose of the study was explained to them clearly from the beginning. The respondents contacted the researcher back via email and agreed to contribute to the research. Participation was entirely voluntary, and the researcher applied no pressure. During the interviews, the researcher clarified the purpose of the research, the duration of the interview, asked for permission to record the interviews, and used the respondents' names in the master thesis. Furthermore, the researcher made it clear that the interviews will be encoded later in the research process and used for this master thesis and eventually for further publications.

The interviews were held at the most suitable time and location for the respondents. There was a comfortable atmosphere during the interviews, making the respondents feel relaxed and eager to have an in-depth conversation. The researcher made the respondents feel more comfortable by starting the discussion with easier and lighter questions asking about the respondents' backgrounds and allowing some small talk at the beginning of the conversations. The researcher

believes that the ethical principles in this research were kept and that the research can be considered ethically conducted.

4 Results

This chapter presents the performed study's outcomes on creating a thriving entrepreneurial university in the regional innovation ecosystem. This chapter reveals the outcomes collected through primary and secondary data. The results are presented in the same order as in the OECD guiding framework of the entrepreneurial university.

4.1 Leadership and Governance

Strong leadership and good governance cannot be emphasized enough and their importance when creating an entrepreneurial culture in an institution. This element repeatedly appeared in each of the conducted interviews and all secondary data as the top one when creating an entrepreneurial university and trying to create an entrepreneurial culture. It is not sufficient that a university would have the word entrepreneurship in its mission statement; creating an entrepreneurial university takes much more than a statement on the webpage; it takes a powerful and dedicated management to support this movement.

Entrepreneurship as a major part of the university strategy

It can be stated that entrepreneurship is at the heart of Aalto's university strategy. However, this has not always been the case at Aalto. At Aalto's creation, there was no explicit entrepreneurship policy in place. Nowadays, the entrepreneurial strategy is more visible than ever. As Janne Laine, Vice president of Innovation at Aalto reported, "Entrepreneurship is a cross-cutting team among all our activities". Furthermore, he states, "We have education, research and entrepreneurship in all our doing". At Aalto, the entrepreneurial vision is not only part of the university's mission statement on the webpage but also visible clearly in every activity and doing of the university. The entrepreneurship vision is concrete: "We try to get an entrepreneurial taste to the students through education, research and even have separate programs because we have entrepreneurial visions", says Janne Laine. Aalto University's mission and vision statement are explicit: "Aalto

Networking Platform has all the three cross-cutting themes Sustainability, Radical Creativity and Entrepreneurial Mindset visible in its activities" (Aalto University, Mission and Vision, 2021). At Aalto University, entrepreneurship and innovation come together, and there is a solid commitment to both areas: "Aalto's mission to build an innovative society includes developing the local innovation ecosystem…" (Bingham et al., 2018, 158). In addition to the entrepreneurial strategy, there are associated performance indicators used to measure the impact of the entrepreneurial activities. According to Janne Laine, Aalto has "every year this kind of university review in which one of the areas we are assessing is the impact of entrepreneurial activities".

High level commitment to implement the entrepreneurial strategy

Executing the entrepreneurial strategy is very important to Aalto's management, and there is a remarkable commitment. The commitment can be seen at all institution levels, starting from the top management, and going all the way down to the students. The commitment toward entrepreneurship started back when Aalto was created. The students were among the first to notice the possibilities the innovation university could provide, and they adopted a model of mass entrepreneurship (Graham, 2014). Undoubtfully, the student-led movements have been seen as the basis of Aalto's evolving status as an entrepreneurial university and the catalyst for cultural change towards entrepreneurship (Graham, 2014). Without the support of the university management, none of the student activities could have continued to exist and flourish to the level of today. The determination of the students to establish something new and from scratch was not left unnoticed by the senior university management, and they provided their unconditional support (Graham, 2014). According to Janne Laine, "The university management stood behind them and gave them the resources, and then they came back with all kinds of very wild ideas."

The senior management was the biggest and most enthusiastic supporter of the entrepreneurial movement from the establishment of the university (Graham, 2014). According to Ahmed Hadi

> *"Aalto ES was always backed up by Aalto's management from the beginning because there was the vice president at the time who saw the potential and was giving support of course. And then when Slush happened, it was like the first indicator, okay, these students are actually doing something important here. And then Aalto ES started to get more validation and more support."*

Furthermore, Lauri Järvilehto also validates the significant impact on the development of the entrepreneurial agenda of the first President of Aalto University. “Tuula Teri was the president back then, the president of a management team - they had enough like foresight to stay out of their way but still provide resources to the student-driven initiatives.” The proactiveness of the senior management has been visible since the formation of the university. The engagement of all parties is significant for the creation and existence of the entrepreneurial agenda. Janne Laine also emphasizes this importance by stating, “But all levels are needed, even the president of the university has to be really committed.”

Universities with a high level of commitment toward entrepreneurship will revise their strategies regularly, which is also entirely relevant for Aalto. According to Janne Laine, Aalto generates every year a university review and one of the assessed areas is the impact of the entrepreneurial activities. Furthermore, he states, "at Aalto, we have a living strategy which means that we are revising what is happening in different areas every year.”

University’s model for coordinating and integrating entrepreneurial activities at all levels across the university

Entrepreneurial activities are delivered at Aalto through various channels. According to Janne Laine the entrepreneurial activity at Aalto consists of established, such as Aalto ES (Aalto Entrepreneurship Society), AVP (Aalto Ventures Programme) and ADF (Aalto Design Factory), and some random activities. Aalto University has very diverse entrepreneurship components and very complex architecture of all provided services. On a general level the entrepreneurship activities could be divided into two major blocks: student-led initiatives and university-led initiatives (See Figure 7).

Figure 7: Aalto Entrepreneurial Ecosystem, (Hilavuo et al., 2022), slide 20

The student-led and the university-led activities are briefly summarised below.

Student-led initiatives

- ***Aalto ES*** fully student-led and alumni non-profit society
- ***Start-up Sauna*** co-working space managed by students
- ***Slush*** biggest start-up and investors event in Norden Europe
- ***Junction*** Europe's largest hackathon
- ***Wave ventures*** the first student-run VC fund in the Nordics
- ***Start-up lifers*** Internship programme intended for students to work in the San Francisco Bay area
- ***KIUAS*** Accelerator programme with main focus on business idea identification and development

University-led initiatives

- ***Aalto Ventures Program (AVP)*** offers variety of entrepreneurial courses to students across the university aiming at development of entrepreneurial skills and attitude
- ***Design Factory*** offers practical courses, main focus is on innovation
- ***STVP Partnership*** is collaboration with the Stanford Technology Ventures Partnership aiming at transferring the Silicon Valley culture into Aalto University.

- ***Aalto Start-up center*** is a hybrid accelerator which offers incubator and accelerator services

The entrepreneurship model at Aalto is highly fragmented, even slightly confusing, and hard to understand for an external observer. However, the university has a suitable mechanism in place to perceive and monitor all ongoing activities. According to Janne Laine, there is a steering group meeting where all relevant actors participate. During these meetings, all ongoing activities are presented by each participant, enabling knowledge sharing and keeping all players up to date. Furthermore, Janne Laine mentions:

> *"We are coordinating, in each of these meetings, each entity would give a summary of what is ongoing." and "Vice president of education is sitting in the same steering group, meaning that I know exactly what type of activities are happening there".*

According to many of the respondents, there is an overlap between the different entrepreneurial activities at Aalto. However, this is not necessarily observed as a competition or an issue. Ahmed Hadi states that many of these enterprises work together on joint initiatives. Ahmed Hadi shares:

> *"For example, with Aalto Ventures Program, we host this Unfolding tomorrow event series, which is CO-owned. It's every month. It's this panel, where we invite one person from academia, one person from politics, and one person from the business world to talk about a certain SDG goal."*

Another exciting initiative that illustrates the cross-department coordination is that numerous faculty staff representing all departments of Aalto are participating in teaching and keeping courses in entrepreneurship via the AVP program (Graham, 2014).

Faculties and units have autonomy to act

The importance of independence and autonomy has come across almost all interviews. The management has realised the importance of not controlling and monitoring all entrepreneurial activities and especially not controlling the student-led activities. According to Janne Laine: "So, in principle, I have an overview of all activities, but I do not control students." The Aalto ES president Ahmed Hadi also confirmed the freedom to act independently:

> *"yeah, that's completely true. And it's part of I think that's a perk of the success stories that came out of here. And that's why the system is like this now because it's been proven that if you let these*

students do stuff freely, and it's more about not giving them freedom, it's more about giving them the ownership."

Janne Laine says that to enable entrepreneurship: "you just really need the right type of people and also the freedom to let this happen" and: "very little bureaucracy is very important". There is clear support from the management towards the student-led entrepreneurial activities and their moto has been until now "support but not direct" (Graham, 2014, p. 26). The autonomy to act freely and independently can be easily observed across the university. The management has been a good example, and the culture of autonomy can be observed in many other entities across Aalto. Aalto ES, for example, supports an inclusive and democratic culture from its creation, allowing people to take whatever responsibility they want and supporting all the ideas that are coming out (Graham, 2014). The same spirit is to be noticed in Aalto Design Factory. According to George Atanassov: "It is very difficult to put a specific role. Also, we don't necessarily put roles on people, we sort of let them come up with it and choose their tasks according to their expertise and skills." Furthermore, Atanassov shares about Aalto Design Factory: "Because we are a project there's a very low hierarchy" and "So, there's very little bureaucracy and it's just generally a place where things happen because it is just easy" The same approach and view about autonomy is supported by the university's professor Lauri Järvilehto: "Our job is basically to just provide as much value to the student ecosystem as much as possible, and then stay out of the way." In narrative, Aalto's perception can be summarised as: "But I think as a whole at Aalto, the story of the university is that you're free to try and you're free to somewhat fail, fail at trying to do new things." says George Atanassov.

The university as a driving force for entrepreneurship development in the wider regional, social and community environment.

Aalto University is undoubtedly a key orchestrator and primary contributor to the successful development of Espoo's innovation and entrepreneurial ecosystem (Rissola et al., 2017). The numbers are self-evident and illustrate the scale of Aalto's impact on the regional environment. Janne Laine states, " We already have around 2000 high-tech companies around us and more and more want to come here because there are so many new things happening here all the time." Furthermore, he shares that: "50% of all start-ups in Finland come from the Aalto University area."

Aalto also impacts the attitude of young people towards entrepreneurship, an unprecedented level of participation in entrepreneurship activities has been seen in recent years (Graham, 2014). The impact of Aalto to the regional innovation ecosystem is visible from the high number of companies originating from the university's innovation activities.

4.2 Organisational capacity, people and incentives

Another essential element when transforming a university from traditional towards entrepreneurial is the organisational capacity, the people, and the incentives. This subchapter presents some of the most important findings.

Variety of funding sources and sustainable financial strategy to support entrepreneurial development

The Ministry of Education and culture finances universities in Finland and the parliament decides and votes on the budget. In addition to the core funding, educational institutions in Finland are eligible for further funding, originating from external organisations such as the Academy of Finland, Business Finland, the European Union and various foundations (Ministry of Education and Culture, 2022). Aalto University receives around 60% of its funding from the government (see Table 1). Janne Laine states, "It means that the 40% of the money that are not coming directly from the ministry of education." By providing almost half of its income from other sources, Aalto University ensures a variety of funding instruments and less dependability on the Finnish government.

AALTO UNIVERSITY FOUNDATION PRO FORMA PROFIT & LOSS STATEMENT, €1M

(not audited)

OPERATIVE INCOME	2020	%	2019	%	2018	%	2017	%	2016	%	2015	%	2014	%
Government funding	212	62%	212	62%	219	63%	229	66%	237	67%	254	68%	266	69%
Academy of Finland	47	14%	48	14%	51	15%	45	13%	40	11%	35	10%	31	8%
European Union	24	7%	24	7%	21	6%	19	5%	21	6%	19	5%	21	5%
Business Finland	12	4%	11	3%	15	4%	18	5%	23	6%	26	7%	31	8%
Corporate	17	5%	14	4%	12	4%	12	4%	13	4%	13	3%	14	4%
Other	27	8%	26	8%	24	7%	21	6%	19	5%	24	6%	23	6%
Transfer from special purpose funds	4	1%	5	1%	4	1%	1	0%	1	0%	1	0%	1	0%
TOTAL	**343**	**100%**	**339**	**100%**	**347**	**100%**	**345**	**100 %**	**353**	**100%**	**372**	**100%**	**389**	**100%**

Table 1: Aalto University foundation pro forma profit and loss statement, (Aalto University, 2020 Annual board report and financial statement)

Aalto University provides services to companies and individuals and ensures further diversity of its incomes. An excellent example of such service is the Aalto University Executive Education. The programme ensures stable and substantial income for the university received from tuition fees, renting of facilities and others (Rissola et al., 2017). TEKES, the Finnish Funding Agency for Technology, has provided continuous funding to many of the university's entrepreneurial activities (Graham, 2014). TEKES has founded various collaborative research projects recently (Bingham et al., 2018). A big part of Aalto's success is due to the financing received from TEKES. According to Graham (2014), TEKES has made many exceptions to their rules to finance Aalto's activities. However, in recent years the financing from Business Finland (previously TEKES) has been reduced. To compensate for the reduced funding from Business Finland, Aalto University has strengthened its collaboration with other partners locally and globally. These collaborations with companies have brought €17 million in subsidies to the university in 2020 (Aalto University, 2020 Annual board report and financial statement). Another impressive sum of €10.5 million was received by foundation in 2020 to create a bio innovation centre (Aalto University, 2020 Annual board report and financial statement). In 2021, €37 million out of the total income of €370 million were generated mainly from intellectual property rights (Aalto University, 2021 annual board report and financial statement, 2021).

Mechanisms to bring internal stakeholders together (staff and students) and building synergies between them

Aalto University has successfully brought different stakeholders together and has various examples of it. One of the most prominent examples is Aalto Design Factory. According to George Atanassov:

> *"we are a physical space but also a way and philosophy of working. And the idea is that what we tried to act as a host for courses and activities that have the core values, we believe that Aalto is, or with other words, multidisciplinary, project-based learning PBL, and so on"*

Furthermore, he says: "We try to bring together basically, three stakeholders, researchers, students, and business." Aalto Design Factory is a place where a lot of product development is happening and as a field "probably benefits most from this cross-disciplinarity and sort of this project-based learning methodology" says George Atanassov.

One of Aalto's central concepts is the collaboration with internal and external stakeholders. There are six different schools at Aalto, and various initiatives, projects and programmes which support collaboration between these students. The multidisciplinary approach at Aalto is an engine for new ways of thinking and a significant accomplishment for the successful development of the entrepreneurial university (Aalto University, 2021 annual board report and financial statement, 2021). Lauri Järvilehto says: "I think that our university has created this kind of like melting pot between these different types of fields." This says a lot about Aalto's collaborative culture. Furthermore, Lauri Järvilehto explains why it is essential for students with different backgrounds to work together on projects: "how to get especially researchers and scientists to work with businesspeople there is a kind of a natural opposition on both ends. We have a couple of new initiatives at Aalto to facilitate that." Such recent initiatives is a course called impact with research, which is intended for researchers and aims to introduce business ideas and concepts. Another currently ongoing program is called impact studio, which resembles start-up company experience where students with different backgrounds can form teams, start the company, and go through different milestones. Järvilehto continues and explains even further the importance of putting people with diverse backgrounds working together:

”the typical start-up team that comes to me are like: *Hey, we have this business idea, can you help us out or can you help us make it interesting to the investors or something like that? So, they're like three marketing people. They're great at making PowerPoint presentations and they have this really great idea that they're super excited about and they're really great, extroverted, super good talkers and they are great at pitching, but they don't really have the capabilities to actually execute on that plan. This happens so often that it really hurts*.

The university is open to recruiting and engaging with individuals who have entrepreneurial attitudes, behaviours and experience

To foster entrepreneurship in an educational institution, the employees must have a strong entrepreneurial background. Aalto University is no exception to this; according to Janne Laine, there are numerous professors of practice type of positions at Aalto, which helps diversify the staff at Aalto. Furthermore, he says: "Then we have also professors in entrepreneurship, and we have embedded these more entrepreneurial profiles in different schools around Aalto." Lauri Järvilehto is one of the multiple professors of practice at Aalto University and a AVP (Aalto Business Ventures) co-director. He is an academic with a PhD in Philosophy and a real entrepreneur in his heart. He says, "I have pretty much experienced most of the possible entrepreneurship forms in Finland." Before Aalto, Lauri was a CEO and co-founder of various companies. There are numerous other professors of practice at Aalto, each bringing incredible value, expertise and practical knowledge to the institutions, students, and the entrepreneurial spirit (Bingham et al., 2018).

4.3 Entrepreneurship Development in Teaching and Learning

Another important element of formation of the entrepreneurial university is the entrepreneurial education of the institution, there must be right tools in place to deliver education and training opportunities within the university but as well with external partners.

Entrepreneurial approach to teaching in all departments

A university which is committed to entrepreneurial learning should deliver the learning through various instruments (European Commission & OECD, A guiding framework for entreprenurial univeristies, 2012). According to the two interviewed students Kalle Ylönen and Lauri Elfving there are visits from entrepreneurs, start-ups, and guest lecturers during the lectures. They evaluate these visits as interesting and inspiring and brining an interesting edge to the normal teaching ways. According to Lauri Järvilehto there is a high level of commitment in Aalto to build an entrepreneurial mindset in the students. Lauri shares:

> *we provide a number of start-up courses similar to Stanford or Berkeley where students are interested in starting up their own company so they can come to our classes. We also have strong interaction with the student ecosystem such as Start-up sauna or Aalto ES.*

The entrepreneurial teaching is delivered through various interactive channels and different formal and informal methods. According to Lauri Järvilehto, entrepreneurial courses should not be

mandatory included in everyone's curriculum. Lauri shares, those students: "have to take it obviously, but they wouldn't really learn much because it is forceful." However, entrepreneurial education is delivered at Aalto in a fun and non-forceful way. According to Lauri, there is a mandatory project course which is all about electrical engineering, however AVP teachers attend these courses and "sneak in there a few entrepreneurial themes into the course". This teaching method seems to be effective and in the end of the course students learn about the main topic of the course but in addition also a little bit about entrepreneurship. Lauri summarises: "then when the students actually complete the course and they realise that actually, this is useful learning for them. So, they might even get motivated about entrepreneurship."

Senior staff responsible for entrepreneurship at unit level

There is additional staff across Aalto university responsible for maintaining the entrepreneurial agenda. Janne Laine oversees the innovation activities within Aalto. He shares:

> *"when it comes to research-based entrepreneurship, then we have all kinds of Aalto start-up centres, and innovation services, and I am controlling those. So, in principle, I have an overview of all activities, but I do not control students and I am in the steering group of the educational program activities. Then we have these separate units like the Design factory, which I am also following."*

In addition, other senior staff supervise the activities, such as Tomi Erho – head of Innovation Ecosystem Services at Aalto university. The Aalto Ventures Programme is coordinated by the Dean of the school of science, Jouko Lampinen, and according to Janne Laine, he is also the: "same person who is nowadays responsible for this cross-cutting team"

According to Janne Laine, all these players from across the university participate in the Impact Steering Group. This working group concentrates on strategic issues, such as partnerships with stakeholders and the university's entrepreneurial and innovation agenda. Furthermore, Laine shares: "In each of these meetings, each entity would give a short summary of what is ongoing. And there we have representatives of all the schools of academic point of view. "

Collaborating and engaging with external stakeholders

Aalto University is a good example of a university who makes use of its partnerships. There are various ongoing partnerships and projects with the local communities, local organisations, and alumni.

According to (Graham, 2014), a high percentage of the local entrepreneurs are engaged in Aalto's various activities. Some of them are coaching, mentoring, being advisors, or participating in Aalto ES activities. According to Ahmed Hadi the Start-up Sauna accelerator program was started by Aalto ES, and it grew to: "one of the biggest and best start-up accelerators in the world, even compared to like Y Combinator." Back then Aalto ES worked with the best coaches in entrepreneurship in Finland. This worked: "There was a lot of support from local experts, like for example, Ilkka Kivimäki, one of the more prominent investors right now. These people saw the potential here and gave all their support." says Hadi. The active participation of Aalto's alumni, who are experienced entrepreneurs and prominent players in the regional ecosystem, has been a significant and essential component of Aalto's success (Bingham et al., 2018). Mainly, Ilkka Kivimäki (investor in early-stage entrepreneurs) and Risto Siilasmaa (chairman of the board of Nokia and F-secure) are the driving force behind the creation of the local ecosystem (Bingham et al., 2018).

Aalto Design Factory and its product development Project (PDP) course illustrates another interesting example for collaboration. Manufacturing companies provide interdisciplinary teams with problems that need to be solved – students benefit from problem-based learning approach and companies receive different point of view and a potential solution to their problems (Bingham et al., 2018).

Furthermore, Aalto collaborates with University of Helsinki and the local hospitals. The aim of the collaboration is the development of new teaching models on two health related program (Bingham et al., 2018). Aalto university works on multiple projects with various different companies such as Kone, Fiskars, Wärtsilä, Kesko, Elisa and many others.

4.4 Pathways for Entrepreneurs

The university raises awareness of the value of developing entrepreneurial abilities amongst staff and students

Aalto University makes its staff and students aware of the importance of establishing entrepreneurial abilities and gaining entrepreneurial knowledge and expertise. Universities that aim to shift being more entrepreneurial should follow Aalto's example and integrate awareness-raising approach across all faculties, staff and students across the university. According to Janne Laine, the entrepreneurial agenda of the university should be communicated more because: "there is still a lot of potential amongst students and personnel to develop."

The university manages to raise awareness about entrepreneurship amongst its staff and students by arranging inspirational events. Lauri shares that "we have invited already in the past all the big successful entrepreneurs in Finland."

According to Rissola et al. (2017), entrepreneurial education at Aalto has become very important and this is not only in regards of start-up companies' creation. Aalto has put a lot of emphasis on creating entrepreneurial mindset in the students, in way they take responsibilities and execute tasks and projects. Lauri Jarvilehto shares that his and the ABV's teachers' goal is: "to build an entrepreneurial mindset in our students. We don't want everybody to start their own company. But even if our students go to work for Nokia or whatever, they will have this entrepreneurial mindset and be able to take initiatives or tackle problems, stuff like that."

Aalto university is a place where a lot of people with entrepreneurial mindset can be met. Lauri shares: "we had these handful of students who were really having entrepreneurial minded, like Miki Kuusi, Kristo Ovaska, and they started Aalto ES."

The university provides opportunities to experience entrepreneurship

One of Aalto's main aims is to guarantee that every student and staff member can experience entrepreneurship in one way or another (Bingham et al., 2018). Aalto University has extremely diverse system to provide entrepreneurial education, courses, projects, and many other

opportunities to its students. According to Ahmed Hadi, currently Aalto ES has its focus more on the entrepreneurial experience of students. Ahmed shares: “if you have any kind of idea, this is the safest and best place to have full ownership of whatever you do, and also the freedom to fail.” Students from Aalto are welcome to Aalto ES with their project ideas where they can get support from Aalto ES mentors and test their business idea and potentially expand it further. It is a safe environment where students can feel free to experiment and eventually fail or succeed but the emphasis is one experience of being an entrepreneur.

Another initiative which offers various possibilities for students to experience entrepreneurship is Aalto Venture Program (AVP). AVP is accessible to all Aalto students, and it offers entrepreneurial courses taught by professors, entrepreneurs, venture capitalists and the main focus is on building and growing scalable businesses (Bingham et al., 2018).

As already mentioned earlier in this chapter, according to Aalto student’s – Lauri and Kalle in some of the lectures various entrepreneurs are coming as guest lecturers and this is something very interesting, inspiring, and motivating for the students. Having a chance to ask questions and listen to the experience of other entrepreneurs is an excellent example of an opportunity to witness entrepreneurship.

According to Janne Laine, one of Aalto’s cross-cutting teams is entrepreneurial mindset and the idea behind this is that all students at Aalto from any educational programme get some “flavor of entrepreneurship – either participating in Aalto Venture Programmes or some courses which involve entrepreneurship like in Design Factory or other those kinds of programs” Furthermore, he continues: “We try to get an entrepreneurial taste to the students through education, research and even have separate programs because we have entrepreneurial visions.”

Support for individual and groups to move entrepreneurial ideas into action

The idea is only the first step of the entrepreneurial process, but in order the idea to be moved into action normally entrepreneurs need plenty of support. Aalto university provides a range of support services to the students on their way to develop further their ideas. One of the supporting elements is Aalto ES. According to Ahmed Hadi, Aalto ES has put in place a support system that

helps students who would like to fund their companies. Ahmed states: “The plan is that people would come here with a business idea, and we provide them with services and tools.” Additionally, Ahmed shares “Then of course we have a well-established mentors’ network that we have been using for the last 15 years.

Mentoring by academic and industry personnel is available

Another important element of the entrepreneurial university is the availability of mentors and mentoring services available for students and graduate entrepreneurs. Janne Laine mentions: “the right type of mentors, such Ilkka Kivimaki, Risto Siilasmaa. These big players wanted to help and support these students.” Ahmed Hadi furthermore confirms the importance of the mentors for the creation of the ecosystem and for its existence: “There was a lot of support from local experts, like for example, Ilkka Kivimaki, one of the more prominent investors right now. These people saw the potential here and gave all their support.”

Aalto university makes use of its alumni and utilises their knowledge and experience. According to Bingham et al. (2018) one of Aalto’s major success lies in the active involvement of their alumni, who are themselves skilled entrepreneurs and play major roles in the society. Furthermore, famous entrepreneurs are dedicating time to mentor and coach companies and entrepreneurs which are using the Start-up Sauna (Rissola et al., 2017).

The university provides access to business incubation facilities

According to Rissola et al. (2017), The Start-up Sauna is a space, kind of a business incubator which offers services to students to promote start-up creation. Furthermore, Aalto’s Start-up center is the biggest business accelerator in Finland (Rissola et al., 2017).

4.5 University -business/external relationships for knowledge exchange

As already previously described, the active involvement of the entrepreneurial university with a wide range of stakeholders is a requirement for its success. Aalto University is scoring very highly in this area as the university can be an example of fruitful collaboration with variable partners.

Aalto University is committed to collaborating with industry, the public sector and other stakeholders and this commitment is evident. According to Lauri Elfving, a Finance student at Aalto, there are plenty of opportunities for students to engage in real-life collaboration opportunities with companies. According to him, “Aalto ES has promoted some collaborative projects where I participated and together with a team of 8 students were tasked with a concrete business project.”

Aalto collaborates with leading industries across Finland. According to Bingham et al., (2019), industry engagement is at the heart of Aalto. Aalto cooperates not only with industry but as well with cities. An illustrative example is Aalto’s collaboration with Urban Mill, a co-creation space operating under the city of Espoo. This collaboration aims to improve urban living through innovations. (Bingham et al., 2019)

Furthermore, Aalto has strong connections to incubators, accelerators and science parks. Aalto Center for Entrepreneurship is part of Aalto and it plays the role of a platform that connects the university entrepreneurial activities with the surrounding system of incubators, accelerators and investors. (Rissola et al., 2017)

4.6 The entrepreneurial university as an international institution

Internationalisation is an essential characteristic of an entrepreneurial university. Aalto University is no exception to this. At the beginning of 2021, Aalto University was ranked the 35th out of 1500 most international universities in the world according to Times Higher Educations (Aalto University, 2020 Annual board report and financial statement). Ahmed Hadi shares that Aalto ES has many collaborations with numerous international universities, and the Aalto ES board makes a lot of international learning trips to Stanford, MIT and various other universities to exchange ideas and collaborate.

Not only Aalto ES but various other faculties of Aalto enthusiastically take part in international activities. Another prominent example is Aalto Design Factory. According to George Atanassov, there are nowadays around 40 design factories around the world which collaborate with multiple universities. The concept of the Aalto Design factory has been benchmarked in over 20 countries

and five continents (Bingham et al., 2018). The Design Factory Global Network aims to drive change in the local context. George Atanassov has set up design factories in other countries, and an interesting lesson learned is that each country is unique, and the same methods cannot be applied worldwide. All design factories worldwide are set up differently, but they all believe in the same core idea.

Furthermore, Aalto is building an entrepreneurship-related collaboration with the University of Berkeley and Stanford University; both are known for their revolutionary university-based innovation ecosystems (Bingham et al., 2018).

Aalto University participates in the European Union 9th Framework Programme, which offers various opportunities for international networking, research activities and corporate collaboration (Bingham et al., 2018).

4.7 Measuring the impact of the entrepreneurial university

Measuring the impact of the entrepreneurial university to all involved stakeholders is essential for its further existence and development. Aalto is a good example in this area as the university performs annual review in which one of the assessed areas is exactly the impact of the entrepreneurial activities (Janne Laine, p 13). Janne Laine shares that at Aalto University there is a living strategy, meaning that the strategy is revised annually in different areas and ever evolving.

When measuring the entrepreneurial activities at Aalto one of the factors used is the number of students that participate in entrepreneurial educational courses, furthermore information such as gender and country of origin of the students is considered (Janne Laine, p13). Furthermore, Janne Laine states that form his point of view entrepreneurship and innovations are closed interlinked. The innovation activities are being monitored by many different metrics such as numbers of inventions and patents created in one year time, number of professors and faculty members participating in spin-offs companies and others.

Participating in entrepreneurial courses and measuring satisfaction level of the courses is not enough to evaluate the impact of these activities on the participants. It is more important to monitor and evaluate students' engagement and the level of capability and knowledge gained

through the participation in the course. According to Lauri Järvilehto, at Aalto Business Ventures entrepreneurial courses, the professors are keener on focusing on the learning outcomes and not on the grades. According to Lauri, learning results are better if the students are not chasing grades but focusing on the learning outcomes.

Furthermore, Lauri shares, that at ABV they do not only track numbers to measure the impact of the entrepreneurial courses. He says that: “this does not give an indication of the quality.” One of the measuring parameters are: “Our key KPI is the number of conscious decisions of our students to either start or not start a company. We want to teach them to evaluate whether they're good to go or not.” (Järvilehto, p 30)

Knowledge exchange is another important element which needs to be monitored and evaluated. According to Bingham et al. (2018) at Aalto the number of companies and other external stakeholders present on campus is constantly monitored. Aalto also monitors the number of collaborative research projects with companies and other external stakeholders. Aalto measures the outcome of its societal impact by measuring the number of joint publications with industry and research funding received from private companies (Bingham et al., 2018).

5 Discussions

5.1 Answer to the research question

This master thesis intended to answer the following research question: “How can we create a successful entrepreneurial university in the regional innovation ecosystem?”. The researcher used as a case study Aalto university and applied the OECD entrepreneurial universities framework as a theoretical background. The research question was answered via the information collected through secondary data – validated reports and primary data – in-depth interviews with six different stakeholders. The research question remained unchanged during the research process and the researcher is confident that the collected information enabled her to reply fully to the research question.

Following the OECD framework and the collected research data it can be concluded that there are couple essential fundamentals for the creation of successful entrepreneurial university.

Entrepreneurship should be clearly identified and part of the university's strategy. The entrepreneurship vision should be concrete and there should be clear initiatives that are visible to students, staff, and the management.

There is a need commitment toward the entrepreneurial strategy. The commitment should come from all involved actors – students, staff, and the management. There is a very strong commitment at Aalto University, the student's strong commitment and initiatives are one of the main reasons behind the creation of the entrepreneurial strategy at Aalto. The entrepreneurial strategy is fully supported also by the entire management, and this is essential for the creation of a truly entrepreneurial university. Aalto University has had a remarkable management team since its creation which has always fully supported the entrepreneurial strategy and worked for its continuous development.

An entrepreneurial university should have a clear and coordinated system in place to integrate and monitor all entrepreneurial activities around the entire university. Without a good overview, it would be impossible for a university to adopt an entrepreneurial approach. The implementation of a new strategy requires multiple actors who coordinate and work for a common goal. Therefore, the establishment of such a model is significant for the formation of a successful entrepreneurial university.

Another critical element of creating an entrepreneurial university is the autonomy and freedom of different faculties, personnel, and students to be independent and creative and to be allowed to try different ideas. The only way entrepreneurship can exist and flourish is when there is freedom for it. Aalto University is an excellent example of a lot of freedom and autonomy for different departments, students, and staff. The results of the given freedom are more than encouraging – one of the most active, fully student-led societies.

A successful entrepreneurial university should be a key player in entrepreneurship development in the regional context. This is truly the case of Aalto University, which has shaped the local

ecosystem in a spectacular way and continues to contribute and develop the entrepreneurial ecosystem in the Great Helsinki metropolitan area.

Diverse funding allows more freedom for the university to act and decide how to use its money. Fully governmental funding limits the freedom of the universities and their abilities to use the money for various entrepreneurial activities. Stable and diverse university income is one of the really important essentials of a successful entrepreneurial university. A successful entrepreneurial university should think of ways to diversify its income by providing different services to companies and other stakeholders and reinvest the money so that it will be more independent from governmental funding.

Another extremely important element for creating an entrepreneurial university is the mechanism to bring internal stakeholders to work together. Aalto University is again an excellent example of a university that manages to bring students and staff from different departments to work together on projects and various other initiatives. Multidisciplinary is essential for the creation of a successful entrepreneurial university.

Universities that recruit staff with entrepreneurial attitudes and experience are more likely to be successful in the implementation of their entrepreneurial strategy. Aalto University is again a great example in this field – there are various professors of practice across the university and furthermore professors of entrepreneurship.

A successful entrepreneurial university should offer entrepreneurial teaching to all departments and the teaching should be delivered by diverse methods that engage and attract students to the topic.

Another highly important element is the partnership with external stakeholders – companies, municipalities, other universities, research centers, business incubators, and so on.

Furthermore, a successful entrepreneurial university should raise awareness across its students of the importance of the value of developing entrepreneurial skills and mindset. The university should also provide an opportunity for all staff and students to experience entrepreneurship. It is

essential that interested students and staff get to experience real entrepreneurship and not only learn theory. Aalto University scores very highly in this section as well as the university offer numerous possibilities to its students to experience real entrepreneurship. Mentorship of academic and industry personnel, alumni, and experienced business people is important for students to develop their ideas further. Additionally, the successful entrepreneurial university should offer access to business incubation facilities where students and staff can experience start-up creation.

If a university wants to be successful in the implementation of its entrepreneurial strategy, the university should also have an internationalisation strategy in place. The university needs to collaborate with other similar-minded universities and exchange ideas and benchmark the best models from other locations. It is important for students and staff to engage in international projects to develop more experience and diverse points of view. Aalto University scores highly in this section, as well as the university, collaborates actively with many international educational institutions.

Finally, another important element for the formation of a successful entrepreneurial university is the constant monitoring of its entrepreneurial activities and their impact on the involved stakeholders. The entrepreneurial strategy needs KPIs and their continuous follow-up

5.2 Practical implications

The research revealed that Aalto University is truly a successful entrepreneurial university. Many elements from the OECD entrepreneurial university framework were found at Aalto which validates the quality and relevancy of the selected theoretical framework.

The above-described fundamentals which have made Aalto University a successful entrepreneurial university are important elements which are relevant for other universities across the globe. It is to be highlighted that the same elements and ways of working cannot be copy pasted to other universities one to one. Each university is unique, and it cannot be expected that the same approach would work in every country the same way as it has happened in the case of Aalto.

However, each university needs to evaluate first its own strengths and consider which of the elements are relevant for it and could be transferred and benchmarked.

Taking example from the best entrepreneurial university is the right tactic to follow, if another university would like to shift its focus from more traditional university approach towards being entrepreneurial. Aalto university has also benchmarked the best entrepreneurial universities in the world – Berkley, MIT and have applied their ideas and ways of working and modified the approach so that it could work in the Finnish environment.

5.3 Theoretical implications

Some elements of the theoretical framework are repetitive and appearing in the different pillars which complicated the analysis. The theoretical framework could be shortened and made clearer to enable universities to follow it more easily.

5.4 Limitations of the research

Due to the limited amount of time the researcher managed to complete only six interviews. Due to the time limitation the researcher had to conclude the study despite the willingness to continue researching the topic further. Ideally, there would be two to three respondents from each stakeholder group to allow the outcomes of the research to be more objective by representing bigger focus group. During the interviews the researcher received names of other important and valuable contributors to the entrepreneurial ecosystem at Aalto. The researcher was interested to reach out to these new contacts, but the time limitation did not allow further interviews.

Ideally, by having larger respondents' pool from each stakeholder group it could have allowed the researcher to prob the interview's questions and adjust them. The researcher had only one, maximum two respondents from each group and this did not allow any adjustments of the interview questions. If the researcher would have continued the study, some of the questions would have been re-phrased or changed.

Furthermore, the researcher aimed to be impartial and not control or impact the answers of the respondents in any way. However, during the interviews some topics were discussed more in-

depth than others and some questions were skipped due to time restrictions. None of these actions were done purposely and the researcher is aware that this could have impacted partly the outcomes and put more emphasis on certain areas and maybe neglected other areas.

Some elements of the OECD framework were not found during the research, meaning that the research did not manage to cover all possible aspects. Certain elements that were not found during the research process. These elements can be found in Appendix 3.

The researcher acknowledges that the limited number of interviews and the amount of time spent with each respondent did not allow all topics to be discussed in-depth. That could be very well the reason why some elements did not appear in the discussions.

5.5 Recommendation for future research

This research was done under tight time schedule. The researcher suggests further in-depth analysis of the researched case. If further research on this topic is considered, the researcher recommends extending the interviewed stakeholders and invite three, four representatives of each group. The broader scope of the interview would validate the outcomes of the research even further and would allow all essential elements form the OECD theoretical framework to be analysed further. Furthermore, the researcher suggests that the findings could be tested with quantitative approach. Multiple successful universities from Europe could be interviewed and there could be conclusions drown if the same factors contribute to the creation of an entrepreneurial universities in other countries. This could lead to the further validation of the OECD theoretical framework and even leading to the addition of new elements that are valid to the today's university development. The OECD framework was published in 2012 and it very well might be that 10 years later there are new elements relevant to the universities.

Certain issues which came out during this research could be investigated further. One very interesting observation was the impact of Covid on the development of the entrepreneurial strategy. Students, who have started their studies within the last two years and have spent most of their studies online are much more unaware of the entrepreneurial strategy of the university. According to these students, the online studies do not support the entrepreneurial agenda and its development. Furthermore, the online study method impacts the collaboration between students

from different faculties, students do not have the opportunity to meet up at campus and engage in active discussions. The informal discussions which happen during lectures, at campus, during lunch are an important element of creating a society which collaborates, shares, and works together. The researcher is as of the opinion that this implication should be analysed further. If the distant learning has such a negative impact over the development of the entrepreneurial strategy at Aalto University, the management should carefully reconsider how to integrate the entrepreneurial strategy of the university within the new ways of studying more and more remotely.

Some of the elements at Aalto University seem to be a bit unclear according to the researcher's viewpoint and as well in some of the secondary data. The entrepreneurial activities matrix at Aalto University is overly complex and there is certain duplication and repetition of the provided services. This could be a potential interesting further research topic and if the complex offering benefits or hampers the development of the entrepreneurial strategy.

In the current OECD framework the role of the students is not emphasised sufficiently. Students are considered as one of the players for the creation of a successful entrepreneurial university. From the researcher's point of view, the students are the main stakeholders, and their role is critical. Therefore, the researcher proposes the topic of students' perception of academic entrepreneurship for a further research topic.

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Appendices

Appendix 1. Questionnaires

- **Questions for management**

1. What is the role of entrepreneurship in Aalto's overall strategy?
2. What are the objectives of entrepreneurship orientation at Aalto University?
3. How often do you assess your entrepreneurial strategy and adjust it?
4. Which are the key performance indicators measuring the success of the university's entrepreneurial goals?
5. How the commitment toward entrepreneurship is visible across the organisation?
6. How do you communicate across the organisation your entrepreneurial agenda? Which channels do you use to spread the message?
7. What kind of entrepreneurship structure you have in place at Aalto which helps you to coordinate and monitor all entrepreneurial activities across the university?
8. In your opinion what is the impact of Aalto on the growth of the entrepreneurial ecosystem in the Helsinki Metropolitan area?
9. What organisational constraints you face in Aalto that challenge the implementation of the entrepreneurial agenda and how do you resolve them?
10. How do you finance the university's entrepreneurial activities?
11. Can you give an example of what kind of initiatives you have to bring together internal stakeholders and build synergies between them? What kind of cross institutional activities you have?
12. What kind of skill and knowledge is essential when you hire new staff?
13. How do you support academic entrepreneurship?
14. Do you have incentives and reward system for staff that is actively engaged in entrepreneurship and business creation activities?
15. Aalto is known for its continuous collaboration with various stakeholders, such as industry, society, and public sector? Can you give examples of such collaborations? How about internal collaboration to implement the entrepreneurial agenda?
16. Which has been the biggest reason behind Aalto's entrepreneurial success?
17. What kind of advice would you give to another educational institution which would like to follow your path? Which are the most important steps that traditional university needs to follow towards the change of becoming entrepreneurial university

18. Can you tell how the governance structure of your university is organized to support your entrepreneurial orientation?

- **Questions for university professors**

1. Can you please present yourself and tell me a bit more about your background and your role at Aalto?

2. Is there a position at Aalto such as Professor of Entrepreneurship? Is there senior staff responsible for entrepreneurship at faculty level?

3. Are these people involved in the future planning of the entrepreneurial strategy of the university?

4. How are entrepreneurial skills and knowledge being delivered to the students? Which methods are used to deliver entrepreneurial teaching across all departments?

5. How do you build entrepreneurial behaviour amongst the students?

6. How do you measure the entrepreneurial performance of your students?

7. How often do you update the entrepreneurial courses content?

8. How do you use collaboration with external stakeholders in university entrepreneurship education?

9. What is the role of internal collaboration in the development of entrepreneurial education?

10. How does the university promote a work culture that embraces change and entrepreneurial thinking? Please give examples of how it is noticeable in practices concretely?

11. Which has been the biggest reason behind Aalto's entrepreneurial success?

12. What kind of advice would you give to another educational institution which would like to follow your path? Which are the most important steps that traditional university needs to follow towards the change of becoming an entrepreneurial university

- **Questions for students**

1. Can you please present yourself? Name, department of studies, and year of studies?

2. How is the university raising awareness amongst students of the importance of developing entrepreneurial abilities?

3. How the university encourages students to become entrepreneurs or develop an entrepreneurial mindset?

4. How do you recognize entrepreneurial opportunities? Furthermore, how do you see the role of collaboration in undertaking entrepreneurial initiatives?

5. Does the university provide opportunities for students to experience entrepreneurship?

6. What kind of support do you get to move your entrepreneurial ideas into action?

7. How easy it is to find support to move your entrepreneurial idea into action?

8. Are there mentoring services available for students? If yes who provides such services: professors, alumni, graduate entrepreneurs?

9. How easy it is to find financial opportunities to realize your business ideas? What possibilities are provided by the university for funding?

10. Is there access to business incubators? If yes, how easy it is to get services?

11. Can you tell me about your experience with Aalto Venture Program?

12. What kind of career prospects do you see for yourself after graduating from Aalto?

- **Questions for AaltoES**

1. Can you please present yourself and tell me a bit more about your background and your role at Aalto ES?

2. Can you briefly describe what is Aalto ES?

3. Aalto ES is described to be one of the most important reasons for transforming Aalto into an entrepreneurial university. How did this happen? What was the driving force behind the Aalto ES establishment?

4. Can you describe how Aalto ES is coordinated? Who manages Aalto ES? How do you select the Aalto ES board?

5. Can you describe your relationship with the university management? How often do you communicate with the management and exchange ideas?

6. How are you financed? How big is your annual budget? Who monitors your financial activities?

7. How do you advertise yourself to students and attract them to join Aalto ES? It seems from the discussions with the students that you are the first entry point for them when they have a business idea. How have you achieved this popularity?

8. Can you say that in a way you compete with the other entrepreneurial organisation within Aalto?

9. Do you have international partners?

10. What kind of support do you provide to students? Describe your portfolio?

11. Aalto is known for its continuous collaboration and knowledge exchange with industry, society, and the public sector? Can you give examples of such collaborations? How about internal collaboration to implement the entrepreneurial agenda?

12. Which has been the biggest reason behind Aalto's entrepreneurial success?

13. What kind of advice would you give to another educational institution which would like to follow your path? Which are the most important steps that traditional university needs to follow towards the change of becoming entrepreneurial university

- **Questions for Aalto Design Factory**

1. Can you please present yourself and tell me a bit more about your background and your role at Aalto?

2. How is the university raising awareness amongst researchers of the importance of developing entrepreneurial abilities?

3. How the university encourages researchers to become entrepreneurs or develop entrepreneurial mindset?

4. How do you recognize entrepreneurial opportunities? Furthermore, how do you see the role of collaboration in undertaking entrepreneurial initiatives?

5. Does the university provide opportunities to researchers to experience entrepreneurship?

6. How easy it is to find support to move your entrepreneurial idea into action?

7. Are there mentoring services available for researchers? If yes who provides such services: professors, alumni, graduate entrepreneurs?

8. How easy it is to find financial opportunities to realize your business ideas? What possibilities are provided by the university for funding?

9. Is there an access to business incubators? If yes, how easy it is to get services?

10. Can you tell me about your experience from Aalto Venture Program?

Appendix 2. Qualitative data analysis - coding excel

Research question:	How can we create a successful entrepreneurial university in the regional innovation ecosystem?	
Theoretical framework: OECD guiding framework for entrepreneurial universities		
Pillars	**Description**	Code
1. Leadership and Governance	Entrepreneurship is a major part of the university strategy.	1a
	There is commitment at a high level to implementing the entrepreneurial strategy.	1b
	The university has a model for coordinating and integrating entrepreneurial activities at all levels across the university	1c
	The faculties and units have autonomy to act	1d
	The university is a driving force for entrepreneurship development in the wider regional, social and community environment	1e
2. Organisational capacity	The university's entrepreneurial objectives are supported by a wide variety of funding sources/investment, including investment by external stakeho	2a
	The university has a sustainable financial strategy in place to support entrepreneurial development	2b
	There are mechanisms in place for bringing internal stakeholders together (staff and students) and building synergies between them.	2c
	The university is open to recruiting and engaging with individuals who have entrepreneurial attitudes, behaviours and experience	2d
	The university invests in staff development to support its entrepreneurial agenda	2e
	There are clear incentives and rewards for staff who actively support the university's entrepreneurial agenda	2f
	The university gives status and recognition to other stakeholders who contribute to the university's entrepreneurial agenda	2g
ntrepreneurship development in teaching and learn	The university is structured in such a way that it stimulates and supports the development of entrepreneurial mindsets and skills.	3a
	Staff take an entrepreneurial approach to teaching in all departments, promoting diversity and innovation in teaching and learning	3b
	Entrepreneurial behaviour is supported throughout the university experience; from creating awareness and stimulating ideas through to developme	3c
	The university validates entrepreneurship learning outcomes.	3d
	Collaborating and engaging with external stakeholders is a key component of teaching and learning development in an Entrepreneurial University	3e
	Research results are integrated into entrepreneurship education and training	3f
4. Pathways for entrepreneurs	The university raises awareness of the value/importance of developing entrepreneurial abilities amongst staff and students	4a
	The university actively encourages individuals to become entrepreneurial	4b
	The university provides opportunities to experience entrepreneurship	4c
	The university provides support for individuals and groups to move from entrepreneurial ideas to action	4d
	Mentoring by academic and industry personnel is available	4e
	The university facilitates access to private financing for its potential entrepreneurs	4f
	The university provides access to business incubation facilities	4g
5. University – business/external relationships for k	The university is committed to collaboration and knowledge exchange with industry, society and the public sector	5a
	The university demonstrates active involvement in partnerships and relationships with a wide range of stakeholders	5b
	The university has strong links with incubators, science parks and other external initiatives, creating opportunities for dynamic knowledge exchange	5c
	The university provides opportunities for staff and students to take part in entrepreneurial activities with business/the external environment.	5d
	The university specifically supports staff and student mobility between academia and the external environment.	5e
	The university links research, education and industry (wider community) activities together to affect the whole knowledge ecosystem.	5f
6. The Entrepreneurial University as an internationa	Internationalisation is a key part of the university's entrepreneurial strategy	6a
	The university explicitly supports the international mobility of its staff and students (including PhD students)	6b
	The university seeks and attracts international and entrepreneurial staff (including teaching, research and PhDs)	6c
	The university demonstrates internationalisation in its approach to teaching	6d
	The university, its departments and faculties actively participate in international networks	6e

	Code	Text from data sheet	Location of text (Na	Analysis/comme
3	3c	There are also courses for start-ups	Interview 1, page 1	Kalle is a young student, who does not have so much previous experience and o
3	3e	Also, we have had some entrepreneurs coming	Interview 1, page 1	Different ways of teaching seems to be very efficient in teaching method and ve
3	3e	We've had a guest lecturer on a few courses a	Interview 1, page 1	Different ways of teaching seems to be very efficient in teaching method and ve
2	2c	there is a minor course during the summertime	Intreview 1, page 2	
5	5d	I think there was something that they have co	Interview 1, page 3	
3	3a	We have visits from entrepreneurs	Interview 2, page 5	Indirect impact on developing entreprenurial mindset
3	3c	The remote studies do not support collaboratio	Interview 2, page 5	Negative impact of covid
3	3c	Aalto ES and the Aalto Venture program could	Interview 2, page 5	Negative impact of covid
3	3c	Aalto ES would be the preferred place to reach	Interview 2, page 5	Reaching out to Aalto ES due to the fact that is led by students and students feel
5	5a	Aalto ES has promoted some collaborative proje	Interview 2, page 5	Importance of collaboration
2	2c	before even Aalto University was formed, we n	Interview 3, page 7	Prototyping the future university
2	2c	we try to bring together basically, three stakeh	Interview 3, page 7	Collaboration, highly important for the success
2	2c	product development as, as a sort of, as a fiel	Interview 3, page 7	Collaboration, highly important for the success
6	6e	There are 40 design factories now around the v	Interview 3, page 8	Design Factories spreading around the world
1	1d	Because we are a project there's a very low hie	Interview 3, page 8	Importance of freedom and low autonomy
1	1d	you need to give freedom to people so they ca	Interview 3, page 10	Importance of freedom and low autonomy
1	1d	But I think as a whole at Aalto, the narrative, t	Interview 3, page 10	Fail when trying to do new things without being judged
1	1d	Aalto the mentality is more like alright, you cou	Interview 3, page 10	Fail when trying to do new things without being judged
1	1a	entrepreneurship is cross-cutting team among	Interview 4, page 12	Entrepreneurship is embedded in all Aalto's doings and activities
1	1a	we have education and research and entrepren	Interview 4, page 12	Entrepreneurship is a major part of the university strategy.
1	1a	As a cross-cutting team, we have entrepreneu	Interview 4, page 12	Entrepreneurship is a major part of the university strategy.
1	1c	the idea there is that basically in all our educat	Interview 4, page 12	Everyone can have a taste of entrepreneurship
1	1a	We try to get an entrepreneurial taste to the s	Interview 4, page 12	Aalto has entrepreneurial vision
1	1b	So, entrepreneurship should be visible at all our	Interview 4, page 13	High level of commitment

Appendix 3. Qualitative data analysis – areas not found during the research process

Description	Code
The university invests in staff development to support its entrepreneurial agenda	2e
There are clear incentives and rewards for staff who actively support the university's entrepreneurial agenda	2f
The university gives status and recognition to other stakeholders who contribute to the university's entrepreneurial agenda	2g
Research results are integrated into entrepreneurship education and training	3f
The university facilitates access to private financing for its potential entrepreneurs	4f
The university explicitly supports the international mobility of its staff and students (including PhD students)	6b
The university seeks and attracts international and entrepreneurial staff (including teaching, research and PhDs)	6c
The university demonstrates internationalisation in its approach to teaching	6d